Lepidoptera of North America 6

Butterflies of Oregon
Their Taxonomy, Distribution, and Biology

by

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Front cover: Extremes in variation seen among females of the *Eriogonum marifolium*-feeding segregate of the *Euphilotes battoides* complex, ventral view. Specimens from Deschutes Co., vic. north base of Mt. Batchelor, ca. 6400', 17 July 2002, 5 July 2003, Andrew D. Warren

Back cover: Extremes in variation seen among females of *Euphilotes glaucon* (Mt. Hood segregate), ventral view. Specimens from Clackamas / Hood River Co., Mt. Hood, above Timberline Lodge, ca. 6000', 20 July 2003, Andrew D. Warren

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INTRODUCTION

The purpose of this document is to provide an update on the taxonomy, distribution and biology of Oregon's 171 naturally occurring butterfly species. A preliminary attempt has been made to identify patterns of geographic and ecological variation displayed by each of Oregon's species. The distribution of each butterfly species is recorded at the county level. Available life history information for each species is summarized, and foodplant records for Oregon's butterfly species are reviewed. I have attempted to trace information related to Oregon's butterflies to its original source, and all documents consulted during literature searches have been cited. Additionally, a considerable amount of new taxonomic, distributional and ecological information is presented herein, based on extensive fieldwork I have conducted throughout the state between April 1999 and March 2005, together with study in various public and private collections.

This document is not a field guide to the identification of Oregon's butterfly species. Nor is this document meant to serve as a single, stand-alone reference on the butterflies of Oregon. Rather, this document is intended to serve as a companion to other works on, or related to, Oregon's butterflies. Specifically, this volume is meant to be a companion to the following western butterfly books. These, along with hundreds of papers published in technical journals (see References), have laid the basic foundation upon which this document is based: Pyle (1974, 1981, 1984a, 2002), Neill & Hepburn (1976), Dornfeld (1980), Christensen (1981), Ferris & Brown (1981), Garth & Tilden (1986), Tilden & Smith (1986), Stanford & Opler (1993), Hinchliff (1994), Emmel (1998), Opler (1999) and Neill (2001). Readers without all of these references should at least consult, if possible, Ernst Dornfeld's (1980), *The Butterflies of Oregon*, Tom Emmel's (1998) *Systematics of Western North American Butterflies*, Crispin Guppy & Jon Shepard's (2001) *Butterflies of British Columbia*, Bob Pyle's (2002) *The Butterflies of Cascadia*, and most importantly, John Hinchliff's (1994) *An Atlas of Oregon Butterflies*. Taxonomic changes proposed in Emmel (1998) are herein discussed and evaluated for all cases that potentially apply to Oregon.

In many ways, this document remains very incomplete. A tremendous amount of field and laboratory research remains to be done before a thorough knowledge of the taxonomy, distribution and biology of Oregon's butterfly species can be attained. This is but an initial attempt to synthesize the available information on Oregon's butterflies, identify areas where further research is necessary, and stimulate interest in filling gaps in our knowledge. Hopefully, within just a few years, most information presented herein will be outdated. The structure of this document has very much been dictated by time constraints. I sincerely wish it would have been possible to fully illustrate this volume, together with distribution maps for each species, but constraints on time cannot allow for that at present. Perhaps, in the future, all populations mentioned herein can be mapped and figured in a separate volume. I apologize upfront for the lack of photos and distribution maps, as well as illustrations of genitalia. As a substitute, I have tried to reference sources where such may be obtained. I also apologize for all errors in this document, and accept full responsibility for them.

METHODS AND PROCEDURES

FIELDWORK

Between April 1999 and March 2005, I spent about 240 days studying butterflies at various localities in 33 of Oregon's 36 counties. Some of these trips were purely exploratory, but many were conducted in order to study particular species. At each locality, effort was made to sample at least a few individuals of each butterfly species encountered, and long series of certain taxa have been obtained for morphological and genetic studies. In addition, larval foodplant vouchers were collected for many species. Information on sampling and how to curate and store voucher specimens is not repeated herein, since many references on butterflies published before about 1995 include this information (e.g., Dornfeld 1980: 31-36). In particular, those interested in information on collection and curation techniques should consult Winter (2000).

The *Oregon Atlas & Gazetteer* (DeLorme 2001) proved to be very useful during exploratory fieldwork. However, not all roads indicated in that volume are open to the public. Additionally, some localities in the Columbia River Gorge discussed by Jolley (1988) proved to be excellent sites for butterflies. The herbarium at Oregon State University was frequently consulted in order to determine sites where larval foodplants of certain butterfly species occur. More often than not, once relocated, those sites hosted populations of the butterflies being sought. This methodology was particularly successful in locating populations of lycaenids, including *Callophrys*, *Euphilotes* and *Plebejus*.

A detailed discussion of the various physiographic regions in Oregon was provided by Dornfeld (1980: 5-16), who summarized the butterfly species that occur in each area. No attempt is made herein to duplicate his efforts. Two butterfly taxa in Oregon are protected by the Endangered Species Act, and cannot be sampled without special permits. These are *Plebejus icarioides fenderi* and *Speyeria zerene hippolyta*. Neither of these taxa were personally studied during field research through 2004.

REVIEW OF COLLECTIONS

Dornfeld (1980: 1-2) provided a good historical summary of the study of butterflies in Oregon and western North America (also see Garth & Tilden 1986: 41-49), with information on early collectors and collections. Between 1999 and 2004, I studied parts of various private and institutional butterfly collections, with a special focus on species from Oregon. Institutional collections consulted include those at the Oregon State Arthropod Collection (Oregon State University, Corvallis), the Burke Museum (University of Washington, Seattle) and the McGuire Center for Lepidoptera Research (Gainesville, Florida; including Nevadan material from the George Austin collection). Unfortunately, institutional collections in California were not examined, although they are likely to contain many specimens from Oregon. Private collections consulted, in part, include those of Vern Covlin, Steve Kohler, David McCorkle, Harold Rice, Dana Ross, Erik Runquist, Donald and Paul Severns, Ray Stanford, Terry Stoddard and John Vernon.

Statements made in the text about adult butterfly phenotypes are generated from side-by-side visual comparison of pinned specimens. All references to "average" phenotypes herein are anecdotal, and were not derived from any statistical procedures. For some taxa, genitalic examination proved necessary for identification, especially for species of *Erynnis*, *Pyrgus* (*communis*), *Cupido*, *Euphilotes* (see p. 171 herein), *Plebejus* and *Euphydryas*. However, to date I have performed only a limited number of genitalic dissections on butterfly species from Oregon, only enough to ensure accurate species-level determinations. A great deal of laboratory work remains to be conducted on samples obtained between 1999 and 2004.

A few comments on potentially mislabeled museum specimens are needed. Occasionally, specimens may be accidentally mislabeled at some point during the curation process. A few specimens (discussed in the text) found in the Oregon State Arthropod Collection are apparently mislabeled. Most of these are from the Elmer Griepentrog collection, although a few are from the Vick McHenry collection. It is unknown how these apparent mix-ups happened, but they certainly were unintentional. Mention in the text of potentially mislabeled specimens is made in order to clarify distributional patterns of various species, and should in no way be interpreted as criticism of those researchers.

John Hinchliff kept notebooks of data pertaining to butterfly species known from each county in Oregon. These notebooks were used to produce Hinchliff's (1994) *An Atlas of Oregon Butterflies*, as well as records plotted from Oregon by Guppy & Shepard (2001). Copies of these notebooks are deposited in the Oregon State Arthropod Collection. These notebooks were carefully searched for butterfly records from Oregon, and data from before 1999 cited in the text, unless stated otherwise, was usually taken from those notebooks. Some specimens mentioned in Hinchliff's notebooks as being housed in the Oregon State Arthropod Collection could not be found there during searches between 2000 and 2004.

REVIEW OF LITERATURE

During the compilation of this document, many literature sources were consulted (see References). Most of these references are cited in the text. Additional references consulted include Boisduval (1852, 1868-1869), Cunningham (1895b), Leighton (1946, 1972), Dornfeld & Hinchliff (1971), Shields (1972), Field et al. (1974), Vane-Wright & Ackery (1984), Bridges (1985), Grimble et al. (1992), Shepard (1995-2004) [some of these are cited in the text], Austin (1998c), Acorn & Sheldon (2001), Warren (2001), Anderson (2003), Boggs et al. (2003) and Calhoun (2004). For additional life history information, Tietz (1972a,b) and Robinson et al. (2002) were briefly consulted, but were not extensively searched.

Most references to original descriptions have not been included, since this information is available elsewhere, and will be presented in Jon Pelham's upcoming catalog of North American butterflies. Literature citations herein should not be confused with references to authorship of butterfly taxa. Literature citations do not have a comma separating the date and the author's name, although when multiple sources by the same author are simultaneously cited, commas appear between dates. References to the authorship and year of description of a taxon have a comma separating the author's name and the year of description, and may or may not be cited in the list of references.

Following Dornfeld's (1980) example, at the end of most species accounts, citations to literature related to that taxon are provided. These citations are usually preceded with "Also see." These references may or may not be related to subjects discussed in species accounts, and often refer to ecological or chemical studies. They are intended to direct interested readers to further information on each taxon.

It is stressed that the literature review conducted during the compilation of this document should in no way be considered "complete." Several hundred additional references could have been included, in addition to citations of all original descriptions. However, I have tried to cite the most important works related to each species, although have undoubtedly missed some. I apologize for any significant omissions.

RESULTS

LIST OF SPECIES

The list of species is presented in the form of an annotated checklist. Each species account begins with the scientific name, followed by the name of the author who described the taxon, and the year its description was published. The name of the author is included between parentheses if that taxon was originally described in a genus other than that in which it is herein placed. The year of description is placed between brackets if it is uncertain, or if it was determined from information not provided in the original publication. Geographic segregates discussed for each species are indicated below the species name, preceded by a black space for a check mark or brief notes. The approximate range of each segregate is included between parentheses after each of these spaces, followed by any applicable trinomial, along with its authorship. Following this, the distribution of each segregate is indicated, at the county-level, in alphabetic order, using abbreviations defined below. Counties listed below in **boldface** indicate counties where I have personally observed each taxon. Taxonomic and biological notes are then discussed for each species.

Nomenclature:

In the list presented below, family-, genus-, and species-level names generally follow Opler & Warren (2002), with very few exceptions. All cases that differ from Opler & Warren (2002) are explained and discussed. Information on authorship, dates of description, and type localities for each taxon were obtained from Opler & Warren (2002), or from Jon Pelham's (in preparation) catalog of North American butterflies. In most cases, details on complicated genus- or species-level nomenclatural issues are not discussed herein, whenever they have been recently discussed elsewhere. The order of species listed below also follows Opler & Warren (2002), with some exceptions. Only binomial Latinized names are used in reference to butterflies discussed herein, and the mandatory provisions of the *International Code of Zoological Nomenclature* (ICZN 1999) have been strictly followed, with one exception. The provision in the Code requiring agreement in the gender of species-group names (when they are not or do not end in a Latin or Latinized adjective or participle in the nominative singular; see ICZN 1999: 38, article 31.2.1) with that of the genus-group name (ICZN 1999: 38, article 31.2, p. 43, article 34.2) has not been followed. For a complete discussion of why the application of this provision is impractical and problematical, see Sommerer (2002) and Lamas (2004). In cases where the status of emended names is questionable (see ICZN 1999: 39-43, articles 32 and 33), the original orthography of names is used herein (but see Lamas 1999). No attempt to apply vernacular or "common" names to Oregon's butterfly species has been made, since unlike scientific names, there are no rules that govern the use or application of such names, and any author is free to create or use whatever common name they wish to apply to local butterfly populations.

For butterflies, the application of trinomials to describe geographic variation has been popular. While I am not personally in favor of naming every distinguishable population as a "subspecies," I do believe it is necessary to study and understand patterns of geographic variation displayed by each species at the finest level possible. Therefore, I have tried to be as detailed as possible in describing patterns of geographic variation seen in Oregon's butterflies, and identify areas where these patterns are poorly understood. When they can be applied in an unambiguous manner, I have retained the use of trinomials to represent geographic variants, in order to simplify comparison between, and provide continuity with, previously published sources on Oregon's butterflies. However, while some new taxonomic combinations are proposed herein, no new trinomials (or binomials) are formally proposed.

Botanical names (and their authors) cited herein follow Kartesz (1999), as well as more recent authors (e.g., Olmstead et al. 2001). Hitchcock & Cronquist (1973), Mason (1975), Mansfield (2000) and Gilkey & Dennis (2001) were frequently consulted to identify plant specimens, as was the herbarium at Oregon State University. Regrettably, I did not pay special attention to floral characters of *Lotus* species encountered during field studies. Some references herein to *Lotus crassifolius* (Benth.) Greene from Oregon may refer to *L. aboriginus* Jepson, a plant formerly known as *L. crassifolius* var. *subglaber* (Ottley) Hitchc. (e.g., Hitchcock & Cronquist 1973). Hopefully, future field researchers will sample blooming *Lotus* species when butterflies are found in association with them, so that their identities may be confirmed.

Mention of counties and mountain ranges in the text has not been presented in a standardized manner, and varies according to each species account, depending on the order in which geographic segregates are discussed. However, when mountain ranges in northeastern Oregon are named, they are usually listed from west to east. When a series of counties is listed, counties usually are not in alphabetical order, but are in geographic order, with adjacent counties being listed next to each other.

<u>Abbreviations and Definitions</u>:

Abbreviations used for Oregon's 36 counties. **Ba** = Baker, **Be** = Benton, **Clk** = Clackamas, **Cls** = Clatsop, **Col** = Columbia, **Cos** = Coos, **Cr** = Crook, **Cu** = Curry, **De** = Deschutes, **Do** = Douglas, **Gi** = Gilliam, **Gr** = Grant, **Ha** = Harney, **HR** = Hood River, **Ja** = Jackson, **Je** = Jefferson, **Jo** = Josephine, **Kl** = Klamath, **La** = Lane, **Li** = Lincoln, **Lin** = Linn, **Lk** = Lake, **Mal** = Malheur, **Mar** = Marion, **Mo** = Morrow, **Mu** = Multnomah, **Po** = Polk, **Sh** = Sherman, **Ti** = Tillamook, **Um** = Umatilla, **Un** = Union, **Wal** = Wallowa, **Wan** = Washington, **Was** = Wasco, **Wh** = Wheeler, **Ya** = Yamhill

assoc. = associated with
ca. = about / approximately; **Co.** = County
CSNM = Cascade-Siskiyou National Monument, Jackson County, Oregon
Dist. = District
E = east ; **etc.** = etcetera
hrs. = hours, in Pacific Standard Time; **Hwy.** = Highway
Jct. / jct. = junction
km. = kilometer(s)
m = meter(s) ; **mi.** = mile(s)
Mt. = Mountain; **Mts.** = Mountains
N = north
nr. = near
OSAC = Oregon State Arthropod Collection, Department of Zoology, Oregon State University, Corvallis, Oregon
p. = page; **pp.** = pages
pers. comm. = personal communication; **pers. obs.** = personal observation
pl. = plate; **pls.** = plates
Rd. / rd. = road
S = south; **sp.** = species; **ssp.** = subspecies
TL = Type Locality; **Twp.** = Township
var. = variety; **vic.** = vicinity
W = west

The term "**Siskiyous**" is used in a very general sense herein, and refers to both the Klamath and Siskiyou ranges in Josephine, Jackson, Curry and southern Coos counties, and related geological formations (see Dornfeld 1980: 5-7).

The site in the Warner Mountains, Lake County, known as "**Drake Peak**" (Dornfeld 1980: 12) is properly called Drake Peak Lookout on Light Peak. The actual Drake Peak is the next peak to the east (see DeLorme 2001).

Accidental records of two species, *Aglais io* (Linnaeus, 1758) [Eugene, Lane Co.] and *Pyrisitia proterpia* (Fabricius, 1775) [Stayton, Marion Co., 448', 12 August 1964], reported by Hinchliff (1994: 176), are not treated in the list below, since those records probably represent human-assisted introductions, and neither species is likely to be found in Oregon with any regularity. They have not been included in the total of 171 species for Oregon.

FUTURE RESEARCH

There are many remaining unanswered questions about the taxonomy, distribution and biology of Oregon's butterflies. As the text of the annotated species list will hopefully indicate, despite the number of field guides on western North American butterflies, very little is well understood about most of Oregon's species. The continued need for systematic collecting of butterflies in Oregon, and throughout the Pacific Northwest, combined with life history studies, cannot be overstated. Observers who do not wish to develop a collection of butterflies can further our knowledge through careful observations on adult behavior, larval foodplants and immature stages, and are encouraged to sample poorly known species and pass specimens on to active researchers.

Northwestern butterfly enthusiasts meet each fall, for the Pacific Northwest Lepidoptera Workshop. This gathering presents an excellent opportunity to exchange observations on northwestern butterflies, and taxonomists are always present, happy to accept or review specimens for study and identification. The location and date of this meeting varies from year to year, but it is usually in Corvallis, Oregon, in late October or early November. Details are posted ahead of time on the NorWestLeps listserv, see: http://groups.yahoo.com/group/NorWestLeps/. Everyone interested in northwestern butterflies is encouraged to join The Lepidopterists' Society, which publishes a newsletter and journal, an annual summary of new county records, and monographs on Lepidoptera. See: http://alpha.furman.edu/~snyder/snyder/lep/index1.htm.

POTENTIAL ADDITIONAL SPECIES

Continued field research in Oregon will undoubtedly document additional species of butterflies in the state, both residents and accidental strays. Some potential additional species are discussed in the text. Other species that should be watched for, in addition to those mentioned in the text, are discussed below.

Erynnis tristis tristis (Boisduval, 1852) (TL: San Francisco, San Francisco Co., California; see Emmel et al. 1998i: 20). This species could appear in southern Jackson County or Klamath County. It has been recorded as far north as Siskiyou County, California (Stanford 2002). Larval foodplants include various species of *Quercus* (Garth & Tilden 1986: 173, Tilden & Smith 1986: 259-260).

Erynnis funeralis (Scudder & Burgess, 1870) (TL: [Texas]). This species is known to be a powerful dispersalist (Stanford 1981: 79, Shull 1987: 41), and apparent stray individuals are known from Lassen and Modoc counties, California (Stanford & Opler 1993: 41). In Oregon, *E. funeralis* should be watched for in Jackson, Klamath and Lake counties. Larval foodplants include various species of legumes (Garth & Tilden 1986: 172, Tilden & Smith 1986: 258).

Erynnis afranius (Lintner, 1878) (TL: Colorado). Previous records of this species from Oregon (e.g., Hinchliff 1994: 8) are in error (see Pyle 2002: 54), and refer to *Erynnis* *persius* (see discussion herein, p. 26). However, *E. afranius* could possibly be found in extreme southeastern Malheur County. Larval foodplants include various legumes (Stanford 1981: 80, Scott 1992: 156-157).

Pyrgus albescens Plötz, 1884 (TL: Mexico). This species was recently shown to be distinct from *Pyrgus communis* (see Burns 2000; also see discussion herein, pp. 28-29). It can only be reliably separated from *P. communis* based on characters of the male genitalia. It is possible that this species may eventually turn up somewhere in Lake, Harney or Malheur counties. Larval foodplants are presumably similar to those of *P. communis* (see p. 30).

Thymelicus lineola (Ochsenheimer, 1808) (TL: [Germany]). This introduced Eurasian species (see Asou & Sekiguchi 2002) has spread across parts of western North America (e.g., Burns 1966, Shepard 1983, Belicek et al. 1989, Stanford 1991), and was recently found in northern Washington (Shepard 2003: 9). It seems that it is only a matter of time until *T. lineola* is found in Oregon (see Pyle 2002: 68-69). Larval foodplants include *Phleum pratense* (Stanford 1981: 135, Guppy & Shepard 2001: 103), and possibly other grasses (Opler & Krizek 1984: 225).

Hylephila phyleus (Drury, 1773) (TL: Antigua; see Evans 1955: 311). This species is frequently found in disturbed habitats in central and southern California, and is known from as far north as Siskiyou County, California (Stanford & Opler 1993: 67). It is known to be a powerful dispersalist (Shull 1987: 51, Pyle 2002: 70), and individuals could turn up anywhere in southwestern Oregon. Larval foodplants include various grasses (Stanford 1981: 135, Opler & Krizek 1984: 226), including *Cynodon dactylon* (Garth & Tilden 1986: 164).

Pseudocopaeodes eunus (W. H. Edwards, 1881) (TL: the bottoms of Kern River, nr. Bakersfield, [Kern Co.], California; see Morrison 1883: 43). This species could eventually be found in alkali flats in Lake County. It is known from Washoe and Pershing counties in Nevada, and from Lassen County, California (Stanford & Opler 1993: 68). Larval foodplants include *Distichlis spicata*, formerly known as *D. stricta* (MacNeill 1975: 492).

Polites mystic (W. H. Edwards, 1863) (TL: Hunter, Greene Co., New York; see Brown & Miller 1980: 51). Previous records of *P. mystic* from Oregon (e.g., Hinchliff 1994: 28) are in error, and refer to *Polites sonora* (see discussion herein, p. 52; also see Pyle 2002: 95). However, *P. mystic* may eventually be found in Wallowa County, since it is known from nearby parts of Idaho (Stanford & Opler 1993: 74). Larval foodplants include various species of grasses (see Guppy & Shepard 2001: 112).

Poanes melane melane (W. H. Edwards, 1869) (TL: San Francisco Bay area, California; see Brown & Miller 1980: 75). This species is known from as far north as Siskiyou County, California (Stanford & Opler 1993: 81), and may eventually be found in Jackson County or Klamath County. Larval foodplants include various species of grasses (Garth & Tilden 1986: 156).

Anthocharis cethura hadromarmorata J. Emmel, T. Emmel & Mattoon, 1998 (TL: 2.5 rd. mi. W of Jct. US Hwy. 50 and US Hwy. Alternate 95 on US Hwy. 50, S end of Swingle Bench, 4100', Churchill Co., Nevada). This taxon is known from Washoe and Humboldt counties in Nevada (Stanford & Opler 1993: 120), and may eventually be found in southern Lake, Harney or Malheur counties in Oregon. Search should be conducted wherever *Streptanthella longirostris* grows in abundance (*fide* John Emmel pers. comm. 2004).

Zerene cesonia (Stoll, 1790) (TL: [Georgia]). This species is a powerful dispersalist (Shull 1987: 128), and has been recorded as far north as Washoe and Pershing counties in Nevada (Stanford & Opler 1993: 126). It should be watched for in all southeastern counties in Oregon. Larval foodplants include various legumes (see Ferris 1981a: 166, Opler & Krizek 1984: 68, Tilden & Smith 1986: 138).

Eurema mexicana (Boisduval, 1836) (TL: [Mexico]). This species occasionally turns up in unusual places, as a rare stray (Heitzman & Heitzman 1987: 110, Shull 1987: 132). It has been recorded from Alpine and El Dorado counties in California, and from Eureka County, Nevada (Stanford & Opler 1993: 129). It could possibly appear anywhere in Oregon, especially in the southeastern counties. Larval foodplants include species of *Cassia* (Ferris 1981a: 174, Tilden & Smith 1986: 142).

Abaeis nicippe (Cramer, 1780) (TL: Arizona; see Mielke & Casagrande 1985: 328). This species is a powerful dispersalist (Heitzman & Heitzman 1987: 112), and has been recorded in Elko and Lander counties, Nevada (Stanford & Opler 1993: 131). It could possibly appear, as a rare stray, anywhere in southeastern Oregon. Larval foodplants include species of *Cassia* (Ferris 1981a: 171), and various other legumes (Opler & Krizek 1984: 78, Tilden & Smith 1986: 144).

Nathalis iole Boisduval, 1836 (TL: [Mexico]). This species is a powerful dispersalist (Heitzman & Heitzman 1987: 113, Pyle 2002: 166-167), strays of which have been found in the Sierra Nevada of California (Shapiro 1993c), Washoe and Humboldt counties, Nevada (Stanford & Opler 1993: 131), Ada County, Idaho (Stanford & Opler 1993: 131), and Asotin County, Washington (see Pyle 2002: 166-167). It is expected in southeastern Oregon, in the late summer or early fall. Larval foodplants include various species of Asteraceae (Ferris 1981a: 174, Opler & Krizek 1984: 80, Tilden & Smith 1986: 144).

Celastrina lucia (W. Kirby, 1837) (TL: possibly Cumberland House, Saskatchewan; see Klots 1951: 170). This species, or one closely related to it, is known from the eastern slope of the Cascades in Washington (e.g., Yakima Co., pers. obs.). It could occur in the northeastern Cascades of Oregon, in the Wallowas, or in the northern Blue Mountains. See discussions under *C. echo* (pp. 162-165), and Guppy & Shepard (2001: 227-228).

Euphilotes pallescens (Tilden & Downey, 1955)
A segregate of this species may eventually be found in southeastern Oregon (see p. 170 herein). *Euphilotes pallescens ricei* Austin, 1998 (TL: Sand Pass Rd., about 15 mi. NW of Winnemucca, just W of Sand Pass, Humboldt Co., Nevada; see Austin 1998a) occurs

not far south of the Oregon border in Humboldt County, Nevada. To date, its only known larval foodplant is *Eriogonum nummulare*, a plant that has not been reported from Oregon (Kartesz 1999). *Euphilotes pallescens mattonii* (Shields, 1975) (TL: ridge 4 air mi. W of Charleston Reservoir, 6600', SW of Jarbidge Mts., Elko Co., Nevada) is known from a few sites in Elko County, Nevada. This segregate, or one similar to it, could occur in southeastern Malheur County. According to Gordon Pratt (pers. comm. 2003), potential larval foodplants for *E. pallescens*, should it occur in Oregon, might include *Eriogonum baileyi* and/or *E. watsonii*.

Echinargus isola (Reakirt, [1867]) (TL: nr. Veracruz, [Veracruz], Mexico). This powerful dispersalist (Heitzman & Heitzman 1987: 139, Pyle 2002: 225) has been recorded in Washoe, Pershing and Elko counties, Nevada, and in Owyhee County, Idaho (Stanford & Opler 1993: 170). It is expected as a rare stray in southeastern Oregon, and should be sought late in the season. Larval foodplants include a variety of legumes (Fisher 1981b: 210, Tilden & Smith 1986: 190).

Oeneis chryxus chryxus (E. Doubleday, [1849]) (TL: Rock Lake, Alberta; see Shepard 1984: 40-41). This species, known from Adams County and Idaho County, Idaho (Stanford & Opler 1993: 254), may eventually be found in northeastern Wallowa County, Oregon. Larval foodplants include grasses (Guppy & Shepard 2001: 342-343, Pyle 2002: 361), and possibly sedges (Scott 1992: 21j-21L).

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This document is dedicated to Harold Rice of Eugene, Oregon. Thank you so much for all you have shared!

LIST OF SPECIES

<u>HESPERIIDAE</u>: (32 species)

<u>Pyrginae</u>: (13 species)

***Epargyreus clarus* (Cramer, 1775)**
_____(lower Columbia Basin, Snake River drainage, N Blues) nr. *clarus* <u>Recorded</u>: Ba (E), Mal (N), Sh (N), Um (N), Un, **Wal**, <u>Expected</u>: Gi (N), Gr?, Mo (N), Was (far NE), Wh?
_____(NE Cascades) <u>Recorded</u>: De (N), **HR**, **Je**, **Was** (W), <u>Expected</u>: Cr (far NW)
_____(W Cascades, N Coast Range, Siskiyous) *californicus* MacNeill, 1975 <u>Recorded</u>: **Be**, Clk, Cls, Col, Cu, Do, **HR**, **Ja**, **Jo**, Kl (S), **La**, **Li**, Lin, **Mar**, **Mu**, **Po**, Ti, Wan, Ya, <u>Expected</u>: Cos, Lk?

<u>Taxonomic notes</u>: Populations of *Epargyreus clarus* in northeastern Oregon have generally been called *Epargyreus clarus clarus* (e.g., Hinchliff 1994: 1, Guppy & Shepard 2001: 87). Adults from this area, however, more closely resemble those from other western populations (e.g., eastern Washington, Colorado) than they do *E. c. clarus*. These western populations differ from typical eastern North American *E. c. clarus* (TL: Dayton, [Rockingham Co.], Virginia; see Dixon 1955: 7) in being paler above and below, usually with a well-developed brassy sheen towards the bases of the wings above. In addition, adults of *E. clarus* from northeastern Oregon have narrower ventral hindwing silver bands, on average, than do those of *E. c. clarus*. Populations of *E. clarus* in northeastern Oregon are herein called *Epargyreus clarus* nr. *clarus*.

Adults of *E. clarus* in the northeastern Cascades of Oregon are highly variable, and are generally of an intermediate phenotype, between those of *E. c.* nr. *clarus* from northeastern Oregon and *E. c. californicus* (TL: China Flat, El Dorado Co., California; see Ferris 1989c: 5). Adults from the northeastern Cascades are highly variable in forewing and ventral hindwing maculation. Above, individuals may be dark or pale, and checkering of wing fringes varies from absent to well-developed. Forewing hyaline spots on individuals in these populations may be broad or narrow, and details of their position and coloration vary. Violet overscaling along the wing margins on the ventral wing surfaces may be well-developed or highly reduced. Despite this variability, adults in northeastern Cascadian populations average larger than those of *E. c. californicus*, and most are somewhat distinctive in overall appearance from other *E. clarus* adults, to the east and west. In the Columbia River Gorge, adults of *E. clarus* remain highly variable, and average phenotypically intermediate between western and northeastern Cascadian populations. A series of 44 individuals I sampled in Hood River County (nr. Dee, 4 June 2004) displayed a wide range of phenotypes, from typical *E. c. californicus* to those seen along the northeastern slope of the Cascades. However, series of *E. clarus* I have assembled from the western end of the Columbia River Gorge (Multnomah Co., ca. 2400') are phenotypically like *E. c. californicus*.

Populations of *E. clarus* west of the Cascadian crest represent *Epargyreus clarus californicus*. Adults are dark above, wing fringe checkering is absent or poorly developed, and violet overscaling along the wing margins below is reduced or absent. Throughout western Oregon, adults of *E. c. californicus* show considerable individual variation in the size and position of the forewing hyaline spot in cell 1A-CuA2. The position of this spot is not always reliable for separating *E. c. californicus* from other *E. clarus* segregates (*contra* Pyle 2002: 46).

<u>Biological notes</u>: While seldom abundant, *Epargyreus clarus* is widespread in western Oregon, at elevations from near sea level (Tillamook, Lincoln Co.) to over 6000' (Mt. Ashland, Jackson Co.). Populations of *E. clarus* in northeastern Oregon usually occur below 3500', in riparian habitats, or occasionally in residential gardens (Pendleton, Umatilla Co., 16 June 2000). Males are frequently found at mud, and both sexes visit a wide variety of flowers. In western Oregon, *E. clarus* apparently flies in a single extended brood from mid-May to late July, or perhaps, in a primary early brood and a small second brood. Populations of *E. clarus* east of the Cascades (e.g., mouth of Deschutes River, Sherman Co.; Imnaha, Wallowa Co.) may be regularly double-brooded, flying from late April to mid-June, and again in late July through early September. Throughout the state, most records of *E. clarus* are from late May to early July, but adults have been recorded as early as 27 April (1968, Spanish Hollow, Sherman Co., see Dornfeld 1980: 224-225), and into September at some sites (e.g., 1 September 2002, mouth of Deschutes River, Sherman Co., see Shepard 2003: 8).

In western Oregon, populations of *E. c. californicus* are most often associated with *Lotus crassifolius*, which is clearly the preferred larval foodplant. Populations of *E. clarus* occur in most areas where *L. crassifolius* is abundant. On 4 June 2004, I found *E. clarus* common among clear-cuts near Dee, Hood River County, where *L. crassifolius* was widespread. Male *E. clarus* perched on roadside *L. crassifolius* plants, flew between them, and occasionally paused to feed at nearby *Apocynum* or *L. crassifolius* flowers. Late in the day (as late as 18:30 hrs.) adults were found mostly at the flowers of *L. crassifolius*, where they were easily approached. While most western Cascadian populations of *E. clarus* are associated with *L. crassifolius* (also see Davenport 2004b: 4), primary foodplants for this species along the northeastern Cascades and in northeastern Oregon still need to be documented.

Stanford (1981: 68) and Scott (1992: 153) reported *Glycyrrhiza lepidota* as a larval foodplant for *E. clarus* in Colorado, McCabe & Post (1977: 47) reported use of this foodplant in North Dakota, and Bird et al. (1995: 80) reported the use of *G. lepidota* in Alberta. I suspect that populations of *E. clarus* in northeastern Oregon also use *G. lepidota*, possibly among other foodplants. Populations of *E. clarus* in the eastern United States (and *E. c. californicus* from Weaverville, Trinity Co. California; see Shapiro et al. 1981: 129), are frequently encountered in urban settings, and larvae are often found on various planted ornamental trees, including *Robinia* and *Gleditsia*, among others (e.g., Smith & Abbot 1797: pl. 19, W. H. Edwards 1884c: 28, Scudder 1898b: 1405, Field 1940: 220, Clark & Clark 1951: 147-148, Klots 1951: 206, Forbes 1960: 64, Harris 1972: 107, McCabe & Post 1977: 47, Opler & Krizek 1984: 200, Heitzman & Heitzman 1987:

18, Iftner et al. 1992: 28, Scott 1992: 153, Allen 1997: 184, Gochfeld & Burger 1997: 215, Nielsen 1999: 178).

Early stages of eastern North American *E. c. clarus* were illustrated and described by Smith & Abbot (1797: pl. 19) and Scudder (1898b: 1402-1404, 1889c: pls. 73, 76, 80, 82, 85, 86, 87; also see Klots 1951: pls. 5, 6), and were subsequently figured by various authors (e.g., Comstock & Comstock 1943: 293-294, pl. 43, Klots 1951: pl. 9, Wright 1993: 35, Bird et al. 1995: 81, Tveten & Tveten 1996: 209, Allen 1997: 325, 345, Wagner et al. 1997: 97, Nielsen 1999: 178). Scott (1992: 153-154) described the early stages of *E. clarus* from Colorado. Larvae of *E. c. californicus* were recently figured by Pyle (2002: 46) and Miller & Hammond (2003: 28). Also see Ehrlich (1960), Venables & Barrows (1986), Lind et al. (2001) and Jones et al. (2002).

***Thorybes pylades* (Scudder, 1870)**

_____(W Cascades, NE Cascades, Siskiyous, Warners, Ochocos) *indistinctus* Austin & J. Emmel, 1998 Recorded: Cr (N), De (NW), Do, **HR**, **Ja**, **Je**, **Jo**, Kl (S) La (E), **Lin** (E), **Lk** (S), Mar (E), **Was**, Expected: Clk (E), Cos (S), Cu, Mu (E), Wh (S)?
_____(Wallowas) Recorded: Ba, Expected: Gr?, Ha?, Mal (N), Un, Wal

Taxonomic notes: All populations of *Thorybes pylades* in western Oregon are tentatively called *Thorybes pylades indistinctus* (TL: Boiling Springs, Laguna Mts., San Diego Co., California; see Austin & Emmel 1998b: 501-502). Adults from the Siskiyous and western Cascades closely match typical *T. p. indistinctus*, although some northeastern Cascadian individuals (e.g., Wasco and Hood River counties) have larger forewing hyaline spots. A small population of *T. pylades*, apparently of the northeastern Cascadian phenotype, occurs at Big Summit Prairie, in the Ochoco Mountains of Crook County.

Specimens of *T. pylades* from the southern Wallowas of Baker County are rare in collections, and only one individual has been personally examined (Durkee 2656', 5 June 1940, OSAC; other records include: Durkee, 28 May 1940; North Pine Creek nr. Halfway, 2600', 20 June 1972; Rd. 6615, 8 mi. N of Halfway, 4000', 6 June 1985; nr. Summit Point lookout, 10 mi. NW of Halfway). Populations in this region are tentatively listed separately from *T. p. indistinctus* herein, because of the seemingly large distributional gap between them and Cascadian populations (Hinchliff 1994: 2), and the likely continuity of *T. pylades* populations near the Wallowas with populations in western Idaho (Stanford & Opler 1993: 17; note that Stanford 1981: 71 remarked on pale-fringed adults of *T. pylades* from Idaho). The relationship between nominate *Thorybes pylades pylades* (TL: probably Massachusetts) and *T. p. indistinctus* has not been clearly defined, and it is not entirely clear which of these trinomials, if either, could be applied to populations in the northeastern Cascades and/or Wallowas. Further study of specimens from these regions is needed to determine if *T. p. pylades* is an appropriate trinomial for them, as implied by Guppy & Shepard (2001: 89). Phenotypic variation among populations of *T. pylades* is not great, and a careful review of populations throughout the species' range is needed before confidence can be placed in the use of trinomials to describe variation. Also see Lanktree (1968) and Duffy & Garland (1978: 114-117).

Biological notes: While widely distributed in western Oregon, *Thorybes pylades* is common only in oak woodlands in two widely separated areas, the Siskiyous and northeastern Cascades. Records from the western Cascades in Marion, Linn, Lane and Douglas counties are based on singleton individuals. Males of *T. pylades* are frequently found at mud, where they must be carefully separated from the usually far more numerous males of *Erynnis propertius*. Males and females of *T. pylades* in Oregon visit flowers, and are especially fond of *Apocynum*. No details on the biology of *T. pylades* populations near the Wallowa Mountains are available. Once their life history details are known, and additional exploration is conducted, *T. pylades* may eventually be found throughout more of central Oregon than is previously known, perhaps in Grant, Wheeler or Harney counties. Adults of *T. pylades* fly in a single protracted brood in Oregon, from late April to mid-July, and records extend from about 50' (shore of Columbia River nr. Hood River) to over 5000' (Warner Mts., Lake Co.).

In Oregon, *Thorybes pylades* is usually found in close association with *Lotus crassifolius* (many sites in Hood River Co., especially nr. Dee; also in Colusa Co., California, see Scott 1992: 154) and *Lotus nevadensis* var. *douglasii* (best seen at Satus Pass, Klickitat Co., Washington; see Newcomer 1964a: 226, reported as *Hosackia decumbens*). Shapiro et al. (1981: 128) reported *T. pylades* in association with *Lathyrus jepsonii* ssp. *californicus* in the Trinities of northern California, and Scott (1992: 154) witnessed ovipositions of *T. pylades* on *Lathyrus lanszwertii* var. *leucanthus* in Colorado. Comstock & Dammers (1933a: 110-113) described the early stages of *T. pylades indistinctus* (as *T. mexicana*) from California, reared from eggs oviposited on *Amorpha californica,* and illustrated the egg, full-grown larva and pupa (also see Emmel & Emmel 1973: 92). Immature stages of eastern North American *T. p. pylades* were described and illustrated by Scudder (1889b: 1438-1439, 1889c: pls. 66, 69, 73, 76, 80, 85, 86; also see Klots 1951: pl. 5), and have more recently been figured by Allen (1997: 327). Also see Lyman (1895) and Heitzman (1964).

***Thorybes diversus* Bell, 1927**

_____(SW Siskiyous) Recorded: **Cu** (S), **Jo** (S), Expected: Ja (SW)

Taxonomic notes: Adults of *Thorybes diversus* from Oregon are slightly darker on the ventral surface than those of typical *T. diversus* (TL: Plumas Co., California; see Bell 1927; topotypical specimens examined). Records of *T. diversus* from Klamath (Klamath River Canyon) and Lake (Warner Mts.) counties (see Hinchliff 1994: 3) are based on specimens sampled by John Hinchliff, and deposited in OSAC. Personal examination of these specimens has confirmed that they are all *Thorybes pylades*. To date, *T. diversus* remains unknown in Oregon east of central Josephine County.

Biological notes: All valid records of *Thorybes diversus* from Oregon are from Curry County (Dornfeld 1980: 119; 9 July 1925, near Brookings, 129') and western Josephine County (Pyle 2002: 49), where the species is apparently single brooded. On 25 June 2000, I sampled a single male of *T. diversus* near Eight Dollar Mountain, 1400', Josephine County, and on 26 June 2000, I found about a dozen individuals of *T. diversus* along the Wimer Rd. (NFD 4402), on both sides of the Curry – Josephine County line (ca. 2300'-2650', see Shepard 2001: 6). Here, males guarded areas around wet spots in the dirt road (from 11:00 to 15:00 hrs.), and repeatedly perched on the tops of prominent stones in the roadway, overlooking wet areas. These male *T. diversus* flew more rapidly than the co-occurring *Erynnis propertius*, and were more wary than *E. propertius* when approached. At this site, one female *T. diversus* attempted to oviposit on a low, roadside *Trifolium* at about 15:45 hrs. A second female sought nectar from a roadside *Rhododendron* at about 17:15 hrs. *Thorybes diversus* was observed at the same site on 19 May 2001 by Dana Ross, and was subsequently found at Rough and Ready Creek (TNC preserve), Josephine County, by Erik Runquist.

MacNeill (1975: 550) described the egg and larva of *Thorybes diversus* from the central Sierra Nevada of California, and reported *Trifolium wormskioldii* as a larval foodplant there. Scott (1992: 154) subsequently reported *T. diversus* from Tuolumne County, California, in association with *Vicia americana*.

***Thorybes mexicana* (Herrich-Schäffer, 1869)**

_____(E-central Cascades) *aemilea* (Skinner, 1893) Recorded: **De** (W), Je (SW), Kl (N), La (far E), Lk (W), Expected: Do (far E), Ja (far NE), Lin (far E)?

Taxonomic notes: All populations of *Thorybes mexicana* in Oregon represent *Thorybes mexicana aemilea*. The type locality of *T. m. aemilea* was stated as "Fort Klamath, [Klamath Co.], Oregon" (Skinner 1893: 64), but type material almost certainly came from higher elevations to the north. As discussed by Shapiro et al. (1981: 128-129; also see Tilden & Smith 1986: 267 and Shapiro 1991a: 150), adults of *T. m. aemilea* are phenotypically distinctive, even though the taxon has often been considered a synonym of *Thorybes mexicana nevada* Scudder, [1871] (TL: Sierra Nevada Range, California) (e.g., Evans 1952: 131 [who did not examine specimens from Oregon], dos Passos 1964: 25, Miller & Brown 1981: 12). Individuals of *T. m. aemilea* average slightly larger in size, larger forewing hyaline spots, and a more two-toned dorsal hindwing coloration than those of *T. m. nevada*.

Biological notes: *Thorybes mexicana* occurs in widely separated populations in Oregon, but can be locally abundant. Adults are usually found in meadows above 5000' (up to about 6800' at Todd Lake, Deschutes Co.), but are known from 4400' in northern Klamath County (Gilchrist), and from as low as 3000' in Jefferson County (Camp Sherman, where they have not been seen in recent years). In Oregon, adults of *T. m. aemilea* fly in a single brood, from late May to mid-August, depending on seasonal conditions. First noted by Dornfeld (1980: 9, 119) to be common at Three Creeks Meadow in Deschutes County, *T. mexicana* remains abundant there. Males of *T. m. aemilea* watch over small open areas from ground-level perches, usually in dry meadows, from at least 12:00 to 16:30 hrs. Males of *T. m. aemilea* have not been seen on hilltops in Oregon, but males of *T. m. nevada* are frequently encountered on hilltops in the Sierra Nevada of California (Shields 1968: 85, Shapiro 1977d: 451) and in Colorado (Stanford 1981: 72, pers obs.).

Despite the abundance of adults of *T. mexicana* in some populations in Oregon, details on the species' life history in Oregon and elsewhere remain unknown. The population at Three Creeks Meadow is associated with a short *Trifolium* species growing on well-drained soils (pers. obs. 2002). Lembert (1894: 46) reported a *Trifolium* species as a larval foodplant of *T. m. nevada* in the Sierra Nevada of California, and Emmel & Emmel (1974: 347) reported *Trifolium* as a foodplant of *T. m. nevada* at Donner Pass, Placer County, California. Shapiro et al. (1981: 129) found *T. m. aemilea* in association with an undetermined *Trifolium* species in Trinity County, California. Garth and Tilden (1986: 175) reported *Trifolium monanthum* as a larval foodplant of *T. m. nevada*, presumably in California. Shields et al. (1970: 33) reported an oviposition by *T. m. nevada* in Colorado on *Lathyrus lanszwertii* var. *leucanthus,* and Scott (1992: 154) recorded ovipositions of *T. m. nevada* on *Trifolium longipes* ssp. *pygmaeum* (as *T. rusbyi*) and *Vicia americana* in Rio Arriba County, New Mexico.

***Erynnis icelus* (Scudder & Burgess, 1870)**

_____(Cascades, N Coast Range, Siskiyous, Blues, Wallowas) Recorded: **Ba**, Be, Clk, Cls, **Do**, Gr, Ha (N), **HR**, **Ja**, **Je** (W), **Jo**, **Kl** (W), **La**, **Lin**, Mar, **Mo**, Ti, **Um**, **Un**, **Wal**, Wan, **Was**, Expected: Col, Cos, Cr, Cu, De (NW), Li, Lk, Mal (N), Mu, Po, Wh (NE), Ya

Taxonomic notes: No variation has been noticed among populations of *Erynnis icelus* (TL: New England) in Oregon, and no geographic variation has been formally described from elsewhere.

Biological notes: *Erynnis icelus* is locally uncommon in Oregon, but is widely distributed. Males of *E. icelus* visit mud, and watch over open areas from perches on dead branches, often along roadsides, from at least 11:45 to 17:00 hrs. (e.g., Klamath River Canyon, Klamath Co., 25 April 2004; Mill Creek Canyon, Wasco Co., 14 May 2004). Females of *E. icelus* are usually found around larval foodplants or at flowers. Where *E. icelus* is found in Oregon, it often flies with *E. persius* and/or *E. propertius*, both of which generally tend to be more numerous than does *E. icelus*. Adults fly in a single annual brood from late April through late July, depending on location and seasonal conditions. Records of *E. icelus* in Oregon extend from near sea level (Tillamook, Tillamook Co.) to over 7000' (Anthony Lake, Baker Co.). The long labial palpae and lack of forewing hyaline spots on *E. icelus* are useful characters for identification when wings are worn.

In Oregon, I have found *E. icelus* in close association with various *Salix* species, the presumed larval foodplants, at many sites throughout the state. However, in addition to *Salix*, species of *Populus* or possibly *Betula* may serve as larval foodplants for *E. icelus* in Oregon, as elsewhere (Shapiro 1966: 51). I found *E. icelus* in close association with *Populus tremuloides* in Blaine County, Idaho (27 May 2000), where males were found flying between small trees within a large grove of *P. tremuloides*, as late as 19:00 hrs. Stanford (1981: 73) noted that *P. tremuloides* is the primary larval foodplant for *E. icelus* throughout the Rocky Mountain region, and Scott (1992: 154) noted ovipositions on *P. tremuloides* in New Mexico and Colorado. Guppy & Shepard (2001: 90) reported

Salix as a larval foodplant in British Columbia, and McCabe (1991: 4) reported *Salix bebbiana* as a larval foodplant of *E. icelus* in New York. William H. Edwards (1885c) and Scudder (1889b: 1509-1510, 1889c: pls. 77, 85) described and illustrated the immature stages of *E. icelus*. More recently, Emmel et al. (1992: 35) figured late-instar larvae of *E. icelus* on *P. tremuloides* from Colorado, and Allen (1997: 327) figured a late-instar larva feeding on *Salix* in West Virginia. Also see Maeki & Remington (1960b: 38).

***Erynnis propertius* (Scudder & Burgess, 1870)**
_____(Siskiyous, Cascades, N interior Coast Range, Willamette Valley) Recorded: **Be**, **Clk**, Cos, **Cu**, De (W), **Do**, **HR**, **Ja**, **Je** (W), **Jo**, **Kl** (N & W), **La**, **Lin**, **Mar**, Mu, **Po**, Wan, **Was**, Ya, Expected: Col, Li (E), Ti (E)

Taxonomic notes: *Erynnis propertius* (TL: "California") ranges from extreme southern British Columbia to northern Baja California Norte, Mexico, and no geographic variation has been formally described. Likewise, no geographic variation has been detected among populations of *E. propertius* in Oregon.

Biological notes: In western Oregon, *Erynnis propertius* adults can be very common, and are found at most sites where *Quercus garryana* grows in abundance. At low elevations (e.g., Columbia River Gorge), *E. propertius* adults appear in late March, and fly through mid-July, in a single extended brood. Males are frequently encountered at mud along roads and creek banks, and can occasionally be seen by the hundreds on wet rock faces along roadsides (e.g., Klamath River Canyon, Klamath Co., 25 April 2004). Male *E. propertius* watch over open areas from perches a meter or two above ground level, on the tips of branches or leaves, to await passing females. Males also perch on hilltops (e.g., Shields 1968: 85, pers. obs.), sometimes a considerable distance from larval foodplants (e.g., Hoodoo Butte, Linn Co., ca. 5500'). Female *E. propertius* are frequently seen flying around larval foodplants, and both sexes visit a wide variety of flowers.

Most populations of *E. propertius* in Oregon use *Quercus garryana* as a larval foodplant, although other *Quercus* species in southwestern Oregon, including *Q. kelloggii* and possibly *Q. chrysolepis* and/or *Q. vacciniifolia* may also be used. High-elevation populations (3500'-7200') of *E. propertius* are mostly associated with *Chrysolepis chrysophylla* (e.g., Mt. Washington lookout, Hwy. 20, Jefferson Co., 4100'; Odell Butte, 6500-7200', Klamath Co.), the apparent larval foodplant there, and adults at these sites fly until mid-August. Records of *E. propertius* from the east slope of the Cascades, south of Jefferson County (e.g., Deschutes River, 2900', Deschutes Co.; Gilchrist, 4500', Klamath Co.), are apparently based on stray individuals from higher-elevation populations associated with *C. chrysophylla*, since no species of *Quercus* or *Chrysolepis* occur nearby. Hardy (1958a) described the early stages of *E. propertius* from Vancouver Island. Subsequently, a pupa of *E. propertius* was illustrated by Dammers in Emmel & Emmel (1973: 91), and a late-instar larva was figured by Miller & Hammond (2003: 29).

***Erynnis pacuvius* (Lintner, 1878)**

_____(Siskiyous, Cascades, Warners, NE Blues, Wallowas) *lilius* (Dyar, 1904)

Recorded: Ba, De, **Do**, **HR**, **Ja**, **Je** (W), **Jo**, **Kl**, **La** (E), **Lin** (E), **Lk**, **Mar** (E), Um?, **Un**, **Wal**, **Was** (W), Expected: Clk (E), Cos (S), Cr, Cu, Gr, Ha (N), Mal (N), Mo (S), Mu (E), Um (for confirmation), Wh

Taxonomic notes: Adults of *Erynnis pacuvius* in Oregon represent *Erynnis pacuvius lilius* (TL: Kaslo, British Columbia). No geographic variation within the state has been detected. Separation of damaged specimens from the similar *E. persius* is best accomplished through examination of the genitalia; see Lindsey et al. (1931: 63), Ferris (1971: 73), Dornfeld (1980: 117), Scott (1986: 516) and Guppy & Shepard (2001: 90) for illustrations.

Biological notes: *Erynnis pacuvius* is infrequently encountered in Oregon. It was once considered rather rare in Oregon (e.g., Hinchliff 1994: 7), but is now known from most Cascadian and several northeastern counties. Adults of *E. pacuvius* fly in a single annual brood in Oregon, from early May to early August, depending on local and seasonal conditions. Records of *E. pacuvius* in Oregon extend from 100' (nr. The Dalles, Wasco Co.) to over 8200' (Light Peak, Warner Mts., Lake Co.). Males of *E. pacuvius* frequently perch on hilltops (e.g., Satus Pass, Klickitat Co., Washington; summit of Light Peak, Warner Mts., Lake Co.; summit of Onion Mt., Josephine Co.; Hobart Peak, CSNM, Jackson Co.; also see Shields 1968: 85), sometimes in the company of the superficially similar *Erynnis persius*. On hilltops, male *E. pacuvius* defend territories from perches on rocks or vegetation less than a meter above ground level. Males also perch on windswept ridgelines that are not well-defined hilltops (e.g., Hat Point Road, Wallowa Co., 29 June 2004), and on ridgelines among clear-cuts (SE of Hills Creek Reservoir, Lane Co., early July 2002). Freshly eclosed males of *E. pacuvius* are frequently found at mud along roadside ditches or riverbanks (e.g., Metolius River, Jefferson Co., late May 2002), and patrol among stands of *Ceanothus velutinus* in open pine woodlands (e.g., Camp Sherman, Jefferson Co., late May 2002). Females of *E. pacuvius* are usually encountered near *C. velutinus*, and both sexes visit flowers.

The single Crook County record for *E. pacuvius* is based on a female taken by Ernst Dornfeld (Viewpoint Rd. off Hwy. 26, ca. 4700', 1 July 1967, with a determination label by Dornfeld as *E. pacuvius*, in OSAC). Personal examination of this specimen has revealed that it is actually a female of *E. persius*. Additionally, I have sampled series of *E. persius* from the same locality in the Ochocos, without finding *E. pacuvius*. Therefore, Crook County has been deleted from the distribution of *E. pacuvius* until it can be verified through future fieldwork. I have not examined specimens of *E. pacuvius* reported from Umatilla County (S fork Walla Walla River, 27 May 1967; Langdon Lake, 1 July 1967) by Hinchliff (1994: 7). While these records may actually refer to *E. persius*, they are accepted for now, but the presence of *E. pacuvius* in Umatilla County requires verification. The apparent gap in the distribution of *E. pacuvius* across central Oregon (Crook, Grant and Wheeler counties) is perplexing, since *C. velutinus* (see below) is common in montane habitats across this region. It seems possible that, with further search, this species may eventually be found across this region.

While *Ceanothus velutinus* is clearly the primary larval foodplant of *E. pacuvius* in Oregon, populations are associated with *C. integerrimus* at some locations (e.g., lower Mill Creek Canyon, Wasco Co.), and *E. pacuvius* may utilize additional *Ceanothus* species in the Siskiyous. MacNeill (1975: 527) and Garth & Tilden (1986: 172) reported *C. cordulatus* as a larval foodplant of *E. p. lilius* in California. Eff (1955) reported *E. p. pacuvius* from eastern Colorado using *Ceanothus fendleri* as a larval foodplant, but adults of *E. p. lilius* from northwestern Colorado (e.g., near Hot Sulphur Springs, Grand Co.) are associated with *C. velutinus* (pers. obs.). To date, the immature stages of *E. pacuvius* have not been reported in detail, but the species was recently reared in Washington from egg to adult on *C. velutinus*, by David Nunalee.

Erynnis persius **(Scudder, 1863)**

_____(N Coast Range, Siskiyous, Cascades, Warners) <u>Recorded</u>: **Be**, **Clk**, Cls, Col, Cos, Cu, De, **Do**, **HR**, **Ja**, **Je** (W), **Jo**, Kl, **La**, **Li**, **Lin**, **Lk**, **Mar**, **Mu**, **Po**, Ti, Wan, **Was**, Ya
_____(Ochocos, Aldrichs, Blues, Wallowas) <u>Recorded</u>: **Ba**, **Cr**, **Gr**, Ha (N), Mal, **Mo** (S), **Um**, **Un**, **Wal**, **Wh**, <u>Expected</u>: Gi, Je (E), Sh

<u>Taxonomic notes</u>: To date, it has not been possible to identify consistent characters to delineate populations of *Erynnis persius* in Oregon, and trinomials cannot be reliably applied to describe patterns of geographic variation in the state. In general, populations of *E. persius* in western Oregon, including the Warner Mountains, tend to have smaller, darker, poorly marked adults, compared to those from northeastern Oregon. Throughout the mountains of northeastern Oregon, adults of *E. persius* average larger, paler and more boldly marked above than those from further west. Adults from the Ochoco Mountains are phenotypically variable. Smaller, darker adults fly together with larger, paler ones, and various intermediate forms.

Layberry et al. (1998: 42) considered all western Canadian populations of *E. persius* to be *Erynnis persius borealis* (Cary, 1907) (TL: mouth of N Nahanni River, [Dist. of Mackenzie, Northwest Territories]). Emmel et al. (1998a: 836) called Californian populations *Erynnis persius* nr. *frederecki* H. A. Freeman, 1943 (TL: nr. Lead, Spearfish Canyon, [Lawrence Co.], South Dakota). Application of the names *E. p.* nr. *frederecki* or *E. p. borealis* to populations of *E. persius* in Oregon, however, does not seem appropriate at this time. An extensive study of *E. persius* populations from throughout its geographic range should be conducted before trinomials are applied to Pacific Northwestern populations (Burns 1964: 191-193, also see Freeman 1943, Davenport 2004a: 3, 2004b: 6). While *Erynnis afranius* (Lintner, 1878) was reported from two sites in eastern Oregon by Hinchliff (1994: 8), subsequent studies at these localities (Ochoco Mts., vic. jct. Rd. 2600 & Rd. 600, ca. 8 mi E jct. Hwy. 26, Wheeler Co.; Blue Mts., N of Long Creek Summit, vic. Hwy. 395, Grant Co.) have shown that populations there are of *Erynnis persius* (pers. obs.). *Erynnis afranius* is not expected from anywhere in the mountains or valleys of northeastern Oregon, but could eventually be found in the extreme southeastern corner of the state, possibly in Malheur or Harney counties. The male "*E. persius*" figured by Crabtree (1998: 61) is apparently a male of *E. pacuvius*.

Biological notes: In Oregon, *Erynnis persius* is single brooded at most sites, flying from mid-April to mid-July. Various unusually late records (e.g., Soda Mt. Rd., CSNM, Jackson Co., 29 July 2003; 12 mi. W McMinnville, Yamhill Co., 30 July 1961; 4 mi. W Hoskins on Hoskins Rd., Benton Co., 8 August 2004; Gold Beach, Curry Co., 10 August 1925; Keene Creek, CSNM, Jackson Co., 19 August 2003) suggest a small second brood may fly at some sites (also see Burns 1964: 194). Shapiro et al. (1981: 128) noted a second brood of *E. persius* in the Trinities of northern California. Records for *E. persius* in Oregon extend from near sea level (Tillamook, Tillamook Co.) to over 9000' (Chief Joseph Mt., Wallowa Co.). Male *E. persius* visit mud, fly through forest clearings among stands of *Lupinus*, *Thermopsis*, or patches of *Lotus nevadensis* var. *douglasii*, and frequently perch on hilltops. Females of *E. persius* are usually encountered around larval foodplants, and both sexes visit a variety of flowers. *Erynnis persius* should eventually be found in all 36 counties.

In Oregon, *E. persius* is found in close association with various species of *Lupinus*, but also uses *Lotus nevadensis* var. *douglasii* (e.g., Rickreall Ridge, Polk Co.), *Thermopsis* (e.g., Fields Creek Canyon, Grant Co.) and probably *L. crassifolius* (e.g., nr. Dee, Hood River County) as larval foodplants. Populations of *E. persius* in western Oregon may also use *Lotus corniculatus* as a larval foodplant (Paul Severns pers. comm. 2004). Some populations of *E. persius* in Nevada have been reported to use *Lupinus* and *Aquilegia* (Fleishman et al. 1997: 16) as larval foodplants. Besides *Thermopsis* (Stanford 1981: 80), *Astragalus* species are widely used larval foodplants in Colorado (Scott 1992: 155-156), and perhaps also in Oregon. Detailed life history information for western populations of *E. persius* is lacking, although Scott (1992: 156) provided a brief description of the egg, first, and last-instar larva from Colorado, and Emmel et al. (1992: 35) figured a late-instar larva from Colorado, feeding on *Thermopsis divaricarpa*. Also see Maeki & Remington (1960b: 38).

***Pyrgus ruralis* (Boisduval, 1852)**

_____(N Coast Range, Siskiyous, Warners, E and W Cascades) *ruralis* Recorded: **Be**, **Clk**, Cls, Col, Cos, Cu, **De**, **Do**, **HR**, **Ja**, **Je** (W), **Jo**, **Kl**, **La**, **Li**, **Lin**, **Lk**, **Mar**, **Mu**, **Po**, Ti, Wan, **Was** (W), Ya

_____(Ochocos, Blues, Wallowas) nr. *ruralis* Recorded: **Ba**, Cr, **Gr**, **Mo** (S), Um, **Un**, **Wal**, **Wh**, Expected: Ha (N), Je (E), Mal (N)

Taxonomic notes: Populations of *Pyrgus ruralis* in western Oregon represent *Pyrgus ruralis ruralis* (TL: Hwy. 70 at Murphy Creek, 2.5 rd. mi. SW of Belden, North Fork Feather River Canyon, 1800', Plumas Co., California; see Emmel et al. 1998i: 20). Adults of *P. ruralis* from northeastern Oregon tend to be slightly smaller and darker above than those from western Oregon, with darker wing fringes. These somewhat resemble *Pyrgus ruralis ricara* (TL: vic. Empire, Clear Creek Co., Colorado; see Brown & Miller 1975: 626), but typical adults of *P. r. ricara* are smaller and even darker than those from northeastern Oregon, especially on the dorsal hindwing. Herein, populations of *P. ruralis* in northeastern Oregon are called *Pyrgus ruralis* nr. *ruralis*, until a more detailed study of *P. ruralis* populations throughout its range is conducted. Individuals from higher elevations in the Cascades (e.g., Echo Creek Basin, ca. 5000', Linn Co.) tend to be slightly smaller and darker than adults from lower elevations, and somewhat resemble the phenotype of *P. r.* nr. *ruralis*. Shapiro et al. (1981: 127) also noted a distinctive phenotype displayed by high-elevation *P. ruralis* in the Trinities of northern California.

<u>Biological notes</u>: Adults of *Pyrgus ruralis* fly in a single annual brood from late March to mid-August, depending on elevation and seasonal conditions. In northeastern Oregon, adults of *P. r.* nr. *ruralis* tend to be scarce, and are usually encountered in small numbers along creeks and rivers, or along gravel roads. Records of *P. r.* nr. *ruralis* are mostly from above 3500', and extend to over 9500' (Matterhorn Mt., Wallowa Co.). In western Oregon, *P. r. ruralis* may be abundant, and occurs from near sea level (Lincoln and Multnomah counties) to over 7000' (Mt. Ashland, Jackson Co.). Males of *P. ruralis* visit mud, and watch over gullies and depressions, usually from perches near ground level. Both sexes visit a wide variety of flowers.

In western Oregon (e.g., Fitton Green nr. Corvallis, Benton Co.; vic. Burnt Woods, Lincoln Co., pers. obs.; Mill Creek, Polk Co., David McCorkle), adults of *P. ruralis* are found in close association with *Fragaria*, a confirmed larval foodplant. Additional larval foodplants in Oregon potentially include *Geum macrophyllum* (Pyle: 57), *Potentilla* and/or *Argentina* (Erik Runquist pers. comm. 2004; also see Emmel & Emmel 1962: 35, Garth & Tilden 1986: 169), and possibly other members of the Rosaceae (see MacNeill 1975: 516). Other than a description of the egg (Coolidge 1909a), information on early stages of *P. ruralis* has not been reported for any population, although the species has been reared several times (e.g., Guppy & Shepard 2001: 96).

***Pyrgus communis* (Grote, 1872)**

_____(E of Cascades) *communis* <u>Recorded</u>: **Ba**, **Cr**, De (N & E), Gi, Gr, **Ha**, **Je**, Kl (S), **Lk**, **Mal**, **Mo**, **Sh**, Um, Un, **Wal**, **Was**, **Wh**, <u>Expected</u>: HR

_____(E-central Cascades) <u>Recorded</u>: **De** (SW), **Kl** (N), <u>Expected</u>: Lk (far NW)

_____(Siskiyous, N Coast Range, Willamette Valley, W Cascades) <u>Recorded</u>: **Be**, Cos, Cu, Do, **Ja**, Jo, **La**, Li, Lin, Mar, **Po**, Ti, Wan, Ya, <u>Expected</u>: Clk, Cls?, Col, Mu

<u>Taxonomic notes</u>: *Pyrgus communis* is a widespread North American species that shows little or no geographic variation throughout most of its range. Burns (2000) reviewed the relationship between *P. communis* and *P. albescens* Plötz, 1884, and treated the latter as a full species, one that is not currently known from Oregon. Other than *P. albescens*, geographic variation in *P. communis* has not been widely reported in the literature. There are, however, consistent patterns of geographic variation across populations of *P. communis* in Oregon. Adults from eastern Oregon, including the Warner Mountains (specimens from western Lake County have not been personally examined), are typical of *P. communis* from elsewhere in western North America (e.g., Idaho, Nevada, Wyoming, Colorado, Utah). These populations presumably represent typical *Pyrgus communis* (TL: central Alabama). Adults are bright above, and frequently

have a pale yellowish, tan or olive coloration to the ventral hindwing bands, especially at low elevations (ca. 400’, Boardman, Morrow Co.). Individuals of *P. communis* from higher elevations in eastern Oregon (ca. 4950’, Ochoco Mts., Wheeler Co.) are similarly bright above, but are usually somewhat darker below.

Populations of *P. communis* in the east-central Cascades and in western Oregon, west of the Cascadian crest, differ from those further to the east, in that males have reduced light maculation above, and appear quite dark in comparison. Adults from these populations of *P. communis* lack the colorful tones to the ventral hindwing that are seen on adults from further east, and ventral coloration is generally darker (e.g., Dornfeld 1980: 221, 7c,d). Adults of *P. communis* from east-central Cascadian populations (e.g., Gilchrist, Klamath Co., ca. 4400’) are small and very dark below. Shapiro et al. (1981: 127) made reference to “phenotypic oddities of high-altitude” Sierra Nevadan *P. communis*, although it is not currently known how populations in the Cascades of central Oregon may relate to those in the Sierra Nevada of California.

Adults of *P. communis* from the Siskiyous (e.g., Soda Mountain Road, CSNM, Jackson Co., ca. 5100’), low elevations in the western Cascades (southern Lane Co., ca. 2600’), and the Willamette Valley (e.g., Fitton Green, Benton Co., ca. 600’) tend to be larger than central Cascadian individuals, and not as dark below. These adults, however, are considerably darker above and lack the colorful tones to the ventral hindwing, compared to *P. c. communis* from eastern Oregon. Further study is needed of the various segregates of *P. communis* in Oregon. All *Pyrgus* from the southernmost counties should be routinely sampled and examined for the possible presence of *Pyrgus albescens*. Only through examination of the male valvae can *P. albescens* be definitively separated from *P. communis* (see Steinhauser 1971, Austin 1986b, Burns 2000, Austin & Warren 2001, Calhoun 2002).

<u>Biological notes</u>: In eastern Oregon, *Pyrgus communis* is very widespread, and occurs in a number of disturbed and undisturbed habitats, including roadsides and vacant lots (e.g., Burns, Harney Co.), low-elevation riparian habitats (vic. Imnaha, Wallowa Co.), and higher-elevation wet meadows (NFD 2630, Ochoco Mts., Wheeler Co., ca. 4950’). Most populations of *P. communis* in the Cascades and Siskiyous occur in wet or seasonally dry meadows, and populations in the Willamette Valley are most often found in open prairies and fields, or disturbed roadside habitats. In Oregon, adults of *P. communis* fly from early April to early October, depending on number of local broods and seasonal conditions. Populations of *P. communis* in eastern Oregon are at least bivoltine, with perhaps three or more broods at some sites (e.g., Imnaha, Wallowa Co.). Records in Oregon range from about 100’ (nr. The Dalles, Wasco Co.) to over 7200’ (Steens Mt., Harney Co.). Populations of *P. communis* in the Siskiyous and Willamette Valley are apparently double brooded, with adults from late April to late June, and late July to early October. These populations occur from near sea level (Cascade Head, Tillamook Co.) to about 3500’ in the Cascades, and up to 5200’ in the Siskiyous. Adults of *P. communis* are scarce in the Willamette Valley most years, but I recorded them every year in Benton County (vic. Fitton Green) from 1999 to 2004. Central Cascadian

populations of *P. communis* appear to be univoltine, flying from mid-June to late August, and most populations occur between 4400' and 4800'.

Specific details on immature stages or larval foodplants of *P. communis* populations in Oregon have not been previously reported. David McCorkle (pers. comm. 2004) found immatures of *P. communis* on *Malva parviflora* and *Alcea rosea* in the Monmouth area, Polk County, in the 1960's and 1970's. Paul Severns (pers comm. 2004) has found populations of *P. communis* in the Willamette Valley associated with *Sidalcea malviflora* ssp. *virgata*, *S. campestris* and *S. cusickii*. Erik Runquist (pers. comm. 2004) has found adults of *P. communis* in the CSNM, Jackson County, associated with an undetermined *Sidalcea*. In Washington, Jon Pelham (pers. comm. 2004) has recorded *Sidalcea oregana*, *Sphaeralcea munroana*, *Malvella leprosa*, *Malva neglecta* and *M. parviflora* as larval foodplants of *P. communis*. Emmel & Emmel (1962: 35) and Shapiro (1977d: 451) found immatures on *Sidalcea glaucensis* in Placer and Nevada Counties, California, respectively. Shapiro (1975a: 203) found larvae of *P. communis* on *Malva rotundifolia*, *M. nicaeensis* and *Malvella leprosa* (reported as *Sida hederacea*) in central California, and Shapiro et al. (1981: 127) found immatures on *Sidalcea oregana* ssp. *spicata* and *Malva neglecta* in the Trinities of northern California. Other larval foodplants for *P. communis* are known (e.g., Graves & Shapiro 2003: 426). Early stages of eastern North American *P. communis* were described and illustrated by Scudder (1889b: 1539-1540, 1889c: 77, 85, 88). A late-instar larva was figured by Tveten & Tveten (1996: 227), and a full-grown larva and pupa was figured by Allen (1997: 329, 345). Comstock (1927a: 207-208) described and illustrated the egg, late-instar larva and pupa of *P. albescens* from California (as *Urbanus tessellata occidentalis*). Dethier (1944b) described the early stages of *P. communis* from Solano County, California (as *U. tessellata occidentalis*), illustrated the first-instar larva, and reported *Sidalcea* as the local larval foodplant. The origin of the late-instar larva of *P. communis* figured by Miller & Hammond (2003: 30) was not stated. Also see T. Emmel & J. Emmel (1963) and Shapiro (1968a).

Heliopetes ericetorum **(Boisduval, 1852)**

_____(Columbia Basin, Snake River basin, SE deserts) <u>Recorded</u>: **Ba**, Cr, De, Gr, Je, Lk, Mal, Mo, Sh, Um, Un, Wh, <u>Expected</u>: Gi, Ha, Wal, Was

<u>Taxonomic notes</u>: No geographic variation has been described for *Heliopetes ericetorum* (TL: vic. Sawmill Peak at Griffin Gulch, rim of W Branch Feather River, 2 air mi. E of Magalia, Butte Co., California; see Emmel et al. 1998i: 20).

<u>Biological notes</u>: *Heliopetes ericetorum* is an uncommon species in Oregon. It is usually found in disturbed, low-elevation habitats along the John Day River, its tributaries, and other rivers flowing into the Columbia, including the Snake. In Baker County, *H. ericetorum* also occurs in the Burnt River drainage. It occasionally strays into forested areas (nr. Big Summit Prairie, Crook Co., Harold Rice; Catherine Creek, Union Co., Dan Thackaberry), or into the southeastern deserts (Blue Mt., Malheur Co., Vern Covlin). Males of *H. ericetorum* are usually found dashing up and down dry washes or in

open fields, and visit mud (Pyle 2002: 60). Adults apparently fly in two or three annual broods, and can be found from late May to early October. Records of *H. ericetorum* in Oregon range from about 100' (Rufus, Sherman Co.) to 6000' (Blue Mt., Malheur Co.).

Coolidge (1923a, also see Comstock 1927a: 209-210) described the life history of *H. ericetorum* from California in great detail, and listed species of *Malvastrum*, *Sphaeralcea*, *Malva* and *Alcea* as larval foodplants. Newcomer (*fide* Coolidge 1923a: 142, 1964c: 50, 1964a: 227) reared *H. ericetorum* from near Yakima, Washington, on *Iliamna rivularis*. Details of larval foodplant use of *H. ericetorum* in Oregon are lacking, but larvae have been reported to use *Malva sylvestris, M. parviflora*, *Malvella leprosa*, *Iliamna rivularis* var. *rivularis* and *Sphaeralcea munroana* in Washington by Jon Pelham (pers. comm. 2004). Additional larval foodplants have been reported from California (Garth & Tilden 1986: 168).

***Pholisora catullus* (Fabricius, 1793)**
_____(E of Cascades, basin habitats) <u>Recorded</u>: Ba, De (NE), Gi, Gr, Ha, HR, Je, Lk, Mal, Mo, Sh, Um, Un, **Wal**, **Was**, Wh, <u>Expected</u>: Cr, Kl

<u>Taxonomic notes</u>: No trinomials have been applied to populations of *Pholisora catullus* (TL: probably Georgia). No geographic variation has been seen across populations of *P. catullus* in Oregon.

<u>Biological notes</u>: *Pholisora catullus* is usually found in highly disturbed habitats in Oregon, at low elevations (usually below 4500') east of the Cascades. Adults apparently fly in two broods in Oregon, and can be found from late April to early September. Individuals of *P. catullus* are often seen around the edges of agricultural fields, especially near riparian habitats (vic. Imnaha, Wallowa Co.). Both sexes visit flowers.

The full-grown larva and pupa of *P, catullus* was illustrated by Smith & Abbot (1797: pl. 24). William H. Edwards (1885e) and Scudder (1889b: 1521-1522, 1889c: pls. 66, 69, 77, 80, 85; also see Klots 1951: pl. 6) subsequently described and illustrated the immature stages, which were later summarized by Comstock (1927a: 211). Comstock & Dammers (1935a: 141) provided additional details on *P. catullus* immatures, and provided an illustration of the egg. Dammers in Emmel & Emmel (1973: 85) illustrated a full-grown larva and pupa of *P. catullus* (also see Wright 1993: 37). Life history information from populations of *P. catullus* in Oregon is lacking, but Jon Pelham has recorded *Atriplex rosea*, *Chenopodium rubrum*, *C. fremontii* var. *fremontii*, *C. album*, and *Amaranthus retroflexus* as larval foodplants in Washington (Pyle 2002: 62). Newcomer (1964a: 227) reported ovipositions of *P. catullus* on *Malva rotundifolia*, also in Washington. Shapiro (1975a: 205) reported larvae of *P. catullus* feeding on *Amaranthus hybridus* in Central California, and other foodplants have been noted (see Shapiro 2002: 39, Graves & Shapiro 2003: 424-245). Also see Clark & Clark (1951: 153) and Shapiro (1968a).

***Hesperopsis libya* (Scudder, 1878)**
_____(SE deserts) <u>Recorded</u>: De (S), Ha, **Lk**, Mal, <u>Expected</u>: Ba?

<u>Taxonomic notes</u>: Populations of *Hesperopsis libya* in Oregon have previously been called *Hesperopsis libya lena* (W. H. Edwards, 1882) by Dornfeld (1980: 115) and Hinchliff (1994: 14). However, adults of *H. libya* from Oregon (including those from the Charles Sheldon Antelope Range, 4800', Humboldt Co., Nevada) are consistently larger than those of typical *H. l. lena* (TL: Montana; see Brown & Miller 1975: 645-646), and are larger than adults from any other known population of *H. libya*. These populations of *H. libya* also differ from *H. l. lena* in having decreased pale overscaling and sometimes having well-developed white spots on the hindwing below (in addition to the discal cell spot). Adults of *H. libya* from Oregon also have reduced white dorsal markings on males and females, compared to those of *H. l. lena*. The dorsal ground color of *H. l. lena* adults is grayer than that seen on adults from Oregon. A study of all western phenotypes of *H. libya* will be necessary before the geographic limits of the segregate in Oregon and northern Nevada, and its relationship to other segregates, can be known. For now, no trinomial is associated with populations of *H. libya* in Oregon.

<u>Biological notes</u>: In Oregon, *Hesperopsis libya* occurs in hot desert habitats, often along edges of lakes and alkaline flats, where its larval foodplant, *Atriplex canescens*, is common (see Newcomer 1964c: 50). Adults are usually found near *A. canescens* plants, and both sexes visit flowers, especially *Chrysothamnus*. In Oregon, adults of *H. libya* fly in a single annual brood, from early July to early August, and range from about 4200' (nr. Summer Lake, Lake Co.; Alvord Desert, Harney Co.) to at least 4400' (nr. Jordan Valley, Malheur Co.). An apparent stray individual of *H. libya* was taken south of Sunriver, Deschutes County, by Harold Rice, on *Chrysothamnus* flowers. A record of *H. libya* from Canyon County, Idaho (Stanford & Opler 1993: 47), suggests that a search should be conducted for this species along the Snake and Burnt rivers in Baker County.

Comstock & Dammers (1932d: 96-97) provided details on the early stages of *H. l. libya* from California, and illustrated an egg, late-instar larva, and pupa (also see Emmel & Emmel 1973: 85). Details on the immature stages of *H. libya* populations from Oregon have not been reported.

<u>Heteropterinae</u>: (1 species)

***Carterocephalus palaemon* (Pallas, 1771)**
_____(Siskiyous, N Coast Range, Cascades) nr. *skada* (W. H. Edwards, 1870) <u>Recorded</u>: **Be**, **Clk**, Cls, Cos, De (W), **Do**, HR, **Ja**, **Je** (W), **Kl** (N & W), **La**, **Lin**, **Mar**, **Mu**, Po, Wan, Ya, <u>Expected</u>: Col, Cu, Jo, Li (E), Ti (E), Was (W)
_____(Wallowas) <u>Recorded</u>: **Wal**, <u>Expected</u>: Ba (NE), Un (E)

Taxonomic notes: Comparative research on European, Asian, and North American populations considered conspecific with *Carterocephalus palaemon* (TL: [nr. Novodevitschia, Kuybyshevskaya oblast], Russia) is required before great confidence can be placed in use of the name *C. palaemon* for North American populations (also see Gorbunov 2001: 42). Contrary to statements made by Pyle (2002: 66) and Guppy & Shepard (2001: 101), no populations of *C. palaemon* in Oregon are referable to the recently described Californian taxon *Carterocephalus palaemon magnus* Mattoon & Tilden, 1998 (TL: Plantation, Sonoma Co., California; also see Tilden 1958a). Adults of *C. palaemon* from western Oregon are individually variable in ventral coloration, but are consistently smaller and darker than those of typical *C. p. magnus* (topotypes examined). This is also true of populations in the Trinity Alps of northwestern California, as noted by Shapiro et al. (1981: 126), where adults are similar to those in western Oregon. Adults of *C. palaemon* from the north Coast Range (e.g., Mary's Peak, Benton Co., ca. 3300') are phenotypically consistent with Cascadian adults in all ways. Apparently, no existing trinomial is appropriate for populations of *C. palaemon* in western Oregon. They are phenotypically closer to the western boreal *Carterocephalus palaemon skada* (TL: Kodiak, [Alaska]; see Brown & Miller 1977: 263-264) than they are to *C. p. magnus* (see Mattoon & Tilden, 1998), and are therefore called *Carterocephalus palaemon* nr. *skada* herein. Adults of *C. p.* nr. *skada* from western Oregon show minor variation in adult size. The largest individuals are from lower elevations (e.g., nr. base of Larch Mountain Rd., Multnomah Co., ca. 900'), while adults at Gilchrist, Klamath County, ca. 4450', are noticeably smaller and paler than those from other Cascadian populations.

Adults of *C. palaemon* from Wallowa County are similar to those from the eastern Rocky Mountains (e.g., Wyoming, Alberta) in having larger, paler spots on the hindwing below, compared to those from western Oregon. However, adults from Wallowa County average somewhat smaller than those from further east. Nevertheless, adults from Wallowa County are generally larger than Cascadian adults, and hindwing spots below average larger. Study of *C. palaemon* populations in Idaho, Washington and British Columbia will be necessary to determine the relationship between populations in the Wallowas and those in western Oregon, since *C. palaemon* is apparently absent from the Blue, Aldrich and Ochoco mountains. For now, no trinomial is associated with populations of *C. palaemon* in the Wallowa Mountains.

Biological notes: *Carterocephalus palaemon* flies in a single annual brood in Oregon, from mid-April to late July, depending on elevation and seasonal conditions. It is distributed from near sea level (Portland, Multnomah Co.) to about 7000' (Mt. Ashland, Jackson Co.), and occurs in wet meadows, along stream and river margins, and along wet roadside ditches. In Wallowa County (vic. Gumboot Creek, ca. 4200'), males of *C. palaemon* fly through sunny gaps along creek edges, and in wet hanging meadows (Hat Point Rd., ca. 6400'). Cascadian populations of *C. palaemon* also fly in sunny gaps along creek edges (e.g., Gilchrist, Klamath, Co., ca. 4400'; Metolius River, Jefferson Co., ca. 3000'), although adults from the Cascades and Siskiyous are frequently found near sunny roadside puddles or ditches with a trickle of water, adjacent to densely forested habitats.

No information on larval foodplants is available from populations of *C. palaemon* in Oregon or Washington, although larval foodplants in California apparently include *Calamagrostis purpurascens* (MacNeill 1975: 507, Garth & Tilden 1986: 166). The immature stages of *C. palaemon* from eastern North America were described by Fletcher (1889) and Scudder (1889b: 1571-1572), but were not illustrated. Also see Ravenscroft (1994).

Hesperiinae: (18 species):

Oarisma garita **(Reakirt, 1866)**

_____(Grande Ronde and Minam rivers) *garita* Recorded: Un, **Wal**, Expected: Ba

Taxonomic notes: No geographic variation has been described across the range of *Oarisma garita* in western North America, north of Mexico. These populations represent *Oarisma garita garita* (TL: vic. Twin Lakes, Lake Co., Colorado; see Brown & Miller 1977: 269). The relationship of Mexican *Oarisma garita calega* (Godman, 1900) (TL: Mexico) to *O. g. garita* has not been studied in detail, and some authors treat *O. g. calega* as a separate species (e.g., Bridges 1993).

Biological notes: In Oregon, *Oarisma garita* has been found at a few sites along the Minam and Grande Ronde rivers in Wallowa (since at least 11 July 1967) and Union counties. Adults here are common in disturbed habitats, such as mowed lawns and roadsides (Minam, Wallowa Co., ca. 3000'), but are also found in more natural settings along river edges. The distribution of *O. garita* in Oregon is puzzling, since many apparently suitable habitats occur throughout the Blue and Wallowa mountains and adjacent valleys. It is possible that *O. garita* is a recent agricultural introduction into Oregon. Periodic searches for *O. garita* should be conducted along the Wallowa, Grande Ronde, and Powder rivers and their tributaries, including nearby disturbed areas, to track any potential geographical expansion. Males and females of *O. garita* fly over short and through taller grasses, in sunny, open habitats. *Oarisma garita* is apparently univoltine in Oregon, and adults have been recorded from mid-June to mid-July. Specimens of *O. garita* I found at the Carnegie Museum of Natural History (Pittsburgh, Pennsylvania, May 2004), labeled from "Fort Klamath," Klamath County, are presumably mislabeled, since no other records of *O. garita* from southern Oregon are known.

Larval foodplants of *O. garita* in Oregon have not been reported. Scott (1992: 97-98) reported ovipositions by *O. garita*, and noted the presence of larvae on several genera of grasses and sedges in Colorado, including species of *Poa*, *Elymus*, *Muhlenbergia*, *Koeleria*, *Bouteloua*, *Bromus*, *Agrostis* and *Carex*, among others. Gibson (1910) described the early stages of *O. garita* from Saskatchewan. According to Scott (1992: 98-99), who described the early stages from Colorado in detail, larvae of *O. garita* are unusual for skippers in that they are highly polyphagous, and do not construct shelters or nests from modified foodplant leaves.

***Hesperia uncas* W. H. Edwards, 1863**
_____(SE deserts) *terraclivosa* Austin & McGuire, 1998 Recorded: **Ha** (S), Mal (S), Expected: Lk (SE)

Taxonomic notes: Populations of *Hesperia uncas* in Oregon were formerly called *Hesperia uncas macswaini* MacNeill, 1964 (TL: Blancos Corral, White Mts., Mono Co., California) by Hinchliff (1994: 17). Great Basin populations of *H. uncas* were reviewed by Austin & McGuire (1998), who named several new taxa and restricted the range of *H. u. macswaini* to the White Mountains of Nevada and California. Following Austin & McGuire (1998), populations of *H. uncas* in Oregon represent *Hesperia uncas terraclivosa* (TL: Monitor Valley, Toquima Range, Nye Co., Nevada), although adults display a considerable amount of individual variation. Males of *H. u. terraclivosa* from Oregon vary from rather dark to bright orange above, and are also variable in size (smaller individuals tend to be darker). Females of *H. u. terraclivosa* from Oregon are very large and bright above, and represent the largest female *Hesperia* individuals in the state, other than the occasional "giant" females of *Hesperia juba*.

Biological notes: Adults of *Hesperia uncas* in Oregon fly in a single annual brood, from mid-May to late June, and all known populations occur between about 3600' and 4200'. While *H. uncas* is rarely encountered in Oregon, Dan Thackaberry found a large population at the north end of the Alvord Desert in Harney County (ca. 4200'). I visited his site on 16 May 2002, and found *H. uncas* males to be very common. Males guarded territories on top of poorly defined bajadas (linear, sandy bluffs), at the bases of rocky desert hills, but were not found on prominent rocky hilltops nearby (where males of *H. juba* were found). These bajadas extend from the bases of mountains, out into the desert, for up to two miles, and male *H. uncas* were found along their entire length. Female *H. uncas* at this site (at least 15 individuals observed) flew through rather barren sagebrush flats with scattered *Artemisia* plants (e.g., Dornfeld 1980: 14), and whenever they approached bajadas, would invariably end up with one or more male *H. uncas* chasing them. At one point, four males were seen in pursuit of a single female. Adults at this site were not observed to feed, except for one female found at an undetermined flower (possibly a *Penstemon*). This site was unusual in its almost complete lack of grasses. The only grass present in any numbers at the site was *Achnatherum hymenoides*, the probable larval foodplant of *H. uncas*.

Achnatherum nevadense (reported as *Stipa nevadensis* by MacNeill 1975: 465) and *A. pinetorum* (reported as *Stipa pinetorum* by McGuire 1982: 2) have been reported as larval foodplants for *H. u. macswaini*. Populations of *H. u. uncas* in Colorado (Shields et al. 1970: 33, Scott 1992: 102), South Dakota (McCabe & Post 1977: 32) and Texas (McGuire 1982: 2) use *Bouteloua gracilis* as a larval foodplant. Scott (1992: 102-103) described the last-instar larva and pupa of *H. u. uncas* from Colorado, and Emmel et al. (1992: 41) figured a late-instar larva of *H. u. uncas*, also from Colorado. No details on immature stages or larval foodplants are available for western taxa of *H. uncas*, other than *H. u. macswaini*.

***Hesperia juba* (Scudder, 1874)**

_____(most of state, sporadic W of Cascades) Recorded: **Ba**, **Be**, **Clk**, Cls, Col, Cos, **Cr**, Cu, **De**, **Do**, Gi, **Gr**, **Ha**, **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, **Lin**, **Lk**, **Mal**, **Mar**, **Mo**, **Mu**, **Sh**, **Um**, **Un**, **Wal**, Wan, **Was**, **Wh**, Ya, Expected: Li, Po, Ti

Taxonomic notes: No geographic variation has been described across the large western North American range of *Hesperia juba* (TL: California). Adults of *H. juba* are individually variable, and worn examples may present challenges to identification. The illustration of a "male" *H. juba* by Pyle (2002: 77, upper right) is apparently of a female.

Biological notes: *Hesperia juba* is widespread in Oregon, and is often common in the Cascades, eastward. It is rarely seen in the north Coast Range, although it may eventually be recorded from all counties in Oregon. The scarcity and unpredictability of records for *H. juba* in the north Coast Range suggests it is not a regular resident there, but rather, that adults occurring there are strays or temporary colonists from further east (see below). Adults of *H. juba* fly from mid-April through early October, in a wide variety of habitats (from about 70' to over 9500'). *Hesperia juba* is one of few butterfly species I regularly find seeking nectar at *Balsamorhiza* flowers, although adults visit a wide variety of flowers, and freshly eclosed males are strongly attracted to mud. Throughout the state, *H. juba* males watch over open areas in gullies, along trails, and on grassy hillsides, often from ground-level perches, and also guard hilltop perches at some sites (e.g., N end of Alvord Desert, Harney Co., 16 May 2002; also see Shields 1968: 85).

Early-season individuals of *H. juba* (late May, early June), often showing considerable wing wear, are frequently encountered in mid- and high-elevation montane habitats in parts of Oregon and California. Throughout July, adults of *H. juba* are found in small numbers at high elevations in the Cascades (e.g., Dutchman Flat, 6400', Deschutes Co.). Invariably, wings of July adults are very worn and/or faded, and most individuals found then are females. Shapiro (1980a) suggested that worn montane *H. juba* adults, found in some areas shortly after snow melt, represent overwintered individuals. Berkhousen & Shapiro (1994) elaborated on this hypothesis. Guppy & Shepard (2001: 105) endorsed this idea, but Scott (1992: 109) refuted it. While flight-worn adults of *H. juba* are frequently found in the Cascades and mountains of northeastern Oregon in late May through early July, their appearance in these habitats generally follows an emergence of fresh *H. juba* adults one to three weeks earlier in lowlands below. Freshly eclosed *H. juba* adults have been observed in great abundance during the spring at many lower-elevation locations across Oregon (e.g., Jones Canyon, Sherman Co., ca. 800', 2 May 2003; Tygh Valley, Wasco Co., ca. 1400', 2 May 2003; John Day River nr. Spray, Wheeler Co., ca. 1800', 13 May 2003; N end Alvord Desert, ca. 4200', Harney Co., 16 May 2002), although adults usually do not persist long at these localities. These spring-emerging individuals of *H. juba* apparently move to higher elevations shortly after eclosion, thus accounting for the wing wear seen on adults observed in late May and June at higher elevations. Observations on *H. juba* in Oregon suggest to me that it is a powerful dispersalist, and like the pierids *Pontia protodice* and *Colias eurytheme*, adults of *H. juba* may be somewhat migratory, or at least highly vagile (see discussion below). As noted by MacNeill (1964: 11, 20-21, 76), the lack of geographic variation across the large range of *H. juba* certainly suggests that adults "wander" large distances.

After dry winters in Oregon with little snowfall, adults of *H. juba* appear at high elevations in central Oregon up to a month after overwintered *Nymphalis* and *Polygonia* species make their first spring appearance. Adults of *H. juba* at high elevations in central Oregon often appear together with immigrants of *Vanessa cardui, V. annabella* and *V. virginiensis*. None of these nymphalid species pass the winter as adults in eastern Oregon above 4500' (if at all), but all three are sometimes found at high elevations shortly after snow has melted. In 2001, snow in most of the Ochoco Mountains (Crook Co.) was completely gone by late April (when adult *Nymphalis* and *Polygonia* were in flight), and only traces of snow could still be found by early May, at the highest elevations in the range (pers. obs.). *Hesperia juba* adults were not seen in the Ochocos in late April (above 3000'), but began to appear above 4500' in early May. On 29 May 2001, Erik Runquist and I observed movements of *H. juba*, along with the three *Vanessa* species mentioned above, near the top of the Ochoco Mountains, at the west end of Big Summit Prairie (ca. 4700'). From about 16:30 to 17:30 hrs., many dozens (perhaps hundreds) of somewhat worn *H. juba* adults were seen flying just above ground level, in what looked like a whirlwind of orangish dashes. Adults also sought nectar from a variety of flowers. Individuals of *H. juba* were observed for the better part of an hour, until we left the site, but no particular directionality to their movements could be detected. I have seen similar events, involving fewer adults of *H. juba*, at many other sites in the Cascades and mountains of northeastern Oregon.

These observations suggest that worn springtime *H. juba* individuals at high elevations are short- or even long-distance migrants, and not overwintered adults. However, Berkhousen & Shapiro (1994) found pollen grains, apparently of *Chrysothamnus*, on spring-collected adults of *H. juba* and *Nymphalis antiopa* from California. They suggested that their finding demonstrated adult overwintering of *H. juba*, under the assumption that *Chrysothamnus* pollen found on spring-collected butterflies had persisted on those individuals from the previous fall. However, *Chrysothamnus* plants produce massive amounts of pollen, and secondary transfer of persistent pollen during springtime movements of adult *H. juba* (and *N. antiopa*) appears to be a realistic hypothesis to explain Berkhousen & Shapiro's (1994) results (also see p. 264 herein).

Scott (1992: 109) described the early stages of *H. juba* from eastern Colorado. In the lab, larvae of *H. juba* reared by Scott were able to complete development (from egg to adult) in two months, versus three months or longer for other *Hesperia* he reared. He concluded that because of this ability to complete development rapidly, *H. juba* eggs laid in the fall would have plenty of time to mature into adults for the spring flight, even during cooler fall and springtime feeding conditions. MacNeill (1964), who also reared and described immatures, noted that *H. juba* larvae appear to be variable in number of instars. While some larvae he reared completed development in only five instars, others required six.

In Oregon, *H. juba* appears to fly in two annual broods, although probably only produces one brood annually, if at all, at higher elevations. As discussed above, adults of the spring brood of *H. juba* originate at lower elevations, and apparently emigrate to higher elevations shortly after eclosion. A second, usually more abundant brood of *H. juba* adults appears in early or mid-August, and persists at some sites until early October. It is unknown if adults of *H. juba* originating from higher elevations in the late summer subsequently return to lower-elevation sites for oviposition and longer survival as the fall approaches, but considering the pattern observed during the spring, movements of fall-flying adults seem likely (also see discussion under *Speyeria coronis*). It is also unknown at what elevations, and under what conditions, *H. juba* can produce one versus two annual broods. As suggested by MacNeill (1964), immatures of *H. juba* may employ a variety of ecological strategies in different environmental conditions. Additional investigations are needed to further our understanding of the biology of this common species.

Details of larval foodplants of *Hesperia juba* in Oregon have not been recorded, but McGuire (1982: 2) reported *Deschampsia elongata* as a larval foodplant in Alpine County, California. Scott (1992) found eggs of *H. juba* on various species of *Bromus*, *Poa* and *Bouteloua* in Colorado. Also see Lindsey (1923).

***Hesperia colorado* (Scudder, 1874)**

_____(E of Cascades) *idaho* (W. H. Edwards, 1883) Recorded: Ba, Cr, **De** (N & E), Gi, Gr, Ha, HR (N), **Je**, **Kl** (SE), **Lk**, **Mal**, Mo, Sh, Um, **Un**, **Wal**, Wh
_____(far NE Valleys and Canyons, low elevations) Recorded: Un, **Wal**
_____(Wallowas, high elevations) Recorded: Wal (S), Expected: Ba (NE), Un (E)
_____(E-central Cascades) Recorded: **De** (SW), **Kl** (N)
_____(E & C Siskiyous, far S Cascades, Jackson Co.) *oregonia* (W. H. Edwards, 1883) Recorded: **Ja** (S), Jo (SE)
_____(SW Siskiyous) *mattoonorum* McGuire, 1998, **new combination** Recorded: Cu, [**Ja**], Jo (W), Expected: Cos (S)
_____(W Cascades) nr. *oregonia* Recorded: Clk, Do, HR (SW), Ja (N), **La**, **Lin**, Mar

Taxonomic notes: The *Hesperia comma* (Linnaeus, 1758) complex in North America is currently under study by Jon Pelham, myself, and others, who will elaborate on the species-level taxonomy presented herein. Images of the lectotype of *Hesperia colorado harpalus* (W. H. Edwards, 1881) (see Brown & Miller 1977: 288) were examined by Scott (1998b: 7-8), who determined that the taxon represents the Sierra Nevadan populations in California previously called *Hesperia colorado yosemite* Leussler, 1933. This action left populations of *H. colorado* in eastern Oregon previously known as *H. c. harpalus* (e.g., Dornfeld 1980: 113, Hinchliff 1994: 19) with the next available name, *Hesperia colorado idaho* (TL: Doyle, Lassen Co., California; see Scott 1998b: 8). *Hesperia c. idaho* is the widespread phenotype found at elevations below 4500’ across much of eastern Oregon. Throughout the mountains of eastern Oregon, below treeline and above about 4500’, adults of *H. colorado* are similar to those of lowland *H. c. idaho*, but average slightly smaller and darker on both wing surfaces. These are considered to be "montane forms" of *H. c. idaho*.

In addition to *H. c. idaho*, in its various forms, there are numerous distinctive populations of *H. colorado* distributed throughout much of Oregon. Populations of *H. colorado* in Wallowa County are highly variable depending upon location and elevation. At low elevations in the Imnaha River drainage (below about 4500'), and to a lesser extent, along the Grande Ronde and Minam rivers (extending into Washington and presumably Idaho to an unknown extent), populations are partly composed of adults of the *H. c. idaho* phenotype. However, a small percentage (about 10-15 %) of adults in these populations completely lack spots on the hindwing below, or have highly reduced (e.g., Howe 1975: pl. 88, #20), vestigial spots below, sometimes surrounded by black smudges. These individuals of *H. colorado* with reduced spotting somewhat resemble *H. c. mattoonorum* (see below), but are phenotypically much paler, above and below, than that taxon. At higher elevations in Wallowa County (e.g., Wallowa Lake, ca. 4800'), below tree line, adults of *H. colorado* are like those from other "montane" populations of *H. c. idaho* in eastern Oregon (see above).

Adults of *H. colorado* from sub-alpine and alpine habitats in the Wallowa Mountains (e.g., Mt. Howard, Wallowa Co., 8500', 29 August 1996, Harold Rice) are phenotypically similar to sub-alpine populations of *H. colorado* in Idaho and Wyoming (e.g., Wind River Mts., Sublette Co., Wyoming, ca. 9000'), but few specimens from the Wallowas have been sampled to date. Extant specimens from the high Wallowas are somewhat similar to those of *Hesperia colorado colorado* (TL: possibly Tennessee Pass, 3150 m [ca. 10,395'], Lake-Eagle counties, Colorado; see Scott 1998b: 6), but average paler below. The population of *H. colorado* in the high Wallowas is definitely not of *Hesperia comma manitoba* (Scudder, 1874). The relationship between these high- and lower-elevation populations in Wallowa County merits further study, but is presumably similar to that of altitudinal segregates elsewhere in the species' range (e.g., Scott 1975a). Until more samples of this segregate are available for study, no trinomial is associated with sub-alpine and alpine populations of *H. colorado* in the Wallowas.

Populations of *H. colorado* in the vicinity of Sand Creek, Klamath County, north to extreme southern Deschutes County, are mostly similar to montane forms of *H. c. idaho*, but are somewhat distinctive. Adults in these populations have a very dark ventral ground color, and some females are grayish below. Above, adults are somewhat darker than those of other montane forms of *H. c. idaho*. The distribution of this phenotype apparently matches that of other butterflies occurring in the Sand Creek area of Klamath County (see Tilden 1963c), in the shadow of Mt. Mazama's eruption.

Between Klamath Falls, Klamath County, and the CSNM, Jackson County, phenotypes of adult *H. colorado* vary from those of *H. c. idaho* to *Hesperia colorado oregonia* (TL: Trinity Co., California), with all types of intermediates (also see Shapiro 1986: 338, 342, 345, 1991a: 149). In the vicinity of Keno, Klamath County, many adults of *H. c. idaho* have reduced spot size on the wings below, which generally lack the silvery luster prominent on most *H. c. idaho*. At the CSNM, most *H. colorado* adults are of the *H. c. oregonia* phenotype, lacking silver below, although rare individuals are closer to that of *H. c. idaho* or *H. c. mattoonorum* (see below). While Scott (1998b) suggested that *H. c. oregonia* should be considered a synonym of *H. c. harpalus* (the Sierra Nevadan segregate), that arrangement is not followed herein. The lectotype of *H. c. oregonia* illustrated by Brown & Miller (1977: 292) compares favorably to the commonest phenotype in the eastern Siskiyous and extreme southern Cascades (e.g., CSNM, Jackson Co.) of Oregon, and to some individuals in highly variable populations in Trinity County, California (e.g., Shapiro et al. 1981: 124, Shapiro 1991b: 35). Brown & Miller (1977: 291-292) restricted the type locality of *H. c. oregonia* to Trinity County, California, which based on our current knowledge, seems quite reasonable. In Oregon, populations composed mostly of phenotypically consistent adults of *H. c. oregonia* occur only in southern Jackson County.

Hesperia colorado mattoonorum (TL: Low Divide Rd. (County Rd. 308) at High Divide, 6 air mi. E of Hwy. 101 at Smith River, 2300', Del Norte Co., California; described as a trinomial of *H. comma*) was named for populations of *H. colorado* near the Pacific coast adjacent to the Siskiyous, where adults have highly reduced dorsal and ventral spotting, and a darker ground color above and below. Populations of *H. colorado* in Josephine and Curry counties are mainly of the *H. c. mattoonorum* phenotype, but some individuals are better maculated, and approach the phenotype of *H. c. oregonia*.

Western Cascadian populations of *H. colorado* previously called *H. c. oregonia* (Hinchliff 1994: 19) are composed of adults that average smaller and darker than those of typical *H. c. oregonia*, and generally have better developed and darker ventral hindwing markings. Until taxonomic studies on *H. colorado* are completed (see above), populations in the western Cascades are called *Hesperia colorado* nr. *oregonia*. These extend from about the Crater Lake area (Douglas and Klamath counties), north to about Mt. Hood (Clackamas Co.). Adults of *H. c.* nr. *oregonia* are fairly uniform in appearance, compared to most other segregates of *H. colorado* in Oregon. Northeastern Cascadian populations of *H. colorado*, situated east of the Cascadian crest (e.g., Camp Sherman, Jefferson Co.), appear to form a broad blend zone with *H. c. idaho* populations below them to the east. Throughout this area, adult phenotypes are highly variable, and average intermediate between those of *H. c.* nr. *oregonia* and *H. c. idaho*.

<u>Biological notes</u>: In Oregon, males of *Hesperia colorado* are frequently found on hilltops (also see Shields 1968: 85), flying along roads, and at mud. Both sexes visit a wide variety of flowers, and are especially fond of *Chrysothamnus*. Populations of *H. colorado* in Oregon occur from about 100' (mouth of Deschutes River, Wasco and Sherman counties) to over 9000' (Mt. Howard, Wallowa Co.; Steens Mt., Harney Co.). Adults in some populations may be very common. Records of *H. colorado* in Oregon extend from mid-June at some sites (e.g., Sand Creek, Klamath Co.; CSNM, Jackson Co.) to late September, in what is apparently a single extended brood. Some populations in the Siskiyous appear to fly mostly in late July, while others there apparently fly mostly in September (e.g., Pyle 2002: 74). However, these observations could be an artifact of insufficient sampling efforts (but see Gervais & Shapiro 1999: 157-158). Additional

field surveys and life history studies on these populations are needed to clarify flight times of *H. colorado* in the Siskiyous.

Larval foodplant information for populations of *H. colorado* in Oregon is lacking. McGuire (1998: 466) reported *Festuca* as the larval foodplant of *H. c. mattoonorum* at its type locality, and MacNeill (1975: 467) reported *Achnatherum thurberianum* (as *Stipa thurberiana*) as a foodplant of what is now called *H. c. idaho* in Mono County, California. Scott (1992: 109-113) recorded eggs or larvae of *H. colorado* from Colorado on a wide variety of grasses and sedges, including *Bromus*, *Bouteloua*, *Andropogon* and *Carex* species. The early stages of *H. colorado* have not been fully described, but Hardy (1954) provided some life history notes on *H. colorado* from Vancouver Island, British Columbia. The life history of *H. comma* from Quebec was described by Fyles (1895).

Hesperia columbia **(Scudder, 1872)**
_____(Siskiyous, far S Cascades) Recorded: **Ja**, **Jo**, Kl (far SW), Expected: Cu, Do (S)?

Taxonomic notes: While no geographic variation has been described in the primarily Californian distribution of *Hesperia columbia* (TL: California), males and females of *H. columbia* from Oregon average larger and darker than central Californian specimens with which they have been compared (from Marin, Napa, Santa Clara and Stanislaus counties). Adults of *H. columbia* from Siskiyou County, California (examined in 2004, see below), however, resemble those from southwestern Oregon.

Biological notes: Following Dornfeld's (1980: 218) lead, I found several dozen adults of *Hesperia columbia* at the south base of Eight Dollar Mountain in Josephine County (ca. 1400'), on 19-20 May 2001. Males flew through small clearings in grassy woodlands, visited mud, and both sexes visited *Allium* flowers. At the CSNM in Jackson County, I have watched males of *H. columbia* perch on hilltops (e.g., Hobart Peak, ca. 5450'; also see Shields 1968: 85, Gervais & Shapiro 1999: 156), and along gravel roadsides overlooking steep grassy meadows (ca. 4500'). At the CSNM, *H. columbia* can be found flying in sympatry and synchrony with *H. lindseyi*, *H. colorado*, and *H. juba* (e.g., 8 July 2003, ca. 5800'). Records of *H. columbia* in Oregon span from 1300' (Illinois River nr. Eight Dollar Mt., Josephine Co.) to over 5800' (CSNM, Jackson Co.).

Until recently, I thought *H. columbia* was univoltine in Oregon (see Shapiro 1991a: 149, Pyle 2002: 76), flying from mid-May to early July. Dornfeld (1980: 113) reported late summer adults of *H. columbia* from Oregon, but all late summer specimens previously determined as *H. columbia* in OSAC and in other collections I have examined are of *H. colorado oregonia*. Shapiro et al. (1981: 125) reported late-summer adults of *H. columbia* in the Trinities of northern California, and George Austin sampled a series of *H. columbia* in Siskiyou County, California, on 5 September 1988 (specimens examined in 2004 at McGuire Center, Gainesville, Florida). On 16 September 2004, Erik Runquist found several fresh adults of *H. columbia* at Box-O Ranch, and in Oregon Gulch Canyon, 3300', CSNM, Jackson County (vouchers were obtained), which fed at flowers of *Epilobium*, *Eryngium* and *Polygonum douglasii*. Additionally, a single male of *H. columbia* from the Wimer Road (ca. 2000'), Josephine County, taken on 5 October 1978 by Stan Jewett, was located in the William McGuire *Hesperia* collection at the McGuire Center (Gainesville, Florida, September 2004). It appears that *H. columbia* is double brooded at lower elevations in Jackson and Josephine counties, with early (mostly May), and very late (probably mid-September to mid-October) flights. However, at elevations above about 5000', *H. columbia* may be only single brooded (also see discussion of *Hesperia juba*, pp. 36-38).

Larval foodplants of *H. columbia* are unknown from Oregon, but MacNeill (1964: 139, 1975: 474) noted *Koeleria macrantha* (as *K. cristata*) as a larval foodplant at Alpine Lake, Marin County, California. Garth & Tilden (1986: 162) listed *Danthonia californica* as a larval foodplant of *H. columbia*. The egg, late-instar larva and pupa of *H. columbia* from California were briefly described by MacNeill (1975: 474).

***Hesperia lindseyi* (Holland, 1930)**

_____(Siskiyous, far S Cascades, Warners) *septentrionalis* J. Emmel, T. Emmel & Mattoon, 1998 Recorded: Cu, **Ja**, Jo, **Kl** (S), **Lk** (S)

_____(S Umpqua River drainage, SW Cascades) Recorded: **Do** (S)**,** Expected: Cos (S)?, Jo (N)?

Taxonomic notes: *Hesperia lindseyi* was recently reviewed by Emmel et al. (1998k), who described three new trinomials. All of these were originally recognized as distinctive segregates by MacNeill (1964). One, *Hesperia lindseyi septentrionalis* (TL: Shasta Valley Wildlife Area on Little Shasta River, 4 rd. mi. E of Montague, 2500', Siskiyou Co., California), occurs in Oregon at least in southern Josephine, Jackson and Klamath counties. Adults of *H. lindseyi* from Warner (= Bullard) Canyon, Warner Mountains, Lake County, are similar, but apparently average slightly greener below. Specimens from Curry County (Vulcan Lake, W edge of Kalmiopsis Wilderness, 12 July 1975) have not been personally examined. Adults from Josephine County I have examined include 3 males of *H. l. septentrionalis* from Rough and Ready Creek in the southwestern part of the county (5 July 1975, S. Jewett, W. McGuire collection), and one female and two males from Jumpoff Joe Creek, 1300', in the northern part of the county (female, 20 June 1982, S. Jewett, in OSAC; males, 20 June 1976, S. Jewett, McGuire collection). Individuals from Jumpoff Joe Creek are somewhat darker than *H. l. septentrionalis*, and approach the phenotype occurring further north. Further study of this population, in comparison to the following one, is needed.

The population of *H. lindseyi* in the South Umpqua River drainage of Douglas County, near Tiller, was first discovered by Don Severns (see Shepard 1997: 8), and represents the northernmost known population of the species. This population is phenotypically unique in many ways, with adults that are consistently darker than those of other *H. lindseyi* segregates, and females that are often rather greenish below. Further details on the morphology and biology of this unique segregate will be presented by Paul and Don Severns.

Biological notes: In Oregon, *Hesperia lindseyi* is most often found near the CSNM in Jackson County, and in the Klamath Falls and Bly Mountain areas of Klamath County, between 2400' and 5800' (though it occurs as low as 1300' in Josephine Co., see above). Adults of *H. lindseyi* in Oregon fly in a single annual brood, from late May to early August. At the CSNM, *H. lindseyi* can be very common, and is often the dominant butterfly species (along with *Speyeria callippe*) at roadside *Apocynum* flowers in June and early July. Males also visit mud, fly in a variety of areas, and guard hilltop perches. A small population of *H. lindseyi* exists in Warner Canyon (Warner Mts.), where adults are usually seen at mud or *Apocynum* flowers. Observations on the population of *H. lindseyi* in the Umpqua River drainage (ca. 1800') were made on three occasions in 2003. Males here patrolled through and above tall grasses, and among the tips of pine branches, up to four meters above ground level, in variably sunny forest openings. Both sexes were observed to feed at *Allium* flowers. On 27 June, two females were observed to utilize the tips of dead, lichen-covered branches of *Pinus ponderosa* as an oviposition substrate, in partly shaded settings, generally 5-7 feet above ground level (see MacNeill 1964 for a discussion of similar behaviors in Californian populations). In Jackson County, Erik Runquist (pers. comm. 2004) has noted ovipositions by females of *H. lindseyi* on various substrates at the CSNM, including clumps of *Festuca* and live *Quercus* leaves.

Published reports of larval foodplants for *H. lindseyi* from Oregon are lacking, but MacNeill (1975: 478) reported *Festuca idahoensis* (possibly in reference to *F. roemeri*) and *Danthonia californica* as foodplants in Marin County, California. Graves & Shapiro (2003: 422) subsequently reported *Phalaris aquatica* as a larval foodplant of *H. lindseyi* in California. No detailed descriptions of the early stages of *H. lindseyi* have been presented. Also see Gervais & Shapiro (1999: 155-156).

Hesperia nevada **(Scudder, 1874)**
_____(Warners) *sierra* Austin, J. Emmel, T. Emmel & Mattoon, 1998 Recorded: **Lk** (S)
_____(SE Blues) nr. *nevada* Recorded: **Ba**, Ha (N), **Mal** (N), Expected: Cr (S), De (far E)?, Gr (SE), Um?, Un, Wal

Taxonomic notes: *Hesperia nevada* has long been considered monotypic. The name *Hesperia nevada sierra* (TL: Tahoe Meadows, Nevada State Route 431, 2.4 mi. W Mt. Rose (road) Summit, Carson Range, Washoe Co., Nevada) was recently proposed for populations of *H. nevada* in California and western Nevada (Austin et al. 1998). Specimens of *H. nevada* examined from the Warner Mountains of Lake County represent *H. n. sierra* (e.g., summit of Light Peak, ca. 8000', and nearby areas). Adults in these populations differ most dramatically from topotypical *Hesperia nevada nevada* (TL: South Park, [Park Co.], Colorado; see Barnes & McDunnough 1916: 126) in being considerably darker, above and below.

Adults of *H. nevada* from Elko County, Nevada, northeastern Oregon, Washington (including Satus Pass, Klickitat Co., see Newcomer 1966: 253) and British Columbia, are paler above and below than typical *H. n. nevada*, average slightly larger, and usually have larger and more regularly-shaped spots on the ventral hindwing. Adults in these populations are also paler above and below than those of *H. n. sierra*, and average larger. For now, these are called *Hesperia nevada* nr. *nevada*, until a detailed study of all known populations of *H. nevada* is conducted (also see Scott 1992: 116-125). It is possible that populations of *H. nevada* in the Warner Mountains are more continuous with those in the Blue Mountains than currently known, since peaks between these areas (e.g., Hart Mt., Juniper Mt., Glass Buttes, etc.) have not been surveyed for the possible presence of this species. Much additional study of *H. nevada* is needed, throughout its range.

Biological notes: Males and females of *Hesperia nevada* in Oregon are found on dry, wind-blown summits of ridges and peaks, usually above 4500', often in areas dominated by somewhat stunted *Artemisia tridentata* plants (also see Shields 1968: 85). Males perch on hilltops and ridgelines, on the very highest rocks, and females are usually found among grasses or at flowers not far below these high points. Unlike adults of typical *H. n. nevada* in Colorado, which may be found on hilltops or in gullies (Stanford 1981: 131, pers. obs.), adults in Oregon have been found in numbers only on hilltops and ridges. *Hesperia nevada* flies in a single annual brood in Oregon, from late May through early July. I found a large population of *H. n.* nr. *nevada* on a ridge at the Baker – Malheur County line (nr. Hwy. 26, ca. 5000'), on 20 June 2001. Adults fed at yellow composites and males guarded perches on the top of the ridgeline. No individuals were observed that day just below the ridgeline on hillsides, or in riparian habitats at the base of the ridge.

The currently known distribution of *H. nevada* in Oregon is puzzling. It is known from several sites along the southeastern edge of the Blue Mountains (King Mt., Harney Co., ca. 6400'; Baker City area, Baker Co., ca. 3500'; see above), but has not yet been confirmed along the northwestern drainage of these mountains. Two records of *H. nevada* from Umatilla County (S Fork Walla Walla River, 1800', 12 May 1968 and 27 May 1967) are based on specimens I have not personally examined. Due to their unusually early date of capture and low elevation of collection, it is suspected that these specimens are actually of *H. juba*. Until Umatilla County records can be verified, that county has been excluded from the distribution of *Hesperia nevada* in Oregon. Careful searches for *H. nevada* in Deschutes County (summit of Pine Mt., June and July 2003) and Wallowa County (hilltops off of Hat Point Rd., June 2004) were unsuccessful. Despite this, watch for *H. nevada* should be maintained in all hilltop habitats throughout northeastern Oregon.

Details on the larval foodplants and immature stages of *H. nevada* from Oregon are lacking. MacNeill (1975: 480) reported *Achnatherum occidentale* (as *Stipa occidentalis*) as a larval foodplant of *H. nevada* in California. Emmel et al. (1971: 241) noted an oviposition in California on *Elymus elymoides* ssp. *elymoides* (reported as *Sitanion hystrix*), and Jon Pelham (pers comm. 2004) suspects *Achnatherum occidentale* as a larval foodplant of *H. nevada* in Washington. Scott (1992: 124) briefly described the immature stages of *H. nevada* from Colorado, found on various species of *Festuca*, *Koeleria*, *Bouteloua* and other grasses.

***Atalopedes campestris* (Boisduval, 1852)**
_____(W Oregon, Columbia Basin) *campestris* Recorded: **Be**, Clk, Cls, Col, Cos, Cu, De (NE), Do, Gi, HR (N), **Ja**, **Jo**, Kl, **La**, **Li**, Lin, Mar, Mo (N), Mu, **Po**, Sh, Ti, Um, **Wal**, Wan, **Was**, Ya, Expected: Ba, Cr, Gr, Ha? Je, Lk?, Mal, Un, Wh

Taxonomic notes: Populations of *Atalopedes campestris* in Oregon are referable to *Atalopedes campestris campestris* (TL: Sacramento, Sacramento Co., California; see Emmel et al. 1998i: 22). The name *Atalopedes campestris tenebricosus* Austin & J. Emmel, 1998 (TL: Eureka, Humboldt Co., California; see Austin & Emmel 1998b: 504) apparently refers to an early and late seasonal phenotype, and not to any geographically or phenotypically distinct populations. Late-season (October-November) adults of *A. campestris* from throughout western and northern Oregon match topotypical *A. c. tenebricosus*, while adults from July and August are considerably brighter and paler above and below. Also see Burns (1989).

Biological notes: In western Oregon (e.g., Corvallis, Benton Co.), *Atalopedes campestris* flies in three annual broods, in mid-May and June (variably darkened below), mid-July through August (pale above and below), and mid-September through early November (variably darkened). Wherever it occurs in the state, *A. campestris* is most abundant late in the season, and is the latest-flying butterfly species (along with *Colias eurytheme*) in the Willamette Valley that does not hibernate as an adult. Records for *A. campestris* in Oregon extend from sea level (see below), to about 5650' (Evening Creek, Mt. Thielsen Wilderness, Klamath Co.). While frequently common on lawns, in suburban flower gardens, and along roadsides, *A. campestris* is also found in less disturbed habitats, including open woodlands (e.g., Eight Dollar Mt., Josephine Co., 20 May 2001) and native prairies (Willamette Valley, *fide* Paul Severns). Males guard perches less than a meter above ground level, and adults of both sexes frequently visit flowers.

Dornfeld (1980: 109) noted that *A. campestris* had been unknown from Oregon until the summer of 1967, when it appeared in the Willamette Valley in large numbers (although specimens exist from the Medford area, Jackson Co., in the American Museum of Natural History, New York, from 11 May 1931, collected by W. E. Lawrence). *Atalopedes campestris* has been common throughout western Oregon at least since 1967, and was found on the immediate coast by Bob Pyle in 2003 (Tillamook, Tillamook Co.; Cannon Beach, Clatsop Co., see Shepard 2004: 8). In the last decade, *A. campestris* has embarked on another major expansion of its range (see Pyle 2002: 83, Crozier 2003, 2004), through the Columbia River Gorge, along the Columbia River, and up the lower Snake River, at least into Wallowa County (vic. Imnaha, July 2001, J. Peacock & A. Warren), as well as into Nez Perce and Lewis counties, Idaho (R. & K. Stanford, see Shepard 2000: 11). Consequently, *A. campestris* is now known from all counties in Oregon touching the Columbia River, and it was recently found far inland at Smith Rock State Park in Deschutes County (2 May 2004, Neil Björklund). This suggests that *A. campestris* will also be found to occur along the lower Deschutes and John Day river drainages. Should *A. campestris* successfully pass through the Snake River Canyon (and its presence along the Imnaha River in Wallowa Co. suggests it might), it should be found in Baker and Malheur counties, and adjacent parts of Idaho. *Atalopedes campestris* may eventually be recorded from all counties in Oregon.

Larval foodplants for *Atalopedes campestris* in our area include at least *Poa pratensis* (lawn grass, pers. obs.), and probably several other grasses (see Graves & Shapiro 2003: 420). Immature stages of *A. c. campestris* were described by Comstock (1929b: 30-32), who illustrated an egg, last instar larva and pupa (also see Emmel & Emmel 1973: 82). Guppy & Shepard (2001: 114) figured part of an egg, young and late-instar larvae, and a pupa of *A. campestris*, from Corvallis, Benton County, Oregon. Immature stages of eastern North American *A. c. huron* (W. H. Edwards, 1863) were described by Scudder (1889b: 1664-1665, 1889c: pls. 66, 77, 80, 85) and Scott (1992: 125), and a late-instar larva and pupa were subsequently figured by Allen (1997: 331, 347). Warren & Roberts (1956) cited an economic infestation by *A. c. huron* on *Cynodon dactylon* (Bermuda grass) in Arkansas, and Bryson (1985) provided a review of larval foodplants. Also see Venables & Barrows (1986).

Polites peckius **(W. Kirby, 1837)**
_____(N Blues, Wallowas) <u>Recorded</u>: Ba (N), Um, **Un**, Wal, <u>Expected</u>: Gr (NE), Mo (S)

<u>Taxonomic notes</u>: No geographic variation has been described from anywhere in the North American range of *Polites peckius* (TL: "North America"), despite minor morphological and ecological variation that exists among western segregates (e.g., Colorado, Arizona, etc.; see Stanford 1981: 118). Study of *P. peckius* populations from throughout its range is needed, before relationships between populations in Oregon, the Rocky Mountains and eastern North America can be determined. The "male" *P. peckius* figured by Pyle (2002: 81) is actually a female. Also see Stanford (1981: 118).

<u>Biological notes</u>: *Polites peckius* is uncommon in Oregon, where adults fly in a single annual brood from mid-June to late July. Records in Oregon range from 3000' (3 mi. N Halfway, Baker Co.) to at least 5000' (upper Imnaha River, Wallowa Co.). In Oregon, *P. peckius* occurs mostly in riparian habitats and wet grassy meadows in the northern Blue and Wallowa Mountains. I located a population of *P. peckius* along Catherine Creek, Union County (22 June 2002), flying in sympatry with *P. sonora*. Males guarded low perches among lush grasses (probably *Poa pratensis*), and females flew through taller grasses nearby. Both sexes visited flowers. In contrast, populations of *P. peckius* in eastern Colorado (e.g., Arapahoe and Douglas counties) are bivoltine, and are often found in highly disturbed, often rather xeric habitats. Adults in eastern Colorado are frequently found on suburban lawns (pers. obs.).

Scudder (1889b: 1686, 1889c: pl. 80) described the egg, first- and third-instar larvae of *P. peckius* from the eastern United States. Other early stages of *P. peckius* were subsequently described by Dethier (1940), but no details on larval foodplants were provided. Scott (1992: 129-130) described the early stages of *P. peckius* from eastern Colorado, where larval foodplants include *Poa pratensis* (mostly) and *Distichlis spicata*. Allen (1997: 331, 347) figured a late-instar larva and pupa of *P. peckius* reared on

Leersia oryzoides in West Virginia, and the same grass was reported as a larval foodplant for *P. peckius* in New York (Shapiro 1974d: 25). Details on immature stages and larval foodplants of *P. peckius* in Oregon remain unreported.

***Polites sabuleti* (Boisduval, 1852)**

_____(NE Cascades, Columbia Basin, Snake River drainage, Ochocos, Blues, Steens, Warners) *alkaliensis* Austin, 1987 Recorded: Ba, **Cr**, De (N & E), Gi, Gr, Ha, HR, **Je**, **Kl** (S), Lk (S), Mal, Mo, Sh, Um, Un, **Was**, Wh, Expected: Wal

_____(E-central Cascades) nr. *aestivalis* J. Emmel, T. Emmel & Mattoon, 1998 Recorded: De (SW), Do (E), **Kl** (N), Lk (NW), Expected: Ja (far NE), La (far E), Lin (far SE)

_____(Siskiyous and far SW Cascades) *aestivalis* J. Emmel, T. Emmel & Mattoon, 1998 Recorded: Ja, Kl (far SW), Expected: Jo (SE)

_____(possibly S Harney Co.) *sinemaculata* Austin, 1987 Recorded: Ha? (see text)

Taxonomic notes: Populations of *Polites sabuleti* in Nevada were reviewed by Austin (1987). I have compared specimens of *P. sabuleti* from various populations in Oregon to series of all Nevadan taxa recognized by Austin (1987). Populations of *P. sabuleti* from most of eastern Oregon (NE Cascades, eastward, including the Warners and southern Klamath Co.) are clearly referable to *Polites sabuleti alkaliensis* (TL: Fortynine Mt., Nevada State Route 8A, 1.3 mi. W Nevada State Route 34, 5950', Granite Mts., Washoe Co., Nevada). Additionally, all populations of *P. sabuleti* in Washington (e.g., images in Pyle 2002: 81, 87) and British Columbia (e.g., Guppy & Shepard 2001: 109) are of *P. s. alkaliensis*. None of these populations are referable to *Polites sabuleti sabuleti* (TL: San Francisco, San Francisco Co., California; see Emmel et al. 1998i: 23), as treated by Hinchliff (1994: 25, 1996: 20) and Guppy & Shepard (2001: 109). Adults of *P. s. alkaliensis* show some individual variation within most populations, but in series, average considerably paler above and below than those of *P. s. sabuleti.*

Populations of *P. sabuleti* in the east-central Cascades (e.g., Gilchrist, Klamath Co.; Crater Lake, Klamath Co., see Tilden & Huntzinger, 1977: 179-180; Diamond Lake, Douglas Co.) somewhat resemble the phenotype of *Polites sabuleti tecumseh* (Grinnell, 1903) (TL: Little Crabtree Meadow, nr. Mt. Whitney, California), and were called *P. s. tecumseh* by Newcomer (1964c: 50). Austin (1987: 6) noted that "outlying populations heretofore referred to as or close to [*P. s. tecumseh*] are different enough to recognize subspecifically and apparently represent convergence among the various higher-elevation populations with different evolutionary histories." Indeed, adults of *P. sabuleti* from the south-central Cascades are most like *P. s. alkaliensis*, but adults are slightly smaller and considerably darker, and approach *P. s. aestivalis* in phenotype but not size. Herein, I refer to these populations as *Polites sabuleti* nr. *aestivalis*. This segregate has a typical "Sand Creek" distribution in northern Klamath County, extreme eastern Douglas County, southwestern Deschutes County, and apparently into northwestern Lake County (also see Tilden 1963c).

In the Siskiyous, adults of *P. sabuleti* are large and dark, as first as noted by Shapiro et al. (1981: 125-126). These are *Polites sabuleti aestivalis* (TL: Highway 3 nr. Dan Rice Creek, SE of Scott Mt., Trinity Co., California), and are known in Oregon from the CSNM and the Dutchman Peak areas in Jackson County (also see Emmel et al. 1998d: 201-202). Adults of *P. sabuleti* from extreme southwestern Klamath County, adjacent to the Jackson County line, are also of the *P. s. aestivalis* phenotype (Erik Runquist pers. comm. 2004). A single female specimen examined from northern Jackson County (Rogue River, 7 mi. SW Prospect, 2175', 24 June 1937, S. Jewett) is either *P. s. aestivalis* or *P. s.* nr. *aestivalis*; more specimens from this area are needed before northern Jackson County populations can be confidently associated with any segregate.

I have not personally examined specimens from Oregon resembling the very pale phenotype of *Polites sabuleti sinemaculata* Austin, 1987 (TL: Baltazor Hot Spring, Nevada State Route 140, 5.0 mi. W Denio Jct., 4213', Humboldt Co., Nevada), but this taxon was reported from Harney County (Rt. 292, 13 mi. S Fields) by Roever in Shepard (1998: 6). Populations of *P. sabuleti* in southern Harney County require additional study. For now, *P. s. sinemaculata* is tentatively included as part of the fauna of Oregon, pending further elaboration of the phenotypes of *P. sabuleti* occurring in southern Harney County. Also see MacNeill (1993).

Biological notes: In Oregon, *P. s. alkaliensis* occurs in various native and disturbed habitats, including pastures, lawns (e.g., Newcomer 1964a: 227, 1964c: 50), riparian habitats and dry hillsides, ranging from about 100' (mouth of Deschutes River, Sherman Co.) to over 8000' (Light Peak, Warner Mts., Lake Co.). Records of *P. s. alkaliensis* from Oregon indicate that, like topotypical populations of that taxon, adults fly in a small spring brood, from mid-May to mid-June, followed by a larger brood later in the summer, from late July to early October. East-central Cascadian adults of *P. s.* nr. *aestivalis* fly in wet and dry meadows (e.g., Gilchrist, Klamath Co.), in a single late summer brood from mid-July to mid-September, with most records from mid-August. Adults of *P. s. aestivalis* occur in various habitats in the Siskiyous and extreme southern Cascades, and fly mostly in a single annual brood, from late July to early September (see Shapiro et al. 1981: 91). A single female of *P. s. aestivalis* or *P. s.* nr. *aestivalis* from late June, taken in northern Jackson County (see above), suggests a small spring brood may fly at some localities. Males and females of *P. sabuleti* are frequently encountered at flowers, especially *Chrysothamnus* at lower elevations. Males also visit mud, and guard perches at or near ground level in a variety of settings, but not on hilltops.

Reports of larval foodplants for *P. sabuleti* in Oregon are lacking, but in other parts of the species' range, larvae feed on various grasses. Comstock (1929b) reared *P. s. chuska* (W. H. Edwards, 1873) on *Cynodon dactylon* in California, and illustrated its egg (p. 26). Dammers in Emmel & Emmel (1973: 82) illustrated the last-instar larva and pupa of Californian *P. sabuleti*. Dethier (1944b) described the complete life history of *P. s. sabuleti* from Solano County, California, but did not indicate larval foodplants. Newcomer (1967b: 243-245) described the immature stages of *P. s. alkaliensis* from Yakima County, Washington, which he reared on lawn grass (presumably *Poa pratensis*). Shapiro (1975a: 205) reported *Distichlis spicata* as a common larval foodplant of *P. s.*

sabuleti in central California, and Shapiro (1977d: 451) noted ovipositions of *P. s. tecumseh* on *Agrostis scabra* in the Sierra Nevada. Scott (1992: 127-129) described the immatures of *P. sabuleti* from eastern Colorado (a phenotype near that of *P. s. alkaliensis*, pers. obs.), and reported *D. spicata*, *Hordeum jubatum*, *Poa arida* and *Puccinellia distans* as larval foodplants there. Also see Shapiro (1975c: 272, 1975d, 1993a) and Garland (1977).

***Polites mardon* (W. H. Edwards, 1881)**
_____(far S Cascades) *klamathensis* Mattoon, J. Emmel & T. Emmel, 1998 Recorded: **Ja** (SE), Kl (SW), Expected: Cu?, Jo? (see below)

Taxonomic notes: *Polites mardon* was originally described from "Mt. Hood," Oregon (W. H. Edwards 1881a: 47-48). The collector of the type specimens, H. K. Morrison (1883: 43), corrected the type locality of *P. mardon* to "prairies of Washington Territory…," "near Tenino." The type locality was further defined as "Tenino Prairie, Thurston County, Washington" by Brown & Miller (1980: 53). *Polites mardon* was reviewed by Mattoon et al. (1998), who named populations from the southern Cascades of Oregon as *Polites mardon klamathensis* (TL: Soda Mountain Rd., 3.0 to 3.8 rd. mi. S Hwy. 66, 4500'-4800', [CSNM], Jackson Co., Oregon). Adults of *P. m. klamathensis* have consistently tawnier dorsal and ventral coloration, when compared to adults from other populations of *P. mardon*.

A group of *P. mardon* populations exist approximately 80 air miles to the southwest of *P. m. klamathensis*, in coastal Del Norte County, California. These were called *Polites mardon mardon* by Mattoon et al. (1998). However, series of *P. mardon* from Del Norte County populations have not yet been carefully compared to series of typical *P. m. mardon* from Washington (see Mattoon et al. 1998), and the use of the name *P. m. mardon* for the Californian populations should be considered tentative. The "male" *P. mardon* figured by Pyle (2002: 89, lower right) is actually a female. Also see MacNeill (1993).

Biological notes: In Oregon, *P. m. klamathensis* has thus far been located only in a few small, wet meadows in southwestern Klamath County (Lake of the Woods, 1931, leg. W. E. Lawrence; this population has not been relocated in recent decades), and southeastern Jackson County (Soda Mountain Rd., Dead Indian Rd., Hyatt Prairie Rd., etc., all ca. 5200'; these populations have been known since 1990). *Polites mardon* flies in a single annual generation, with records in Oregon from 30 May to 18 July, based on surveys by Erik Runquist (pers. comm. 2004). Adults of *P. mardon* are locally common in Oregon, and fly just above ground level, among low grasses. Apparently a poor dispersalist, the ecological requirements of *P. mardon* remain mostly unknown, although populations at the CSNM are under study by Erik Runquist. Potter et al. (1999) summarized biological data on *P. m. mardon* in Washington, and listed several flower species as adult nectar sources. Careful search should be made in Curry and Josephine counties for *P. mardon* populations. Perhaps, populations of *P. mardon* similar to those in Del Norte County, California, may eventually be found there.

Populations of *P. m. klamathensis* in Jackson County apparently use *Danthonia californica*, *Festuca roemeri* or *F. idahoensis* as larval foodplants (E. Runquist pers. comm. 2004). Newcomer (1967b: 246-247) described the immatures of *P. mardon* from Signal Peak, 4800'-5000', Yakima County, Washington. Adults of *P. mardon* from that site were reportedly associated with species of *Festuca* and *Bromus*, although Newcomer (1967b) reared larvae to maturity on lawn grass (presumably *Poa pratensis*) from the city of Yakima. Potter et al. (1999) reported an oviposition by *P. mardon* on *Festuca* (probably *F. roemeri*) in Washington.

Polites themistocles **(Latreille, [1824])**
_____(Grand Ronde River drainage, accidental elsewhere) Recorded: Be, Wal

Taxonomic notes: Across its range, *Polites themistocles* (TL: Amerique meridionale) shows considerable geographic and individual variation. However, to date, only one geographic variant has been named, *Polites themistocles turneri* H. A. Freeman, 1944 (TL: Jesmond, British Columbia). This segregate tends to have small, dark adults, compared to populations of *P. t. themistocles* from the eastern United States (see Freeman 1944). Other western segregates of *P. themistocles* also appear distinctive (e.g., Colorado, see Stanford 1981: 120; Arizona; SW Utah). The single specimen of *P. themistocles* I have examined from northeastern Oregon (see below) is phenotypically somewhat different than adults of other known segregates, but no taxonomic conclusions can be based on this.

Populations of *P. themistocles* occur in Siskiyou County, California (e.g., Hwy. 89, 1 mi. E Bartle), suggesting that this species may eventually be found in southwestern Oregon. Adults from Siskiyou County are small and fairly pale above, with rather well-defined pale spots on the ventral hindwings. Overall, these adults are more similar to eastern North American populations of *P. themistocles* (e.g., Oklahoma, Arkansas, Tennessee) than they are to *P. s. turneri*, but have somewhat more rounded wings and usually have better-developed markings on the hindwings below.

Biological notes: The present-day occurrence of *Polites themistocles* in Oregon requires confirmation. Pyle (2002: 93) recounted the history behind records from western and northeastern Oregon. The only specimen of *P. themistocles* I have examined from Oregon is a female from "Minam, [Wallowa Co.] 27 July 1945," given to me by Hugh Avery Freeman in 1998. At that time, Freeman did not recall where he had obtained the specimen, although it may have originated with Jim Baker (whose collection, at the United States National Museum, Washington D.C., has not been personally examined; see Tilden 1978, Clarke 1979). It is unknown if this specimen of *P. themistocles* represents a lost or extirpated relictual population in our northeastern mountains and valleys, or if the individual (or temporary population?) arrived in the Minam area through human activities. However, this specimen is likely to represent an authentic record. As illustrated by Howe (1975: pl. 88, #20), specimens of the low-elevation segregate of *Hesperia colorado* from Wallowa County are known to have been sampled at Minam on the same day as the *P. themistocles* female, and *H. colorado*, at least, still occurs there. Pyle (2002: 93) suggested that the record of *P. themistocles* from Corvallis, Benton County (2 July 1925), was the result of a human-assisted introduction.

Scudder (1889b: 1727-1728, 1889c: pls. 66, 77, 80, 85, 86) described and illustrated the early stages of *P. themistocles* from eastern North America. Dethier (1942) provided additional life history notes on *P. themistocles*, and recently, Emmel et al. (1992: 41) and Allen (1997: 331) figured full-grown larvae. Scott (1992: 131) described the early stages of *P. themistocles* from eastern Colorado, where larvae feed mostly on *Poa pratensis*, but also use *Koeleria macrantha* as a larval foodplant. In South Dakota, larvae of *P. themistocles* have been reported to feed on *Panicum* (McCabe & Post 1977: 31).

***Polites sonora* (Scudder, 1872)**
_____(Cascades, Siskiyous) *sonora* Recorded: Clk (E), Cu, **De**, Do (E), HR (S), **Ja**, **Je** (W), **Jo**, **Kl**, **Lin** (E), Lk (W), Mar (E), Mu (E), **Was** (W), Expected: Cos, La (E)
_____(Warners) nr. *flavaventris* Austin, 1998 Recorded: **Lk** (Warners)
_____(Ochocos, Aldrichs, Blues, Wallowas) Recorded: **Ba**, Cr, Gr, Ha (N), Mo (S), Um, **Un**, Wal, **Wh**, Expected: Je (E), Mal (N)
_____(N Coast) *siris* (W. H. Edwards, 1881) Recorded: Cls, Expected: Col?, Ti?, Wan?
_____(Willamette Valley) nr. *siris* Recorded: **Be**, La (C), Lin (W), Mar (W), Mu (W), Ya, Expected: Clk (W), Do (far N), Po, Wan?

Taxonomic notes: *Polites sonora* is geographically variable in Oregon. Populations in the Cascades and Siskiyous represent *Polites sonora sonora* (TL: "Sierra Nevada, California"). Adults of *P. s. sonora* are individually variable in most populations, especially in ventral hindwing color. Despite this, in series, no consistent differences could be seen between populations of *P. s. sonora* from Jackson and Josephine counties, compared to those in the Cascades of Wasco and Hood River counties, and most populations in between. Adults of *P. s. sonora* from central Klamath County (Sand Creek area) average slightly paler above and below than adults from other Cascadian populations. Specimens of *P. sonora* reported from the southern coast (e.g., vic. Wedderborn, 2 mi. N Gold Beach, 27 May 1978, S. Jewett) have not been personally examined, but these are tentatively associated with nearby populations of *P. s. sonora*.

Adults of *P. sonora* from the Warner Mountains, Lake County, are consistently paler above and below than adults from other Cascadian populations (when fresh, and compared in series), and are phenotypically similar to *Polites sonora flavaventris* (TL: Pine Forest Range, Blue Lake Rd., 6.7 rd. mi. W of Nevada State Route 140, Alta Creek Basin, 1829 m, Humboldt Co., Nevada; see Austin 1998e: 525). However, on average, adults from the Warner Mountains are not quite as pale as those of typical *P. s. flavaventris*. Until variation of *P. sonora* in Lake County is better understood, these populations are called *Polites sonora* nr. *flavaventris*. I have not examined specimens of *P. sonora* from northwestern Lake County, and it is unknown how these may relate to populations of *P. s. sonora* in central Klamath County, or *P. s.* nr. *flavaventris* in the Warner Mountains.

Across the mountains of northeastern Oregon (Ochocos, Aldrichs, Blues, Wallowas), a distinctive phenotype of *P. sonora* occurs, that has been erroneously associated with *Polites sonora utahensis* (Skinner, 1911) (e.g., Hinchliff 1994: 29). Adults in these populations are similar to *P. s.* nr. *flavaventris* from the Warner Mountains, but average somewhat darker above and below. The phenotype of *P. sonora* in northeastern Oregon is somewhat similar to *P. mystic*, with which it has been confused (see below), but adults of *P. sonora* are smaller and darker than Pacific Northwestern adults of *P. mystic* (see Guppy & Shepard 2001: 112). Typical *P. s. utahensis* (TL: Park City, [Summit Co.], Utah) is a much darker butterfly than the segregate of *P. sonora* in northeastern Oregon, with a cold grayish-green to grayish ventral ground color, and reduced tawny coloration above. The relationship between populations of *P. sonora* from northeastern Oregon and *P. s. utahensis* requires study across Idaho. All series of *P. sonora* I have examined from Montana are of *P. s. utahensis* (Steve Kohler collection 2004). As noted by Pyle (2002: 95), I have examined the specimens upon which all records of *Polites mystic* (W. H. Edwards, 1863) from Oregon are based (nr. Anthony Lake, 6000', Union Co., 26 July 1945; N of Halfway, Baker Co.: all in OSAC). All of these specimens are of *Polites sonora*.

A single male of *P. sonora* found near the coast in Clatsop County (vic. Camp Rilea), by Dana Ross, appears to represent *Polites sonora siris* (TL: Tenino Prairie, Thurston Co., Washington; see Morrison 1883: 43 and Brown & Miller 1980: 46). Records of *P. sonora* from the Portland area, Multnomah County, are of singleton individuals that could be associated with *P. s. siris* or the segregate of *P. sonora* in the Willamette Valley (see below). For now, records of *P. sonora* from western Multnomah County are mapped with the Willamette Valley segregate. More specimens of *P. sonora* are needed from northwestern Oregon in order to understand local patterns of phenotypic variation, and to clarify the taxonomic status of populations there.

While phenotypically similar to *P. s. siris*, adults of *P. sonora* from the Willamette Valley (e.g., Benton Co. nr. Adair; native prairies in Lane Co.) are larger and somewhat brighter above and below than *P. s. siris*. Some adults from these populations are the largest individuals of *P. sonora* that I have examined from anywhere in the range of the species. Herein, these are tentatively called *Polites sonora* nr. *siris*. Adults of *P. sonora* from Mendocino County, California, historically called *P. s. siris* (e.g., Martin 1943), average darker above and below than those of typical *P. s. siris* or Willamette Valley adults. Much more study of geographic variation in *P. sonora* is needed.

Biological notes: *Polites sonora* is univoltine in Oregon, where it occurs in a wide variety of habitats, but usually in localized populations. Records of *P. sonora* in Oregon range from late May at low elevations, to late August in the mountains, depending on seasonal conditions, and from near sea level (Camp Rilea, Clatsop Co.) to over 6500' (Three Creeks Meadow, Deschutes Co.; Crater Lake area, Klamath Co.; Mt. Ashland, Jackson Co.). A single record of *P. sonora* from November (Portland, Multnomah Co., 28 November 1987, G. Lindberg) has not been duplicated. The male of *P. sonora* from Clatsop County (see above) was found on dunes near the coast. Populations of *P. sonora* in the Willamette Valley occur in native prairies and old fields, and fly mostly in mid- to late June. At higher elevations, *P. sonora* is usually found along small creeks and in moist meadows (e.g., Gate Creek, Wasco Co.; Metolius River, Jefferson Co.; Three Creeks Meadow, Deschutes Co.; Crane Creek, Warner Mts., Lake Co.; Catherine Creek, Union Co.), although some populations are found in dry forested habitats with pumice soil (e.g., Sand Creek, Klamath Co.; La Pine, Deschutes Co.). Male *P. sonora* guard territories from perches at or near ground level, and visit mud. Both sexes of *P. sonora* visit flowers. In Jackson and Josephine counties, *P. sonora* may occasionally be found in highly disturbed habitats such as yards and lawns (Rogue River Community College, Josephine Co., late June 2001, pers. obs.; downtown Medford, Jackson Co., August 2003, Erik Runquist pers comm. 2004).

Larval foodplants of *Polites sonora* in Oregon are unknown, although populations in the Willamette Valley are apparently associated with *Festuca rubra* or *F. idahoensis* (Paul Severns pers. comm. 2004). Newcomer (1967b: 245-246) reared early-instar larvae of *P. sonora* from Washington on *Poa pratensis* and *Festuca.* Scott (1992: 130-131) described the early stages of *P. s. utahensis* from Grand County, Colorado, where adults were found in close association with *Poa pratensis.*

***Ochlodes sylvanoides* (Boisduval, 1852)**

_____(most of state) *sylvanoides* <u>Recorded</u>: all counties
_____(immediate coast) *orecoasta* Scott, 1981 <u>Recorded</u>: all coastal counties
_____(SE deserts) *bonnevilla* Scott, 1981

<u>Taxonomic notes</u>: While several trinomials have been applied to various adult color forms of *Ochlodes sylvanoides*, application of those names to populations in Oregon has proven problematic (see Pyle 2002: 100). Recorded from every county in Oregon, adult phenotypes of *O. sylvanoides* in the state seem correlated more with environmental conditions than with geographic location. Populations along the immediate coast, named *Ochlodes sylvanoides orecoasta* by Scott (1981c: 11) (TL: Cullaby Lake, Clatsop Co., Oregon), have the darkest adults (see Dornfeld 1980: 214-215). However, at some coastal sites, paler individuals resembling *O. s. sylvanoides*, and phenotypic intermediates, can be found flying together with dark adults (e.g., nr. Siletz Bay State Airport, Lincoln Co.).

Inland, populations of *O. sylvanoides* in the western Siskiyous and north Coast Range are highly variable in phenotype (e.g., McDonald Forest, Benton Co.). Here, adults phenotypically like *Ochlodes sylvanoides sylvanoides* (TL: Queen Lily Campground, nr. Belden, N Fork Feather River Canyon, Plumas Co., California; see Emmel et al. 1998i: 20) dominate, but fly in company with darker and much paler individuals. These highly variable populations, apparently referable to O. *s. sylvanoides*, occur at least throughout western Oregon and in the Cascades.

The name *Ochlodes sylvanoides bonnevilla* Scott, 1981 (TL: Ruby Mts., Elko Co., Nevada) was proposed for populations of *O. sylvanoides* with pale adults in the northern Great Basin. More recently, the name *Ochlodes sylvanoides omnigena* Austin, 1998 (TL: Kingston Canyon, 2285 m, Toiyabe Mts., Lander Co., Nevada) was proposed for populations with somewhat darker adults from the east slope of the Sierra Nevada, eastward through central (but not northern) Nevada (Austin 1998e: 526-527). When enough individuals of *O. sylvanoides* are sampled from localities in eastern Oregon, great variation is seen in dorsal and ventral ground color, ranging from very pale to dark. Low-elevation populations of *O. sylvanoides* in the deserts of Harney and Malheur counties (e.g., Leslie Gulch, Malheur Co., 2800'; and to some extent in the Columbia Basin in northern Oregon) do tend to have paler adults than montane populations, on average, and generally match the phenotype of *O. s. bonnevilla*. Adults from higher elevations all over eastern Oregon (3000' to over 6000') average darker than those of *O. s. bonnevilla*, but are variable. A few individuals in these populations resemble *O. s. bonnevilla*, while others resemble *O. s. sylvanoides* or *O. s. omnigena*.

The largest and palest of all *O. sylvanoides* phenotypes occurs in the central Columbia Basin of Grant County, Washington (Pyle 2002: 81, as "*bonnevilla*"), and nearby areas, where adults are easily confused with *Ochlodes yuma* (see Pelham, 1998a,b). Populations phenotypically like those in Grant County have not yet been found in Oregon, but may occur near the Columbia River. Since most populations of *O. sylvanoides* throughout eastern Oregon cannot be comfortably associated with any existing trinomial (even though some individuals in various populations can), most populations in Oregon are herein called *Ochlodes sylvanoides sylvanoides.* Exceptions include dark coastal populations of *O. s. orecoasta*, and consistently pale populations of *O. s. bonnevilla* in the deserts of Harney and Malheur counties. However, due to limited samples from populations in eastern Oregon, no effort has been made herein to map the distribution of the *O. s. bonnevilla* phenotype. Further study of geographic variation in *O. sylvanoides* in Oregon and elsewhere is needed, and long series of adults should be sampled from localities at various elevations in eastern Oregon, whenever possible. The "male" *O. sylvanoides* figured by Pyle (2002: 101, upper left) is a female.

Biological notes: *Ochlodes sylvanoides* is widespread and abundant in Oregon, and occurs in a wide variety of habitats, including forests, open meadows, roadsides, farms, desert washes and yards. Records range from sea level (along the coast) to over 7000' (near Crater Lake, Klamath Co.). Adult *O. sylvanoides* fly in a single annual brood, starting in late June (rare individuals), peaking in late August, and extending into early October. Adults visit a wide variety of flowers, and males visit mud. *Ochlodes sylvanoides* can be abundant on *Cirsium* flowers at some sites (e.g., McDonald Forest, Benton Co.), and the weight of numerous adults on individual flower heads can cause plant limbs to bow.

Comstock (1929b: 27) briefly described a late-instar larva and illustrated a pupa of *O. s. sylvanoides* from California, and Dammers in Emmel & Emmel (1973: 81) illustrated a full-grown larva and pupa, presumably from California. MacNeill (1975: 460) provided additional details on the immature stages. Larval foodplants of *O. sylvanoides* in the region include a wide variety of grasses. Jon Pelham (pers. comm. 2004) has recorded *Pseudoroegneria spicata* ssp. *spicata*, *Agrostis capillaris*, *Danthonia spicata*, *Leymus cinereus*, *L. racemosus*, *L. mollis*, *Elymus alaskanus* ssp. *latiglumis* and

E. trachycaulis ssp. *trachycaulis* as larval foodplants of *O. sylvanoides* in Washington. Scott (1992: 136-139) described the early stages of *O. s. napa* (W. H. Edwards, 1865) from Colorado, and reported immatures from fourteen species of grasses there, including species of *Leucopoa*, *Elymus*, *Bromus*, *Calamagrostis*, *Dactylis*, *Phalaris*, *Phleum* and *Muhlenbergia*. Also see Maeki & Remington (1960b: 40).

Ochlodes agricola **(Boisduval, 1852)**

_____(Siskiyous, far S Cascades) Recorded: Cos (S), Cu, Do (S), Ja, **Jo**, Kl (far SW)

Taxonomic notes: Adults of *Ochlodes agricola* from Oregon are phenotypically somewhat intermediate between *Ochlodes agricola agricola* (TL: between Yellow Bluff and Cavallo Point, 2 mi. SSE Sausalito, Marin Co., California; see Emmel et al. 1998i: 21) and *Ochlodes agricola nemorum* (Boisduval, 1852) (TL: Queen Lily Campground, nr. Belden, N Fork Feather River Canyon, Plumas Co., California; see Emmel et al. 1998i: 21). Adults of *O. agricola* from Oregon average larger than both Californian taxa, tawnier above than *O. a. agricola*, but darker above than typical *O. a. nemorum*. Individuals from Oregon have poorly marked ventral hindwings, like those of *O. a. nemorum*. For now, no trinomial is applied to populations of *O. agricola* in Oregon.

Biological notes: *Ochlodes agricola* is infrequently seen in Oregon. It occurs in chaparral and open woodland habitats in the Siskiyous, from about 900' (various sites) to 4500' (Little Grayback Mt., Josephine Co.). Records from Oregon indicate a single annual brood, from late May to late July. I found *O. agricola* locally abundant near Eight Dollar Mountain (ca. 1400') , Josephine County, on 25 June 2000. Here, males perched on branch tips about 0.5 to 1 meter above ground level, in a deep gully, from which they would guard small areas for passing females (ca. 11:00 to 13:00 hrs.). Multiple male *O. agricola* occupied sites along the entire length of the gully. In June, 2004, I found *O. agricola* at several sites in northern Josephine County (Rogue River drainage, ca. 1100'-1500'), where males guarded roadside perches from 13:00 to 17:30 hrs., sought nectar from roadside *Eriogonum nudum* flowers, and visited mud and wet moss.

Comstock (1927b, also see Comstock 1928a: 70) described the egg and first instar larva of *O. agricola* from California, and Dammers in Emmel & Emmel (1973: 81) illustrated the last-instar larva and pupa. Larval foodplants of *O. agricola* have not been reported. Pyle (2002: 98) stated that the northernmost record of *O. agricola* is from Curry County (Rogue River at Agness, 26 May 2001, Dana Ross, see Shepard 2002: 6). However, this species has been sampled near Canyonville in Douglas County (13 July 1991, Don Severns), which is the actual northernmost record of *O. agricola*.

Ochlodes yuma **(W. H. Edwards, 1873)**

_____(SE basins) *lutea* Austin, 1998 Recorded: **Lk**, Expected: Ha, Mal (S)?

_____(Snake River drainage) Recorded: **Wal** (NE), Expected: Ba (E)?, Mal (NE)?

_____(lower Columbia Basin) Recorded: HR (N), Sh (N), Was (N), Expected: Gi (N), Mo (N), Um (N)

Taxonomic notes: Adults of *Ochlodes yuma* from near Summer Lake, ca. 4100', Lake County (see Hinchliff 1994: 32), are indistinguishable from topotypical *Ochlodes yuma lutea* (TL: Bowman Creek, 1859 m, Toiyabe Mts., Lander Co., Nevada; see Austin 1998e: 527). These adults have paler dorsal and ventral coloration, and heavier black scaling along the wing veins above, compared to those from other Pacific Northwestern populations of *O. yuma*. Additional populations of *O. y. lutea* should be sought in Harney and Malheur counties.

Adults of *O. yuma* from Wallowa County (vic. Imnaha, ca. 1800'-2200') are larger and considerably darker than adults of *O. y. lutea*. These adults are the darkest *O. yuma* seen from throughout the range of the species, excluding the New Mexican *Ochlodes yuma anasazi* Cary & Stanford, 1995, the very darkest of known *O. yuma* segregates (Cary & Stanford 1995). The overall distribution of the segregate of *O. yuma* in Wallowa County is unknown, but it apparently also occurs in parts of the lower Salmon River drainage in Idaho (Jon Shepard pers. comm. 2002).

Recently sampled specimens of *O. yuma* from the lower Columbia River (e.g., Deschutes River at I-84, ca. 100', Wasco and Sherman counties; I-84, 2 mi. E Hood River, Hood River Co., all by Ray Stanford, see Shepard 2001: 7, 2002: 6) are phenotypically similar to adults from the central Columbia Basin, in Grant County, Washington (see Pelham 1988a,b). These adults are similar to those from Wallowa County in size, but are paler above and below, although they are not as pale as adults of *O. y. lutea*. The ventral image of *O. yuma* in Pyle (2002: 103) is of a male, not a female as stated. Also see Tilden (1958b, 1961) and dos Passos (1960: 28-29).

Biological notes: To date, *Ochlodes yuma* is known in Oregon from three widely separated areas (see above). Adults in all populations fly from mid-July through mid-August. Ray Albright first discovered *O. yuma* in Oregon, in Lake County (30 July 1986). Adults are usually found in close association with their primary larval foodplant, *Phragmites australis* (sometimes treated as a synonym of *Phragmites communis*). Saltonstall (2004) demonstrated that two strains of *Phragmites australis* occur in North America including the Pacific Northwest, one native and one non-native. It is assumed that most *O. yuma* populations are associated with native genotypes of *P. australis*, but the extent to which *O. yuma* may also use non-native *P. australis* strains as larval foodplants is not currently known. Additionally, more details on potential non-*Phragmites* larval foodplants of *O. yuma* would be of great interest (see below).

In Lake County (2 August 2003), I found adults of *O. y. lutea* to be locally common near Summer Lake, and many were seen flying among *Phragmites* plants. Male *O. yuma* guarded perches on the tips of *Phragmites* plants, or on leafs at the edges of reed patches. Females spent most of their time flying among the shaded stalks of *Phragmites*, although several were found a considerable distance from reeds, at flowers of *Dipsacus* (teasel). In Wallowa County, *O. yuma* is locally common along the Imnaha River. Here, on 31 July 2001, male *O. yuma* guarded perches near ground level, along roadsides a considerable distance from *Phragmites* patches. This is an "unusual" behavior for *O. yuma*, unless perhaps an alternate foodplant is being used there. Females in Wallowa

County were also fond of *Dipsacus* flowers. Pyle (2002: 103) found adults of *O. yuma* in association with an ornamental grass in a manicured garden, in Klickitat County, Washington, near the Columbia River. Further study at this site is needed to determine if those records represent an isolated occurrence, or if a breeding population is established there. Recent records of *O. yuma* from this area (Hood River, Wasco, Sherman counties, Oregon; see above) suggest that *O. yuma* is an established resident along the Columbia River riparian corridor. The historical absence of records for *O. yuma* from this area could indicate a recent immigration from central Washington (Grant Co.), since adults from the two areas are phenotypically similar.

The early stages of *O. yuma* have not been fully described, but Emmel & Emmel (1973: 82) figured the egg and pupa of Californian *O. y. yuma*. This species should be searched for along the Snake River in Baker and Malheur counties, in the Owyhee River canyon of Malheur County, along the John Day River, and along the Columbia River east of Sherman County. Also see Scott et al. (1977).

***Euphyes vestris* (Boisduval, 1852)**

_____(Siskiyous, N Coast Range, Willamette Valley, Cascades) *vestris* <u>Recorded</u>: **Be**, Clk, Cls, Col, Cos, Cu, De (W), **Do**, **Ja**, **Je** (W), **Jo**, **Kl**, **La**, Li, Lin, Mar, Mu, Po, Wan, Was (W), **Ya**, <u>Expected</u>: HR, Lk (far NW), Ti

<u>Taxonomic notes</u>: After restricting the type locality of *Euphyes vestris* (TL: Spanish Ranch Rd. at Meadow Valley Creek, vic. fire station in Meadow Valley, 3600', Plumas Co., California), Emmel et al. (1998i: 23) treated the taxon *Euphyes vestris osceola* (Lintner, 1878) (TL: Mendocino, [Mendocino Co.], California) as a distinct segregate. However, details of the geographic range of *E. v. osceola* were not discussed, and no detailed comparison with *E. v. vestris* was provided. The diagnosis presented by Emmel et al. (1998i: 23) for *E. v. osceola* simply noted that females have "reduced forewing spots." Although I have not examined long series of topotypical *E. v. vestris* or *E. v. osceola*, Californian specimens examined from Sonoma, Trinity and Siskiyou counties are all very similar, and compare favorably with series from Oregon, where no obvious geographic variation has been detected. Until populations of *E. vestris* in northern California and Oregon are studied in more detail, and the range and taxonomic status of *E. v. osceola* is better defined, all populations of *E. vestris* in Oregon are considered to represent *Euphyes vestris vestris*. Also see Brown & Miller (1980: 77) and Shuey (1994).

<u>Biological notes</u>: *Euphyes vestris* is widespread and sometimes common in Oregon west of the Cascadian crest, but populations on the east slope of the Cascades are more localized. This species is found in a wide variety of habitats, including open fields and weedy roadsides (e.g., nr. Corvallis, Benton Co.), riparian corridors (e.g., Metolius River, Jefferson Co.), and marshy areas dominated by *Darlingtonia californica* (e.g., nr. Eight Dollar Mt., Josephine Co.). Records of *E. vestris* in Oregon range from near sea level (55', Oregon City, Clackamas Co.) to about 5000' (Muddy Spring Creek at Clover Creek Rd., Klamath Co.). The single annual brood of *E. vestris* in Oregon flies from late

May to early September, but most records are from June and July. Both sexes visit a wide variety of flowers (Pyle 2002: 104). Males defend perches, usually less than a meter above ground level.

Larval foodplants of *E. vestris* in Oregon have not been reported, but *Carex* (sedges) are suspected. Scudder (1889b: 1741, 1889c: pl. 66) described and illustrated the egg of eastern North American *E. v. metacomet* (Harris, 1862). Heitzman (1965) described the early stages of *E. v. metacomet* from Missouri, which he reared on *Cyperus esculentus*, and Allen (1997: 333) figured a late-instar larva from West Virginia. Scott (1992: 145-146) described the immatures of *E. v. kiowah* (Reakirt, 1866) from Colorado, and reported various *Carex* species as larval foodplants there. McCabe & Post (1977: 25) reported *Tridens flavus* as an additional larval foodplant for *E. vestris*.

Amblyscirtes vialis **(W. H. Edwards, 1862)**
_____(Cascades, N Coast Range, Ochocos, Aldrichs, Blues, Wallowas) Recorded: **Ba**, **Be**, **Clk**, Cls, **Do**, **Gr**, **HR**, **Ja**, **Je**, **Kl**, **La**, Lin, Mar, **Mo** (S), Mu, Po, Sh, Ti, Um, **Un**, **Wal**, Wan, **Was**, Wh, Expected: Col, Cr (N), De (NW), Gi, Ha (N), Jo (SE), Li, Mal (N), Ya

Taxonomic notes: No geographic variation has been noted across the wide North American range of *Amblyscirtes vialis* (TL: Perryton Twp., Mercer Co., Illinois; see Brown & Miller 1987: 41). The "female" *A. vialis* figured by Pyle (2002: 45) is actually a male.

Biological notes: *Amblyscirtes vialis* is widely distributed in Oregon, but is infrequently seen, probably due to its small size and rapid flight. Adults fly in a single annual brood in Oregon (and elsewhere), from mid-April to late July, although most records are from May and June. Records of *A. vialis* in Oregon extend from near sea level (Tillamook, Tillamook Co.) to about 4400' (several sites in the Blues and Wallowas). Males vigorously defend perches, less than a meter above ground level, often in roadside gullies, small open meadows, or along trails in riparian areas. On 4 June 2004, near Dee, Hood River County, I watched two male *A. vialis* repeatedly dueling over a preferred roadside perch, intermittently, for over two and a half hours (from about 15:30 to 18:00 hrs.). Both sexes of *A. vialis* visit flowers, including *Apocynum* (Fields Creek Canyon, Grant Co.; CSNM, Jackson Co.) and others (Pyle 2002: 106), and newly eclosed males visit mud.

Scudder (1889b: 1583-1585, 1889c: pls. 66, 69, 77, 80, 85) described the immature stages of *A. vialis* from the northeastern United States. Scott (1992: 147-148) described the early stages of *A. vialis* from Colorado, and reported *Elymus canadensis*, *E. trachycaulis*, *Bromus lanatipes*, *B. inermis* and *Phleum pratense* as larval foodplants there. McCabe & Post (1977: 24) listed *Poa pratensis*, *Schizachne purpurascens* (as *Avenae* [*sic*] *striata*), *Agrostis* and *Cynodon* as larval foodplants of *A. vialis* in South Dakota. Details on the immature biology or foodplants of *A. vialis* in Oregon have not been presented.

<u>PAPILIONIDAE</u>: (9 species)

<u>Parnassiinae</u>: (2 species)

***Parnassius clodius* Ménétriés, 1857**
_____(N Coast Range, Cascades, Siskiyous, edges of Willamette Valley) *claudianus* Stichel, 1907 <u>Recorded</u>: **Be**, **Clk**, **Cls**, Col, Cos, Cu, De (far NW), **Do**, **HR**, **Ja**, Je (far W), **Jo**, Kl (W), **La**, Li, **Lin**, **Mar**, **Mu**, **Po**, Ti, Wan, Was (far W), **Ya**
_____(Warners) <u>Recorded</u>: **Lk** (S)
_____(Ochocos, Blues, Wallowas) *altaurus* Dyar, 1903 <u>Recorded</u>: Ba, Cr, **Gr**, Mo (S), Um, **Un**, **Wal**, <u>Expected</u>: Ha (N)?, Mal (N)?, Wh (NE or SE)

<u>Taxonomic notes</u>: *Parnassius clodius* was reviewed by Shepard & Shepard (1975) and Ferris (1977a). Populations of *P. clodius* in western Oregon represent *Parnassius clodius claudianus* (TL: Washington). Individual adults of *P. c. claudianus* show great variation in size, extent and development of wing markings (Shepard & Shepard 1975: 405), but no patterns of geographic variation have been detected among populations in western Oregon. Adults of *P. c. claudianus* are similar to those of *Parnassius clodius clodius* (TL: Bear Valley, Marin Co., California; see Shepard & Shepard 1975: 405), but tend to be more boldly patterned, on average.

Adults of *P. clodius* from the Warner Mountains of Lake County (e.g., Rd. to Drake Peak lookout, ca. 7000') are somewhat smaller and paler than those of *P. c. claudianus*, and are phenotypically similar to *Parnassius clodius baldur* W. H. Edwards, 1877 (TL: Tioga Pass, California; see Brown 1975b: 5) and *Parnassius clodius sol* Bryk & Eisner, 1932 (TL: Baxters, Placer Co., California; see Shepard & Shepard 1975: 405). Adults from the Warners appear to average slightly smaller than those of typical *P. c. sol*, and are similar in size to those of *P. c. baldur*. Until the relationships of populations in the Warner Mountains to *P. c. sol* and *P. c. baldur* are studied in more detail, no trinomial is herein applied to *Parnassius clodius* in the Warners.

Populations of *P. clodius* in northeastern Oregon are referable to *Parnassius clodius altaurus* (TL: Alturus Lake, 7000'-9000', [Blaine Co.], Idaho). Adults of *P. c. altaurus* tend to be slightly smaller than Cascadian adults, dorsal hindwings of males average more immaculate, and colored hindwing spots tend to be small. The taxon *Parnassius clodius shepardi* Eisner, 1966 (TL: Wawawai, Whitman Co., Washington) represents a low-elevation population (or set of populations if the name is broadly applied), apparently derived from *P. c. altaurus* at higher elevations. Low-elevation adults tend to be larger than their montane counterparts, and average better maculated above, usually with larger colored spots on the hindwings. Individuals from low elevations in Baker County were called *P. c. shepardi* by Guppy & Shepard (2001: 123). However, until a detailed review of all *P. clodius* populations in the Pacific Northwest is conducted, the name *P. c. shepardi* is not applied to populations in Oregon. The "male" and "female" captions for *P. clodius* in Pyle (2002: 111), for the lower left and upper right images, have been reversed.

Biological notes: Widespread and common west of the Cascadian crest, males of *Parnassius clodius* frequently patrol along roads and in sunny meadows. Females are often seen around larval foodplants, and both sexes visit a wide variety of flowers (see Pyle 2002: 110). In Oregon, *P. clodius* flies in a single annual brood from early May until mid-September, depending on elevation and seasonal conditions, but most records are from June and July. Adults fly from near sea level (N Coast Range) to about 8000' (e.g., Mt. Thielsen, Douglas Co.; Warner Mts., Lake Co.). In northeastern Oregon, most records of *P. clodius* are from between about 4000' and 7900', but records exist from as low as 1800' (Snake River Canyon, Baker Co.; S Fork Walla Walla River, Umatilla Co.).

Throughout western Oregon, larvae of *P. c. claudianus* feed primarily on *Dicentra formosa* (McCorkle & Hammond 1986: 157, pers. obs. many sites). In the Snake River Canyon, Baker County, *P. clodius* larvae use *D. cucullaria* as a larval foodplant (David McCorkle pers. comm. 2004). In Washington, Jon Pelham (pers. comm. 2004) has recorded *D. cucullaria* and *D. uniflora* as a larval foodplants of *P. clodius*. Pyle (2002: 110) also reported the use of *Dicentra pauciflora* as a foodplant for *P. clodius* larvae. The use of *Corydalis aurea* and/or *C. scouleri* as larval foodplants at sites where *Dicentra* is absent or scarce is strongly suspected (McCorkle & Hammond 1986: 157, Jon Pelham pers. comm. 2004). Early stages of *P. clodius* were first described by Mead (1878: 181) and W. H. Edwards (1885a). Eggs, late-instar larvae and pupae of *P. clodius* were subsequently figured by McCorkle & Hammond (1986: 158), Wright (1993: 21), Tyler et al. (1994: 89-91, also see Tyler 1975), Guppy & Shepard (2001: 123) and Miller & Hammond (2003: 64). Also see T. Emmel & J. Emmel (1963).

***Parnassius smintheus* Doubleday, [1847]**

_____(Siskiyous) *sternitzkyi* McDunnough, 1937 Recorded: **Ja** (S), Jo (S)

_____(Aldrichs, Blues, Wallowas) *magnus* W. G. Wright, 1905 Recorded: Ba, Gr, **Mo** (S), **Um**, Un, **Wal**, Expected: Cr (E), Gi (SE), Ha (N)?, Mal (N), Wh (NE or SE)

Taxonomic notes: *Parnassius smintheus* was reviewed by Ferris (1976a, as *P. phoebus* (Fabricius, 1793)), and more recently by Shepard & Manley (1998), who split *P. smintheus* and *P. behrii* W. H. Edwards, 1870 from Arctic American and Eurasian segregates of *P. phoebus* (also see Bird et al. 1995 and Layberry et al. 1998). Populations of *P. smintheus* in the Siskiyous represent *Parnassius smintheus sternitzkyi* (TL: Castle Lake, Siskiyou Co., California). Adults of *P. s. sternitzkyi* are large and whitish, males tend to be strongly maculated above, and females often have large red spots on the dorsal wing surfaces.

Populations of *P. smintheus* in northeastern Oregon are herein called *Parnassius smintheus magnus* (TL: Enderby, British Columbia), following Guppy & Shepard (2001: 125), who considered *P. s. xanthus* Ehrmann, 1918 (TL: [Moscow, Latah Co.], Idaho) to be a junior synonym of *P. s. magnus* (*contra* Dornfeld 1980: 43, Hinchliff 1994: 36, Shepard & Manley 1998: 718). Adults of *P. s. magnus* average smaller and somewhat creamier than those of *P. s. sternitzkyi*, usually have smaller red spots above, and are variably maculated. Also see Omoto et al. (2004).

Biological notes: Absent from the Cascades in Oregon north of the CSNM (Jackson Co.), *Parnassius smintheus* occurs along the eastern slope of the Cascades in Washington, as far south as Satus Pass, Klickitat County (Ferris 1976a, pers. obs. 2004). In Oregon, adults fly in a single annual brood, from late June to late August, depending on elevation and seasonal conditions, with most records from July. Adults of *P. s. sternitzkyi* in the Siskiyous fly over *Sedum obtusatum*-covered rocky outcroppings, usually above 5000', although individuals may be observed as low as 3900' (Scotch Creek, CSNM, Jackson Co.), and up to 7500' (Mt. Ashland, Jackson Co.). Similarly, adults of *P. s. magnus* are usually found flying along *Sedum*-covered hillsides, ridges and rocky outcroppings, although males can also be seen patrolling along roads and through open meadows at some sites. Records of *P. s. magnus* in Oregon range from 2500' (upper Willow Creek, Morrow Co.) to about 8300' (Mt. Howard, Wallowa Co.). Both sexes visit flowers.

William H. Edwards (1872: [22], pl. [6]) described and illustrated the life history of *P. smintheus* from Colorado, and later (1897: [35-38], pl. [4]), described and illustrated the early stages of *P. smintheus* from a population in Montana (also see W. H. Edwards 1885a). Mead (1875: 743) described the egg of *P. smintheus* from Colorado. Eggs, late-instar larvae, and pupae of *P. smintheus* were figured by Tyler et al. (1994: 91) and Guppy & Shepard (2001: 126). Additional late-instar larvae were figured by Pyle (2002: 113) and Miller & Hammond (2003: 65). Larval foodplants of *P. smintheus* include various species of *Sedum*, including *S. obtusatum* in the Siskiyous (Erik Runquist pers. comm. 2004). In northeastern Oregon, *P. s. magnus* feeds primarily on *S. lanceolatum* (Morrow, Umatilla, Wallowa counties, pers. obs. 2002, 2004). In Washington, larvae of *P. smintheus* feed on *S. lanceolatum* ssp. *lanceolatum*, *S. divergens* and *S. stenopetalum* (Jon Pelham pers. comm. 2004). Also see Maeki & Remington (1960a: 195), Emmel et al. (1971: 234), Guppy (1989), Emmel et al. (1995: 293), Nishida & Rothschild (1995), Keyghobadi et al. (1999, 2003), Roland et al. (2000), Fownes & Roland (2002) and Matter & Roland (2002, 2004).

Papilioninae: (7 species)

Battus philenor **(Linnaeus, 1771)**
_____(rare stray) *hirsuta* (Skinner, 1908) Recorded: Cu?, Ha (S), Ja (S), Kl (S)

Taxonomic notes: The central and northern Californian segregate of *Battus philenor* is *Battus philenor hirsuta* (TL: 9500', Plumas Co., California; see Skinner 1908: 149). Adults of *B. p. hirsuta* differ from those of *B. p. philenor* (TL: America) of the southern United States and much of mainland Mexico, in having long, "hairy" scales on the abdomen, in details of wing shape, and possibly, in details of larval morphology (e.g., Sourakov & Daniels 2002: 64). However, as shown by Fordyce & Nice (2003), *B. p. hirsuta* is genetically very similar to *B. p. philenor*, and appears to have colonized California fairly recently. Also see Tyler et al. (1994: pl. 51).

Biological notes: Like eastern *B. p. philenor*, adults of *B. p. hirsuta* often wander, and strays from California apparently account for the few records from Oregon. At least two individuals of *B. philenor* have been seen in Jackson County (Ashland, ca. 2000', 23 May 1982, M. Burgess; Lower Jenny Creek, nr. Rd. 41-2E-10.1, ca. 2500', CSNM, 7 July 2004, E. Runquist). One specimen exists from Klamath County (Miller Island, 4190', 25 April 1987, S. Summers, OSAC), and a second individual was seen nearby (310 Del Fatti Lane, Klamath Falls, 4105', 7 May 1987, S. Summers). An individual of *B. philenor* was apparently video taped at Fields, Harney County, on 5 June 2004 (*fide* Jeff Gilligan). A record of *B. p. hirsuta* also exists from Curry County (see Pyle 2002: 115). Several specimens of *B. p. hirsuta* labeled from Clackamas County, in OSAC (from the Stanley Jewett collection), may have been reared in Clackamas County, but adult stock was almost certainly obtained elsewhere. Being an unpredictable stray species in Oregon, *B. philenor* should always be watched for, but never expected, in the southwestern counties. Males of *B. p. philenor* sometimes perch on hilltops (e.g., Merritt 1952). Both sexes visit a variety of flowers.

The life history of eastern North American *B. p. philenor* is well known, and immature stages have been described and illustrated by various authors (e.g., Smith & Abbot 1797: pl. 3, W. H. Edwards 1881b, Gruber 1884: 88-89, Comstock 1927: pl. 63, #4, Wright 1993: 75). The only known larval foodplant of *B. p. hirsuta* in California is *Aristolochia californica* (e.g., Sims & Shapiro 1983a: 96, 1983b: 237, 1983c, Fordyce 2000, Fordyce & Nice 2003), a plant that apparently does not occur naturally in Oregon (Kartesz 1999). Late-instar larvae of *B. p. hirsuta* were figured by Sourakov & Daniels (2002: 65) and Miller & Hammond (2003: 58). *Battus philenor* has been a popular study species, and is the model of a Batesian mimicry complex involving various butterflies and moths in eastern North America. For more information, see Kunze (1893), Brower (1958b), Maeki & Remington (1960a: 195), Hazel & West (1979), West & Hazel (1979), Rausher (1980, 1981, 1983), Smith (1982), West (1983), Sims & Shapiro (1984), Gillaspy & Lara (1984), Neck (1986), Papaj (1986), Papaj & Rausher (1987), Rausher & Odendaal (1987), Stamp (1987), Tatar (1991), Emmel et al. (1995: 294), Rausher (1995, and references cited therein), Sime et al. (2000), Fordyce (2001), Fordyce & Agrawal (2001), Sime (2002), Fordyce (2003), Fordyce & Shapiro (2003) and Fordyce & Nice (2004).

***Papilio machaon* Linnaeus, 1758**

_____(E of Cascades) *oregonia* W. H. Edwards, 1876 Recorded: **Ba**, De, Gi, Gr, Ha (S), **Je**, Kl (far N), Lin (far E), Mal, Mo, Mu, **Sh**, Um, **Wal**, **Was**, Wh, Expected: Cr, HR (E), Lk, Un

Taxonomic notes: Differences in species-level taxonomy for the *Papilio machaon* group mostly reflect differences in species concepts between various authors (e.g., Hinchliff 1994: 38, Bird et al. 1995: 99, Layberry et al. 1998: 84, Opler 1999: 132-133, Pyle 2002: 117). The species-level taxonomy of the *P. machaon* group proposed by Sperling (1987, 1993, 2003) and Sperling & Harrison (1994) is followed herein (but also see Eitschberger 1993 and Tyler et al. 1994). All specimens of *P. machaon* examined to date from Oregon are typical of *Papilio machaon oregonia* (TL: vic. Heppner, [Morrow Co.], Oregon; see Brown 1975b: 24). Continued search should be conducted in southern Harney and Malheur counties for possible signs of intergradation with *Papilio machaon bairdii* (W. H. Edwards, 1869) (TL: vic. Fort Whipple, nr. Prescott, Arizona; see Brown 1975b: 14-15), which includes a certain percentage of black adults in its populations. Thus far, only yellow adults have been seen from this region (Barry Sullivan pers. comm. 2004). However, one black adult was reared by David McCorkle (pers. comm. 2004), from a batch of larvae that otherwise produced yellow adults, obtained from south-central Idaho (Goose Creek Rd. at Spring Creek, Cassia Co.). *Papilio machaon oregonia* is the official State Insect of Oregon (see Dornfeld 1980: 128, Pyle 1981: 333).

Biological notes: In Oregon, *P. m. oregonia* regularly occurs in lower-elevation habitats throughout the Columbia and Snake River basins. Records extend from about 85' (The Dalles, Wasco Co.) to 6400' (Three Creeks Meadow, Deschutes Co., 19 July 2003, *fide* Paul Severns), although *P. m. oregonia* is usually encountered below 3800'. Adults fly in two or three annual broods, from mid-March to late June, and in July through September. Males perch on hilltops, and both sexes visit flowers, especially *Cirsium*. Apparently, all records of *P. m. oregonia* from west of the eastern foot of the Cascades (e.g., W Deschutes Co., see above; N Klamath Co.[Davis Lake, 15 July 1956], Linn Co. [Sand Mountain, see Shepard 2000: 12] and Multnomah Co.) represent rare strays from further east.

The larval foodplant for *P. m. oregonia* is *Artemisia dracunculus*, although as noted by J. Emmel & T. Emmel (1963: 192) and Pyle (2002: 117), larvae may be reared on a variety of umbels in the lab. Stretch (1882b) and Newcomer (1964b) described the early stages of *P. m. oregonia*, and Newcomer (1964a: 220) reported *Apanteles lunatus* (Pack.) as a larval parasite. Immatures were subsequently described and/or figured by Perkins et al. (1968: 53), Dornfeld (1980: 40), Tyler et al. (1994: pl. 28a-b), Guppy & Shepard (2001: 130) and Neill (2001: 52). Also see Hagen (1883b), Westcott (1981), McCorkle & Hammond (1989), Emmel et al. (1995: 296), Sperling & Feeny (1995) and Brower & Sime (1998).

***Papilio zelicaon* Lucas, 1852**

_____(most of state) *zelicaon* Recorded: all counties

Taxonomic notes: *Papilio zelicaon* displays subtle patterns of phenotypic variation across Oregon. Adults in western Oregon are referable to *Papilio zelicaon zelicaon* (TL: San Francisco, [San Francisco Co.], California; see Emmel et al. 1998j: 78). At elevations above about 4600' east of the Cascades, adults are consistently smaller and darker than most adults of *P. z. zelicaon* from western Oregon (and low elevations eastward). It is not known if these apparent phenotypic differences reflect genetic differences, or local responses to varied ecological conditions (see Clarke & Sheppard 1970, Shapiro 1995). Since no dark form adults of *P. zelicaon* have been recorded from Oregon to date, the name *Papilio zelicaon nitra* (W. H. Edwards, 1883) (TL: Mt. Judith, Montana; see Brown 1975b: 26) is not applied to any populations in the state. However, smaller adults of *P. zelicaon* from higher elevations in northeastern Oregon closely resemble the yellow form of *P. z. nitra* (= *Papilio gothica* Remington 1968), as seen in the central (e.g., Idaho) and eastern (e.g., Colorado) Rocky Mountains. Further study will be necessary to elucidate relationships between these smaller, high-elevation adults, and their larger, low-elevation counterparts, and to determine if *P. z. nitra* is useful as a trinomial. For now, all populations of *P. zelicaon* in Oregon are called *Papilio zelicaon zelicaon*. Also see Shapiro (1975f), Fisher (1977), Tong & Shapiro (1989) and Sperling (2003).

Biological notes: *Papilio zelicaon* is found in a wide variety of habitats in Oregon, including coastal dunes and wetlands (e.g., Newport, Lincoln Co.), open fields, powerline cuts, urban settings, roadsides (Benton Co.), riparian corridors (e.g., Jones Canyon, Sherman Co.), windy summits high in the Blue Mountains (e.g., Aldrich Mt., Grant Co.), and various basin habitats (e.g., N end of Alvord Desert, Harney Co.; also see Shapiro 1995). Records in Oregon extend from sea level to over 9700' (Steens Mt., Harney Co.). Populations of *P. zelicaon* in southwestern Oregon (e.g., Ashland area, Jackson Co.) and in the Willamette Valley (e.g., Corvallis area, Benton Co.), as well as along the coast, are multivoltine, with adults flying from late February to mid-September. Adults in northeastern Oregon fly in a single annual brood, from mid-April through July or mid-August, depending on elevation and seasonal conditions. Males of *P. zelicaon* are frequently found perching on hilltops (e.g., Mead 1878, Shields 1968: 77, Merritt 1952, Guppy 1953, 1970), and visit mud. Males and females visit a wide variety of flowers (Pyle 2002: 118).

Larval foodplants of *Papilio zelicaon* in the Pacific Northwest and northern California include a very wide range of native and introduced plants, mostly umbels (also see Bird et al. 1995: 102-103, Shapiro 2002: 39, Graves & Shapiro 2003). Wehling (1994, pers. comm. 2004) and Jon Pelham (pers. comm. 2004) have recorded the following larval foodplants, among others, for *P. zelicaon* from Oregon and surrounding regions: *Angelica arguta*, *A. dawsonii*, *A. genuflexa*, *A. hendersonii*, *A. kingi*, *A. lucida*, *Carum carvi*, *Cicuta douglasii*, *C. maculata* var. *angustifolia*, *Conioselinum gmelinii*, *Conium maculatum*, *Pteryxia terebinthina*, *Daucus carota*, *D. pusillus*, *Foeniculum vulgare*, *Glehnia littoralis* ssp. *leiocarpa*, *Heracleum maximum*, *H. mantegazzeanum*, *Ligusticum apiifolium*, *L. grayi*, *Lomatium ambiguum*, *L. bradshawii*, *L. brandegei*, *L. columbianum*, *L. dissectum*, *L. howellii*, *L. macrocarpum*, *L. martindalei*, *L. nudicaule*, *L. simplex* var. *simplex*, *L. suksdorfii*, *L. triternatum* var. *triternatum*, *L. utriculatum*, *Oenanthe sarmentosa*, *Osmorhiza berteroi*, *O. occidentalis*, *Sium suave* and *Zizia aptera* (also see Sperling & Feeny 1995: 301). The life history of *P. zelicaon* is well known, and various authors have described and/or illustrated immatures (e.g., W. H. Edwards 1884d: [26-27], pl. [6], 1885d, 1897: [9-12], pl. [3], Jordan 1894, May 1917, Coolidge 1924a, Comstock 1926c: 85, 1927: 21, pl. 63, #1, Emmel & Emmel 1973: 9). Recently, Tyler et al. (1994: pl. 28a-b), Guppy & Shepard (2001: 132) and Pyle (2002: 119) figured the complete life history of *P. zelicaon*. Also see Maeki & Remington (1960a: 196), Due (1965), Remington (1968), Emmel & Shields (1979), Sims (1979, 1980, 1983a,b), Shapiro (1984), Emmel et al. (1995: 296), Wehling & Thompson (1997) and Brower & Sime (1998).

***Papilio indra* Reakirt, 1866**
_____(NE Cascades, Ochocos, Aldrichs, Blues, Wallowas, Steens) *indra* Recorded: Ba, Cr, Gi, **Gr**, Ha, **Je**, Mal, **Sh**, Um, Wal, Was, Wh, Expected: De (N), HR, Lk (S), Mo, Un
_____(Siskiyous, extreme S Cascades) *shastensis* J. Emmel & T. Emmel, 1998 Recorded: **Ja** (S), **Jo**, **Kl** (far SW), Expected: Cos (S)?, Cu, Do (S)

Taxonomic notes: While *Papilio indra* shows a tremendous amount of geographic variability at the southern end of its range (e.g., California, Nevada, Arizona), populations in Oregon are phenotypically rather similar. Adults of *P. indra* in northern and eastern Oregon resemble *Papilio indra indra* (TL: Pike's Peak, [El Paso Co.], Colorado). Populations in the Siskiyou Mountains, and at the extreme southern end of the Cascades at the CSNM, Jackson County, were recently named *Papilio indra shastensis* (TL: McCloud Bridge Campground, Shasta Lake, Shasta Co., California; see Emmel & Emmel 1998b: 701-702). Adults of *P. i. shastensis* differ from those of *P. i. indra* in usually having narrower yellow wing bands, and reduced yellow overscaling near the base of the forewings, above.

Biological notes: *Papilio indra* occupies a wide variety of basin and forested habitats, from about 300' (nr. Rowena, Wasco Co.) to over 9500' (Steens Mt., Harney Co.). Adults fly in a single annual brood in Oregon, from late March to late July, depending on elevation and seasonal conditions. Males of *P. indra* perch just below hilltops (e.g., Chrome Ridge, 4000', Josephine Co.; Aldrich Mt., 6600', Grant Co.; also see Shields 1968: 77), and fly along desert washes (e.g., nr. Trout Creek, 1500', Jefferson Co.) and roads in forested areas (e.g., Klamath River Canyon, 3600', Klamath Co.). Males also visit mud (e.g., Jones Canyon, ca. 900', Sherman Co.). Females of *P. indra* are most often encountered on or near rocky ridges, among larval foodplants, and at flowers (Pyle 2002: 120).

Larval foodplants of *P. indra* in Oregon and Washington include, possibly among others, *Pteryxia terebinthina*, *Lomatium grayi* and probably *L. martindalei* (Jon Pelham pers. comm. 2004). In California and Nevada, larval foodplants of *P. indra* include *P. terebinthina* (J. Emmel & T. Emmel 1963: 192, Fleischman et al. 1997: 16). Newcomer (1964b) reared *P. indra* from Yakima County, Washington, on *Lomatium grayi*, and described the early stages in detail. More recently, larvae and pupae of *P. indra* were figured by Emmel & Emmel (1973: 11-13), Tyler et al. (1994: pl. 28a-b), Neill (2001: 54), Pyle (2002: 120) and Miller & Hammond (2003: 61). Also see Comstock (1928c: 83-85), Emmel & Emmel (1964, 1967, 1974) and Sperling & Feeny (1995: 301).

***Papilio multicaudata* W. F. Kirby, 1884**
_____(Siskiyous, E and S Cascades, most of E Oregon) *pusillus* Austin & J. Emmel, 1998 Recorded: **Ba**, Cos (S), **Cr**, Cu, **De**, **Do** (S), Gi, **Gr**, **Ha**, **HR** (E), **Ja**, **Je**, **Jo**, **Kl**, La (far NE), **Lk**, **Mal**, **Mo**, **Sh**, **Um**, **Un**, **Wal**, **Was**, **Wh**

Taxonomic notes: From Guatemala to western Canada, *Papilio multicaudata* varies phenotypically along a long, gradual cline. Austin & Emmel (1998a) reviewed *P.*

multicaudata, and named phenotypes at the ends of this cline. Populations of *P. multicaudata* in Oregon are referable to *Papilio multicaudata pusillus* (TL: N end of Independence Mts. (Bull Run Mts.), Nevada State Route 11A, 6.7 rd. mi. E Nevada State Route 226, 1800-2000 m, Elko Co., Nevada), the smallest and yellowest of *P. multicaudata* phenotypes. Tail length on *P. m. pusillus* adults is sometimes reduced, and early season individuals (e.g., 19 April 2003, Pelton Dam, Jefferson Co., 1800') can be very small. Also see Brower (1959b) and Hagen & Scriber (1991).

Biological notes: *Papilio multicaudata* is adapted to a wide variety of habitats east of the Cascades, where adults fly from about 85' (vic. The Dalles, Wasco Co.) to over 8500' (Pueblo Mts., Lake Co.). However, *P. multicaudata* becomes uncommon in the Siskiyous, and is unknown from the Willamette Valley and north Coast Range. Records from the western slope of the Cascades (e.g., H. J. Andrews Forest, nr. Blue River, Lane Co., G. Hawk) presumably represent vagrants from further east. Usually emerging before *P. rutulus* appears, adults of *P. multicaudata* fly as early as late March, and can sometimes be numerous by late April or early May. Apparently, one extended brood of *P. multicaudata* flies in most inhabited parts of Oregon, with adults flying through late August. However, a small second brood may be produced at some localities (e.g., vic. mouth of Deschutes River, Wasco and Sherman counties; CSNM, Jackson Co.). Males visit mud and dung, and patrol along riparian corridors, roads and through urban landscapes. At times, males of *P. multicaudata* are seen at or near hilltops, but they do not seem to perch or persist there. Females are usually seen near larval foodplants, and both sexes visit a wide variety of flowers, especially *Cirsium*.

Larval foodplants of *P. multicaudata* in Oregon mostly include *Prunus virginiana* var. *melanocarpa* in natural settings east of the Cascades. Larvae probably feed on *Prunus subcordata* and/or *P. emarginata* in the CSNM, Jackson County (Erik Runquist pers. comm. 2004). Additional larval foodplants include ornamental trees such as *Fraxinus viridis* (Pyle 2002: 124) and *Ptelea trifoliata* (Grant 1963), in urban and suburban settings. In British Columbia (see McDunnough 1927), larvae of *P. multicaudata* have also been reported to feed on *Amelanchier alnifolia*, although this requires confirmation. The early stages of *P. multicaudata* have been described and illustrated by many authors (e.g., Pronin 1955, Emmel & Emmel 1973: 15, Tyler et al. 1994: pl. 28a-b). Also see Brower (1959a,c) and Emmel et al. (1995: 297).

***Papilio rutulus* Lucas, 1852**

_____(most of state) *rutulus* Recorded: all counties

Taxonomic notes: No consistent geographic variation has been detected among populations of *Papilio rutulus* in Oregon, which are referable to *Papilio rutulus rutulus* (TL: vic. Queen Lily Campground, nr. Belden, N Fork Feather River, 2400', Plumas Co., California; see Emmel et al. 1998j: 78). Occasional adults from Wallowa County (e.g., Freezeout Creek, vic. Imnaha River) have some orangish coloration to the ventral hindwing submarginal macules (Dana Ross pers. comm. 2004). These may indicate some genetic influence from *Papilio canadensis* Rothschild & Jordan, 1906 (TL:

Newfoundland). In parts of southern British Columbia (see Guppy & Shepard 2001: 134), *P. rurulus* and *P. canadensis* are known to hybridize. Also see Gunder (1927), Brower (1959b) and Hagen & Scriber (1991).

Biological notes: *Papilio rutulus* is the most widespread and frequently observed swallowtail in Oregon, occurring from sea level to over 7200' (Steens Mt., Harney Co.). Adults apparently fly in a single annual brood, and records span from mid-April to mid-August. Males of *P. rutulus* patrol along riparian corridors and roads, in open meadows, and through urban and suburban areas. Occasionally, males occur at or near hilltops (e.g., Shields 1968: 77), and males frequently visit mud. Both sexes visit a wide variety of flowers, as noted by Pyle (2002: 122), although they seem especially fond of *Cirsium*.

Larval foodplants of *P. rutulus* in Oregon include many species of *Populus* and *Salix* (e.g., Jones 1936: 30), as well as *Acer* species and possibly *Alnus rubra* (also see Dowell et al. 1990). In Washington, Jon Pelham (pers. comm. 2004) has recorded *Populus tremuloides*, *P. balsamifera* ssp. *trichocarpa*, *Salix amygdaloides*, *S. melanopsis*, *S. exigua*, *S. lucida* ssp. *lasiandra*, *S. l.* ssp. *caudata*, *S. lasiolepis* and *Acer macrophyllum* as larval foodplants of *P. rutulus*. *Salix exigua* is also a larval foodplant of *P. rutulus* in Nevada (Emmel et al. 1971: 234), Colorado (Scott 1992: 5), and undoubtedly elsewhere. Various ornamental tree species are used as larval foodplants of *P. rutulus* in California (Shapiro 2002: 39, Graves & Shapiro 2003: 423-424). The life history of *P. rutulus* is well known, and immatures have been described and/or illustrated by various authors (e.g., H. Edwards 1882, W. H. Edwards 1884d: [54-58], pl. [13], Comstock 1926c: 85, 1927: 22, pl. 63, #2, Sugden & Ross 1963: 17, Emmel & Emmel 1973: 14, Garth & Tilden 1986: pl. 1, o, p). Recently, eggs, larvae and/or pupae of *P. rutulus* were figured by Emmel et al. (1992: 48), Tyler et al. (1994: pl. 28a-b), Guppy & Shepard (2001: 136), Pyle (2002: 122) and Miller & Hammond (2003: 62). Also see Brower (1959a,c), Arms et al. (1974), Wagner (1978), Smith (1982) and Emmel et al. (1995: 297).

Papilio eurymedon Lucas, 1852

_____(most of state, usually near forested areas) Recorded: all counties except the following, Expected: Gi, Sh

Taxonomic notes: Adults of *Papilio eurymedon* (TL: vic. Queen Lily Campground, nr. Belden, N Fork Feather River, 2400', Plumas Co., California; see Emmel et al. 1998j: 78) are phenotypically variable on an individual basis, and no patterns of geographic variation have been detected in Oregon. Some Californian adults examined (e.g., Santa Clara Co.) have somewhat reduced black bands, and a creamier dorsal coloration, compared to most individuals from Oregon. Occasional adults of *P. eurymedon* from higher elevations are somewhat smaller and darker than those from lower sites, and the name *Papilio eurymedon albanus* C. Felder & R. Felder, 1865 (TL: vic. Queen Lily Campground, nr. Belden, N Fork Feather River, 2400', Plumas Co., California; see Emmel et al. 1998g: 88) has sometimes been applied to them (see Comstock 1927: 24, Tilden & Smith 1986: 123, Opler 1999: 141). However, *P. e. albanus* is herein considered to be a synonym of *Papilio eurymedon*, following Emmel et al. (1998g: 88). Females from all populations of *P. eurymedon* frequently have a yellowish ground color, and may appear intermediate in color between males of *P. eurymedon* and *P. rutulus*. Also see Brower (1959b) and Hagen & Scriber (1991).

Biological notes: *Papilio eurymedon* is widespread in Oregon, occupying most forested and chaparral habitats, from near sea level to over 8200' (Warner Mts., Lake Co.). Adults fly in a single annual brood, from mid-April (often slightly before *P. rutulus*) through September, depending on elevation. Males of *P. eurymedon* frequently patrol on hilltops (e.g., Shields 1968: 76, Guppy 1970), ridges, along roads and through riparian corridors. Males also visit mud, where they may congregate in large numbers (e.g., Mead 1878: 180, pers. obs.). Both sexes visit a wide variety of flowers.

Larval foodplants of *P. eurymedon* in Oregon mainly include various *Ceanothus* species, including C. *velutinus*, *C. sanguineus* and C. *integerrimus* (pers. obs.). Additional larval foodplants in the Pacific Northwest reportedly include *Alnus rubra*, *A. incana* ssp. *tenuifolia*, *Amelanchier alnifolia* var. *alnifolia*, *Holodiscus discolor*, *Prunus emarginata* var. *emarginata*, *Frangula purshiana* and possibly *Betula*, among others (Jones 1936: 30, Dornfeld 1980: 42, Jon Pelham pers. comm. 2004; also see J. Emmel & T. Emmel 1963: 191, 193). The life history of *P. eurymedon* is well known, and various authors have described and/or figured immature stages (e.g., Scudder 1870, W. H. Edwards 1884d: [2], pl. [1], Comstock 1926b: 65, 1927: 24, Sugden & Ross 1963: 18, Emmel & Emmel 1973: 14-15). Immatures of *P. eurymedon* have recently been figured by Tyler et al. (1994: pl. 28a-b), Guppy & Shepard (2001: 138), Pyle (2002: 126) and Miller & Hammond (2003: 60). Also see Remington (1952), Brower (1959a,c), Wagner (1978), Emmel et al. (1995) and West (1995).

PIERIDAE: (20 species)

Pierinae: (12 species)

***Neophasia menapia* (C. Felder & R. Felder, 1859)**
_____(Siskiyous, N Coast Range, immediate coast, Cascades, Warners, NE ranges)
menapia Recorded: all counties except three, Expected: Gi, Sh, Wan

Taxonomic notes: A considerable amount of effort has been made trying to detect geographic variation among populations of *Neophasia menapia* in Oregon. To date, no obvious patterns have been seen, although there is a great deal of individual variability among adults in most populations. Throughout the state, red scaling may or may not be present on male hindwings, below. Males of *N. menapia* from the southern and eastern Blue Mountains (Harney and Baker counties) are variable in this trait; some males have obvious red scaling below, others lack it. Adults of *N. menapia* from the Cascades are similarly variable, where about half of examined males have red scales below, and half of the males lack red scales below. This is true from Klamath County in the south to Wasco County in the north. For the most part, males of *N. menapia* in the Siskiyous and north

Coast Range tend to lack red below, but may have a trace of red scales, especially at the hindwing apex. Females of *N. menapia* from across the state are variable below. They may have well-developed red or orangish scaling, or may have essentially none. Red versus orange coloration below in females, as well as the extent of dark scaling along ventral hindwing veins, apparently varies on an individual basis, and does not show a geographic pattern in Oregon. No consistent differences could be seen between adults of *N. menapia* from Oregon and those representing typical *Neophasia menapia* (TL: vic. Davis Creek Park, Washoe Valley, Washoe Co., Nevada; see Emmel et al. 1998g: 88), except that adults of typical *N. m. menapia* are frequently decorated with red/orange coloring below, and those from Oregon are more variable in this trait.

The name *Neophasia menapia tau* (TL: nr. Port Townsend, Washington; see Hagen 1883a: 164) has been applied to populations in the Pacific Northwest lacking red scaling below in males, and with orange or black replacing red below in females (see Austin 1998h: 534, Guppy & Shepard 2001: 141-142). While individual adults representing this phenotype can be seen among series from many localities in Oregon, nowhere in the state does this appear to be a consistent phenotype. However, no British Columbian males examined (from the Jon Shepard collection, OSAC) have red ventral scales. Based on variation seen in Oregon, *N. m. tau* may be treated as a synonym of *N. m. menapia*, or alternatively, populations in Oregon could be considered to represent a broad blend zone between *N. m. menapia* and *N. m. tau*. However, since the lectotype male of *N. menapia* apparently lacks red scaling below (see Emmel et al. 1998g: 93), *Neophasia menapia tau* is herein considered to be a synonym of *N. m. menapia*.

Emmel et al. (1998g: 88) restricted the type locality of *N. menapia* to western Nevada (from "Utah" as previously stated), which left the phenotype in the southern Rocky Mountains with larger adults without a trinomial; these had historically been considered nominate (e.g., Dornfeld 1980: 45, Ferris 1981a: 146). Austin (1998h: 533-534) named the southern Rocky Mountain phenotype *Neophasia menapia magnamenapia* (TL: Wilson Peak Rd., 2134 m, Wilson Creek Range, Lincoln Co., Nevada). Nothing approaching the phenotype of *N. m. magnamenapia* has been seen from eastern Oregon.

Additionally, nothing approaching the phenotype of *Neophasia menapia melanica* Scott, 1981c (TL: W of Willits, Mendocino Co., California) has been reported from coastal habitats in Oregon, but I have not examined specimens from coastal Curry County (e.g., Brookings). Adults of *N. menapia* from near the coast in Lane County (e.g., Florence) appear typical of inland populations. Until further study is conducted on geographic variation in *N. menapia* in the Pacific Northwest, all populations in Oregon are herein called *Neophasia menapia menapia*.

<u>Biological notes</u>: *Neophasia menapia* is single brooded in Oregon, with adults flying from mid-July to mid-October. However, most records are from August and early September. Populations of *N. menapia* exist in most forested parts of Oregon. Males patrol at or below canopy level from at least 9:30 hrs. to 19:00 hrs., and both sexes visit a wide variety of flowers. *Neophasia menapia* undergoes periodic population "explosions" (e.g., Fletcher 1902: 103, Newcomer 1964a, Young 1987, Pyle 2002: 141). During an

outbreak year, it should be possible to record *N. menapia* in all counties in Oregon from which we currently lack records (see above).

Neophasia menapia can be found essentially anywhere pines and firs grow in Oregon, from sea level (coastal dunes with *Pinus contorta* var. *contorta*) to 8000' (E side of Broken Top Mt., Three Sisters Wilderness, Deschutes Co., assoc. *Pinus contorta* var. *latifolia* and/or *P. albicaulis*). Other larval foodplants of *N. menapia* in Oregon include *Pseudotsuga menziesii* (e.g., McDonald Forest, Benton Co.), and probably other conifers. Elsewhere, larval foodplants of *N. menapia* reportedly include *Pinus edulis* (Scott 1992: 21), *Pinus jeffreyi*, *Abies lasiocarpa* (Howe 1975: 376, as *A. balsamea*), *Picea* (Bird et al. 1995: 115), and *Tsuga heterophyla*, as well as introduced pine species (Guppy & Shepard 2001: 142). Evenden (1926) reported localized but severe defoliation of *Pinus ponderosa* by *N. menapia* in Idaho during outbreak years, and (p. 343) reported the ichneumonid *Theronia fulvescens* Cress. as a parasite of *N. menapia* larvae. Immatures of *N. menapia* were described by Stretch (1882a), W. H. Edwards (1897: [410-412]), Evenden (1926), Holland (1931: 276), summarized by Comstock (1926c: 85, 1927: 29), and illustrated by Tilden (1965: 45) and Garth & Tilden (1986: 104). Pyle (2002: 131) figured eggs and a larva of *N. menapia* from Washington, and Miller & Hammond (2003: 67) figured a late-instar larva. Also see Comstock (1924a: 18-19) and Jennings & Toliver (1976).

***Pontia beckerii* (W. H. Edwards, 1871)**

_____(E side Cascades and Siskiyous, eastward; stray elsewhere) Recorded: **Ba**, Clk (E), **Cr**, **De**, Gi, **Gr**, **Ha**, HR, Ja (SE), **Je**, **Kl**, **La** (E), **Lk**, **Mal**, Mar, **Mo**, Po, **Sh**, Um, Un, **Wal**, **Was**, **Wh**, Ya, Expected: Do (as stray), Lin (as stray), Mu (as stray)

Taxonomic notes: No consistent patterns of geographic variation have been observed among samples of *Pontia beckerii* (TL: vic. Virginia City, [Storey Co.], Nevada; see Brown 1973: 115) from Oregon, although the species displays considerable seasonal polyphenism. Adults in the early spring are smaller, with increased green coloration below, compared to summer adults (see Dornfeld 1980: 137). The name *Pontia beckerii pseudochloridice* (McDunnough, 1928) (TL: Oliver, British Columbia) is usually applied to adults of the early spring form. However, summer adults from the Pacific Northwest are sometimes darker below than those from further south (e.g., California) and east (e.g., Colorado), and Tilden & Smith (1986: 126) applied the name *P. b. pseudochloridice* as a trinomial to populations in British Columbia, Washington, northern Idaho and western Montana. Until putative patterns of geographic variation in *P. beckerii* the Pacific Northwest are studied in detail, no trinomials are herein applied to populations in Oregon.

Biological notes: *Pontia beckerii* is common and widespread in eastern Oregon, and occurs in a variety of disturbed and undisturbed arid habitats. Records of *P. beckerii* in Oregon extend from late March through mid-September, in what appears to be two broods at higher elevations, and three or four broods at lower sites. Adult fly from near sea level (85', The Dalles, Wasco Co.) to over 9000' (nr. summit, Steens Mt., Harney Co.). Records of *P. beckerii* from west of the Cascadian crest (e.g., Timothy Lake, Clackamas Co, 12 August 1961; southern Lane Co., ca. 5000', 23 July 2004; Stayton area, Marion Co., July and August 1965; Monmouth, Polk Co., August 1969; Yamhill Co., see Fender 1931) are based on rare strays or temporary colonists from further east, and do not represent persistent populations. Both sexes of *P. beckerii* visit a wide variety of flowers.

Larval foodplants of *P. beckerii* in the Pacific Northwest include at least *Descurainia pinnata* var. *intermedia*, *D. incana* ssp. *viscosa*, *Sisymbrium altissimum*, *Schoenocrambe linifolia*, *Lepidium perfoliatum*, *Brassica nigra*, *Thelypodium saggitatum* and *T. laciniatum* (Jon Pelham pers comm. 2004). Reported larval foodplants of *P. beckerii* in California, among others (see Graves & Shapiro 2003: 425-426) include *Stanleya pinnata* (Powell 1957, Tilden 1957), *Cleome isomeris* (as *Isomeria arborea*, Emmel & Emmel 1973: 16), and in Nevada include *Sisymbrium loeselii*, *Lepidium perfoliatum*, and *Descurainea sophia* (Emmel et al. 1971: 235). The early stages of *P. beckerii* were described in part by Mead (1878). Later, W. H. Edwards (1884d: [73], pl. [14]) described and illustrated a full-grown larva. Coolidge (1923c) provided additional life history notes on *P. beckerii*. A full-grown larva and pupa of *P. beckerii* were illustrated by Comstock (1926c: 86) and Dammers in Emmel & Emmel (1973: 17). An early-instar larva of *P. beckerii* was figured by Neill (2001: 61), and a late-instar larva was figured by Pyle (2002: 132), from Grant County, Washington. Also see Comstock (1924a: 19) and Maeki & Remington (1960b: 46).

***Pontia protodice* (Boisduval & Le Conte, [1830])**
_____(sporadic breeding immigrant; mostly E of Cascades) <u>Recorded</u>: Ba, Be, Clk, **De**, Gr, Ha, Ja, Je, Kl, La, **Lk**, Mal, Po, Um, Un, Wal, Wh, <u>Expected</u>: Cr, Do, Gi, HR, Jo, Lin, Mar, Mo, Mu, Sh, Wan, Was, Ya

<u>Taxonomic notes</u>: No geographic variation has been described for *Pontia protodice* (TL: possibly Screven Co., Georgia), although the species is seasonally polyphenic (see Bean 1877, Shapiro 1968b). The early spring adult form of *P. protodice* (see below) is called *Pontia protodice* form "vernalis" (W. H. Edwards, 1864), which is more heavily marked above and below than forms occurring later in the season. Also see Shapiro (1976a) and Shapiro & Geiger (1986).

<u>Biological notes</u>: *Pontia protodice* is most frequently encountered in Oregon in the southeastern deserts. Even there, it is uncommon or absent most years. All records of *P. protodice* from counties in western Oregon are based on rare stray individuals. This species apparently is not a permanent resident in Oregon, but is one that immigrates from further south on an irregular basis (also see Shapiro et al. 1981: 118). It may produce two or three broods in Oregon during some years. Shapiro (1975h: 122) noted five or six annual broods of *P. protodice* in the Sacramento Valley of California, where it was reported to be a permanent resident. To date, early season phenotypes of *P. protodice* have not been seen from any locality in Oregon, suggesting that the species does not survive winters anywhere in the state. In Oregon, I have found *P. protodice* in highly disturbed roadside habitats (nr. Millican, Deschutes Co., 9 June 2003), and on hillsides

that had burned the previous year (Picture Rock Pass, Lake Co., 2 August 2003). I have observed males patrolling hilltops elsewhere in the species' range (Colorado, New Mexico, Arizona, Mexico; also see Shields 1968: 78). Records of *P. protodice* from Oregon exist from as low as about 250' (Corvallis, Benton Co.) to over 7000' (Strawberry Mt., Grant Co.), and from late May to early October.

Larval foodplants of *P. protodice* include a wide variety of crucifers. Scudder (1889b: 1168) reported *Brassica*, *Lepidium* and *Capsella* as larval foodplants of *P. protodice* in the eastern United States. Scott (1992: 18-19) reported species of *Arabis*, *Sisymbrium*, *Descurainia*, *Thelypodium*, *Schoenocrambe*, *Wislizenia*, *Cardaria*, *Berteroa*, *Rorippa*, *Chorispora*, *Barbarea*, and *Cleome* as larval foodplants, and other genera have been reported (e.g., Emmel et al. 1971: 236, Shapiro 2002: 39, Shapiro 1975h: 122, Shapiro et al. 1981: 118, Guppy & Shepard 2001: 147, Graves & Shapiro 2003: 426). Immature stages of *P. protodice* were described and illustrated by Bethune (1873a), and in greater detail by Scudder (1889b: 1116, 1889c: pls. 65, 76, 79, 84; also see Klots 1951: pl. 6). Comstock (1926c: 87, 1927: 32, pl. 63, #12) described and illustrated the full-grown larva and pupa of *P. protodice* from California. A full-grown larva and pupa were subsequently illustrated by Dammers in Emmel & Emmel (1973: 17). Shapiro (1981d) and Scott (1992: 19) provided additional descriptions of immatures. Late-instar larvae and/or pupae of *P. protodice* have recently been figured by Emmel et al. (1992: 51), Tveten & Tveten (1996: 40) and Allen (1997: 309, 335). Also see Rawson (1945), Abbott (1959), Shapiro (1969, 1970b, 1973c, 1976a, 1978b, 1979c), Priestaff (1972), Rutowski (1979, 1980, 1982, 1984b), Kingsolver (1985, 1987a), Franco et al. (1988) and Wiernasz (1995).

Pontia occidentalis **(Reakirt, 1866)**

_____(most of state; rare in W Siskiyous and N Coast Range) *occidentalis* Recorded: **Ba**, Be, **Clk**, Cls, **Cr**, **De**, Do, Gi, **Gr**, Ha, **HR**, **Ja**, **Je**, Jo, **Kl**, **La**, **Lin**, **Lk**, **Mal**, Mar, **Mo**, Mu, Po, Sh, **Um**, **Un**, **Wal**, **Was**, **Wh**, Ya, Expected: Col, Cos, Cu, Li, Ti, Wan

Taxonomic notes: Populations of *Pontia occidentalis* in Oregon do not display geographic variation, and are referable to *Pontia occidentalis occidentalis* (TL: vic. Empire, Clear Creek Co., Colorado; see Miller & Brown 1981: 70-71). However, *P. occidentalis* does show considerable seasonal variation (see Shapiro 1973e). The early spring adult form of *P. occidentalis* is called *Pontia occidentalis* form "calyce" (W. H. Edwards, 1870), which is more heavily marked above and below than forms occurring later in the season. Also see Chang (1963), Shapiro (1976a,b, 1980b, 1982b), Geiger & Scholl (1985) and Shapiro & Geiger (1986).

Biological notes: *Pontia occidentalis* is widespread in Oregon, and can be common in the Cascades and Siskiyous, eastward. Records from the Willamette Valley and north Coast Range are apparently based on stray individuals or temporary colonists. Two or three annual broods are produced in Oregon, where records for *P. occidentalis* extend from early April to mid-September, and from about 40' (vic. Rooster Rock State Park, Multnomah Co.) to over 9700' (summit of Steens Mt., Harney Co.). Adults occur in most habitat types, and unlike *P. protodice*, *P. occidentalis* is a permanent resident throughout eastern Oregon. Males of *P. occidentalis* are very often found patrolling on hilltops (e.g., Shepard 1966, Shields 1968: 78, pers. obs.), and both sexes visit flowers.

Jon Pelham (pers. comm. 2004) reported *Anelsonia eurycarpa*, *Lepidium perfoliatum*, *L. campestre*, *L. densiflorum* var. *macrocarpum*, *L. virginicum* and *Thelypodium sagittatum* as larval foodplants of *P. occidentalis* in Washington. Shields et al. (1970: 31) and Emmel et al. (1971: 236) recorded ovipositions of *P. occidentalis* on *Thlaspi montanum* var. *montanum* (as *T. alpestre*), *T. arvense* and *Draba cuneifolia* in California and Nevada. Several additional foodplants have been recorded for *P. occidentalis*, including *Sisymbrium altissimum* (Howe 1975: 379), *Cleome serrulata*, *Rorippa teres*, *R. sinuata* (Scott 1992: 20) and others (e.g., Shapiro 1977d: 449, Graves & Shapiro 2003: 426). Early stages of *P. occidentalis* were described by Shapiro (1980a) and Scott (1992: 20). Guppy & Shepard (2001: 148-149) figured eggs, a full-grown larva, and pupa of *P. occidentalis* from British Columbia. Also see Maeki & Remington (1960b: 48), Shapiro (1975c: 275-277, 1975g, 1977b), Kingsolver (1985, 1987a,b, 1995a,b, 1996), Wiernasz (1989, 1995) and Kingsolver & Wiernasz (1991).

***Pontia sisymbrii* (Boisduval, 1852)**
Recorded: Ba, **Cr**, Cu, De, Do (E), **Gr**, **Ha**, **Ja**, **Je**, **Jo**, **Kl**, **Mal**, **La** (SE), **Lk**, Sh, Um, Un, Wal, **Was**, Wh, Expected: Cos (S), Gi, HR, Mo
_____(Siskiyous, S Cascades) nr. *sisymbrii*
_____(SE deserts and ranges) nr. *elivata* (Barnes & Benjamin, 1926)
_____(Columbia River drainage) nr. *flavitincta* (J. A. Comstock, 1924)

Taxonomic notes: Populations of *Pontia sisymbrii* in Oregon show very subtle patterns of geographic variation. Adults from the Siskiyous and southwestern Cascades average large and variably marked above. Females of *P. sisymbrii* from this region are usually yellow. These populations were called *Pontia sisymbrii sisymbrii* (TL: 1 mi. NE of Storrie on Hwy. 70, N Fork Feather River Canyon, 2000', Plumas Co., California; see Emmel et al. 1998i: 8) by Hinchliff (1994: 46). However, when compared to typical *P. s. sisymbrii*, adults from southwestern Oregon are more boldly marked above, and some females are rather dusky (also see Shapiro et al. 1981: 118). Therefore, populations of *P. sisymbrii* in the Siskiyous and southwestern Cascades are herein called *Pontia sisymbrii* nr. *sisymbrii*.

To the east, in Klamath, Lake, Harney, Malheur and Baker counties, adults of *P. sisymbrii* average slightly smaller than those from the Siskiyous and Cascades, and may be somewhat duskier above. Females here are white or yellow, and most lack extensive dark scaling above. Most adults of *P. sisymbrii* in these populations are phenotypically similar to those of *Pontia sisymbrii elivata* (TL: Glenwood Springs, [Garfield Co.], Colorado), although occasional adults are duskier above, with increased dark scaling towards the bases of the wings. For now, populations of *P. sisymbrii* in southeastern Oregon are called *Pontia sisymbrii* nr. *elivata*.

Adults of *P. sisymbrii* examined from Wasco, Jefferson, Crook, Wheeler and Grant counties, in the Columbia River drainage, approach the phenotype of *Pontia sisymbrii flavitincta* (TL: Cranbrook, British Columbia, see Comstock 1924a: 19-20). In these populations, males and especially females tend to have increased dark scaling above, concentrated towards the wing bases. Most *P. sisymbrii* females in these populations are yellow or yellowish. However, when compared to series of typical *P. s. flavitincta* (from the Jon Shepard collection, OSAC), most specimens of *P. sisymbrii* from northern Oregon are not as dusky above, and are phenotypically intermediate between *P. s. flavitincta* and *P. s.* nr. *elivata*. For now, populations of *P. sisymbrii* in the Columbia River drainage are called *Pontia sisymbrii* nr. *flavitincta*.

It appears that a great deal of phenotypic variation exists within populations of *P. sisymbrii* in Oregon, and all potentially applicable trinomials were described from outside of the state. Because of this, no attempt has been made herein to assign trinomials to specific populations in Oregon's counties. Further study is needed to clarify patterns of geographic variation in *P. sisymbrii* in Oregon and elsewhere.

<u>Biological notes</u>: *Pontia sisymbrii* is widespread but locally distributed in most of Oregon. In the southeastern deserts and in the Siskiyous, adults are frequently encountered, but adults of *P. sisymbrii* are less often seen in the Ochoco, Blue, Wallowa and Cascade mountains. In Oregon, *P. sisymbrii* flies in a single annual brood, from late March to early August depending on elevation and seasonal conditions, but most records are from April and May. Records for *P. sisymbrii* in Oregon exist from as low as about 600' (Hat Rock State Park, Umatilla Co.) to over 8000' (Skyline Trail, Mt. Thielsen, Douglas Co.). Males are frequently found patrolling on hilltops (also see Shields 1968: 79 and Shields et al. 1981: 118), but also patrol over open hillsides and along desert washes. Females are usually found around larval foodplants. Both sexes of *P. sisymbrii* visit flowers.

Larval foodplants of *P. sisymbrii* in Washington include *Sisymbrium altissimum*, *Arabis glabra*, *A. furcata*, *A. sparsiflora* var. *atrorubens*, *A. holboelii* var. *retrofracta*, and *A. h.* var. *pinetorum* (Jon Pelham pers. comm. 2004). Emmel et al. (1971: 235) reported *Caulanthus coulteri*, *Streptanthus glandulosus* and *Arabis glabra* as larval foodplants of *P. sisymbrii* in California. Shapiro et al. (1981: 118) reported *Streptanthus barbatus* as a larval foodplant on Mt. Eddy, Siskiyou County, California. Shapiro (1982a) reported *Streptanthus breweri* and *S. tortuosus* as larval foodplants of *P. sisymbrii* elsewhere in California, and others have been reported (e.g., Kellogg 1986). William H. Edwards (1884d: [68], pl. [14]) described and illustrated the immatures of *P. sisymbrii* from southern California. Comstock (1926c: 86, 1927: 30-31) and Dammers in Emmel & Emmel (1973: 17) illustrated and briefly described the egg, full-grown larva and pupa of *P. sisymbrii* from California. Scott (1992: 21) described the early stages of *P. s. elivata* from Colorado, and reported *Arabis glabra*, *A. drummondii* and *Descurainia incana* ssp. *incana* (as *D. richardsonii*) as larval foodplants there. Guppy & Shepard (2001: 146) figured a late-instar larva of *P. sisymbrii* from northern British Columbia. Also see Crowe (1967) and Shapiro (1977a, 1981b).

***Pieris rapae* (Linnaeus, 1758)**
_____(almost everywhere) *rapae* Recorded: all counties

Taxonomic notes: No geographic variation has been described among introduced North American populations of *Pieris rapae*. These populations represent *Pieris rapae rapae* (TL: Sweden). Trinomials have been applied to segregates of *P. rapae* in Japan and north Africa, but morphological differences between named segregates are very subtle. Also see Shapiro (1978b), Vawter & Brussard (1984) and Robbins & Henson (1986).

Biological notes: *Pieris rapae* is one of the most widespread butterflies in Oregon, and can be found in practically all habitats, from sea level to over 8000' (Steens Mt., Harney Co.). Adults are frequently seen in towns and cities, and can be common in other disturbed and undisturbed habitats. Males of *P. rapae* sometimes visit mud, and both sexes visit flowers. Three or more annual broods of *P. rapae* are produced in much of Oregon, depending on elevation and seasonal conditions. Shapiro (1975h: 122) reported six annual broods of *P. rapae* in the Sacramento Valley of California (also see Clark & Clark 1951: 90). *Pieris rapae* is often the earliest flying adult butterfly which does not hibernate as an adult that is seen in towns and cities in Oregon, and records of *P. rapae* in Oregon extend from late February to mid-October. Scudder (1889b: 1175-1190) provided a detailed discussion on the history of the spread of this Eurasian species in North America.

Larval foodplants of *P. rapae* include a wide variety of crucifers, and larvae have at times been reported to be serious pests of some commercial crops, including cabbage, broccoli, cauliflower, radish, collards and others (see references in Vawter & Brussard 1984 and Chew 1995). Genera reported as larval foodplants for *P. rapae* in North America include *Brassica*, *Rorippa* (as *Nasturtium*), *Raphanus*, *Barbarea* (Scudder 1889b: 1210), *Arabis*, *Sisymbrium*, *Lunaria*, *Lepidium*, *Cardaria*, *Cleome* (Emmel et al. 1971: 236, Scott 1992: 17-18, Catling & Brownell 1997), *Malcolmia* (Jon Pelham pers. comm. 2004), and *Tropaeolum* (Guppy & Shepard 2001: 157), among many others (see Shapiro 2002: 38-39, Graves & Shapiro 2003: 245). Life history details of *P. rapae* are very well known (e.g., Bethune 1873a, Scudder 1889b: 1208-1209, 1889c: pls. 65, 68, 72, 76, 79, 84, 86, Comstock 1926c: 87, Klots 1951: pl. 5, Pyle 2002: 141), and the species has proven to be a popular study animal (e.g., Gray 1953, 1954, Hovanitz & Chang 1963, Kolyer 1966a,b, 1969, 1970a,b, 1973, Kolyer & Palmer 1968, citations in Miller 1979, Root & Kareiva 1984, Shapiro 1984, Traynier 1984, Myers 1985, Wourms & Wasserman 1986, Chew 1995 and references therein, Bissoondath & Wilkund 1996, Honda et al. 1998). Recent figures of immature stages of *P. rapae* were provided by Emmel & Emmel (1973: 17), Tveten & Tveten (1996: 42), Allen (1997: 309), Guppy & Shepard (2001: 157), Pyle (2002: 141) and Miller & Hammond (2003: 68). Also see Smyth (1938: 234-236), Maeki & Remington (1960b: 46), Shapiro (1970a), McFarland (1971), Priestaff (1972), Emmel (1973), Smith (1982), Kingsolver (1985) and Franco et al. (1988).

***Pieris marginalis* Scudder, 1861**
_____(N Coast Range, Willamette Valley, W Cascades) *marginalis* Recorded: **Be**, **Clk**, **Cls**, Col, Cos, De (far NW), **Do**, **HR**, Ja (far N), Kl (Crater Lake area), **La**, **Li**, **Lin**, **Mar**, **Mu**, **Po**, **Ti**, Wan, Was (W), **Ya**, Expected: Cu (far N), Je (W)
_____(Siskiyous) *castoria* Reakirt, 1866 Recorded: [Cos], Cu, [Do (SW)?], **Ja**, **Jo**, [**Kl** (far SE)]
_____(Warner Mts., far SE Cascades) Recorded: **Lk**, Expected: Kl (E)
_____(Ochocos, Aldrichs, Blues, Wallowas) *reicheli* Eitschberger, 1983 Recorded: Ba, **Cr**, **Gr**, **Um**, **Un**, **Wal**, Wh, Expected: Ha (N), Je (E), Mal (N), Mo (S)

Taxonomic notes: *Pieris marginalis* is geographically and seasonally variable in Oregon. *Pieris marginalis marginalis* (TL: nr. Port Townsend, Washington; see Hagen 1883a: 164) is found in the north Coast Range, Willamette Valley and western Cascades, barely spilling over the crest onto the east slope of the Cascades at high elevations (see Hinchliff 1994: 49). These populations are double brooded. Adults of the spring generation have narrower wings, and variable amounts of diffused dark scaling along the hindwing veins, below. Occasional spring females of *P. m. marginalis* are yellow or yellowish. The summer form of *P. m. marginalis* is frequently immaculate on both wing surfaces, although females may have some black maculation above. The ventral ground color of both broods tends to be yellowish.

In southern Coos and northern Jackson counties (also presumably in southern Douglas and northern Curry counties, but this requires verification), *P. m. marginalis* apparently blends into *Pieris marginalis castoria* (TL: Castoria [= French Camp], San Joaquin Co., California; see Shapiro 1978b: 199). Populations of *P. marginalis* in the Siskiyous represent *P. m. castoria*. Adults average smaller than those of *P. m. marginalis*, and dark scaling along hindwing veins below appears sharper, with better-defined borders. Ventral ground color of *P. m. castoria* also averages whiter. Above, males may have traces of one or two discal forewing spots (as in females), and dark scaling at the forewing apex and along wing margins is usually well defined.

Adults of *P. marginalis* from the Klamath River Canyon, Klamath County, are apparently intermediate between *P. m. castoria* and the Lake County segregate of *P. marginalis* (also see Shapiro 1986: 341, 1991a: 144). Populations of *P. marginalis* in Lake County are similar to *P. m. reicheli* (see below) in phenotype and individual variation, but have been poorly studied and are not well represented in collections. These populations were first discussed by Shapiro (1986: 341), who considered them to be "endemic" to the Warner Mountains. However, he later (1991a: 144) aligned populations of *P. marginalis* from Ball Mountain, Siskiyou County, California, with the segregate in the Warner Mountains. Adults from these populations vary from poorly marked to immaculate below, and may be seasonally polyphenic (see Shapiro 1986: 341). For now, no trinomial is associated with populations of *P. marginalis* in Lake County, although further comparison of these with populations in northeastern Oregon seems warranted.

Adults of *P. marginalis* from the northeastern mountains, the Ochocos, Aldrichs, Blues and Wallowas, are individually quite variable in appearance, and no consistent differences could be seen between them (*contra* Hinchliff 1994: 49). Adults from this region average smaller than those of *P. m. marginalis*, tend to be paler above and below, and the extent of dark maculation on the ventral hindwings is highly variable. Some spring adults in these populations have fairly heavy dark scaling below, while others are nearly immaculate. Adults from later in the season (see below) tend to be quite pale, and have somewhat rounder wings. The name *Pieris marginalis reicheli* (TL: Revelstoke, British Columbia) was applied to these populations by Guppy & Shepard (2001: 151). While *P. marginalis* in northeastern Oregon had previously been called *Pieris marginalis mcdunnoughi* Remington, 1954 (TL: Silverton, [San Juan Co.], Colorado) by Hinchliff (1994: 49), or close to that taxon by Dornfeld (1980: 46), topotypical adults of *P. m. mcdunnoughi* tend to be slightly paler and average better-developed dark apical forewing markings above. For now, populations of *P. marginalis* in northeastern Oregon are called *Pieris marginalis reicheli*, although the relationship between typical *P. m. reicheli* and populations in northeastern Oregon deserves further study. In addition, the relationship between *P. marginalis reicheli* and *Pieris marginalis pallidissima* Barnes & McDunnough, 1916 (TL: Provo, [Utah Co.], Utah) of the Great Basin requires further study. The captions for "spring female" and "spring male" in Pyle (2002: 139) are reversed. Also see Warren (1961, 1963, 1968), dos Passos (1965), Bowden (1972, 1989, 1991), Shapiro (1978b), Eitschberger (1981, 1983), Shapiro (1985c), Kudrna & Geiger (1985), Ferris (1989c: 19-20) and Geiger & Shapiro (1992).

<u>Biological notes</u>: *Pieris marginalis* is widespread and common in western Oregon, but is local and less common in the Warners and northeastern mountains. Males patrol along roads and riparian corridors, in partly shaded settings, and sometimes visit mud. Both sexes of *P. marginalis* occasionally visit flowers. Records of *P. marginalis* in Oregon extend from the immediate coast, to over 6000' (Warners and Wallowas). In the north Coast Range and western Cascades, *P. m. marginalis* flies in two annual broods, from early March to late June, and early July through mid-September. In the Siskiyous, *P. m. castoria* flies in a single annual brood, from early April to early July. The number of annual broods of *P. marginalis* in Lake County is unclear. Shapiro et al. (1981: 119) noted that populations in the Warners were univoltine, but Shapiro (1986: 341) later described populations in the Warners as being bivoltine (see Shapiro 1986: 341). Records of *P. marginalis* adults from the Warners in Oregon extend from early May to early August. Populations of *P. marginalis* in the Ochocos, Aldrichs, Blues and Wallowas are single or partly double brooded, and number of broods may vary with local or seasonal conditions. The single record of *P. marginalis* from Little Rock Creek, Harney County (Hinchliff 1994: 49), is an error, and refers to an albinic *P. sisymbrii* (see Crowe 1967). However, *P. marginalis* could occur in mountainous areas at the northern end of Harney County. Until it can be confirmed from there, Harney County is not included in the distribution of *P. marginalis*.

Coolidge & Newcomer (1908b) described the early stages of *P. marginalis* from a Californian population. Details on larval foodplant use of *P. marginalis* in Oregon have not been reported, but David McCorkle has found larvae feeding on a species of *Cardamine* in Polk County (Little Luckiamute River, pers. comm. 2004). In Washington, Jon Pelham (pers. comm. 2004) has recorded *Cardamine angulata*, *C. breweri* var.

orbicularis and *Rorippa nasturtium-aquaticum* as larval foodplants of *P. marginalis*. Shapiro (1975e, 1976c: 162) reported *Cardamine californica* (as *Dentaria californica*), *Arabis glabra* and *Lepidium virginicum* var. *pubescens* as larval foodplants of *P. marginalis* in California. Langston (1975a) and Shapiro (1976c) reported on the use of *R. nasturtium-aquaticum* (as *Nasturtium*) as a larval foodplant in California, and various other foodplants are known (Graves & Shapiro 2003: 425). Guppy & Shepard (2001: 152-153) figured a full-grown larva and pupae of *P. marginalis* from British Columbia, reared on *Cardamine pennsylvanica*. Remington (1952: 64) reported larvae of *P. m. mcdunnoughi* on *Thalapsi arvense* in Colorado, and Shields et al. (1970: 31) reported *P. m. mcdunnoughi* from Colorado on *Cardamine cordifolia*. Also see Bowden (1970, 1971), Shapiro (1975b,f, 1977c, 1978b, 1981a, 1982c) and Kingsolver (1985, 1987a,b).

***Euchloe ausonides* (Lucas, 1852)**
_____(S Cascades, Siskiyous, Warners, NE ranges, SE deserts and ranges) *transmontana* Austin & J. Emmel, 1998 <u>Recorded</u>: **Ba**, **Cr**, Cu (E), Do, Gi, **Gr**, **Ha**, **Ja**, Je, Jo, **Kl**, **Lk**, Mal, **Mo**, Sh, Um, Un, **Wal**, **Was**, **Wh**, <u>Expected</u>: Cos (S), De, HR

<u>Taxonomic notes</u>: Populations of *Euchloe ausonides* in Oregon were called *Euchloe ausonides ausonides* (TL: San Francisco, San Francisco Co., California; see Opler 1967e: 191) by Dornfeld (1980: 51) and Hinchliff (1994: 51). Adults of topotypical *E. a. ausonides* are usually large. Males have dark, bold, and prominent apical markings on the forewings above, and most females are quite colorful (see Shapiro 1975h: 137). Many females of *E. a. ausonides* have a prominent pink hue, above and below. Above, on the dorsal hindwing and basal half of the forewing, most female *E. a. ausonides* are pinkish-yellow, and they appear quite dusky overall. Below, female *E. a. ausonides* have a variable amount of pinkish coloration towards the base of the forewing. As noted by Shapiro (1975h: 137) and Shapiro et al. (1981: 120), populations of *E. a. ausonides* are facultatively double brooded in western California at low elevations. No populations of *E. ausonides* in Oregon consistently match the phenotype of typical *E. a. ausonides*, and all are single brooded. Adults of *E. ausonides* from the Siskiyous (e.g., Jackson, Josephine and Douglas counties) average smaller than typical *E. a. ausonides*, and males have more diffused, less prominent apical forewing markings above. Females of *E. ausonides* from the Siskiyous average less colorful than those of *E. a. ausonides*, and generally resemble those from the Great Basin (also see Shapiro et al. 1981: 89).

Populations of *E. ausonides* from the Klamath Falls area (Klamath Co.), northward and eastward, are morphologically similar. Females average somewhat paler than those from further southwest, but often have a yellowish or slightly orangish hue to the dorsal hindwing. Males of *E. ausonides* from eastern Oregon are similar to those from the Siskiyous, although average a bit smaller. Ventral hindwing marbling is individually variable within all populations of *E. ausonides* studied from Oregon, and does not seem useful in assessing geographic variation in the state. Due to the apparent similarity of all populations of *E. ausonides* in Oregon, and the differences noted between Siskiyou populations and typical *E. a. ausonides*, all populations in Oregon are called *Euchloe ausonides transmontana* (TL: Kingston Canyon, 2050 m, Toiyabe Mts., Lander

Co., Nevada; see Austin & Emmel 1998b: 506), pending further study. Note, however, that Guppy & Shepard (2001: 159) applied the name *Euchloe ausonides mayi* F. & R. Chermock, 1940 (TL: Riding Mts., Manitoba) to populations of *E. ausonides* in Oregon (also see Klassen et al. 1989: 67-68, 157, Bird et al. 1995: 129). Further study of geographic variation throughout the range of *E. ausonides* is needed.

<u>Biological notes</u>: *Euchloe ausonides* is widespread in Oregon and can be common in a variety of habitats, from desert washes in the Columbia Basin, to moist montane meadows and canyons (also see Shapiro 1986: 341). Records for *E. ausonides* in Oregon range from about 150' (vic. The Dalles, Wasco Co.) to over 8700' (Pueblo Mts., Harney Co.). The single annual brood of *E. ausonides* in Oregon flies from early April to mid-July, depending on elevation and seasonal conditions. Several adults of *E. ausonides* were sampled in Roseburg, Douglas County, on 4 April 1981 by Nayhart (OSAC), but the current status of the population there is unknown. I have not examined specimens of *E. ausonides* reported from Curry County (10 mi SE Agness, 29 May 1978, Jewett; see Hinchliff 1994: 51).

Larval foodplants for *E. ausonides* in Oregon have not been reported. In Washington, Jon Pelham (pers. comm. 2004) has recorded *Arabis furcata*, *A. sparsiflora* var. *atrorubens*, *A. holboelli* var. *retrofracta*, *A. h.* var. *pinetorum*, *Descurainia pinnata* var. *intermedia*, *D. incana* ssp. *viscosa*, *Schoenocrambe linifolia*, and *Sisymbrium altissimum* as larval foodplants. In addition, Opler (1975: 3-4, also see Remington 1962: 63) reported *Arabis drummondi*, *A. fendleri*, *A. glabra*, *Barbarea vulgaris*, *Brassica nigra*, *B. rapa* var. *rapa* (as *B. campestris*), *Sinapis arvensis* (as *Brassica kaber*), *Descurainia californica*, *Erysimum capitatum*, *Isatis tinctoria* and *Raphanus sativa* as larval foodplants from throughout the range of *E. ausonides*. Other larval foodplants for *E. ausonides* are known (e.g., Shields et al. 1970: 31, Scott 1992: 14-16). William H. Edwards (1884d: [79-80], pl. [15]) described and illustrated a full-grown larva and pupa of *E. ausonides*. Coolidge & Newcomer (1908a) described the early stages of *E. ausonides* from California, and Comstock (1927: 38) illustrated a late-instar larva and pupa. Opler (1975) described early stages of *E. a. ausonides* from Contra Costa County, California, and figured a full-grown larva and pupa. Guppy & Shepard (2001: 160) figured the egg, larva and pupa of *E. ausonides* from British Columbia. Also see Maeki & Remington (1960b: 42), Scott (1975b) and Shapiro (1985b).

Euchloe hyantis (W. H. Edwards, 1871)

_____(Illinois Valley, Josephine Co.) <u>Recorded</u>: **Jo** (S), <u>Expected</u>: Cu (SE), Ja (SW)?
_____(Rogue River drainage) <u>Recorded</u>: **Jo** (N), <u>Expected</u>: Cos (S), Cu (N), Do (S)

<u>Taxonomic notes</u>: *Euchloe hyantis* is represented in Oregon by two morphologically distinct populations, both in Josephine County. The first of these populations occurs in the Illinois Valley. Many records exist from the Eight Dollar Mountain area, south to the vicinity of O'Brien. Adults of *E. hyantis* from this population tend to be small, with very extensive dark green marbling below, and only a trace of yellow scaling along wing veins. Above, dark markings are extensive.

I found a different segregate of *E. hyantis* (21, 23 April 2002; a single worn adult on 2 June 2004; fresh male on 6 March 2005) in the Rogue River drainage of northern Josephine County (ca. 1200'), about 25 air miles north of the Illinois Valley population. Adults in this area average larger, green marbling on the ventral hindwing is paler and greatly reduced, and below, wing veins are decorated with extensive yellowish scaling. Above, dark markings are reduced. In a series of 24 adults sampled from the population in the Rogue River drainage, no individuals approach the phenotype of those from the Illinois Valley. In a series of over 100 specimens examined from the Illinois Valley, only a single male matches the phenotype of the Rogue River drainage population. Much additional study on the relationship between these populations is needed, and the limits of their ranges need to be established. The possibility that these two populations represent separate species cannot yet be ruled out.

As figured by Brown (1973: 36), the female lectotype of *Euchloe hyantis* (TL: vic. Ukiah, Mendocino Co., California; see Brown 1973: 35) appears superficially similar to females from the Rogue River drainage. However, until revisionary studies underway by Paul Opler are completed, no trinomial is applied to any population in Oregon. Considering the dramatic geographic variation seen in Josephine County, it seems premature to associate either phenotype there with populations in Mendocino County, California. Also see Shapiro et al. (1981: 121), Opler (1967b,c,d,e, 1970, 1971, 1975) and Davenport (2003: 14, 2004: 16).

The status of *Euchloe hyantis* in Jackson County is unclear. Hinchliff (1994: 52) plotted two Jackson County records for *E. hyantis*, from "1 mi. W Dead Indian Soda Springs," and "Mt. Ashland" (Hinchliff data notebooks in OSAC). Both of these records are seriously doubted, since research by Erik Runquist has failed to locate this species along Dead Indian Road, in the CSNM, or on Mt. Ashland (a very well studied site), and no specimens from these areas have been located in collections. A single, somewhat stained specimen of *E. hyantis* (Illinois Valley phenotype) labeled from Jackson County was located in OSAC (Cow Creek, 4500', 3 mi. N California border, 16 July 1980, V. McHenry) [this is southwest of Mt. Ashland]. The possibility of mislabeling cannot be ruled out. Further search in southern Jackson County is required to verify the presence of *E. hyantis* there. Until it can be confirmed, Jackson County has been excluded from the distribution of *E. hyantis* in Oregon (above). Also see discussion under *E. lotta* (p. 81), herein.

<u>Biological notes</u>: *Euchloe hyantis* is single brooded. Adults in the Illinois River Valley fly from mid-March to late May, between about 1300'-3500'. These occur in dry meadows and on serpentine hillsides. The population in the Rogue River drainage (at ca. 1200') flies from early March to early June, based on the few occasions I have studied it. This population occurs primarily along a road cut on a steep serpentine hillside. Males from neither population have thus far been seen on hilltops.

No information on immature stages or larval foodplants for populations of *E. hyantis* in Oregon is available. Emmel & Emmel (1974: 345) reported *Streptanthus tortuosus* as a larval foodplant in Placer County, California, and Shapiro (1981d, 1982a) reported *S. tortuosus* as a larval foodplant of *E. hyantis* in Nevada County, California. Opler (1975: 4, 15, 18) figured a full-grown larva of *E. hyantis* from Sierra County and a pupa from Mariposa County, California, and reported *Arabis glabra*, *Streptanthus polygaloides* and *S. tortuosus* as larval foodplants there. In the Trinities of northern California, Shapiro et al. (1981: 121) suspected *Streptanthus*, *Arabis* and *Draba* species as potential larval foodplants of *E. hyantis*. Also see Coolidge (1908a) and Karban & Courtney (1987).

***Euchloe lotta* Beutenmüller, 1898**
_____(E of Cascades and Klamath Basin) Recorded: Ba, Cr, De (NE), Gi, Gr, **Ha**, **Je**, **Kl** (S), **Lk**, **Mal**, Mo, Sh, Um, Was, Wh, Expected: Un, Wal

Taxonomic notes: *Euchloe lotta* (TL: "Colorado, Arizona, Utah, southern California") is currently under study by Paul Opler (also see Opler 1999: 157-158). Subtle patterns of geographic variation seem to exist across the large range of *E. lotta*, from northern Mexico (Chihuahua, Sonora; see Holland 1995) to British Columbia, but no trinomials have thus far been applied to variant populations (also see Opler 1999: 157-158). Across eastern Oregon, no patterns of geographic variation have been seen in *E. lotta*. However, adults in any given population may show considerable individual variation in the extent of dark maculation above, especially in width of the forewing discal cell spot, and in the extent of green marbling below.

I have not examined specimens of *E. lotta* from the immediate vicinity of Klamath Falls, Klamath County (4200'-4500', e.g., Stukel Mt.; Moore City Park; Link River; Cypress Ave.; nr. Oregon Institute of Technology; 310 Del Fatti Lane, all D. Summers). However, I sampled a series of about one dozen adults of *E. lotta* in the community of Sprague River, Klamath County (4400', about 18 air mi. NE of Klamath Falls, late April 2004), which represent *E. lotta*. No adults in this sample were phenotypically intermediate towards either of the *E. hyantis* segregates in Josephine County. Specimens of "*E. hyantis*" reported from the Klamath River Canyon, Klamath County (e.g., Hinchliff 1994: 52), have not been located, and no supporting data for this record could be found in Hinchliff's data notebooks in OSAC (although these are copies and are somewhat outdated). I searched for *E. hyantis* in the Klamath River Canyon in late April, 2004, without success, but fresh male *E. ausonides* were found there in numbers. In addition, Shapiro (1986: 339, 1991a: 146) did not report *E. hyantis* or *E. lotta* from nearby on Ball Mountain, Siskiyou County, California. Assuming that Hinchliff's (1994: 52) report of "*E. hyantis*" from the Klamath River Canyon actually represents *E. ausonides*, and that adults from Klamath Falls are *E. lotta*, Klamath Falls is the western known extent of the range of *E. lotta* in Oregon. Considering the doubtful status of *E. hyantis* in Jackson County (see discussion above, p. 80), the nearest known populations of *E. hyantis* and *E. lotta* in Oregon are separated by about 100 air miles. Further field studies may narrow this gap considerably. Also see Davenport (2004a: 5).

Biological notes: *Euchloe lotta* is most often encountered in Oregon in the southeastern deserts and in the Columbia Basin, where it is sometimes common. It is univoltine, flying from early April to late June, and from about 250' (vic. Boardman, Morrow Co.) to 8700' (Pueblo Mts., Harney Co.). Males of *E. lotta* patrol gullies, sagebrush flats, hillsides and hilltops, and females are usually found around larval foodplants.

Larval foodplants of *E. lotta* in Oregon have not been reported. Coolidge (1925d) described the immatures of *E. lotta* (as *E. creusa hyantis*) from the Mojave Desert, California, where he reported *Caulanthus amplexicaulis* as a larval foodplant. Comstock & Dammers (1932b: 35-35) and Dammers in Emmel & Emmel (1973: 25) described the early stages of *E. lotta* from southern California, and illustrated a late-instar larva and pupa. Opler (1975) described and figured immatures of *E. lotta* from Modoc County, California, reported *Caulanthus crassicaulis* and *Isatis tinctoria* as larval foodplants there, and reported *Stanleya pinnata* as a foodplant in Inyo County, California. Pyle (2002: 145) figured the early stages of *E. lotta* from Wasco County, Oregon. Opler (1975: 5) reported *Descurainia pinnata* var. *nelsonii* and *Sisymbrium altissimum* as larval foodplants of *E. lotta* in Benton County, Washington. Jon Pelham (pers. comm. 2004) has recorded *Arabis furcata*, *A. sparsiflora* var. *atrorubens*, *A. holboelli* var. *retrofracta*, and *Halimolobos whitedii* as larval foodplants of *E. lotta* in Washington. Larvae of *E. lotta* may also feed on other cruciferous plants.

***Anthocharis sara* Lucas, 1852**

Recorded: **Ba**, **Be**, **Clk**, Cls, Col, Cos, **Cr**, Cu, De, Do, Gi, **Gr**, **Ha**, **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, **Lin**, **Lk**, **Mal**, Mar, **Mo**, **Mu**, **Po**, Sh, Ti, **Um**, **Un**, **Wal**, Wan, **Was**, **Wh**, Ya,
Expected: Li (E)
_____(Siskiyous) *sara* Recorded: Cos (S), Cu, [Do (S)?], **Ja**, **Jo**, [**Kl**?]
_____(E of Cascadian crest) nr. *stella* W. H. Edwards, 1879
_____(N Coast Range to Cascadian crest) *flora* W. G. Wright, 1892

Taxonomic notes: The *Anthocharis sara* complex is currently being studied by Paul Opler. There is evidence to suggest that more than one species may be represented by the name *A. sara* in Oregon, but until the results of Opler's research are presented, populations in Oregon are treated as a single species herein. Adults from the Siskiyous closely resemble *Anthocharis sara sara* (TL: Queen Lily Campground, nr. Belden, N Fork Feather River, 2400', Plumas Co., California; see Emmel et al. 1998j: 79). These adults tend to be small, and males have red-orange forewing apical patches above, against a white ground color. Most females are whitish, although some are yellowish or yellow. Ventral hindwing marbling in these adults tends to be very extensive and dark. The relationship of *A. s. sara* to *Anthocharis* populations further north and east is unclear. A long series of adults obtained in the Klamath River Canyon, Klamath County (April, 2004), showed considerable variation in the coloration and extent of hindwing marbling, and phenotypes apparently ranged from those of *A. s. sara* to *A. s.* nr. *stella* (see below).

Adults of *A. sara* throughout most of eastern Oregon tend to have reduced, and lighter green ventral hindwing marbling, and the apical patch on male forewings above tends to be orange. Males throughout eastern Oregon may be white, creamy or yellowish above, and females are usually mostly or entirely yellow, with fairly heavy dark markings. These populations have been called *Anthocharis sara stella* (TL: Marlette Peak, Carson Range, Washoe Co., Nevada; see Brown 1973: 41-42) by various authors (Dornfeld 1980: 50, Hinchliff 1994: 53, Opler 1999: 160, Guppy & Shepard 2001: 166). Pyle (2002: 148) did not apply the name *A. s. stella* to populations east of the Cascades (though did not specify what they should be called), claiming that topotypical *A. s. stella* was of a different phenotype. In Oregon, males from Klamath and Lake counties (including the Warner Mts.) average yellower above than males from other populations in eastern Oregon. While they are phenotypically similar to *A. s. stella*, they were not called *A. s. stella* by Shapiro (1986: 341, 1991a: 144). Moving north and northeast of here, the percentage of yellowish males decreases gradually. Some adults in eastern Oregon are phenotypically intermediate between *Anthocharis sara stella* and *Anthocharis sara browningi* Skinner 1906 (TL: Brightons, Utah, and City Creek Canyon, nr. Salt Lake City, Utah). Occasional individuals from Baker and Wallowa counties approach the phenotype of *A. s. browningi*, with substantially reduced dark markings above, and reduced marbling below, on both sexes. However, in northeastern Oregon, individuals resembling *A. s. browningi* are found together with better-marked individuals resembling *A. s. stella* wherever they fly, along with phenotypic intermediates. Because the intensity and occurrence of yellowish males seems to vary along a gradual cline in eastern Oregon, and due to the morphological variability seen in northeastern Oregon, all populations in eastern Oregon are herein called *Anthocharis sara* nr. *stella*, until the situation can be resolved in more detail. Also see Geiger & Shapiro (1986)

Populations along the Cascadian crest (e.g., Tombstone Prairie, Linn Co.) are mostly like those of *A. s.* nr. *stella*, but occasional adults are larger, and ventral hindwing marbling may be darker and more extensive. Moving to lower elevations in the western Cascades, Willamette Valley and north Coast Range, adults of *A. sara* average larger in size and have slightly increased dark markings above and below, but are otherwise similar to *A. s.* nr. *stella*. These populations represent *Anthocharis sara flora* (TL: Tenino, [Thurston Co.], Washington; see Wright 1905: 109). While most males of *A. s. flora* are white, some yellowish males have been examined (e.g., Clackamas and Linn counties). Females of *A. s. flora* tend to be mostly or completely yellow, and some individuals are quite large. While the relationship between *A. s. sara* and *A. s. flora* requires extensive study throughout Douglas, Jackson, Josephine and Klamath counties, there is little doubt that populations of *A. s. flora* and *A. s.* nr. *stella* in Oregon are conspecific. Differences between the two taxa mostly include average size and darkness below. Since high-elevation Cascadian populations cannot be easily assigned to either *A. s.* nr. *stella* or *A. s. flora*, for mapping purposes (above), no attempt has been made to differentiate populations representing those two names.

<u>Biological notes</u>: In Oregon, *Anthocharis sara* is widespread and sometimes common, occurring in a wide variety of habitats (Pyle 2002: 148). Adults are frequently seen along roadsides and in open meadows, and both sexes occasionally visit flowers. Populations are currently known from all counties except Lincoln. Records of *A. sara* in Oregon extend from near sea level (but not on the immediate coast), to over 7800' (Strawberry Mt., Grant Co.). The single annual brood of *A. sara* in Oregon flies from

late February to mid-August, depending on elevation and seasonal conditions, with most records from April to June.

From Washington, Jon Pelham (pers. comm. 2004) has recorded the following larval foodplants for *A. sara*: *Arabis glabra*, *A. eschscholtziana*, *A. furcata*, *A. puberula A. sparsiflora* var. *atrorubens*, *A. holboelli* var. *retrofracta*, *A. h.* var. *pinetorum*, *Cardamine angulata* and *C. breweri* var. *orbicularis*. Shapiro (1982a) reported *Streptanthus tortuosus*, *S. breweri* and *S. glandulosus* as larval foodplants of *A. sara* in the Sierra Nevada of California. Additional larval foodplants are known (e.g., Emmel & Emmel 1974: 345, Pyle 2002: 148, Graves & Shapiro 2003: 420). Coolidge and Newcomer (1909) described the early stages of Californian *A. sara*. Comstock (1927: 43) described and illustrated the pupa of *A. sara* from California, and Comstock (1932b: 90-92) described and illustrated other early stages. Dammers in Emmel & Emmel (1973: 22) illustrated a full-grown larva and pupa of *A. sara*, also from California. Guppy & Shepard (2001: 164) figured an egg and full-grown larva of *A. s. flora* from British Columbia, and a pupa of *A. s. flora* from Polk County, Oregon. Neill (2001: 64) figured the egg, full-grown larva and pupa of *A. s.* nr. *stella* from eastern Oregon. A late-instar larva was also figured by Miller & Hammond (2003: 66), but its origin was not stated. Also see W. H. Edwards (1897), Opler (1967a), Dornfeld (1971) and Shapiro (1981a,c).

Anthocharis lanceolata **Lucas, 1852**

_____(Siskiyous, S Cascades, Warners) *lanceolata* Recorded: Cu, Do (S), **Ja**, **Kl** (SW), **Lk** (S), Expected: Cos (S)

Taxonomic notes: Populations of *Anthocharis lanceolata* in Oregon do not display geographic variation, and apparently represent *Anthocharis lanceolata lanceolata* (TL: Hwy. 70 at Soda Creek, E branch of N Fork Feather River Canyon, 2500’, Plumas Co., California; see Emmel et al. 1998j: 78).

Biological notes: *Anthocharis lanceolata* is an uncommon species in Oregon. Males patrol along roadsides and in sunny meadows in the Siskiyous and Warners. For unknown reasons, females of *A. lanceolata* are rarely encountered in Oregon. Records of *A. lanceolata* in Oregon extend from about 1400’ (W of Selma, Josephine Co.) to over 5500’ (CSNM, Jackson Co.; also in Warner Mts., Lake Co.). The single annual brood of *A. lanceolata* flies from late April to mid-July.

Immature stages of *A. lanceolata* were described by Mead (1878: 183), W. H. Edwards (1897: [63-64], pl. [5]) and Coolidge (1908b: 130, 1910: 315), and were subsequently described and illustrated by Comstock (1927: 39-40, pl. 63, #10). Larval foodplants for *A. lanceolata* have been reported to include *Arabis sparsiflora* var. *arcuata* (Comstock 1927: 41), *A. perennans* (Emmel & Emmel 1973: 24), *A. glabra*, *A. holboelli* var. *retrofracta* (Shapiro et al. 1981: 120) and *Streptanthus howellii* (Shapiro 1985a). An apparent hybrid between *A. lanceolata* and *A. sara* was taken in Jackson County, by Erik Runquist (pers. obs., also see Comstock 1929a, Shields & Mori 1979).

Coliadinae: (8 species)

***Colias philodice* Godart, 1819**
_____(most of E Oregon) *eriphyle* W. H. Edwards, 1876 Recorded: Ba, Be?, Clk?, Col?, **Cr**, **De**, Gr, **Ha**, HR, **Ja**, **Je**, **Kl**, La?, **Lin**, **Lk**, **Mal**, **Mo**, Mu?, Sh, **Um**, Un, **Wal**, **Was**, Wh, Expected: Do (E), Gi, Jo (for confirmation), Po, Wan, Ya

Taxonomic notes: Populations of *Colias philodice* in Oregon have been called *Colias philodice eriphyle* (TL: Lake Labache (= Lac la Hache), British Columbia; see Brown 1973: 87) by most authors (e.g., Dornfeld 1980: 48, Hinchliff 1994: 55). As noted by Guppy & Shepard (2001: 169), further study of relationships between taxa associated with *C. philodice* is warranted. No geographic variation has been detected across populations of *C. philodice* in Oregon, although individuals are individually and seasonally variable. Males of *C. philodice* do not reflect ultraviolet light (e.g., Silberglied & Taylor 1973, 1978). Apparently, some hybridization with *C. eurytheme* occurs (e.g., Hovanitz 1949, Ae 1959, Shapiro 1986: 341, Ferris 1993: 56-58). Hybrid males, usually with some orange scaling above, are easily confused with yellow or yellowish *C. eurytheme*, but do not reflect ultraviolet light (Ferris 1993: 58-59). The ventral image of a male "*C. philodice*" in Pyle (2002: 155, upper right) is apparently of a male *C. occidentalis*. Also see Pollock et al. (1998).

Biological notes: Records for *Colias philodice* in Oregon extend from near sea level (ca. 50', Hood River Co.) to over 8000' (Steens Mt., Harney Co.; Light Peak, Lake Co.), and from early April to early October. Three or more annual broods of *C. philodice* may be produced east of the Cascadian crest, where it is a common and widespread species in disturbed habitats. At times, *C. philodice* may also be common in native montane habitats (e.g., Ochoco Mts., Crook Co.). Records of *C. philodice* from west of the Cascadian crest (e.g., Corvallis, Benton Co., 31 July 1906; nr. Milwaukee, Clackamas Co., 29 May 1934; SW of Clatskanie, Columbia Co., 7 October 1978; vic. Rooster Rock State Park, Multnomah Co., August and October 1961; nr. Huckleberry Lake, Lane Co., 28 July 1995, see Shepard 1996: 10), if valid, apparently represent rare stray individuals or temporary colonists from further east; no permanent populations in this region are known. I have not examined any of the specimens upon which these records are based, and the possibility that some or all of them are actually yellow or yellowish *C. eurytheme* cannot be ruled out. The single record of *C. philodice* from Josephine County (Jumpoff Joe Creek, 20 June 1976) apparently refers to the male of *C. occidentalis* nr. *chrysomelas* from that locality (see discussion under *C. occidentalis*, p. 88). The record of *C. philodice* from Mount Angel, Marion County (6 September 1964) apparently refers to yellowish *C. eurytheme* (Jon Pelham pers. comm. 2004). Until *C. philodice* is confirmed from Josephine and Marion counties, they have been excluded from its distribution.

The life history of *C. philodice* is very well known (e.g., Saunders 1869a: 54-55, Bethune 1873b, W. H. Edwards 1884d: [94-96], pl. [18], Scudder 1889b: 1115-1117, 1998c: pls. 65, 68, 72, 76, 79, 84, 87; also see Klots 1951: pl. 5, Allen 1997: 311 and Guppy & Shepard 2001: 169), and like *C. eurytheme* (see below), *C. philodice* has been a popular study species (e.g., Gerould 1911, Remington 1954, 1955, Kolyer 1967, citations in Miller 1979, Grula & Taylor 1979, 1980a, b, Taylor et al. 1982, Kingsolver 1983a,b, Tabashnik 1983, Marshall 1985, Springer & Boggs 1986, Karowe 1990, Boggs 2003). *Medicago sativa* (alfalfa) is a commonly used larval foodplant of *C. philodice* in agricultural settings, but a variety of native foodplants are also used, including various species of *Trifolium*, *Baptisia*, *Vicia*, *Astragalus*, *Lathyrus*, *Melilotus*, *Hedysarum*, *Lupinus* and *Thermopsis* (Scudder 1889b: 1120-1121, Emmel et al. 1971: 237, Tabashnik 1983, Scott 1992: 11, Graves & Shapiro 2003: 421, Jon Pelham pers. comm. 2004). Also see discussions under *C. eurytheme*, Ae (1958a), Maeki & Remington (1960b: 42) and Watt et al. (1979).

Colias eurytheme **Boisduval, 1852**

_____(sporadic resident; breeding immigrant) Recorded: all counties

Taxonomic notes: No geographic variation is seen in *Colias eurytheme* (TL: Sacramento, Sacramento Co., California; see Emmel et al. 1998i: 8) in Oregon, or apparently, elsewhere in its range. However, adults of both sexes display considerable individual and seasonal variation (see Clark & Clark 1951: 97-106, Ae, 1958b, Hoffmann 1973). Males of *C. eurytheme* reflect ultraviolet light (e.g., Kolyer & Reimschuessel 1969, Silberglied & Taylor 1973, 1978, Ferris 1993: 56-58), and occasional males are yellow or partly yellow above (e.g., Davenport 2003: 15). The ventral image of a "female" *C. eurytheme* in Pyle (2002: 157) is of a male. Also see Pollock et al. (1998).

Biological notes: *Colias eurytheme* is known from all counties in Oregon, and occurs from sea level (along the coast) to over 9000' (Steens Mt., Harney Co.), in all types of habitats. Records of *C. eurytheme* from Oregon extend from late February (23 February 2005, Lane Co., pers. obs.) to mid-December (18 December 2004, vic. Tillamook, Tillamook Co., Fred Ramsey). Despite this, *C. eurytheme* is probably not a permanent breeding resident in all of Oregon. Most years, *C. eurytheme* apparently persists in the Rogue River Valley (fresh spring-form adults from Medford, 2 May 1970, OSAC), the lower Columbia Basin (two sites in Wasco Co., May, 1966, OSAC), the Willamette Valley (vic. Eugene, Lane Co.; McMinnville, Yamhill Co., May 1927, Fender, OSAC; Mount Angel, Marion Co., Jon Pelham pers. comm. 2004) and perhaps elsewhere. Spring-form adults of *C. eurytheme* are known from Richland, Benton County, Washington, from several different years (15, 26 April 1961, 28 April 1963, OSAC), indicating that *C. eurytheme* may survive winters in this area on a fairly regular basis. However, spring-form adults of *C. eurytheme* have not been seen from southeastern Oregon, the high Siskiyous, or the Cascades. According to Ae (1958a), larvae of *C. eurytheme* do not diapause, and continue to feed throughout the winter. While small populations appear to persist in warmer parts of Oregon following warm winters, these may or may not be maintained through colder winters.

Regardless of its over winter status in Oregon, *C. eurytheme* repopulates the state each year with immigrants from the south, in variable numbers. Some years, immigrants are sparse. Other years, *C. eurytheme* can be seen just about anywhere in the state, where it may produce as many as three or four broods. Immigrants of *C. eurytheme* have no problem finding acceptable larval foodplants in disturbed habitats, since *Medicago sativa* (alfalfa) is a preferred larval foodplant. Because of this, *C. eurytheme* can be considered one of Oregon's most successful immigrant species, even if it is also a sporadic resident (e.g., Pyle 2002: 156). Some years, adults of *C. eurytheme* are common during the late summer and fall, especially in and around alfalfa fields. I have witnessed migratory movements of *C. eurytheme* in the CSNM of Jackson County (upper Scotch Creek Canyon, 7 June 2000), where about 20 worn adults were seen during the day, intermittently, flying north over a hillside pass. In the eastern United States, a region apparently colonized by *C. eurytheme* in the past century (e.g., Clark & Clark 1951: 106-111), larvae may sometimes be a minor pest of cultivated alfalfa (e.g., Iftner et al. 1992: 79). However, *C. eurytheme* probably does not cause economic damage to alfalfa as far north as Oregon (also see Guppy & Shepard 2001: 171).

Not surprisingly, the life history of *C. eurytheme* is very well known (e.g., W. H. Edwards 1872: [44], 1884d: [104-106], pl. [20], Scudder 1889b: 1129-1130, 1889c: pls. 65, 76, 79, 84, Comstock 1927: 50; also see Klots 1951: pl. 6, Tveten & Tveten 1996: 50 and Allen 1997: 311, 335), and *C. eurytheme* has proven to be a popular study animal (e.g., Hovanitz 1944 also see citations in Miller 1979, Allen & Smith 1958, Leigh & Smith 1959, Stern & Smith 1960, T. Emmel & J. Emmel 1963, Watt 1964, 1967, 1969, Burns & Johnson 1967, Kolyer 1967, Levin & Berube 1972, Sherman & Watt 1973, Grula & Taylor 1979, 1980a, b, Tabashnik et al. 1981, Taylor et al. 1982, Kingsolver 1983b, Marshall 1985, Rutowski & Gilchrist 1986, Hayes & Claussen 1988, Sappington & Taylor 1990 and Watt 2003 plus references therein). Besides *Medicago sativa* (alfalfa), *C. eurytheme* feeds on a wide variety of native and introduced legumes, including, among others, species of *Trifolium*, *Melilotus*, *Baptisia* (W. H. Edwards 1872: [44], Allen 1997: 64), *Vicia* (Emmel et al. 1971: 237), *Astragalus*, *Lupinus*, *Glycyrrhiza* (Scott 1992: 9), *Lotus* (Pyle 2002: 156), *Sphaerophysa* and *Thermopsis* (Remington 1952: 65, Jon Pelham pers. comm. 2004). Also see Comstock (1926a), Ae (1958a), Abbott (1959), Clench (1970: 117-118), Shapiro (1979a), Graves & Shapiro (2003) and discussions and citations under *C. philodice*.

***Colias occidentalis* Scudder, 1862**

_____(N Cascades) nr. *occidentalis* <u>Recorded</u>: Clk (E), De (NW), Do (far E), Gi (N), **HR**, Je (W), La (far NE), Lin (E), Mar (W), Mu (E), Sh, **Was**, Ya
_____(far E Siskiyous, far S Cascades) nr. *chrysomelas* Hy. Edwards, 1877 <u>Recorded</u>: **Ja** (S), Jo (N), Kl (far SW)

<u>Taxonomic notes</u>: *Colias occidentalis* is herein separated from *C. christina* based on two consistent characters, males which apparently always lack ultraviolet reflective scales on the dorsal wing surfaces, and the absence of orange dorsal coloration on adults in any known population (Ferris, 1993). All other morphological traits of the adult phenotypes detected to date, across these two taxa, are variable and can only be expressed as a percentage of difference between populations. Clearly, *C. occidentalis* and *C. christina* are very closely related, and occupy similar ecological niches. With so few

consistent morphological or biological characters in this complex of highly variable butterflies, future molecular studies are needed to help clarify relationships between northwestern populations in the *C. occidentalis-christina* group. Until character information from a source (e.g., DNA sequence data, see Brunton 1998, Pollock et al. 1998) other than adult phenotype and host associations is available, relationships will remain somewhat ambiguous, and authors with different species concepts will continue to disagree about how to classify these butterflies (e.g., Gillette 1989, Hammond & McCorkle 2003). It is, however, acknowledged that, based on our current state of knowledge, reasonable arguments exist for treating *C. occidentalis* and *C. christina* as one, or two species.

Populations of *C. occidentalis* in the northern Cascades (concentrated on the east slope) are similar to *Colias occidentalis occidentalis* (TL: nr. Port Townsend, Washington; see Hagen 1883a: 164, Ferris 1988a:19 and Pyle 2002: 159), although adults average slightly larger. Females in these populations are yellow or creamy above, but pale white females have not been seen. These populations extend north to Chelan County, Washington, and are herein called *Colias occidentalis* nr. *occidentalis*. Populations at the southern tip of the Cascades, including those in the CSNM and lower slopes of Mt. Ashland in Jackson County, have been called *Colias occidentalis chrysomelas* (e.g., Hinchliff 1994: 57). However, as noted by Ferris (1993: 36), adult phenotypes in this area are highly variable, and average intermediate between those of *C. o. chrysomelas* (TL: Napa County, California; see Ferris 1993: 38) and the north Cascadian *C. o.* nr. *occidentalis*. Some adults closely resemble *C. o. chrysomelas*, others are most like *C. o.* nr. *occidentalis*, and many intermediate forms occur (also see Klots 1975: 359). These populations apparently represent a zone of intermediacy between typical *C. o. chrysomelas* and *C. o.* nr. *occidentalis*, and are herein called *Colias occidentalis* nr. *chrysomelas*.

The single male specimen of *C. occidentalis* known from Josephine County (Jumpoff Joe Creek, ca. 1300', 20 June 1976, S. Jewett) is a fresh male, phenotypically like those from the CSNM population, suggesting that further search for populations in Josephine County should be conducted. I have not examined specimens upon which the Diamond Lake (5100'), Douglas County, record for *C. occidentalis* is based (Hinchliff 1994: 57). Records from Yamhill (Bellevue) and Marion (Salem, 16 July 1952) counties are based on old specimens that I have not examined, and these records have not been replicated in recent decades. The single female adult of *C. occidentalis* examined from the "Ochoco Gap" (the small distributional gap between the Ochoco Mountains and the Cascades), taken on Round Butte, Jefferson County (20 May 1976, V. McHenry, OSAC), appears to represent a stray individual, since no population has subsequently been located there or nearby.

<u>Biological notes</u>: *Colias occidentalis* is single brooded. In Oregon, adults fly mostly in late May and early June at lower elevations, where they may occur at or below (e.g., Wapinita, Wasco Co., 2000') the ecotone between forested and basin habitats. One very early record of *C. o.* nr. *occidentalis* exists from 3 May 1966 (White River, Wasco Co.), and occasional adults may be taken into early September, at high elevations.

Through mid-June and July, *C. occidentalis* flies in open forested habitats up to 6000' (Mt. Hood, Clackamas and Hood River counties; CSNM, Jackson Co.), although most records from northern Oregon are from 2300' to 3800'. Records of *C. o.* nr. *chrysomelas* in Jackson County are mostly from between 3600' and 6000', although individuals have been taken as low as 2350' (Neil Creek Rd., Ashland, 22 June 2000). In forested settings, adults of *C. occidentalis* fly among sunny breaks in open areas, and visit various flowers. Males visit mud, sometimes in large numbers.

Larval foodplants for *C. occidentalis* in Oregon at least include *Lathyrus nevadensis* (e.g., CSNM, Jackson Co., Erik Runquist pers. comm. 2004; also Kittitas Co., Washington, Ferris 1993: 35). Shapiro et al. (1981) reported *C. o. chrysomelas* in association with *Lathyrus lanszwertii* var. *brownii* (reported as *L. pauciflorus* var. *browni*) and *Lupinus albicaulis* in the Trinities of northern California. Jon Pelham (pers. comm. 2004) reported *Lathyrus nevadensis* ssp. *lanceolatus* var. *puniceus*, *L. pauciflorus* var. *pauciflorus* and *L. lanszwertii* var. *lanszwertii* as larval foodplants of *C. occidentalis* in Washington, and has noted ovipositions in Washington on *Lupinus arcticus* ssp. *subalpinus*, *L. sericeus* ssp. *sericeus* var. *sericeus* and *L. s. s.* var. *flexuosus*. Newcomer (1964a: 220) also noted ovipositions on *Melilotus albus*, *Vicia sativa* ssp. *nigra* (as *V. angustifolia*) and *Lupinus* in Yakima County, Washington. Hardy (1960a) described the early stages of *C. o. occidentalis* from Vancouver Island, and suggested that *Lathyrus nevadensis* ssp. *lanceolatus* var. *nuttallii* (reported as *L. n.* var. *nuttallii*) is a likely larval foodplant there. While *C. occidentalis* may utilize *Lupinus*, *Vicia* and other legumes as secondary larval foodplants, it is unlikely that permanent populations in Oregon are maintained on any larval foodplants other than *Lathyrus* species.

***Colias christina* W. H. Edwards, 1863**

_____(Ochocos, Aldrichs, Blues) Recorded: **Cr**, **Gr**, **Mo** (S), Um, **Wh**, Expected: Gi (SE)?, Je (E)

_____(vic. Wallowa Mts., also Asotin Co., WA) nr. *pseudochristina* Ferris, 1989 Recorded: Ba, Un, **Wal**

_____(SE deserts and ranges) *sullivani* Hammond & McCorkle, 2003, **new combination** Recorded: **Ha**, **Mal**, Expected: Ba (S)?, Lk (SE)

Taxonomic notes: From the Ochoco Mountains, eastward, all known populations in the *Colias christina* complex include some percentage of adults with orange dorsal coloration, and some males with dorsal ultraviolet reflective scales (although ultraviolet reflective males from the Ochocos were not noted by Ferris 1993). These characters are shared with similar populations of *C. christina* outside of Oregon (e.g., Idaho, Utah, Wyoming, South Dakota, Montana, Alberta, Yukon), and following Bird et al. (1995: 136-137) and Layberry et al. (1998: 106-107), all of these populations are treated as a single morphologically and ecologically variable species, *Colias christina* (TL: nr. Slave River, between Fort Smith, Northwest Territories, and Fitzgerald, Alberta; see Kondla 1995). The application of trinomials to this mongrel assemblage of populations seems tenable only for somewhat isolated peripheral populations (e.g., Utah, South Dakota, Yukon, Alvord Desert area in Oregon). Adults from areas in between (Alberta, Montana, Wyoming, W Idaho, NE Oregon) are individually much more variable within most populations, and seem difficult or impossible to delineate as distinguishable taxa, since no single adult phenotype tends to predominate within or across populations. Essentially, every population of *C. christina* within this region, including eastern Oregon, possesses slightly different percentages of adult wing traits. The name *Colias alexandra astraea* W. H. Edwards, 1872 (TL: nr. Yellowstone Lake, Wyoming) has been applied to some of these populations (e.g., Ferris 1993: 26-27), although the holotype of *C. astraea* is apparently of the phenotype seen in *Colias alexandra* populations in the vicinity of its type locality (see W. H. Edwards 1897: [415], Ferris 1972: 3-4, Brown 1973: 73). I have examined very long series of *Colias christina* from the Ochoco, Aldrich and Blue mountains, and from southeastern Oregon (over 750 adults). I have not studied populations in the vicinity of the Wallowa Mountains in as much detail.

Approximately 15-20% of adult male *C. christina* in the western Ochoco Mountains (both sides of the Crook-Wheeler County line off Hwy. 26, about 200 specimens examined) display orange dorsal coloration, which varies from just a few orange scales to a completely orange dorsal surface. Females in this area are predominantly yellowish or creamy above, although a few are white and rare individuals (yellow, creamy and white) have orange overscaling above. Reports of *Colias gigantea* Strecker, 1900 from Oregon (e.g., Ferris 1982: 255) refer to variants of *C. christina* from the Ochoco Mountains. Further east in the Aldrich Mountains (Grant Co.), the percentage of *C. christina* males with orange coloration above is about 30% (over 250 specimens examined), while the percentage of females (yellow, creamy and white) with orange overscaling also increases. White females (with and without orange overscaling) are more frequently encountered in this area than further west. In the central Blue Mountains of Grant County (e.g., Long Creek Summit, see Ferris 1993: 43), males of *C. christina* with dorsal orange coloration make up about 50% of the population, and many female phenotypes are seen. In the northwestern Blue Mountains of northeastern Wheeler, southern Morrow, and southern Umatilla counties, over 65% of male *C. christina* display orange dorsal coloration (118 specimens examined). Creamy and whitish females dominate here (although yellow females do occur), about 50% of which possess some orange dorsal overscaling. Throughout the Ochoco, Aldrich and Blue Mountains, basically no two male or female individuals of *C. christina* are exactly the same. Dorsal and ventral coloration is extremely variable, as are marginal wing markings above. Details of the ventral hindwing discal cell spots are highly variable, on an individual basis, on adults of *C. christina* from central Oregon. Because of the tremendous amount of individual variation seen in adults of *C. christina* from central Oregon, no trinomials can be associated with them. I have not examined specimens reported from McKay Creek, Umatilla County (1 June 1969, W. Neill).

All males of *C. christina* examined to date from Wallowa and Union counties (about 25 specimens) are completely orange above (save the occasional yellow wing bases), except one entirely yellow male is known (Asotin Co., Washington, Barry Sullivan). The few females of *C. christina* examined from this region are white above. Further study of these populations is required to determine how they may differ from populations on the western slope of the Blue Mountains, and from topotypical *Colias* *christina pseudochristina* (TL: N Fork of Provo River, Summit Co., Utah, see Ferris 1989a). For now, these populations in far northeastern Oregon are tentatively called *Colias christina* nr. *pseudochristina*, due to their predominantly orange males (96% of specimens examined), as well as potential ecological differences between them and populations on the western slope of the Blue Mountains. I have not examined specimens of *C. christina* reported from Baker County (Hinchliff 1994: 57). For now, these are associated with *C. c.* nr. *pseudochristina*, until populations in this area can be located and studied. Also see Gillette (1989).

Populations of *C. christina* north of the Alvord Desert, Harney County, were recently named *Colias christina sullivani* (TL: Alvord Desert Rd. at N end of Steens Mt., Harney Co., Oregon). Adults (about 400 examined) of this segregate, on average, have more pointed wings than those from the Blue Mountains, about 5% of males have orange dorsal coloration (the rest are entirely yellow above), and females are mostly creamy to white (one yellowish female is known: Ten Cent Lake, 25 May 1950, OSAC). Ventrally, the hindwing ground color of *C. c. sullivani* averages grayish green, very similar to the phenotype seen in sympatric populations of *C. alexandra edwardsii*. George Austin recently found *C. c. sullivani* in Washoe County, Nevada (specimen examined at McGuire Center, Gainesville, Florida). Populations of *C. christina* in northern Malheur County (N of Beulah Reservoir, at the SE foot of the Blue Mts.) are mostly like *C. c. sullivani*, but have an increased percentage of males (about 20%) and females with orange dorsal coloration, and wing shape is slightly more rounded (Hammond & McCorkle 2003: 277). Adults from northern Malheur County apparently show some phenotypic intergradation between populations of *C. christina* in the Blue Mountains and typical *C. c. sullivani*.

Biological notes: Throughout the northern drainage of the Ochoco, Aldrich and Blue Mountains, populations of *Colias christina* are found in open coniferous woods, from 3500' to over 5000'. Adults are usually found in small sunny openings and along roads in forested habitats, from late May through mid-July. Adults of *C. christina* feed on nectar from a variety of flowers, and males sometimes visit mud. Populations of *C. c.* nr. *pseudochristina* in far northeastern Oregon, depending on seasonal conditions, fly mostly in late May (e.g., Asotin Co., Washington, ca. 3400'), but individual adults have been taken through late June (Minam River, 3000') and early July (upper Imnaha River, ca. 4400') at higher elevations. Observations to date indicate that populations of *C. c.* nr. *pseudochristina* prefer steep sunny slopes at the ecotone between forested and basin habitats, although individuals may infrequently be seen higher in the forests. Desert populations of *C. c. sullivani* fly earlier than those of *C. christina* in forested areas, from late April to late May. Records of *C. c. sullivani* extend from 4000' to 4800', and adults are usually found in open habitats with a dense concentration of the larval foodplant, *Lathyrus rigidus*.

Larval foodplants for populations of *C. christina* in the Ochocos and northwestern Blue Mountains of Morrow County include *Lathyrus lanszwertii*, *L. pauciflorus* and *L. nevadensis*, growing in partly shaded areas (Ferris 1993: 40, 45, Hammond & McCorkle 2003: 276, pers. obs.). In contrast, I witnessed ovipositions on *Thermopsis* in the Aldrich

Mountains (Fields Creek Canyon, Grant Co., 16 June 2001), which is apparently the primary larval foodplant at that site. The population of *C. c.* nr. *pseudochristina* in Asotin County, Washington, was reported to use *Lathyrus pauciflorus* as a larval foodplant (Ferris 1993: 25). Populations of *C. c. christina* in Manitoba were reported to feed on *Hedysarum* (Klassen et al. 1989: 72), and *C. c. pseudochristina* in Utah was reported to feed on *Lathyrus pauciflorus*, *L. lanszwertii*, *L. brachycalix* and possibly *Vicia americana* by Ferris (1993: 25). Details on immature stages have not been reported for populations of *C. christina* in Oregon. Also see Verhulst (2001b).

***Colias alexandra* W. H. Edwards, 1863**
_____(E Cascades, eastward) *edwardsii* W. H. Edwards, 1870 Recorded: **Ba**, Clk (far E)?, **Cr**, **De**, Gi, **Gr**, **Ha**, HR?, Je, Kl, La (far NE), Lin (far E)?, **Lk**, **Mal**, Mar (far E)?, Mo, **Sh**, Um, Un, **Wal**, **Was**, **Wh**

Taxonomic notes: *Colias alexandra edwardsii* is undoubtedly a separate species from *C. occidentalis* and *C. christina* (also see Bird et al. 1995: 134, 136-136), and may occasionally be found flying in sympatry with both of them in Oregon (e.g., with *C. christina* at Fields Creek Canyon, Grant Co., 31 May 2001, 16 June 2001; at N edge of Alvord Desert, 11-12 May 2002; N of Beulah Reservoir, Malheur Co., 17 May 2002; with *C. occidentalis* at Camp Sherman, Jefferson Co., 8 May 2000, Dana Ross). Populations of *C. alexandra* in Oregon represent *Colias alexandra edwardsii* (TL: nr. Virginia City, [Storey Co.] Nevada; see Brown 1973: 67). No geographic variation has been seen in populations of *C. a. edwardsii* from across Oregon. Adults of the spring brood of *C. a. edwardsii* in Oregon average slightly smaller than those of the summer brood, and are darker below. Spring males also have narrower dark wing margins above. Brown (1973: 65-72) figured adults of *C. a. edwardsii* from Lake County, and discussed phenotypic variation there. Also see Pollock et al. (1998).

Biological notes: *Colias alexandra* is widespread and common in Oregon east of the Cascadian crest, and occurs in a variety of basin and forested habitats. Records of *C. alexandra* from west of the Cascadian crest (e.g., H. J. Andrews Forest, Lane Co.) represent rare stray individuals from further east. Specimens upon which records of *C. alexandra* from Clackamas, Hood River, Linn, and Marion (Lemiti Ck., 27 July 1997, see Shepard 1998: 6) counties are based have not been personally examined, and some or all of these records may refer to *C. occidentalis*. Adults of *C. a. edwardsii* fly in two annual broods in Oregon, extending from mid-April to mid-September. Records of *C. a. edwardsii* in Oregon range from 400' (Sherman Co.) to over 9300' (Steens Mt., Harney Co.). Males patrol through open areas, sometimes visit mud, and both sexes visit a variety of flowers (e.g., Ellis 1974: 122).

Detailed observations on immature stages or larval foodplants of *C. alexandra* in Oregon have not been presented. In Washington, Jon Pelham (pers. comm. 2004) has recorded *Astragalus canadensis* var. *brevidens*, *A. miser* var. *serotinus* (also see Newcomer 1964a: 220), *A. filipes*, *A. purshii* var. *glareosus* and *A. lentiginosus* var. *lentiginosus* as larval foodplants of *C. a. edwardsii*, and has noted ovipositions on

Medicago sativa. Typical *C. a. alexandra* from Colorado was reared by W. H. Edwards (1887b), who later (1897: [415]) provided additional notes on its immatures, and reported larvae on *Astragalus* and *Thermopsis*. The life history of *C. a. alexandra* from Colorado was subsequently studied in detail by Hayes (1981), who figured immatures and reported *Lathyrus lanszwertii* var. *leucanthus* as a larval foodplant. Scott (1992: 8) reported *Thermopsis divaricarpa*, *Astragalus laxmannii* var. *robustior* (as *A. adsurgens* var. *robustior*) and *A. alpinus* as larval foodplants of *C. a. alexandra*, also in Colorado. Ellis (1974) reported *Astragalus miser* var. *oblongifolius*, *A. bisulcatus* var. *haydenianus*, *A. lentiginosus* var. *diphysus*, *A. l.* var. *salinus*, *A. eremiticus*, and *A. canadensus* var. *mortonii* as larval foodplants of *C. alexandra* in Colorado, Utah, Idaho, Nevada and Montana. Also see Ae (1958a, 1959), Maeki & Remington (1960b: 42), Shields et al. (1970: 30-31), Kingsolver (1983a,b), Hayes (1984), Verhulst (2001a) and Graves & Shapiro (2003).

***Colias pelidne* Boisduval & Le Conte, [1830]**
_____(Wallowas, Steens) *skinneri* Barnes, 1897 Recorded: Ba (NE), Ha (S), Un (E), **Wal** (S), Expected: Gr?, Um?

Taxonomic notes: Populations of *Colias pelidne* in Oregon occur in two regions, in the middle to high elevations of the Wallowa Mountains, and near the top of Steens Mountain, Harney County. Adult phenotypes of *C. pelidne* in the two areas vary only slightly, but to date, only white females are known from the Steens Mountain population (Paul Severns pers. comm. 2004). Some adults of *C. pelidne* from the Wallowas appear phenotypically intermediate towards *C. interior* (also see Ferris 1988b: 19-20), possibly representing hybrids. For now, all populations of *C. pelidne* in Oregon are called *Colias pelidne skinneri* (TL: Yellowstone National Park, Wyoming; see Barnes & Benjamin 1926: 89). The relationships of *Colias pelidne skinneri* and *Colias pelidne minisni* Barnes & McDunnough, 1916 (TL: Laggan, Alberta) to *Colias pelidne pelidne* (TL: NE coast of Labrador; see Ferris 1988b: 9) require careful study. While these three taxa were considered to be conspecific by Ferris (1988b, but see page 19) and subsequent authors, it seems likely that *C. p. pelidne* is not conspecific with the two western taxa (Jon Pelham pers. comm. 2003, pers. obs.).

Biological notes: *Colias pelidne* is univoltine, flying in Oregon from late June to early September. In the Wallowas, records for *C. pelidne* extend from about 5500’ to 8000’, and most years, adults first appear in late June. The population on Steens Mountain occurs at about 9000’, and adults fly from late July to late August. Adults of *C. pelidne* are usually found in sunny meadows and on open hillsides, and both sexes visit flowers.

The early stages of *C. pelidne* are undescribed. Larval foodplants in Oregon have not been previously reported, but apparently include *Vaccinium* species on Steens Mt. (Dana Ross pers. comm. 2004), and probably also in the Wallowas. Ovipositions have been noted on *Gaultheria hemifusa* in Idaho (Klots 1975: 364). Comparative life history studies between *C. pelidne* and *C. interior* are needed. Also see Verhulst (2002b).

***Colias interior* Scudder, 1862**

_____(E. Cascades, Aldrichs, Blues, Wallowas) Recorded: Ba, De (far W), Do (far E), Gr, Ha (far N), **Je** (SW), Kl (N), La (far E), Lin (far E), **Mo** (S), **Um**, **Un**, Wal, Expected: Cr (E)?, Wh (NE)

Taxonomic notes: Three trinomials have been proposed to describe subtle patterns of geographic variation in *Colias interior* (TL: Mouth of the Saskatchewan River, vic. Grand Rapids, W shore of Lake Winnepeg, Manitoba; see Ferris 1988b: 2). However, none of these named segregates reportedly display consistent morphological differences (Klots 1951: 186, Ferris 1988b, but see Forbes 1960: 118). Following Ferris (1988: 3), no trinomials are applied to populations of *Colias interior* in Oregon, until further study of geographic variation in this species has been conducted. Consistent morphological differences between populations of *C. interior* in the Cascades and northeastern mountains in Oregon have not been detected. The single record of *C. interior* from Wasco County (6 mi. N of Simnasho, 6 June 1972; see Hinchliff 1994: 60) refers to *C. occidentalis* (specimens from that locality in OSAC), and *C. interior* is not expected to occur there. Wasco County has therefore been deleted from the distribution of *C. interior*.

Biological notes: In Oregon, *Colias interior* occurs in small montane meadows and openings in coniferous forests, usually near larval foodplants. Males visit mud, and both sexes visit a wide variety of flowers. Records of *C. interior* in Oregon extend from about 3000' (Camp Sherman, Jefferson Co.) to over 7000' (Anthony Lake, Baker Co.). The single annual brood of *C. interior* in Oregon flies from mid-June to late August, depending on elevation and seasonal conditions. While *C. interior* is sometimes found in sympatry with *C. occidentalis* (e.g., Camp Sherman area, Jefferson Co.) and *C. christina* (e.g., Blue Mts. of Morrow Co.), it tends to occur at higher elevations than those taxa, and adults fly, on average, slightly later in the season.

Immature stages of *C. interior* were described and illustrated by Scudder (1889b: 1107-1108), Lyman (1897) and Ae (1958a: 87). A full-grown larva and pupa of *C. interior* were figured by Allen (1997: 311, 337). Larval foodplants of *C. interior* in Washington include various species of *Vaccinium*, including *V. myrtilloides*, *V. caespitosum* (also see Klots 1975: 363) and *V. uliginosum* (Jon Pelham pers. comm. 2004; also see Bird et al. 1995: 141). Larval foodplant records and information on immature stages from populations in Oregon are lacking. Also see Ae (1956, 1959), Verhulst (2002a) and discussion under *C. pelidne* (p. 93).

***Phoebis sennae* (Linnaeus, 1758)**

_____(rare stray) *marcellina* (Cramer, 1777) Recorded: Do, La

Taxonomic notes: Adults of *Phoebis sennae* in western North America are referable to *Phoebis sennae marcellina* (TL: Suriname). The "*P. sennae*" figured by Pyle (2002: 167) is apparently of a female *Phoebis philea* (Linnaeus, 1763). Also see Vázquez (1949).

Biological notes: *Phoebis sennae* is migratory in North America (e.g., O'Byrne 1933, Williams 1937, Smyth 1938: 226-230, Jones 1943, Clark & Clark 1951: 113-114, Lambremont 1968, Walker 1978, Gaddy & Laurie 1983, Heitzman & Heitzman 1987: 105, Bailowitz & Brock 1991: 156, Gochfeld & Burger 1997: 139, Davenport 2003: 16). Adults may occasionally be encountered far north of their regular breeding range (e.g., Brown et al. 1957: 191, Opler & Krizek 1984: 69, Stanford & Opler 1993: 127, Allen 1997: 66, Gochfeld & Burger 1997: 139-140, Layberry et al. 1998: 115, Nielsen 1999: 55, Wormington 2001: 22, Marrone 2002: 109). The first sighting of *P. sennae* in Oregon was in Eugene, Lane County (23 May 1992, see Hinchliff 1994: 176), and a second sighting was in Douglas County (Pyle 2002: 168). Stray individuals of *P. sennae* could appear anywhere in the state, but their appearance cannot be predicted (see Shapiro 1993c).

Larval foodplants of *P. sennae* in North America include various species of *Cassia* (e.g., Scudder 1889b: 1058, Dyar 1892: 8, Bailowitz & Brock 1991: 157, Allen 1997: 67), none of which occur in Oregon. Early stages of *P. sennae* have been described and/or illustrated by many authors, including Smith & Abbot (1797: pl. 5), Boisduval & Le Conte (1829-[1837]: pl. 24), Scudder (1889b: 1056-1057, 1889c: pls. 65, 76, 79, 84; also see Klots 1951: pl. 5, 6), Dyar (1892: 7-8) and Comstock (1927: 45-46, pl. 63, #7). Recently, Neck (1996: pl. 5), Tveten & Tveten (1996: 54), Allen (1997: 311), Nielsen (1999: 54) and Emmel (2001: 12) figured full-grown larvae of *P. sennae*, and Neck (1996: pls. 11-12) figured pupae. Also see Tilden (1944), Clench (1970: 118-119), Brown (1980) and Rutowski (1984a).

LYCAENIDAE: (58 species)

Lycaeninae: (58 species)

Lycaenini: (11 species)

***Lycaena arota* (Boisduval, 1852)**

_____(Warners, far SE Cascades) *virginiensis* (W. H. Edwards, 1870) Recorded: Kl (S), **Lk** (S)

_____(Siskiyous, SW Cascades) *arota* Recorded: Cos (S), Cu, **Do**, Ja, Jo, [Kl (far SW)?], **La** (E)

_____(Willamette Valley) Recorded: **Be**, La (C), **Po**, Ya, Expected: Clk (SW)?, Li (E), Lin, Mar?, Wan?

Taxonomic notes: Populations of *Lycaena arota* in the Warner Mountains, Lake County (e.g., Warner (= Bullard) Canyon, ca. 5400'), are referable to *Lycaena arota virginiensis* (TL: Virginia City, [Storey Co.], Nevada; see Brown 1969: 164). These adults average small, and are pale below. Males have narrow dark marginal borders above. Adults from lower elevations to the west (e.g., Jackson Co., ca. 3500'; Josephine Co., ca. 1400'; Douglas Co., ca. 1800'; extreme southern Lane Co., ca. 2500') average larger and darker above and below, and males have slightly wider dark wing margins above. These appear to represent *Lycaena arota arota* (TL: Hwy. 70 at Soda Creek, E branch of N Fork Feather River Canyon, 2500', Plumas Co., California; see Emmel et al. 1998i: 13). However, as noted by Shapiro et al. (1981: 104-105), the relationship of populations with small, pale adults to nearby populations with larger, darker adults is not clear, and the application of trinomials herein to describe this variation should be considered tentative. Specimens from Klamath County (Hinchliff 1994: 61) have not been personally examined. These are tentatively associated with *L. a. virginiensis*, although adults from the extreme southwestern part of Klamath County (e.g., Klamath River Canyon) may represent *L. a. arota*.

Recently rediscovered populations of *L. arota* in the western Willamette Valley also require additional study. A preliminary evaluation of their phenotype suggests that, compared to those of *L. a. arota* from the western Cascades and Siskiyous, adults average smaller, ventral hindwing ground color is somewhat paler (when fresh), and females appear to be brighter above, with reduced black maculation. These populations in the Willamette Valley are tentatively considered to be a distinctive segregate, pending future study. Adults closely resemble those from the San Francisco Bay area in California (e.g., Santa Clara Co., pers. obs.). A review of all far western populations of *L. arota* will be necessary in order to further clarify the taxonomic status of populations in Oregon. Also see Tilden (1955).

Biological notes: *Lycaena arota* flies in a single annual brood, from mid-June (rare individuals) to late September, but most records in Oregon are from mid-July and August. Populations occur in riparian habitats of many types, and sometimes on shrubby, well-drained hillsides. Records range from near sea level (Brookings, 130', Curry Co.) to 6000' (Warner Mts., Lake Co.). In Oregon, males of *L. arota* guard perches at various heights, from near ground level to over 3 meters above, sometimes within fairly dense vegetation. Females are often seen in dense vegetation (also see Scott 1974b). *Lycaena arota* can be common in the Warner Mountains, but is normally scarce elsewhere in Oregon. Adults in the Warners visit several flower species, but are especially fond of *Eriogonum nudum* (pers. obs. 2003). Adults in southern Lane County have been observed feeding at flowers of *Anaphalis margaritacea* (Paul Severns pers. comm. 2004).

Dana Ross rediscovered *L. arota* in the Willamette Valley in 2003, in the Luckiamute River drainage of Benton County, at about 600'. It had not previously been reported from Benton County for over 100 years (Corvallis, 24 August 1897, 1 female in OSAC). I found an apparently larger population of *L. arota* in the Luckiamute River drainage of Polk County, at about 450', in August 2004. In addition, I found a single male along Mary's River in Benton County, at 450', on 31 July 2004. Continued search for additional populations of *L. arota* is needed in all counties along the edges of the Willamette Valley.

Adults of *L. arota* are usually found near larval foodplants, which include various *Ribes* species. At the CSNM, Jackson County, adults are associated at least with *R. velutinum* (Erik Runquist pers. comm. 2004), which is also used as a larval foodplant of

L. arota in central Nevada (Emmel et al. 1971: 240). The populations of *L. arota* in the Willamette Valley are apparently associated with *Ribes divaricatum* (Dana Ross pers. comm. 2003, pers. obs. 2003, 2004). Emmel & Emmel (1974: 346) reported *Ribes roezlii* as a larval foodplant in the Sierra Nevada of California, and Ballmer & Pratt (1989a: 69) reported three species of *Ribes* as larval foodplants of *L. arota* in California. Dyar (1891c: 204-205) described the full-grown larva and pupa of *L. arota* from Yosemite, California, found on *Ribes*. Comstock (1928a: 67) illustrated an egg of *L. arota* from the vicinity of Los Angeles, California. Comstock (1928b: 64-65, also see Comstock 1927: 170-171) illustrated a late-instar larva and pupa of *L. arota* from California, reared on *Ribes cereum*, and Comstock in Emmel & Emmel (1973: 62) provided additional illustrations of immatures (also see Miller & Hammond 2003: 37). Ballmer & Pratt (1989a: 24, 37, 71, 75, 77, 81) described and figured the full-grown larva of Californian *L. arota* in detail. According to Ballmer & Pratt (1992b), larvae of *L. arota* in California are facultatively myrmecophilous. Also see Downey (1966).

***Lycaena phlaeas* (Linnaeus, 1761)**

_____(Wallowas) *arctodon* Ferris, 1974 Recorded: Wal, Expected: Ba (NE), Un (E)

Taxonomic notes: Adults of *L. phlaeas* from Oregon are phenotypically similar to *Lycaena phlaeas arctodon* (TL: E side Beartooth Pass, 10,300', Carbon Co., Montana), and were called *L. p. arctodon* by Ferris (1974) and Dornfeld (1980: 97). However, only small series of adults from Oregon have been sampled, and evaluation of individual variation in these populations remains incomplete.

Biological notes: In Oregon, *Lycaena phlaeas* flies over rockslides and talus slopes in the Wallowa Mountains, above 7500'. The original report of this species from Oregon was based on a single male taken on Matterhorn Mountain, on 16 August 1964, by C. W. Nelson (Ferris 1974: 5, 8, 12, Dornfeld 1980: 97). Additional populations have since been found in similar habitats in other parts of the high Wallowas in Wallowa County (e.g., Pyle 2002: 171), and populations will probably be found in northeastern Baker and eastern Union counties with further search.

The larval foodplants of *L. phlaeas* in Oregon remain unknown, although Dornfeld (1980: 97) suggested that *Oxyria digyna* is a likely candidate in the Wallowas. Ballmer & Pratt (1989b: 34, 69) reported *O. digyna* as the larval foodplant of *L. phlaeas* in the Sierra Nevada of California. Larvae of typical *L. p. arctodon* from Beartooth Pass, Carbon County, Montana, reportedly feed on *Rumex acetosa* (Ferris 1974: 5). Ballmer & Pratt (1989a: 24, 34, 74, 77, 81) described and figured a late-instar larva of Californian *L. phlaeas*. Scudder (1889b: 1002-1003, 1889c: pls. 65, 68, 71, 75, 79, 84, 86) described and illustrated the larvae of northeastern North American *L. phlaeas*, and (pp. 1004-1005) reported *Rumex acetosella* and *R. crispus* as larval foodplants there. Additional larval foodplants for *L. phlaeas* in North America were reported by Klots (1951: 152). Also see Downey (1966), Shields & Montgomery (1967), Downey & Allyn (1973, 1981: 27), Ballmer & Pratt (1992b) and Emmel & Pratt (1998).

***Lycaena cupreus* (W. H. Edwards, 1870)**
_____(SE Cascades, Ochocos, S Blues, Wallowas, Steens) *cupreus* Recorded: **Cr**, De (S), Gr, Ha, **Kl**, La (far SE), Lk, **Wal**, **Wh**, Expected: Ba, Do (far E), Je (E), Mal (N), Mo (S), Um, Un

Taxonomic notes: Emmel & Pratt (1998: 663) corrected the type locality of *Lycaena cupreus* to Crane Creek, 3 miles south of Lakeview, Lake County, Oregon, and proposed a new trinomial for the Sierra Nevadan segregate in California that has long gone by the name of *L. c. cupreus*. This action made *Lycaena cupreus artemisia* Scott 1981c (TL: The Potholes, Teton Co., Wyoming) a junior synonym of *Lycaena cupreus cupreus*, since the names represent the same phenotype (George Austin pers. comm. 2002, pers. obs. 2002). Also see Brown (1969: 174-176) and Pratt & Wright (2002: 219).

Biological notes: Ranging in Oregon from 3500' (W end of Ochoco Mts., Crook Co.) to about 8000' (Steens Mt., Harney Co.), *Lycaena cupreus* is most often seen in the southeastern Cascades (e.g., Sand Creek area, Klamath Co., ca. 4800') and Ochoco Mountains, in wet or dry meadows. North and east of the Ochocos, *L. cupreus* is scarce, and rarely encountered. Records of *L. cupreus* in Oregon extend from mid-May at lower elevations, to mid-August at higher elevations (e.g., Steens Mt., ca. 7400'-8000'). Males vigorously defend perching sites in sunny meadows, and usually perch on the ground or on vegetation less than a meter above ground level. Males and females feed at various flowers, including *Taraxacum* and *Cistanthe* in Klamath County (pers. obs., E. Runquist pers. comm. 2004). Also see Newcomer (1964c: 49).

Dornfeld (1980: 98) suspected that *Rumex* species serve as larval foodplants for *L. cupreus* in Oregon. Emmel & Emmel (1974: 346) reported *Rumex acetosella*, and Ballmer & Pratt (1989a: 34, 69) reported *Rumex paucifolius* as larval foodplants of *L. cupreus* in the Sierra Nevada of California. George Austin (pers. comm. 2002) reported *R. acetosella* as a larval foodplant of *L. c. cupreus* in Nevada. No information on immature stages is available for populations of *L. cupreus* in Oregon. Ballmer & Pratt (1989a: 23, 34-35, 77) described the last instar larva of Californian *L. cupreus*, and Downey & Allyn (1981: 23) figured the egg of *L. c. snowi* (W. H. Edwards, [1881]) in detail. Also see Ballmer & Pratt (1992b).

***Lycaena xanthoides* (Boisduval, 1852)**
_____(Siskiyous, Rogue River Valley, Willamette Valley) *nigromaculata* J. Emmel & Pratt, 1998 Recorded: Be, **Ja**, Jo, La (C), Ya, Expected: Do, Lin (W), Mar (W), Po

Taxonomic notes: Northern populations of *Lycaena xanthoides* were named *Lycaena xanthoides nigromaculata* (TL: Jct. Hwy. 45 & Hwy. 20, W of Meridian, Colusa Co., California) by Emmel & Pratt (1998: 674-675). Those authors considered populations in Jackson County (e.g., Dornfeld 1980: 205, 1a, 1b) to represent *L. x. nigromaculata*. The type locality of *Lycaena xanthoides xanthoides* is Sacramento, Sacramento County, California (see Emmel et al. 1998i: 12). Extensive series obtained by Erik Runquist and I from Jackson County in 2003 (CSNM and vicinity) show that the population of *L. xanthoides* there is highly variable in adult phenotype, and difficult to diagnose. Some adults are superficially intermediate between *L. x. nigromaculata* (as figured by Emmel & Pratt and Dornfeld) and local *Lycaena editha* phenotypes (discussed on p. 100), possibly representing intermediates (see Shapiro 1986: 343, 1991a: 148). Because of these populations, Scott (1986: 391) considered *L. xanthoides* and *L. editha* to be conspecific. Despite this, many adults in the CSNM can be classified as either *L. xanthoides* or *L. editha* based on wing phenotype. According to Ballmer & Pratt (1989a), Pratt et al. (1993) and Pratt & Emmel (1998), larvae from populations with phenotypically intermediate adults are identifiable to either species (also see Pratt & Wright 2002: 225). Specimens from Oregon have been obtained for a study of DNA sequence variation, being conducted by Jeff Oliver (University of Arizona). Hopefully, his molecular results will help resolve the taxonomic questions concerning these taxa. Specimens of *L. xanthoides* from the Willamette Valley are rare in collections, and until a longer series is available for study, careful evaluation of their phenotype will not be possible. However, based on specimens examined thus far, adults appear phenotypically similar to *Lycaena xanthoides nigromaculata* of southeastern Oregon. The ventral image of a "female" *L. xanthoides* figured by Pyle (2002: 175, upper right) is of a male, and the "male" *L. dione* (Scudder, 1868) below it is a female. Also see Scott (1981b).

<u>Biological notes</u>: *Lycaena xanthoides* is infrequently encountered in Oregon. Adults fly in a single annual brood, from late May through August, but most records are from July. In Oregon, this species is most often found in Jackson County, especially near Ashland (ca. 2400'), along Hwy. 66 (ca. 2400'-3500') and in the CSNM (up to 3800'). Here, males guard roadside perches, and both sexes visit *Apocynum* flowers. A single confirmed record of *L. xanthoides* exists for Josephine County (Rough and Ready Creek, ca. 1400', Erik Runquist, Shepard 2002: 7, but see discussion under *L. editha*, p. 100), and several old records exist from the Willamette Valley (Corvallis, Benton Co., 27 July 1896, 1 June 1916, 18 July 1969, 2 August 1970; Philomath, Benton Co., 14 July 1969; Salem, Marion Co. (no date); nr. McMinnville, Yamhill Co., 18, 29 June 1928; also see Dornfeld 1980: 95, Pyle 2002: 175). Recently (sighting in 2003, vouchers obtained in 2004), Paul Severns rediscovered this species in the Willamette Valley, in Lane County, near Eugene, at about 400' (see Maben 2004). Further search in the Willamette Valley may reveal additional populations, a hope expressed earlier by Dornfeld (1980: 95).

In 2004, Paul Severns (pers. comm.) witnessed ovipositions of *L. xanthoides* on *Rumex salicifolius* in Lane County, and observed adults feeding at flowers of *Grindelia integrifolia*. Populations of *L. x. xanthoides* in the Sacramento Valley and elsewhere in California have been reported to use *Rumex crispus* and *R. conglomeratus* as larval foodplants (Shapiro 1975a: 203, 1975g: 121, Ballmer & Pratt 1989a: 69). Comstock & Dammers (1936: 213-217) described the early stages of *L. x. xanthoides* from southern California, and illustrated the egg, early and late-instar larvae, and a pupa (also see Dammers in Emmel & Emmel 1973: 63). Ballmer & Pratt (1989a: 23-34, 35, 71, 73-75, 77-78, 81) described and figured the last-instar larva of Californian *L. xanthoides*. Larvae are facultatively myrmecophilous, and are reportedly tended by *Formica francoeuri* Bolton (formerly known as *F. pilicornis* Emery) in California (Ballmer & Pratt 1992b: 103). Also see Scott & Opler (1975).

***Lycaena editha* (Mead, 1878)**
_____(central and SE Cascades) *editha* Recorded: **De** (W), Do (E), Ja (NE), **Kl**, **La** (E), Lk (NW), Expected: Lin (far SE)
_____(far SW Cascades) *pseudonexa* J. Emmel & Pratt, 1998 Recorded: **Ja** (SE), Kl (far SW)
_____(Warners, E to Steens) nr. *obscuramaculata* Austin, 1989 Recorded: Ha (S), **Lk** (S)
_____(Ochocos, Aldrichs, Blues, Wallowas) nr. *editha* Recorded: **Ba**, **Cr**, Gr, Ha (N), Mal (N), Mo (S), Um, **Un**, **Wal**, Wh, Expected: Gi (SE), Je (E)

Taxonomic notes: While *Lycaena editha* is geographically variable across Oregon, clear patterns of variation have not been detected. Long series of *L. editha* adults from any given locality tend to show a great deal of individual variation. Several names are potentially applicable to describe variation seen in Oregon, although the application of these names herein should be considered tentative. A detailed study of the complex, including an analysis of populations in Oregon using DNA sequence data, is being conducted by Jeff Oliver (University of Arizona). Adults of *L. editha* from two sets of populations in the central and southern Cascades of Oregon closely resemble *Lycaena editha editha* (TL: Carnelian Bay, Lake Tahoe, California). The darkest of these populations is centered in northern Klamath County (e.g., Sand Creek area, ca. 4800'). Underside maculation and ground color on most adults from this area are very dark, and discal spots on the ventral hindwing tend to be slightly enlarged. The second set of populations occurs in eastern Lane and Douglas counties, west of the Cascadian crest. Adults in this area are like those from northern Klamath County, but tend to be slightly paler below.

Individuals of *L. editha* at the southern tip of the Cascades (e.g., Dead Indian Rd., Jackson Co., ca. 4800') are highly variable. Some adults resemble those from eastern Lane County, while others are much paler below, with smaller, blacker ventral hindwing spots. These populations are tentatively called *Lycaena editha pseudonexa* (TL: Railroad Park, Dunsmuir, Shasta Co., California), since some individuals in these populations match typical *L. e. pseudonexa* (examined from south of McCloud, Siskiyou Co, California; also see Shapiro 1986: 343, 1991a: 148). I have not examined specimens upon which records of *L. editha* from Josephine County are based (Hinchliff 1994: 65). However, both Josephine County dots in Hinchliff (p. 65) apparently refer to a single specimen with the following data (from Hinchliff's data notebooks): "near Star Flat, Road to Store Gulch from Selma, 1300', 31 May 1985, J. Hinchliff." While this specimen could not be located in the OSAC collection, an annotation in Hinchliff's notebooks indicated that this individual was "worn." I suspect that this specimen is actually of *L. xanthoides*, due to its condition on such an early date, and since *L. xanthoides* was recently found very close to this locality (Rough and Ready Creek, see p. 99). Therefore, Josephine County has been deleted from the distribution of *L. editha*.

In the Warner Mountains of Lake County, individuals of *L. editha* are also highly variable, although adults tend to be pale below. Some adults have dark discal spots on the ventral hindwing, while others have faint, poorly defined spots of variable size, similar to the phenotype seen in *Lycaena editha obscuramaculata* (TL: Jarbidge Canyon, between Pine Creek and Gorge Gulch, 6600', 4 km. S of Jarbidge (town), Jarbidge Mts., Elko Co., Nevada; see Austin 1984). Populations of *L. editha* in the Warner Mountains and on Hart Mountain, Lake County, as well as on Steens Mountain, Harney County, are tentatively called *Lycaena editha* nr. *obscuramaculata*, since many adults from these areas closely match the pale phenotype of *L. e. obscuramaculata*. However, adults in these populations do not display a consistent phenotype, and some individuals approach the phenotype of *L. e. editha*.

From the Ochoco Mountains, northeast to the Wallowa Mountains, adults of *L. editha* are phenotypically variable. Many adults from this region resemble *Lycaena editha editha*, while others are paler below with enlarged ventral hindwing spots, approaching the phenotype of *Lycaena editha vurali* Koçak, 1984 (TL: Broadwater Co., Montana; *Lycaena editha montana* Field 1936 is a homonym, see Koçak 1984: 95). Average ventral hindwing spot size in these populations tends to increase from southwest to northeast. Most individuals from the Ochocos and Aldrich Mountains are dark with small spots below, although occasional individuals are paler below, with larger spots. Some adults of *L. editha* from the Wallowas have considerably enlarged ventral hindwing spots. For now, all populations of *L. editha* from the Ochocos to the Wallowas are tentatively called *Lycaena editha* nr. *editha*, since the average phenotype appears to be closer to that of *L. e. editha* than *L. e. vurali*. Clearly, much additional study is required. Also see discussion under *L. xanthoides* (p. 98-99) and Pratt et al. (1993).

Biological notes: *Lycaena editha* is usually found in dry meadows, from 3500' (Ochoco Mts., Crook Co.) to about 9000' (Steens Mt., Harney Co.), and can be abundant (e.g., Sand Creek area, Klamath Co.). Adults fly in a single annual brood, beginning in mid-June and extending through August, depending on elevation and seasonal conditions. Males aggressively guard perches in open meadows, usually less than a meter above ground level. Adults of both sexes visit a wide variety of flowers. Records of *L. editha* from northern Jefferson County (Warm Springs) and southern Wasco County (Maupin and Kahneeta Hot Springs, all labeled by E. Griepentrog) have not been duplicated despite recent search, and mislabeling is suspected. Until they can be verified, Jefferson and Wasco counties are excluded from the distribution of *L. editha* in Oregon. While *L. editha* should be present in the Ochoco Mountains of southeastern Jefferson County, it is not expected to occur in Wasco County.

Details on larval foodplants of *L. editha* are lacking from most populations in Oregon, although those in the CSNM are apparently associated with *Rumex paucifolius* (Erik Runquist pers. comm. 2004). Elsewhere in its range, larvae of *L. editha* are known to feed on other *Rumex* species, and may feed on *Polygonum douglasii* in Colorado (Scott 1992: 62). Emmel & Emmel (1974: 346), Ballmer & Pratt (1989a: 69) and Pratt et al. (1993: 192) reported *Rumex paucifolius* and *R. acetosella* as larval foodplants for populations in California. Late instar larvae of Californian *L. editha* were described by Ballmer & Pratt (1989a: 23, 34-35, 77). Larvae of *L. editha* are facultatively myrmecophilous, and are reportedly tended by *Formica altipetens* Wheeler in California (Ballmer & Pratt 1992b: 103). Also see Crowe (1970).

***Lycaena gorgon* (Boisduval, 1852)**
_____(Warners) *jacquelinae* J. Emmel & Pratt, 1998 Recorded: **Lk** (S)
_____(Siskiyous) *dorothea* J. Emmel & Pratt, 1998 Recorded: Do (S), **Ja** (S), **Jo**, Kl (far SW), Expected: Cos (S), Cu

Taxonomic notes: *Lycaena gorgon gorgon* (TL: Hwy. 70 at Bear Ranch Creek, vic. Cresta, N Fork Feather River Canyon, 1500', Butte Co., California; see Emmel et al. 1998i: 12) occurs in the Sierra Nevada and other parts of California. Emmel & Pratt (1998: 666-669) reviewed the taxonomy of *Lycaena gorgon*, and named three geographic segregates. Two of these occur in Oregon. Adults of *L. gorgon* from the Warner Mountains (e.g., Warner [= Bullard] Canyon, 5400') have large black spots on a yellowish ground color below, and females are bright tawny above (when fresh). These represent *Lycaena gorgon jacquelinae* (TL: Pine Creek Canyon, 5500', Modoc Co., California). Adults of *L. gorgon* from further west (e.g., CSNM, Jackson Co., ca. 4800'; Illinois River drainage, ca. 1350'-1500'; Rogue River drainage, 900'-1500', Josephine Co.) average smaller spots on a whiter ground color below, and females are variably darkened above, some appearing melanic. These represent *Lycaena gorgon dorothea* (TL: Illinois River Rd., 3 mi. W of Selma, 1350', Josephine Co., Oregon). The population of *L. gorgon* in the Klamath River Canyon, Klamath County, at about 3400' (also see Pratt & Emmel 1998: 668), appears phenotypically intermediate between *L. g. jacquelinae* and *L. g. dorothea* (although is perhaps slightly closer to *L. g. dorothea*), based on a small series taken by John Hinchliff (in OSAC).

Biological notes: *Lycaena gorgon* occurs wherever its larval foodplant, *Eriogonum nudum*, grows in abundance in the Siskiyous, and below about 6800' in the Warner Mountains. However, *L. gorgon* has not been found north of the Canyonville area, Douglas County, despite intensive searches at various sites further north where *E. nudum* plants are abundant. The single annual generation in Oregon flies from late May to mid-August, depending on elevation and local conditions, but most records are from June and July. While adults of *L. gorgon* are powerful fliers, they do not tend to stray far from populations of *E. nudum*. Males patrol in an erratic and rapid flight between flower heads of *E. nudum* plants, on open hillsides, and where *E. nudum* grows along roadsides. Males occasionally stop to feed or perch on *E. nudum* flowers. Females are found in the immediate vicinity of *E. nudum* plants, and readily feed at flowers of *E. nudum* and *Apocynum*. On 2 June 2004, I watched a female *L. gorgon* oviposit on *E. nudum* in Josephine County (Rogue River drainage). She first landed on an *E. nudum* flower head, and proceeded to crawl down the stems of the plant until she reached a major "fork" in the stalk. Here, she deposited a single egg. Upon inspection of other plants at the site, many *E. nudum* stem forks contained eggs of *L. gorgon*.

Comstock & Dammers (1934a: 25-27) described the early stages of *L. gorgon* from California in detail, and illustrated an egg, late-instar larva and pupa. Dammers in Emmel & Emmel (1973: 63) illustrated a full-grown larva and pupa of *L. gorgon*, also from California. Ballmer & Pratt (1989a: 23, 34-36, 71, 77) provided additional notes on and figures of the last-instar larva of Californian *L. gorgon*. No details on early stages from populations of *L. gorgon* in Oregon have been presented. As noted by Emmel &

Emmel (1973: 63), species of *Eriogonum* other than *E. nudum* are apparently used as larval foodplants by *L. gorgon* in southern California. Also see Downey & Allyn (1973) and Ballmer & Pratt (1992b).

***Lycaena rubidus* (Behr, 1866)**
_____(SE Cascades, Warners, Ochocos, Blues, Wallowa Co., Steens) *rubidus* <u>Recorded</u>: Ba, Cr, De, Do (far E), Gr, Ha, Kl, **Lk**, Mal, Un, Wal, Wh, <u>Expected</u>: Ja (far NE)?, Je (E), Mo (S), Um
_____(Columbia Basin) *perkinsorum* K. Johnson & Balogh, 1977 <u>Recorded</u>: Mo (N), Sh (N), Was (N), <u>Expected</u>: Gi (N), Um (N)

<u>Taxonomic notes</u>: *Lycaena rubidus* was reviewed by Johnson & Balogh (1977), who treated populations in Oregon as follows (also see Hinchliff 1994: 67). *Lycaena rubidus rubidus* (TL: Horse Prairie, 5 mi. E of Lakeview, Lake Co., Oregon; see Emmel et al. 1998h: 102) was characterized as having wings that are pale and immaculate below, with dark to bright females. Populations in Lake and Klamath County were assigned to *L. r. rubidus*. Adults of *L. rubidus* from Harney and Malheur counties, as well as the Ochoco and Blue mountains, were called *Lycaena rubidus duofacies* (TL: Bogus Basin, 6000', nr. Boise, Boise Co., Idaho). These were characterized as having dark or bright females, and essentially immaculate ventral hindwings, with a grayer ventral coloration than on *L. r. rubidus*. Females of the third segregate recognized by Johnson & Balogh (1977), *Lycaena rubidus perkinsorum* (TL: 1 mi. E of The Dalles, Wasco Co., Oregon), were characterized as being darker above, compared to females elsewhere. Both sexes of *L. r. perkinsorum* were described as being darker below than other segregates of *L. rubidus*, usually with a fairly well-developed row of discal spots on the ventral hindwing. *Lycaena rubidus perkinsorum* was restricted to the Columbia Basin.

Considerable individual variation in ventral coloration and maculation exists within most populations of *L. rubidus* in Oregon. At some localities (e.g., vic. Frenchglenn, Harney Co.; Summer Lake area, Lake Co.), adults that are phenotypically similar to all three named taxa reported from Oregon by Johnson & Balogh (1977) fly in sympatry. I have not detected consistent morphological differences between populations of *L. rubidus* in Oregon that have been called *L. r. rubidus* and *L. r. duofacies* (Johnson & Balogh 1977: 13, 23-24, Hinchliff 1994: 67). Until future studies on *L. rubidus* in eastern Oregon are conducted, all populations formerly called *L. r. duofacies* are herein considered to represent *Lycaena rubidus rubidus*. The name *Lycaena rubidus perkinsorum* is tentatively retained for apparently isolated populations in the Columbia Basin. Adults of *L. r. perkinsorum* do tend to have slightly shorter forewings, in proportion to hindwing length, than adults from elsewhere in Oregon. As defined by Johnson & Balogh (1977), adults of *L. r. perkinsorum* frequently have fairly prominent discal spots on the ventral hindwing. Additional study of phenotypic variation in populations of *L. rubidus* in Oregon is needed.

<u>Biological notes</u>: *Lycaena rubidus* is usually encountered in riparian habitats in Oregon, from low-elevation riverbanks (e.g., along the Columbia River, ca. 80'), to

mesic, high-elevation, montane meadows (e.g., Camas Creek, ca. 6000', Warner Mts., Lake Co.). The single annual brood of *L. rubidus* flies from late May and early June (along the Columbia River) to late August at higher elevations. Males defend perches, usually less than a meter above ground level, in open meadows and over gravel banks bordering rivers and creeks. Females are often found around larval foodplants, and both sexes visit a wide variety of flowers (Pyle 2002: 178).

Larval foodplants of *L. rubidus* include various broad-leaved species of *Rumex* (Johnson & Balogh 1977: 14, Ballmer & Pratt 1989a: 69, Scott 1992: 61), although details on foodplants in Oregon are lacking. Newcomer (1964a: 225) reported *Rumex salicifolius* as a larval foodplant of *L. rubidus* in Yakima County, Washington, and Jon Pelham (pers. comm. 2004) has recorded *R. venosus* as a larval foodplant, also in Washington. Bird et al. (1995: 157) found adults of *L. rubidus* in association with *R. venosus* in Alberta. Ballmer & Pratt (1989a: 23, 34-35, 77) described the full-grown larva of *L. rubidus* from California. As noted by Funk (1975) and Ballmer & Pratt (1992b), larvae of *L. rubidus* are facultatively myrmecophilous. Also see Maeki & Remington (1961a: 128) and Crowe (1970).

Lycaena heteronea **Boisduval, 1852**

_____(Siskiyous, W Cascades) *submaculata* J. Emmel & Pratt, 1998 <u>Recorded</u>: Cu, **Ja**, **Jo**, **La** (E), **Lin** (E), <u>Expected</u>: Clk (E)?, Cos (S), Do, Mar (E)?

_____(Warners, Ochocos, Blues, Wallowas, Steens) *rava* Austin, 1998 <u>Recorded</u>: Ba, Cr, [**De** (E)], Gi, Gr, Ha, **Lk**, Mal, **Mo**, **Um**, **Un**, **Wal**, Wh, <u>Expected</u>: Je (SE)

_____(SE Cascades, lower Deschutes River drainage) <u>Recorded</u>: De (NW), Do (far E), [Ja (far SE)], Je (W), Kl, **Sh**, **Was**, <u>Expected</u>: HR (NE)

<u>Taxonomic notes</u>: Emmel et al. (1998i: 15) changed the type locality of *Lycaena heteronea heteronea* (TL: between Carvallo Point and Yellow Bluff, ca. 2 air mi. SSE of Sausalito, Marin Co., California; see Emmel et al. 1998i: 15) to coastal northern California, which left interior populations historically known as *L. h. heteronea* (e.g., Dornfeld 1980: 95, Hinchliff 1994: 68) without a trinomial. Emmel & Pratt (1998: 670-671) described *Lycaena heteronea submaculata* (TL: Warner Valley, S boundary of Lassen National Park, Plumas Co., California) for populations of *L. heteronea* in the Cascades and western Sierra Nevada of California, where males usually have immaculate ventral hindwings. Adult phenotypes of *L. heteronea* in the Siskiyous and western Cascades of Oregon appear very similar to those in the southern Cascades of California, and the name *Lycaena heteronea submaculata* is herein applied to them.

Austin (1998f: 540) described *Lycaena heteronea rava* (TL: Lamoille Canyon, E of Lamoille Canyon Rd., 2700 m, Ruby Mts., Elko Co., Nevada) for populations in the northern Great Basin composed of smaller adults, with pale yellowish (when fresh) and weakly spotted ventral hindwings. Austin (1998f) included Nevadan populations of *L. heteronea* ranging from northern Washoe County, eastward, within his concept of *L. h. rava*. Similar phenotypes occur throughout most of eastern Oregon (see distribution above), which are herein called *Lycaena heteronea rava*. The name *Lycaena heteronea* *klotsi* Field, 1936 (TL: Broadwater Co., Montana) has been applied to populations where adults with weakly spotted ventral hindwings predominate (see Field 1936), in Oregon (Dornfeld 1980: 95), California (Pratt & Emmel 1998: 672), and the east slope of the Rocky Mountains (Fisher 1981: 231). Populations called *L. h. klotsi* by Emmel & Pratt (1998) apparently refer to Austin's concept of *L. h. rava* and/or *L. h. rutila* (TL: Wilson Peak Rd., 2470 m, Wilson Creek Range, Lincoln Co., Nevada; see Austin 1998f: 541). However, since the development of ventral hindwing spotting does not necessarily indicate close relationships between disjunct populations of *L. heteronea*, the name *L. h. klotsi* is not herein applied to any populations in Oregon. Further studies on topotypical *L. h. klotsi* need to be conducted, and populations between Broadwater County, Montana, and central Oregon require detailed study. Should all of these populations prove to be of the same phenotype, *L. h. klotsi* is the senior name and has priority.

Two sets of phenotypically similar, geographically discontinuous populations of *L. heteronea* occur along the eastern foot of the Cascades. The first group occurs in extreme eastern Douglas County and western Klamath County (e.g., Sand Creek, Klamath Co., see Dornfeld 1980: 203, #7b; also see Shapiro 1986: 339, 342-344, 1991a: 148). The second group of populations occurs in Wasco County (Tygh Valley and Juniper Flat areas, see Dornfeld 1980: 203, #7d), northern Jefferson County, northwestern Deschutes County (vic. Hwy. 20 at Indian Ford Campground, see Shepard 1999: 6) and western Sherman County (vic. Deschutes River Canyon). Adults in these populations are boldly spotted below, with large females that are usually dark above. Phenotypically, adults in these populations appear similar to *Lycaena heteronea gravenotata* (TL: Plainview, 6783', Jefferson Co., Colorado). However, heavily spotted populations such as these have not been reported from areas between the eastern foot of the Cascades (including Siskiyou Co., California; see Shapiro 1986, 1991a) and the Front Range of eastern Colorado and Wyoming. The phenotypic similarity of these highly disjunct populations most likely does not indicate close genetic similarity. For now, the name *L. h. gravenotata* is restricted to populations on the eastern slope of the Rocky Mountains (also see Klots 1930: 163-165), and no name is associated with boldly spotted populations in Oregon.

Most populations of *L. heteronea* in Oregon that are situated adjacent to boldly spotted populations, east of the Cascadian crest, show some degree of intermediacy towards the boldly spotted phenotype. At the CSNM (Jackson Co.), populations of ventrally nearly immaculate *L. h. submaculata* occur in close proximity to populations where adults have better-developed spots (Erik Runquist pers. comm. 2003). These spotted adults are phenotypically intermediate between *L. h. submaculata* and the boldly spotted forms in western Klamath County (*contra* Shapiro 1986: 342). Adults of *L. heteronea* from the top of Pine Mountain, Deschutes County, vary from boldly spotted below to nearly immaculate. In the Ochocos, and all along the western slope of the northern Blue Mountains (e.g., Morrow and Umatilla counties), adults show a variable degree of spot development on the ventral wing surfaces. Some fairly well spotted individuals fly together with immaculate individuals, and various intermediate forms. Adults of *L. heteronea* from the east slope of the Blue Mountains, and in the Wallowas, are generally immaculate below, and heavily spotted individuals are rarely seen. Clearly, further study is needed to determine the relationships between various populations of *L. heteronea* in Oregon and elsewhere. Populations of *L. heteronea* in Oregon sometimes use more than one *Eriogonum* species as a larval foodplant (see below), and phenotypic variation between populations in Oregon apparently does not parallel differences in foodplant use.

Biological notes: Throughout its range, *Lycaena heteronea* flies in a single annual brood. In Oregon, adults fly from mid-May at the lowest elevations to September at higher elevations, but most records are from June and July. Males of *L. heteronea* frantically patrol between flower heads of their *Eriogonum* foodplants, and defend perches on *Eriogonum* flowers. Females are usually found in the immediate vicinity of larval foodplants. Males are frequent visitors to mud (e.g., along Minam River, Wallowa Co., 28 June 2004, when several hundred individuals were seen), and both sexes visit a variety of flowers, especially *Eriogonum*.

Populations of *L. h. submaculata* in the Siskiyous (e.g., Mt. Ashland, ca. 7000', Dutchman Peak, ca. 7000' and CSNM, ca. 5800', Jackson Co.; Little Greyback Mt., ca. 4600', Josephine Co.) feed on *Eriogonum umbellatum* as larvae. Larval foodplants of *L. h. submaculata* in the western Cascades (e.g., SE of Hills Creek Reservoir, ca. 5000', Lane Co.; Hwy. 20, vic. Tombstone Pass, ca. 4200', Linn Co.) include *E. umbellatum* and *E. compositum* var. *compositum*, sometimes both at a single site. All of these populations are highly localized, and occur on rocky bluffs, ridges, and hillsides where their *Eriogonum* foodplants grow. Populations of *L. h. rava* throughout northeastern Oregon are found on hillsides and in dry meadows dominated by *Eriogonum heracleoides* var. *heracleoides* (and possibly *E. umbellatum* at higher elevations), from ca. 3000' (along the Minam River, Wallowa Co.), to 8200' (Light Peak, Lake Co.). Adults of *L. h. rava* were present at essentially all sites in eastern Oregon I have surveyed with dense stands of *E. heracleoides*. Adults of the boldly spotted segregate of *L. heteronea* in the lower Deschutes River drainage fly from mid-May to late June, and are associated with *E. compositum* var. *compositum* (e.g., Rd. 48 nr. National Forest boundary, ca. 2200', Wasco Co.) as well as *E. heracleoides* var. *angustifolium* (vic. Tygh Valley, 1300', Wasco Co.). Populations in this area frequently occur at sites where both *E. heracleoides* and *E. compositum* are common, and both are apparently used as larval foodplants. In contrast, boldly spotted adults of *L. heteronea* in the southeastern Cascades fly in late June through July, in pumice flats between about 4400' and 4600', where *Eriogonum umbellatum* grows in abundance (e.g., Sand Creek area, Klamath Co.; also on *E. umbellatum* at Indian Ford, Deschutes Co.).

Jon Pelham (pers. comm. 2004) reported populations of *L. heteronea* in Washington associated with *E. sphaerocephalum* var. *sphaerocephalum*, *E. douglasii* var. *douglasii*, *E. elatum*, *E. microthecum* var. *laxiflorum* and *E. compositum* var. *leianthum*, in addition to foodplants also used in Oregon (also see Emmel et al. 1971: 240). Williams (1910) described late-instar larvae of *L. h. heteronea* from the San Francisco area, California. Comstock (1928a: 68) illustrated the egg of southern Californian *L. heteronea*, and Ballmer & Pratt (1989a: 23, 34-36, 71, 77) described the last-instar larva of *L. heteronea* from California. Guppy & Shepard (2001: 194) figured a late-instar larva and pupa from two Californian populations. Larvae of some Californian *L. heteronea* are facultatively myrmecophilous, where they are reportedly tended by *Formica francoeuri* Bolton, a species formerly known as *F. pilicornis* Emery (Ballmer & Pratt 1992b: 103). Also see Maeki & Remington (1961a: 128).

***Lycaena helloides* (Boisduval, 1852)**

_____(most of state) *helloides* Recorded: all counties except one, Expected: Cos

Taxonomic notes: Populations of *Lycaena helloides* in Oregon represent *Lycaena helloides helloides* (TL: San Francisco, San Francisco Co., California; see Emmel et al. 1998i: 12). However, the taxonomic status of high-elevation and boreal populations outside of Oregon (e.g., Colorado, Wyoming, Washington, Alberta) is uncertain (see Brown et al. 1957: 156, Clench 1958, Chambers 1963, Ferris 1977b, Scott 1979). Significant individual variation exists in populations of *Lycaena helloides* in Oregon, especially in dorsal female coloration. Some females are very bright tawny above, while others are darker, sometimes almost melanic.

Biological notes: *Lycaena helloides* is by far the most widely distributed *Lycaena* species in Oregon, and probably occurs in all counties; it is currently known from all but Coos County. Despite its wide distribution, *L. helloides* is seldom seen in great numbers at any site in Oregon. This species is found in a wide variety of habitats, from damp roadside ditches and margins of creeks and rivers, even near sea level, to moist meadows at higher elevations (up to 7500’ in Harney Co.). Males defend perches on vegetation, usually at or below a meter from ground level. Both sexes visit a wide variety of flowers. At least two annual broods of *L. helloides* fly across most, if not all localities in Oregon, from mid-May to mid-October. A small third brood may be produced at some low-elevation locations (e.g., Willamette Valley). Shapiro (1975g: 121) noted five annual generations of *L. helloides* in the Sacramento Valley of California. I do not know of any univoltine populations of *L. helloides* in Oregon, but the possibility that such populations exist in the Blue or Wallowa mountains cannot yet be ruled out.

Larval foodplants of *L. helloides* in California include many species of *Rumex* and *Polygonum* (Shapiro 1975g, Tilden & Smith 1986: 186, Ballmer & Pratt 1989a: 69, Shapiro 2002: 38, Graves & Shapiro 2003: 423), as well as *Argentina egedii* ssp. *egedii* (reported as *Potentilla egedei* by Shapiro 1974c, 1975a: 201). Larval foodplants in British Columbia at least include *Polygonum amphibium* (Jones 1940: 13, Guppy & Shepard 2001: 196). In Washington, Jon Pelham (pers. comm. 2004) has recorded *Polygonum punctatum*, *P. hydropiper*, *P. persicaria*, *Rumex acetosella*, *R. obtusifolius*, *Argentina egedii* ssp. *egedii* and *A. anserina* as larval foodplants of *L. helloides*. Other larval foodplants have been reported (e.g., Bird et al. 1995: 159). No reports of larval foodplants for *L. helloides* have been presented from Oregon. Mead (1875: 780) and Coolidge (1924b) described the immatures of *L. helloides*. Comstock (1927: 174) illustrated an egg, and Comstock (1930a: 55) illustrated a late-instar larva and pupa of *L. helloides* from California (also see Emmel & Emmel 1973: 63). The last-instar larva of Californian *L. helloides* was subsequently described by Ballmer & Pratt (1989a: 24, 37, 77). Scott (1992: 60) described the egg, full-grown larva and pupa of *L. helloides* from Colorado. Guppy & Shepard (2001: 196) figured an egg and late-instar larva of *L. helloides* from British Columbia. Also see Maeki & Remington (1961a: 128), Downey (1966), Shapiro (1973b), Downey & Allyn (1973: 43, 1981: 27) and Shapiro (1973a).

***Lycaena nivalis* (Boisduval, 1869)**

_____(W Siskiyous) *bichroma* J. Emmel & Pratt, 1998 Recorded: **Ja** (S), Jo, Expected: Cos (S)?, Cu

_____(Cascades) nr. *bichroma* Recorded: Clk (E), De (W), Do (E), **HR**, Ja (N), **Je (W)**, Kl (NW), **La** (E), **Lin** (E), Mar (E), **Was** (W), Expected: Mu (E)

_____(Warners, Lake Co., S Klamath Co.; variable in SE Jackson Co.) *warnermontana* J. Emmel & Pratt, 1998 Recorded: **Ja** (far SE), Kl (S), Lk

_____(Ochocos, Aldrichs, Blues, sparse in Wallowas) nr. *warnermontana* Recorded: **Ba**, **Cr**, **Gr**, Ha (N), **Mal** (N), **Mo** (S), **Um**, **Un**, **Wal**, **Wh**, Expected: Gi (SE), Je (E)

_____(Wallowas & N Blues) *browni* dos Passos, 1938 Recorded: Ba (NE), **Mo** (S), **Um**, **Un**, **Wal**

_____(Steens) *praetexta* Austin, 1998 Recorded: Ha (S), Expected: Mal (S)

Taxonomic notes: *Lycaena nivalis* is composed of a confusing set of phenotypes in Oregon and elsewhere. Many populations of *L. nivalis* in Oregon contain individuals of more than one phenotype, usually along with intermediates. Intrapopulational variation is so great within some populations in Oregon that the application of trinomials to describe this variation can be misleading. Newcomer (1964d) discussed the unusual patterns of variation exhibited by *L. nivalis* in Oregon and Washington (also see Brown 1962), and suggested that climatic conditions were primarily responsible for the different phenotypes. The most uniform and phenotypically invariable populations of *L. nivalis* in Oregon are found in the Siskiyous (e.g., vic. Bolan Lake, ca. 5200', Josephine Co.; Mt. Ashland, ca. 6800', Jackson Co.). Adults in these populations are larger and more vividly colored below than those from elsewhere in Oregon (also see Shapiro 1986). Below, the basal part of the hindwing is deep orangish yellow, contrasting strongly with the vivid pink on the outer part of the wing; very small black spots may or may not be present. This phenotype was named *Lycaena nivalis bichroma* (TL: summit of Mt. Eddy, Siskiyou Co., California) by Emmel & Pratt (1998: 664-665), and refers, in part, to Dornfeld's (1980: 206, #2a-d) "Form 1" of *L. nivalis*.

Some populations of *L. nivalis* in the western Cascades are composed mostly of the *L. n. bichroma* phenotype (e.g., Lost Prairie, ca. 3600', Linn Co.), but most known Cascadian populations also include individuals that are somewhat paler below. These paler individuals are patterned like *L. n. bichroma* below, but the basal coloration is paler yellow, and the pink marginal area is not as vivid. As a result, the contrast between yellowish and pinkish areas is not as dramatic in these paler forms as it is on *L. n. bichroma* phenotypes, and their overall appearance below is similar to that of *Lycaena nivalis browni* (but adults average larger than those of typical *L. n. browni*; see below, and see Brown 1962, Newcomer 1964a: 225). Populations on the northeastern slope of the Cascades (e.g., Mill Creek Canyon, ca. 2100', Wasco Co.; Neal Creek Canyon, Hood

River Co., ca. 1600'; Satus Pass, ca. 3500', Klickitat Co., Washington) are composed mostly of these paler phenotypes, and individuals of the *L. n. bichroma* phenotype are less common. Since most or all Cascadian populations are composed of variable percentages of these two phenotypes, and intermediates, for now they are all called *Lycaena nivalis* nr. *bichroma*.

Adults of *L. nivalis* from the vicinity of the CSNM, Jackson County, are highly variable, but individuals as vividly colored below as *L. n. bichroma* have not been found. Most males from CSNM area are phenotypically somewhat intermediate between *Lycaena nivalis warnermontana* (TL: Dismal Swamp, Warner Mts., Modoc Co., California) and *Lycaena nivalis nivalis* (TL: Gold Lake, Sierra Co., California; see Emmel et al. 1998i: 26), but phenotypes apparently typical of both taxa are occasionally found (also see Shapiro 1986: 343-344). However, females of *L. nivalis* from the CSNM are larger and darker above, on average, than those of *L. n. nivalis*. Because of the phenotypic variability of adults from the CSNM area, no trinomial can easily be applied to these populations. In adult size and average coloration, however, they are closest to *Lycaena nivalis warnermontana* (also see Shapiro 1986: 343-344).

Many populations of *L. nivalis* east of the Cascades in Oregon are composed of individuals with nearly uniform ventral hindwing coloration. As described by Emmel & Pratt (1998: 665-666), adults of *L. n. warnermontana* have predominantly tan or pale pinkish ventral hindwings, with no prominent division between basal and distal ground color. These are usually decorated with large black spots below (also see Newcomer 1964d: 272). Emmel & Pratt (1998: 666) proposed the name *L. n. warnermontana* for boldly spotted phenotypes of *L. nivalis* in the Warner Mountains. However, examination of long series of specimens from the Warners shows that not all individuals there are as boldly spotted below as the type specimens figured by Emmel & Pratt (1998: 679). Ventral hindwing spot size on some individuals is considerably reduced. For now, the name *Lycaena nivalis warnermontana* is applied to populations of *L. nivalis* in the Warner Mountains, throughout Lake County, and through the southern part of Klamath County to the CSNM of Jackson County (where adults are more variable), but a phenotype in the mountains of northeastern Oregon is similar.

Throughout the Ochocos, Aldrichs, Blues and, less often, in the Wallowa Mountains, a pale phenotype of *L. nivalis* is found with light pinkish, creamy or whitish ventral hindwing coloration (also see Dornfeld 1980: 97). Like *L. n. warnermontana*, these lack a distinct division between basal and marginal ventral hindwing coloration. Ventral spots average considerably smaller than on most adults of *L. n. warnermontana*, but occasional fairly boldly spotted individuals are seen. These pale populations in northeastern Oregon refer, in part, to Dornfeld's (1980: 207, #3a-d) "Form 2" of *L. nivalis*, and were mapped as *L. n. nivalis* by Hinchliff (1994: 70). Herein, the pale phenotype of *L. nivalis* in the northeastern mountains of Oregon is called *Lycaena nivalis* nr. *warnermontana*. On average, adults of *L. n.* nr. *warnermontana* are smaller, and ventral hindwing spots are usually smaller, when compared to typical adults of *L. n. warnermontana*.

In the Wallowa and northern Blue mountains, some adults of *L. nivalis* have more vivid ventral coloration, and better-defined borders between creamy (or yellowish) basal and pinkish marginal areas. These represent the phenotype of *Lycaena nivalis browni* (TL: Snowslide Canyon, nr. Montpelier, Bear Lake Co., Idaho). Some populations in the Wallowas and northeastern Blue Mountains are comprised mostly of *L. n. browni* phenotypes, which tend to lack black spotting on the two-toned ventral hindwing. However, paler and ventrally spotted adults of the *L. n.* nr. *warnermontana* phenotype, along with various intermediates, can usually be found in these populations when many individuals are examined. Throughout northeastern Oregon, the names *Lycaena nivalis* nr. *warnermontana* and *Lycaena nivalis browni* are best applied to phenotypes of individual adults, and not to particular populations (see overlapping distributions above).

Adults of *L. nivalis* from Steens Mountain, Harney County, are more uniform in phenotype than those from further north (also see Dornfeld 1980: 97), and apparently represent *Lycaena nivalis praetexta* (TL: Wildhorse Crossing Campground, Wildhorse Creek, 1950 m, Owyhee River Valley, Elko Co., Nevada; see Austin 1998f). These have lightly spotted ventral hindwings, and a well-defined border between basal yellowish or orangish and distal pinkish areas. Overall, these adults are phenotypically similar to *L. n. browni* but are more vividly colored below, and average better-developed spots on the ventral hindwings. However, intensity of ventral coloration in *L. n. praetexta* does not approach that seen in *L. n. bichroma*. Clearly, much further study is required before the taxonomic status of *L. nivalis* populations in Oregon will be stable.

<u>Biological notes</u>: In Oregon, *Lycaena nivalis* is most often encountered along gravel roadsides, in dry meadows and on well-drained hillsides, from about 1600' (Neal Creek Canyon, Hood River Co.) to 9500' (nr. summit of Steens Mt., Harney Co.). In Oregon and elsewhere, *L. nivalis* flies in a single annual brood, from late May through August, depending on elevation and seasonal conditions. Males guard perches on leaves or rocks, at or near ground level. Females are frequently seen around larval foodplants, and both sexes visit a variety of flowers.

Newcomer (1964d) reported an oviposition of *L. nivalis* on *Polygonum douglasii* at Satus Pass, [Klickitat Co.], Washington, and reported the same plant as a larval foodplant at Lake Tahoe, California (also see Newcomer 1911). Jon Pelham (pers. comm. 2004) reported *P. douglasii* ssp. *douglasii* as a larval foodplant for *L. nivalis* in Washington, but suggested that additional *Polygonum* species may be utilized as well. In Colorado, *P. douglasii* is the only reported larval foodplant of *L. nivalis* (Chambers 1963: 26). Shapiro et al. (1981: 105-106) suggested that *Polygonum douglasii* ssp. *spergulariiforme* may serve as a larval foodplant in the Trinities of northern California. Apparently, no details on larval foodplants for *L. nivalis* from Oregon have been presented. Newcomer (1911, 1964d) provided details on immatures of *L. n. nivalis* from Lake Tahoe, California, and Downey & Allyn (1981: 21, 24) figured the egg of *L. nivalis* in great detail. Ballmer & Pratt (1989a: 24, 37, 71, 75, 77, 81) described and figured the full-grown larva of *L. nivalis* from California. Guppy & Shepard (2001: 197) figured a late-instar larva of *L. n. warnermontana* from Modoc County, California. Also see Maeki & Remington (1961a: 128) and Ballmer & Pratt (1992b).

Lycaena mariposa **(Reakirt, 1866)**
_____(Cascades, Warners) *mariposa* Recorded: Clk (E), **De** (W), Do (E), HR, Ja (N), **Je** (W), Kl, **La** (E), **Lin** (E), Lk (S & W), Mar (E), Mu (E), Was (W)
_____(Siskiyous) Recorded: Ja (S), Jo, Expected: Cos (S)?, Cu
_____(Wallowas, possibly W through Blues and Ochocos) *penroseae* Field, 1938
Recorded: Ba, Cr, Gr, Mo, Um, Un, Wal, Wh, Expected: Ha

Taxonomic notes: Geographic variation among populations of *Lycaena mariposa* in Oregon is subtle. However, individuals from any given population may show considerable variation in the tone and extent of ventral hindwing markings. Cascadian populations represent *Lycaena mariposa mariposa* (TL: California). Most Cascadian individuals are large, males tend to have variably well-developed dark marginal borders above, and adults have variably darkened ventral hindwings. Individuals of *L. mariposa* from the Siskiyous (examined from Mud Spring on Flat Top Mt., Josephine Co., OSAC) average slightly larger, males have narrower dark marginal borders above, and ventral hindwings tend to be paler, compared to adults from the Cascades (also see Shapiro et al. 1981: 106).

From the Ochoco Mountains eastward, adults of *L. mariposa* average slightly smaller, males are less lustrous above, and have broader dark marginal borders on the dorsal wing surfaces, compared to adults of Cascadian *L. m. mariposa*. Ventral hindwings of *L. mariposa* from northeastern Oregon are variably darkened, and are usually duskier than those of Cascadian adults. Populations in northeastern Oregon are tentatively called *Lycaena mariposa penroseae* (TL: Lake Eleanor, Yellowstone National Park, 8500', Wyoming; see Field 1938a). Adults from the Wallowas mostly match *L. m. penroseae*, but some males from the Ochocos, Aldrichs, and southern Blues are phenotypically intermediate between those of *L. m. penroseae* and *L. m. mariposa*. Females thus far seen from Grant County (e.g., Hwy. 26, vic. Dixie Summit) are unusually dark above (Harold Rice pers. comm. 2004). Clearly, populations of *L. mariposa* throughout central and eastern Oregon require further study, since only small series from the region have been assembled. I have not examined specimens of *L. mariposa* from the Warner Mountains of Lake County (Burnt Creek Rd. 391, 3 mi S Hwy. 140, 29 August 1978, Hinchliff), or from Jackson County (NE of Butte Falls; Briar Creek; Mt. Ashland Loop Rd., 1.4 rd. mi. S Jct. Tolman Creek Rd.; also see Hinchliff 1994: 71).

Biological notes: *Lycaena mariposa* flies in a single annual brood, from late June through August in Oregon. Adults fly in and near moist forested habitats, often in sunlit gaps in the forest, and in small wet meadows and bogs. Records of *L. mariposa* in Oregon extend from about 3000' (many sites) to 7600' (Eagle Cap Wilderness, Union Co.). Males guard perches on low shrubs and trees, and sometimes patrol around flowers in sunny areas. Both sexes feed at a wide variety of flowers (e.g., Pyle 2002: 186). The record of *L. mariposa* from south-central Wasco Co. (Kahneeta Hot Spring, 16 June 1968, E. Griepentrog; see Hinchliff 1994: 71) is highly questionable, and mislabeling in this instance is suspected.

Larval foodplants of *L. mariposa* include various species of *Vaccinium*. Ballmer & Pratt (1989a: 66) reported *V. myrtillus* as a larval foodplant in Oregon. Pratt & Ballmer (1986) reported *V. caespitosum* as a larval foodplant of *L. mariposa* in northern California, and Jon Pelham (pers. comm. 2004) has noted ovipositions on the same plant in Washington. Coolidge (1910: 316) described the egg of *L. mariposa* from Missoula County, Montana. Ballmer & Pratt (1989a: 24, 34, 37, 71, 77) described the last-instar larva of *L. mariposa* from California. Guppy & Shepard (2001: 198) figured a late-instar larva and pupa from British Columbia, and reported larval foodplants there to include *Vaccinium uliginosum*, *V. oxycoccos* and *Andromeda polifolia*. Larvae of Californian *L. mariposa* were noted to be facultatively myrmecophilous by Ballmer & Pratt (1992b).

Theclini: (1 species)

***Habrodais grunus* (Boisduval, 1852)**
_____(Cascades, N Coast Range) *herri* Field, 1938 Recorded: Be (W), Clk (E), De (W), Do (E), HR, Ja (E), Je (W), **Kl** (W), La (E), Li (E), Lin (E), Mar, Mu (E), **Was** (W), Expected: Po?
_____(Siskiyous) *lorquini* Field, 1938 Recorded: Cu, Do (SW), Ja (SW), Jo, Expected: Cos (S)

Taxonomic notes: Adults of *Habrodais grunus* in the Cascades and north Coast Range are large and bright above. These are *Habrodais grunus herri* (TL: McKenzie (Sisters) Pass, [Hwy. 242, Lane-Deschutes counties], Oregon). Populations of *H. g. herri* occupy the length of Oregon's Cascades, from Hood River County in the north, to the CSNM, Jackson County, in the south (where darker adults are also found). The supposed gap in the Cascadian distribution of *H. grunus*, from north of Crater Lake to the McKenzie Pass area (e.g., Hinchliff 1994: 72, Pyle 2002: 190), is not real, since recent fieldwork has shown that populations do indeed occur throughout this area (e.g., pers. obs. 2004). Contrary to Hinchliff (1994: 72) and Pyle (2002: 190), Cascadian adults north of the CSNM (Jackson Co.) are of the *H. g. herri* phenotype, and not of the darker *Habrodais grunus lorquini* (TL: Mt. Diablo, Contra Costa Co., California), which occurs in parts of the Siskiyous. Adults of *H. g. lorquini* may be very dusky above, sometimes with just a hint of orange coloration, and they have more pointed forewings than do *H. g. herri*. Morphological and apparent biological (see below) differences between these two taxa require further study. The "male" and "female" captions associated with *H. grunus* images in Pyle (2002: 191) are reversed. Also see Field (1938b).

Biological notes: In Oregon, *Habrodais grunus* may be found from near sea level (e.g., Chetco River, ca. 150', Curry Co.) to almost 7000' in the Cascades (many sites). Populations of *H. g. herri* in the Cascades and at the CSNM, Jackson County, are closely associated with *Chrysolepis chrysophylla*, its only known larval foodplant. Adults of *H. g. herri* fly late in the season, usually appearing in late July or early August, and flying through September. In contrast, adults of *H. g. lorquini* in the Siskiyous are found in association either with *C. chrysophylla* (vic. Chrome Ridge, ca. 3000', Josephine Co.) or live oaks at lower elevations in Josephine County (possibly *Quercus chrysolepis* and/or *Q. vacciniifolia*). Adults in these populations fly from late June through late August. Where *C. chrysophylla* is densely distributed, adults of *H. grunus* can be very abundant. Adults spend most of the day (before about 14:30 hrs.) resting in the shade of larval foodplants or nearby plants, or flying short distances within a patch of adjacent foodplants. From about 15:00 hrs. to as late as 19:30 hrs., adults are more active and fly above and through the forest canopy. Males guard perches in small sunlit gaps, usually on leaves of larval foodplants early in the day, but on a variety of plants later. Adults don't spend much time at flowers, but do visit various types (Pyle 2002: 190, pers. obs. 2000), and feed at catkins of *Chrysolepis chrysophylla* (Neill & Hepburn 1976: 80, Neill 2001: 93, also see Austin 2002a).

Dyar (1893: 94) described the full-grown larva and pupa of *H. grunus* from Yosemite, California, which fed on *Quercus chrysolepis*. Comstock & Dammers (1935c: 81-82) illustrated a late-instar larva and pupa of *H. grunus* from California (also see Emmel & Emmel 1973: 52). Downey & Allyn (1981: 23) figured the egg in great detail, and Ballmer & Pratt (1989a: 10, 19, 77-78, 81) subsequently described and figured the full-grown larva of *H. grunus* (also see Miller & Hammond 2003: 33). As noted by Ballmer & Pratt (1992b), larvae of *H. grunus* from California are facultatively myrmecophilous. Also see Downey (1966) and Downey & Allyn (1973: 31).

<u>Eumaeini</u>: (21 species):

***Atlides halesus* (Cramer, 1777)**
_____(Willamette Valley, SW Cascades, Siskiyous, Warners) *corcorani* Clench, 1942
<u>Recorded</u>: Be, **Do**, **Ja**, Jo, Kl (S), La, Lk (S), Mar (W), Po, Ya, <u>Expected</u>: Clk (SW), Cos?, Cu?, Lin (W), Wan?

<u>Taxonomic notes</u>: In recent references, western North American populations of *Atlides halesus* have either been called *Atlides halesus corcorani* Clench, 1942 (e.g., Dornfeld 1980: 93) or *Atlides halesus estesi* Clench, 1942 (e.g., Tilden & Smith 1986: 157, Hinchliff 1994: 73, Pyle 2002: 189). When Clench (1942) introduced the name *A. h. estesi* to replace *A. h. corcorani* (which was originally proposed for an aberration, by Gunder 1934: 131, and therefore unavailable), he inadvertently made the name *A. h. corcorani* available (*fide* Jon Pelham; ICZN 1999: article 10.2). No geographic variation has been noted across populations of *Atlides halesus corcorani* (TL: Riverside, Riverside Co., California) in Oregon or California.

<u>Biological notes</u>: Despite the large size and conspicuous coloration of adults, *Atlides halesus* is rarely seen in Oregon. The first reports of *A. halesus* from Oregon were by Fender (1931) and Macy (1932), who encountered it near McMinnville (Yamhill Co.). In Oregon, *A. halesus* is most frequently encountered in Jackson County, where some years, adults may be found in small numbers on roadside *Apocynum* flowers along Highway 66 (below 4500'), at least from late June to mid-September. Males guard

hilltop perches (e.g., Shields 1968: 83, Alcock 1983), sometimes far above the elevational range of their local larval foodplants (e.g., CSMN, ca. 5800', Jackson Co.). Presumably, adults of *A. halesus* spend much of their time in the canopy of various trees, where males may perch on treetops, and females search for suitable clumps of larval foodplants. Adults fly from early April to October, in what may be two or three overlapping broods, but most records of *A. halesus* in Oregon are from July and August. Records of *A. halesus* from the Willamette Valley are widely scattered, and usually represent single individuals. However, Paul Severns observed 3 individuals in Lane County (near Lowell) in late August, 1998 (pers. comm. 2004), and multiple individuals were observed at two sites in Polk County, by Gary and Andrea Peters, in 2003 (Shepard 2004: 8).

Throughout the range of *Atlides halesus* in western Oregon, the mistletoe *Phoradendron villosum* serves as its larval foodplant. This mistletoe usually grows on *Quercus garryana* in Oregon, but sometimes grows on other trees, including exotic species. Records of *A. halesus* from the Warner Mountains and elsewhere in Lake County (where *Quercus* do not grow, e.g., W shore of Crump Lake; also Kelley Creek in the Warners) suggest that larvae may also feed on mistletoes growing on *Juniperus* (see Ballmer & Pratt 1989a: 70). Boisduval & Le Conte (1829-[1837]: pl. 25) illustrated a late-instar larva and pupa of *A. halesus* from the eastern United States. Late-instar larvae of eastern North American *A. halesus* have since been described and/or figured by Haskin (1933), Allen (1997: 313) and Emmel (2001: 15). The egg (1981: 20) and pupa (1973: 27, #5) of *A. halesus* were figured in great detail by Downey & Allyn. Comstock (1927: 154-155) described and illustrated the full-grown larva and pupa of *A. h. corcorani* from California. Comstock (1932b: 87) later described and illustrated its egg. A late-instar larva and pupa of *A. halesus*, presumably from California, were illustrated by Dammers in Emmel & Emmel (1973: 52). Subsequently, Ballmer & Pratt (1989a: 18, 25, 37-38, 72, 75, 77, 81) described and figured the full-grown larva (also see Miller & Hammond 2003: 31). For more information, see Macy (1932), Downey (1966), Downey & Allyn (1973: 35, 39), Scott (1973b), Whittaker (1985) and Ballmer & Pratt (1992b).

Introduction to Oregon's green *Callophrys* species

Three species of *Callophrys* Billberg, 1820 in Oregon have green ventral wing surfaces and lack hindwing tails, *Callophrys affinis*, *Callophrys perplexa* and *Callophrys sheridanii*. Details of ventral hindwing white spot bands on the three green species in the Pacific Northwest are variable within each species, and in general, are not diagnostic of any particular species (*contra* most literature reports). In most populations of all three species in Oregon, this spot band may be continuous and well-developed, or it may be reduced to small spots or be entirely absent. The shape and position of the bands on the ventral wing surfaces is highly variable within most populations (but see *C. perplexa*, p. 117). While adults of all three species are confusingly similar in Oregon, they can be identified by several subtle morphological characters, and the three species differ in details of their biology. When encountered in the field, adult behavior and habitat preferences of the three species differ, and foodplant associations are usually fairly obvious. Adult flight times of the three species average somewhat different, but overlap occurs in many areas where adults of two species fly in sympatry. The identity of various populations of green *Callophrys* in Oregon has been uncertain or confused by previous authors (see discussions below). However, I have closely studied populations of all three green *Callophrys* species in Oregon and Washington since 1999, at over 50 localities, and have examined over 1700 specimens from throughout the Pacific Northwest, including those in various institutional and private collections (see Introduction, p. 8). Distributional information cited herein for these three species is based only on specimens personally examined, and is not taken from literature reports. Also see Haskin & Grinnell (1911), Clench (1963), Tilden (1963b) and Gorelick (1970, 1971).

***Callophrys affinis* (W. H. Edwards, 1862)**
_____(Ochocos, Aldrichs, Blues, Wallowas, SE ranges) *washingtonia* Clench, 1944
<u>Recorded</u>: **Ba**, **Cr**, Gi (SE), **Gr**, **Ha**, **Mal**, Um (S), **Wal**, <u>Expected</u>: De (far E)?, Je (E), Lk (far E)?, Mo (S), Un, Wh

<u>Taxonomic notes</u>: Populations of *Callophrys affinis* in Oregon are referable to *Callophrys affinis washingtonia* (TL: Alta Lake, Washington). No geographic variation has been seen across populations of *C. a. washingtonia* in Oregon, although individual variation in any given population can be considerable. Most adults of *C. a. washingtonia* are entirely gray above, but occasional males and females have a cold tawny glow. Adults are also highly variable in the development of the white ventral hindwing spot band. Some phenotypic intergradation of *C. a. washingtonia* towards *Callophrys affinis affinis* (TL: vic. Fort Bridger, Wyoming; see Brown 1970b: 63-65) may occur in central Idaho (e.g., Blaine Co., pers. obs. 2000), but adults from there average closest in overall phenotype to *C. a. washingtonia*. Both sexes of *C. a. affinis* are warm tawny above. Curiously, records of *C. affinis* are lacking from northern Nevada (George Austin pers. comm. 2004). Images of "*C. affinis*" in Dornfeld (1980: 201, #8a-d) are of *C. sheridanii*.

<u>Biological notes</u>: In Oregon, *Callophrys affinis* occurs in windblown hilltop habitats where its larval foodplants grow in abundance. Throughout the Pacific northwest, *C. affinis* flies in a single annual brood, and records from Oregon extend from mid-May to mid-July (Steens Mt., Harney Co.), depending on elevation and seasonal conditions. Known populations of *C. affinis* in Oregon range from about 3000' (vic. Lonerock, Gilliam Co.) to 9600' (nr. top of Steens Mt.). Males are almost invariably found on the summits of hilltops or ridges, usually guarding perches on tips of *Artemisia* or other plants, or on rocks. Females are usually found among dense stands of *Eriogonum*, or flying between patches of *Eriogonum* plants, often near hilltops but sometimes in lower areas. The range of *C. affinis* in Oregon has not been found to overlap with that of *C. perplexa*, although at Satus Pass, Klickitat County, Washington, *C. perplexa* occurs in forested areas with abundant patches of *Lotus nevadensis* (at 3300'), while *C. affinis* occurs on windblown summits less than a mile away (at 4400'), in areas dominated by *Eriogonum*. Adults of the two taxa at Satus Pass are easily determined to species based on morphology, and are always separable when adult behavior and host associations are noted.

Confirmed larval foodplants of *C. affinis* in Oregon include *Eriogonum heracleoides* var. *angustifolium* in Ochocos, and *E. h.* var. *heracleoides* throughout the northeastern mountains. In Washington, Jon Pelham (pers. comm. 2004) has also found *C. affinis* in association with *Eriogonum sphaerocephalum* var. *sphaerocephalum* and *E. elatum*. Details on the immature stages of *C. a. washingtonia* or *C. a. affinis* have not been presented. Scott (1992: 67) described the early stages of *C. a. homoperplexa* Barnes & Benjamin, 1923 from eastern Colorado.

Throughout eastern Oregon, *C. affinis* occurs in sympatry with *C. sheridanii*, and adults may be difficult to separate based only on wing morphology. However, adult males of these species can usually be told apart based on their behavior. Males of *C. affinis* perch on well-defined hilltops and ridgelines, while *C. sheridanii* males perch in hillside or roadside gullies, and in shallow washes and small canyons. In general, adults of *C. sheridanii* fly earlier in the season than those of *C. affinis*, where they occur in exact sympatry (e.g., Tower Mt., ca. 6600', Umatilla Co.; King Mt., ca. 6600', Harney Co.; N of Beulah Reservoir, ca. 4200', Malheur Co.). However, flight times of the two species often overlap, and on some occasions, both species can be observed in the same spot on the same day. In such situations, careful attention must be paid to the behavior of individual males to accurately identify them. Usually, by the time *C. affinis* adults are numerous, individuals of *C. sheridanii* are scarce and show considerable wing wear. In situations where *C. affinis* and *C. sheridanii* are sympatric and synchronic, females of the two species may be very difficult to separate. Some females of both *C. affinis* and *C. sheridanii* in northeastern Oregon have a cold tawny glow above, although tawny female *C. sheridanii* in the region occur mostly along the north slope of the Blue Mountains. In general, tawny female *C. sheridanii* are very rare within the range of *C. affinis* in eastern Oregon, south of the Blue Mountains (see below), so tawny *Callophrys* females found from mid-May through July in this region will usually be *C. affinis*. Where *C. affinis* and *C. sheridanii* occur in sympatry and synchrony in western Colorado (e.g., Grand Co.), they are of very different phenotypes and their identities cannot be confused, yet biological and behavioral differences discussed herein for Oregon are the same.

***Callophrys perplexa* Barnes & Benjamin, 1923**

_____(N Coast Range, W Cascades, Siskiyous, Warners) nr. *perplexa* Recorded: Be, Clk, Cls, Cos, **Cu**, Do, **HR**, Ja, **Jo**, **La**, **Li**, Lk (S), **Po**, Ti, Wan, Ya, Expected: Col, Kl (S), Lin (E), Mar (E), Mu (E)

_____(NE Cascades) *oregonensis* Gorelick, [1970] Recorded: De (far NW), **HR**, **Je** (W), **Was** (W)

Taxonomic notes: *Callophrys perplexa* was previously known as *C. dumetorum* (Boisduval, 1852) (e.g., Clench 1963, Tilden 1963b, Gorelick 1971, Dornfeld 1980: 92, Pyle 1981: 440-441, Garth & Tilden 1986: 129, Tilden & Smith 1986: 166, Hinchliff 1994: 82), until Emmel et al. (1998i: 11) determined that the lectotype specimen of *C. dumetorum* represents an *Eriogonum*-feeding taxon (see below under *C. sheridanii*). Populations of *C. perplexa* in western Oregon, including those in the Warner Mountains (Lake Co.), generally resemble *Callophrys perplexa perplexa* (TL: San Diego [San Diego

Co.], California). However, there are subtle differences in wing shape and maculation between series from western Oregon and southern California, and the species-level identity of some central and northern Californian populations (see discussion below) is unclear. Until relationships of *C. perplexa* in Oregon to populations throughout California are better understood, those in western Oregon are herein called *Callophrys perplexa* nr. *perplexa*. Dorsal coloration of female *C. p.* nr. *perplexa* from western Oregon is highly variable. Females from single sites (e.g., Burnt Woods, ca. 900', Lincoln Co.), above, may be completely gray, bright tawny, or intermediate. Additionally, adult size in these populations is quite variable, but most individuals are larger than those from the northeastern Cascades.

Adults of *C. perplexa* in the northeastern Cascades, from far northwestern Deschutes County, north to Wasco County (and into Klickitat and Yakima counties, Washington), tend to be smaller than those from western Oregon, and the ventral hindwing postmedial spot band is usually positioned slightly closer to the wing margin. Females in these populations tend to be tawny above, although I have sampled a few gray females. These were named *Callophrys perplexa oregonensis* (TL: Kusshi Creek, 2200' [N side of Satus Pass], Yakima Co., [Washington]) by Gorelick (1970). Adults from the Columbia River Gorge (e.g., nr. Dee, Hood River Co.) appear phenotypically intermediate between those of *C. p.* nr. *perplexa* and *C. p. oregonensis*. A report of intergradation between *C. perplexa* and *C. affinis* (Scott & Justice 1981) is in error, and was partly based on specimens that were misdetermined at the species-level.

<u>Biological notes</u>: *Callophrys perplexa* flies in a single annual brood in Oregon, with adults mostly from late April to late June, depending on elevation and seasonal conditions. Records in Oregon extend from near sea level (Tillamook, Tillamook Co.) to about 6000' (Burnt Creek Rd., Warner Mts., Lake Co.). Male *C. perplexa* perch on prominent points in a variety of habitats, although not on well-defined hilltops. Where populations occur under powerline cuts in hilly terrain (e.g., nr. Burnt Woods, Lincoln Co.), males tend to perch at or near high points, usually on leaves or grass blades less than a half meter above ground level, and less often on the ground. In clear-cut situations (e.g., Bald Mt., Polk Co.), males frequently perch near prominent points along the hillside or along dirt roads (especially near *Lotus crassifolius* plants), overlooking a hillside. In flatter situations (e.g., nr. Dee, Hood River Co.), males tend to perch directly on larval foodplants (*L. crassifolius*), often along roadsides. Males of *C. p. oregonensis* (e.g., Satus Pass, Klickitat Co., Washington) tend to perch on low *Ceanothus velutinus* leaves, situated directly above or adjacent to large roadside patches of *Lotus nevadensis*. Perching behavior in male *C. perplexa* in Oregon has been observed from late morning to late afternoon. Females of *C. perplexa* are usually found in the immediate vicinity of larval foodplants, and adults of both sexes visit various flowers, especially *Lomatium* in Jefferson County.

In Oregon, *C. perplexa* has been found in association with only two larval foodplant species, *Lotus crassifolius* (but see p. 11 herein) and *L. nevadensis* var. *douglasii*, although other *Lotus* species may possibly be used, as in Washington (*L. aboriginus*, Jon Pelham pers. comm. 2004) and California (e.g., Coolidge 1925b: 329, Gorelick 1971, Ballmer & Pratt 1989a: 67). All green *Callophrys* in western Oregon associated with *Eriogonum* species are *C. sheridanii* (see below). Populations of *C. perplexa* in western Oregon are usually associated with *L. crassifolius* (e.g., Wimer Rd., just west of Curry – Josephine County line, 3200'; E of Oakridge, 4100', Lane Co.; Burnt Woods area, ca. 900', Lincoln Co.; Bald Mt., ca. 1800', Polk Co.; nr. Dee, ca. 1500', Hood River Co.), but a population on Rickreall Ridge, 2400', Polk County (that occurs in sympatry with *C. sheridanii*), is associated with *L. nevadensis* var. *douglasii*. Topotypical populations of *C. p. oregonensis* use *L. nevadensis* var. *douglasii* as the larval foodplant (e.g., Satus Pass, ca. 3300', Klickitat Co., Washington), although most populations along the northeastern Cascades in Oregon are associated with both *L. nevadensis* and *L. crassifolius*. The early stages of *C. perplexa* from California were described in detail by Coolidge (1925b: 329-335). Gorelick (1961: 100) figured late instar larvae of *C. p.* nr. *perplexa* from Polk County, Oregon, feeding on *Lotus crassifolius*, and Gorelick (1971: 37, 41) figured the egg, larva and pupa of *C. perplexa* from California. Dammers in Emmel & Emmel (1973: 60) illustrated a full-grown larva of Californian *C. perplexa* (also see Ballmer & Pratt 1989a: 26, 39-40, 72, 78, 81). Typical *C. perplexa* from southern California was reported to use *Eriogonum fasciculatum* and *Lotus scoparius* as larval foodplants by Emmel & Emmel (1973: 61). Larvae of *C. perplexa* were reported to be facultatively myrmecophilous in California by Ballmer & Pratt (1992b). Also see Downey & Allyn (1973: 39).

Where *C. perplexa* and *C. sheridanii* occur in sympatry in western Oregon, they are separable by their adult behavior and foodplant associations, even though adult morphology of the two species is confusingly similar (see discussion under *C. sheridanii*, p. 125). Additionally, when in sympatry, *C. perplexa* generally flies later in the season than does *C. sheridanii*. *Callophrys perplexa* and *C. affinis* have not been found in sympatry in Oregon, where they are apparently separated by the Ochoco gap, but they do occur in very close parapatry (within a mile of each other) at Satus Pass, Klickitat County, Washington (see discussion under *C. affinis*, p. 115).

<u>Additional taxonomic notes</u>: The name *Callophrys perplexa pseudodumetorum* J. Emmel, T. Emmel & Mattoon, 1998 (TL: Ruth Reservoir, Trinity Co., California; see Emmel et al. 1998f: 165) was recently proposed for blue-green *Callophrys* from Trinity and Stanislaus counties, California, which reportedly (p. 165) feed on *Eriogonum nudum* as larvae. No details of adult behavior or biology were discussed in the description of *C. p. pseudodumetorum*, and the figures of type material (p. 169) are not detailed enough to allow a careful analysis of its phenotype. I have not examined the type series of *C. p. pseudodumetorum*, and have not visited its type locality. However, I have examined specimens from the other Californian population assigned to *C. p. pseudodumetorum* by the authors of that taxon, from Del Puerto Canyon, Stanislaus County, California. Adults from Del Puerto Canyon compare quite favorably with those from Josephine County, Oregon, herein called *C. sheridanii* nr. *dumetorum* (see discussion under *C. sheridanii*). In support of their association of *C. p. pseudodumetorum* with *C. perplexa*, Emmel et al. (1998f) cited unpublished data suggesting that immatures of *C. p. pseudodumetorum* may be morphologically more similar to those of *C. perplexa* than to those of coastal *C. dumetorum* (Boisduval, 1852), a taxon formerly known as *C. viridis* W. H. Edwards,

1862 (see Emmel et al. 1998i: 11). However, they did not discuss morphologically similar populations of *C. sheridanii* nr. *dumetorum* in southwestern Oregon that feed on *Eriogonum*, and did not explain how *Eriogonum*-feeding populations in northern California and southwestern Oregon relate to sympatric and parapatric populations of *C. perplexa* feeding on *Lotus crassifolius*.

If larvae of topotypical *C. p. pseudodumetorum* feed on *E. nudum*, as reported in the original description of that taxon, I suggest that *C. p. pseudodumetorum* is likely to be related to, or synonymous with, similar populations of *C. sheridanii* nr. *dumetorum* in Oregon (feeding on *Eriogonum compositum* and/or *E. nudum*, see below), and not conspecific with C. *perplexa*. To complicate matters, I have examined specimens apparently identical to *C. p.* nr. *perplexa* that were reared from *Lotus crassifolius* growing near the type locality of *C. p. pseudodumetorum* (Cedar Camp Rd., 5-12 mi. SE of Ruth Reservoir, Trinity Co., California, reared by Ken Hansen, specimens *via* Mike Smith 2002). Assuming the holotype of *C. p. pseudodumetorum* is from an *Eriogonum nudum*-feeding population, I suggest that, as seen at throughout western Oregon, two species of green *Callophrys* occur in sympatry or close parapatry in the vicinity of Ruth Reservoir (the type locality of *C. p. pseudodumetorum*). One of these species (*C. perplexa*) feeds on *Lotus crassifolius*, while the other feeds on *Eriogonum nudum* (see discussions under *C. sheridanii*). Since I have not yet examined the type series of *C. p. pseudodumetorum*, and have not visited its type locality, that name is not herein applied to any population of *Callophrys* in Oregon. However, future study may demonstrate that the name "*pseudodumetorum*" applies either to populations herein called *C. sheridanii* nr. *dumetorum* (if type specimens are *E. nudum*-feeders), or to populations herein called *C. perplexa* nr. *perplexa* (if they are *L. crassifolius*-feeders). Clearly, additional studies on *Callophrys* in southern Oregon and northern California are needed.

***Callophrys sheridanii* (W. H. Edwards, 1877) (1852)**

_____(E end Columbia River Gorge, on *E. compositum* var. *compositum*) *newcomeri* Clench, 1963 <u>Recorded</u>: **HR**, Was (N), <u>Expected</u>: Sh (far N)?

_____(W Siskiyous, also N Coast Range, on *E. compositum* and/or *E. nudum*) nr. *dumetorum* (Boisduval, 1852), **new combination** <u>Recorded</u>: **Jo**, **Po**, <u>Expected</u>: Cos (S), Cu, Do (SW)?

_____(W Cascades, below 6000', on *E. compositum* and *E. umbellatum*) <u>Recorded</u>: Do (NE), **Ja**, **La** (E), **Lin** (E), <u>Expected</u>: Clk (E)?, Mar (E)?

_____(S Cascades, E Siskiyous, above 6000', on *E. umbellatum*) *lemberti* Tilden, 1963 <u>Recorded</u>: Do (far SE), **Ja** (S), Jo (S), Kl (W)

_____(SE Cascades below 5000', Warners, Aldrichs, S Blues, SE deserts and ranges, on *E. umbellatum*, *E. heracleoides*, among others) *interrupta* Austin, 1998 <u>Recorded</u>: **Gr**, **Ha, Kl** (S), **Lk** (S), **Mal**, <u>Expected</u>: Ba (far SW), Cr (far SE), De (far SE)?

_____(Deschutes River drainage, Ochocos, NW slope Blue Mountains below 4200' and Snake River drainage, on *E. heracleoides* and *E. compositum*) nr. *newcomeri* <u>Recorded</u>: Ba, **Cr**, Sh, Um, Un, **Was** (S), Wh, <u>Expected</u>: De (far NE), Gi (for confirmation), Gr (NW), Je (E), Mal (far NE)?, Mo, Wal

Taxonomic and biological notes: The species-level taxonomy of the *Callophrys sheridanii* complex is being studied by several authors, and will be discussed in greater detail in future publications. I have paid special attention to the *C. sheridanii* complex during field studies in the Pacific Northwest since April 2000, and over 1100 specimens from the region have been examined. In addition, all available literature on the taxonomy of this group has been reviewed (e.g., Clench 1944a, 1963, Tilden 1963b, Gorelick 1971, Austin 1998b, Emmel et al. 1998f). The study of *C. sheridanii* populations in Oregon seems important for understanding larger patterns of variation in this species complex, as well as for defining the taxonomic status of populations outside of Oregon, especially in California and Nevada (also see discussions under *C. perplexa* herein). Adult phenotypes of *C. sheridanii* in Oregon are correlated somewhat with patterns of larval foodplant use, but wherever foodplant distributions overlap, phenotypes of *C. sheridanii* blend into each other. While the patterns of variation in *C. sheridanii* populations deserve further study, at this time there does not appear to be strong evidence that more than one species is involved in the complex in Oregon.

There has been much misunderstanding over the identity of *Callophrys sheridanii newcomeri* (TL: Mill Creek, 1800', Yakima Co., Washington). Topotypical adults of *C. s. newcomeri* are large (frequently the same size as *C. perplexa* from western Oregon), bluish-green below, and females are often cold tawny or partly tawny above (about 35-40% of females have tawny coloration above, and some are completely tawny; about 40 females examined). Male coloration above is gray. Typical *C. s. newcomeri* occurs in association with *Eriogonum compositum* var. *compositum*, the only documented foodplant at its type locality (Jon Pelham pers. comm. 2004). Populations in Oregon that exactly match the phenotype of *C. s. newcomeri* occur in northern Wasco County (e.g., Mill Creek Canyon, ca. 900'), and Hood River County (Neal Creek Canyon, ca. 1700'), in association with *E. compositum* var. *compositum* (and *E. elatum*). Typical *C. s. newcomeri* also occurs at many sites in southern Klickitat and Skamania counties, Washington, where *E. compositum* grows in abundance. No other populations of *C. sheridanii* in northeastern Oregon are referable to typical *C. s. newcomeri* (*contra* all other literature reports). However, populations in the Deschutes River drainage and along the northwestern slope of the Blue Mountains are close to the phenotype of *C. s. newcomeri*. In those areas, tawny females are much less common than they are near the type locality of *C. s. newcomeri*, and many adults appear somewhat intermediate in size and color towards the segregate of *C. sheridanii* in southeastern Oregon (see below).

Populations of *C. sheridanii* in far western Oregon associated with *E. compositum* var. *compositum* are phenotypically and biologically similar to *C. s. newcomeri*, and tawny females are frequently encountered. The unique populations on Rickreall Ridge and Mill Creek Ridge, 1800'-2400', Polk County (mapped as *C. viridis* by Hinchliff 1994: 84, as *C. dumetorum* by Opler 1999: 213 and as *C.* nr. *dumetorum* by Pyle 2002: 204) are phenotypically similar to topotypical *C. s. newcomeri*, and use *E. compositum* var. *compositum* as the larval foodplant (adults apparently ignore sympatric *E. nudum* plants). The bluish-green ventral color of adults is similar to that of *C. s. newcomeri*, but somewhat bluer, and ventral hindwings on adults from Polk County tend to be immaculate or nearly so. Adults of *C. sheridanii* from Josephine County (e.g., Rogue

River drainage, ca. 900'-1500') are also bluish like those from Polk County, but average better marked below than Polk County individuals, although some are immaculate. Females from populations in Polk and Josephine counties are frequently tawny above (around 40% with tawny coloration; about 50 females examined). Males from these populations are gray above, like those of *C. s. newcomeri*. Populations in Josephine and Polk counties are also similar in overall phenotype to the coastal Californian taxon *Callophrys dumetorum* (TL: San Francisco, San Francisco Co., California; see Emmel et al. 1998i: 11). Similarities between *C. sheridanii* populations in far western Oregon (Polk and Josephine counties) and those of Californian *C. dumetorum* include large adult size, similar wing shape, similar bluish ventral coloration, similar gray dorsal coloration, and a similar percentage of females that have tawny coloration above. Populations of *C. sheridanii* in western Oregon differ from typical *C. dumetorum* in having darker wing fringes, and in the species of *Eriogonum* used for larval foodplants (see below).

One population of *C. sheridanii* in Josephine County (at 1500') has been confirmed to feed on *E. compositum* var. *compositum*. At two other sites (900', 1500'), *E. compositum* is present but scarce, and *E. nudum* is very common. While it has not been confirmed, *Eriogonum nudum* apparently serves as a larval foodplant for some populations of *C. sheridanii* in Josephine County, but that plant apparently is not used elsewhere in western Oregon (pers. obs.). Biologically, populations of *C. sheridanii* in far western Oregon are like *C. s. newcomeri* in their use of *E. compositum* as the only (Polk Co.) or an important (Josephine Co.) larval foodplant. Phenotypically, these populations are intermediate between *C. s. newcomeri* and *C. dumetorum* (whose larvae feed on *E. latifolium*; see Tilden 1963b: 290, Gorelick 1971, Ballmer & Pratt 1989a: 68). Herein (also see Pyle 2002: 204), populations of *C. sheridanii* in Polk and Josephine counties are called *Callophrys sheridanii* nr. *dumetorum*. However, further research may demonstrate that these populations should be called *Callophrys sheridanii pseudodumetorum* (see discussion under *C. perplexa*, pp. 118-119). When compared from their type localities, phenotypic differences between *C. s. newcomeri* and *C. dumetorum* are minor. When series of *C. s.* nr. *dumetorum* from western Oregon are studied simultaneously with typical *C. s. newcomeri* and *C. s. dumetorum*, there is little doubt about the conspecificity of these populations. When biological attributes of these populations are also considered, there is even less doubt that they are all conspecific. Further discussion of this matter will be presented elsewhere.

As briefly noted above, the name *Callophrys dumetorum* is currently applied to populations in coastal California using *Eriogonum latifolium* as a larval foodplant. These were formerly (e.g., Miller & Brown 1981: 105, Pyle 1981: 444, Garth & Tilden 1986: 130, Tilden & Smith 1986: 167, Ferris 1989c: 82) known as *Callophrys viridis* (W. H. Edwards, 1982) (TL: San Francisco, San Francisco Co., California; see Clench 1944: 226 and Brown 1970a: 67). These populations occur along the Pacific coast in California, from Monterey County in the south (e.g., Davenport 2004a: 7), through the San Francisco Bay area, at least to Mendocino County in the north (Garth & Tilden 1986: 130, John Vernon pers. comm. 2002), and were cited from "S Ore." by Tilden & Smith (1986: 167). As discussed above (see *C. perplexa*, pp. 118-119), populations in Trinity County, California, and into Josephine County, Oregon, that apparently use *E. nudum* (and/or *E.*

compositum) for larval foodplants, are most likely conspecific with coastal Californian populations using *E. latifolium*. These populations in northwestern California and southwestern Oregon appear to be ecologically and phenotypically intermediate between *C. dumetorum* and *C. s. newcomeri*. Since *C. dumetorum* is the senior of the two names, the realization that *C. dumetorum* and *C. sheridanii* are apparently conspecific creates some taxonomic issues. A complete discussion of these issues will be presented elsewhere, and an application to the ICZN is currently in preparation. For now, in interest of nomenclatural stability (see ICZN 1999: xx, 28: art. 23.9.3), in an attempt to minimize confusion, and in anticipation of results from ongoing studies, *Callophrys dumetorum* is treated as a segregate of *Callophrys sheridanii* (W. H. Edwards, 1877) (1852), until the matter can be formally settled.

Populations of *C. sheridanii* in the western Cascades of Linn (ca. 5000'), Lane (ca. 5000'-5500') and Douglas (ca. 5500') counties (mapped as *C. viridis* by Hinchliff 1994: 84 and as *C.* nr. *dumetorum* by Pyle 2002: 204) are similar to populations of *C. s.* nr. *dumetorum* in Polk and Josephine counties, although adult size averages a bit smaller, and individuals are more variable. Some adults are bluish-green below, like those that predominate further west, while other Cascadian individuals are darker green below. Above, some males are gray, as in *C. s.* nr. *dumetorum*, while others are brown, and the average coloration is darker than that of *C. s.* nr. *dumetorum*. Tawny females occur in these populations (approximately 20% of over 30 females examined), but are not seen as frequently here as they are further west in Polk and Josephine counties. At all known western Cascadian sites where *C. sheridanii* is common, *Eriogonum compositum* var. *compositum* and/or *E. umbellatum* grow in abundance. At one site in southern Lane County (ca. 5500'), from which a long series of vouchers has been obtained, both *Eriogonum* species are common and adult phenotypes of *C. sheridanii* are highly variable. Here, smaller, browner (above) and greener adults, fly together with larger, grayer (above) and bluer adults, and all imaginable intermediates. At a site in northern Lane County (H. J. Andrews Forest, ca. 5000'), both plants grow together but *E. umbellatum* is more common than *E. compositum*. Here, the average adult phenotype is somewhat smaller, greener below and browner above than in southern Lane County. Considered together, these western Cascadian populations are phenotypically intermediate between *Callophrys sheridanii* nr. *dumetorum* and *Callophrys sheridanii lemberti*, and because of this variability, no trinomial is applied to them.

The smaller, browner (above) and greener (below) phenotypes of *C. sheridanii* in the Cascades phenotypically match *Callophrys sheridanii lemberti* (TL: W above Tioga Pass, Yosemite National Park, California). Above about 6000' in the southern Cascades (e.g., Crater Lake National Park, Klamath Co.; W slope Mt. Thielsen, ca. 6500', Douglas Co.), *E. compositum* drops out and *E. umbellatum* and *E. marifolium* dominate (also see Emmel & Emmel 1974: 346). In these areas, adults of *C. sheridanii* are entirely of the smaller, browner and greener phenotype seen in *C. s. lemberti*, and females that are tawny above make up less than 20% of individuals examined (also see Tilden 1963b: 292). High-elevation populations in the Siskiyous (e.g., Mt. Ashland, Jackson Co., ca. 7000', assoc. *E. umbellatum*) are also of the *C. s. lemberti* phenotype, and under 20% of females have some tawny coloration above (over 90 females examined). Populations in

Jackson County at lower elevations (e.g., Soda Mountain, CSNM, ca. 5800'-6000', assoc. *E. umbellatum*) are similar to *C. s. lemberti*, but adults average larger in size. Adults from progressively lower elevations (e.g., Hwy. 66, ca. 3400', Jackson Co., assoc. *E. compositum*; Ash Creek, ca. 1700', Siskiyou Co., California) average even larger than *C. s. lemberti*, and are more bluish green below (but are greener on average than populations of *C. s. nr. dumetorum* on *E. compositum*, and/or *E. nudum* to the west in Josephine Co.). These populations of *C. sheridanii* in Jackson and Siskiyou counties below about 6000' are phenotypically and biologically similar to western Cascadian populations below 6000', as discussed above, and are herein associated with them.

In populations of *C. sheridanii* east of the Cascadian crest and south of the Columbia River drainage, adults are rather similar to *C. s. lemberti*, but tawny females are very rare or absent (over 45 brown females examined). The position and shape of the ventral spot bands are variable throughout this region. However, populations at lower elevations in Klamath County (e.g., Sprague River area, ca. 4400', assoc. *E. umbellatum*), and Harney County (vic. Alvord Desert, ca. 4100'; Burns, ca. 4100', the latter associated with *E. sphaerocephalum* var. *sphaerocephalum* and *E. strictum*), tend to have ventral spot bands positioned closer to the wing margins (although variably developed) than on adults of *C. s. lemberti*. These populations apparently represent *Callophrys sheridanii interrupta* Austin, 1998 (TL: US Route 50, 5.5-5.6 mi. W Frenchman, 1660 m, S end of Stillwater Mts. (= Sand Springs Range), Churchill Co., Nevada). This taxon was described by Austin (1998b: 621) as a segregate of *Callophrys comstocki* Henne, 1940 (TL: Providence Mts., San Bernardino Co., California), yet the phenotype seen in *C. s. interrupta* occurs throughout much of southeastern Oregon, intergrades into *C. s. newcomeri* to the north, and appears to show some influence from *C. s. neoperplexa* to the east (see below, also see Opler & Warren 2002: 23). Additionally, some adults of *C. s. lemberti* from Oregon are very similar to those of typical *C. s. interrupta*, but tawny females are unknown in *C. s. interrupta*.

Populations of *C. sheridanii* at elevations above about 4500' throughout the Warners (e.g., Light Peak, ca. 8200', Lake Co., assoc. *E. umbellatum* and *E. heracleoides*), Aldrichs (e.g., Aldrich Mt., ca. 6600', Grant Co., assoc. *E. heracleoides* var. *heracleoides* and/or *E. umbellatum*) and southern Blue Mountains (e.g., King Mt. and Calamity Butte, both ca. 6600', Harney Co.; N of Beulah Reservoir, ca. 4800', Malheur Co.; all assoc. *E. heracleoides* var. *heracleoides* and/or *E. umbellatum*), are mostly of the *C. s. interrupta* phenotype, and lack tawny females. Individual variation in details of the ventral spot bands on adults in these populations is great, and occasional individuals resembling *C. s. lemberti* and *Callophrys sheridanii neoperplexa* Barnes & Benjamin, 1923 (TL: Eureka, [Juab Co.], Utah) are found. Despite this variation, these populations are herein included within the concept of *Callophrys sheridanii interrupta*. The relationship between *C. s. interrupta* and *C. s. neoperplexa* requires additional study. Clearly, the two taxa represent a similar phenotype. For now, *C. s. interrupta* is applied to populations of *C. sheridanii* in southeastern Oregon between about 4100' and 8200' that lack tawny females, and feed on a variety of *Eriogonum* species (at least *E. umbellatum*, *E. heracleoides*, *E. sphaerocephalum* and possibly *E. strictum* and *E. ovalifolium*).

In the Snake River drainage (e.g., Baker and Union counties), along the north slope of the Blue Mountains (e.g., Pearson Creek Canyon, and along E Birch Creek, both ca. 3000', Umatilla Co.; Tower Mt., ca. 6200', Umatilla Co.), and in the Deschutes River drainage (e.g., Hwy. 26 ca. 4500', Ochoco Mts., Crook Co.; Tygh Valley area, ca. 1800'-2400', Wasco Co.; Jones Canyon, ca. 700', Sherman Co.) populations of *C. sheridanii* occur in areas where *E. heracleoides* var. *angustifolium* (and/or *E. douglasii* var. *douglasii*) and *E. compositum* (var. *compositum* and var. *leianthum*) grow together or in parapatry. In these areas, adults of *C. sheridanii* average phenotypically intermediate between *C. s. interrupta* of southeastern Oregon, and *C. s. newcomeri* of the east slope of the Cascades. Some adults in these populations are phenotypically like those of *C. s. interrupta* or *C. s. newcomeri*, but others are intermediate, and tawny females are present in small numbers (10-20%; over 35 females examined). Throughout this area, the average phenotype in certain populations may be closer to either *C. s. interrupta* or *C. s. newcomeri*, but phenotypic variation in these populations is greater than what is seen in topotypical series of either taxon. Because of the variable presence of several characters typical of *C. s. newcomeri* in these populations, including larger size, grayer coloration above in males, some tawny females, and variable bluish coloration below, they are herein called *Callophrys sheridanii* nr. *newcomeri*.

While a great deal of local variation exists between populations of *C. sheridanii* in Oregon, two main patterns are evident. Wherever populations are associated at least in part with *Eriogonum compositum* (or together with *E. nudum* in Josephine Co.), adult size tends to be larger, dorsal coloration is grayer, tawny females are fairly common, and ventral coloration is bluer. If the name *C. s. newcomeri* is applied broadly, and subtle patterns of phenotypic and biological variation away from its typical populations are ignored, that name could be applied to all populations that feed at least in part on *E. compositum*. In this loose sense (*sensu lato*), *C. s. newcomeri* would range from the northern Blue Mountains and Snake River Basin, through the Columbia Basin and Gorge, and throughout most of western Oregon, including western Cascadian populations and those further west currently called *C. s.* nr. *dumetorum*. Should *C. perplexa pseudodumetorum* (see discussion under *C. perplexa*, pp. 118-119) prove to be conspecific with *C. s. newcomeri*, *C. p. pseudodumetorum* could possibly be treated as a synonym of *C. s. newcomeri* (*sensu lato*). In contrast, wherever populations of *C. sheridanii* are associated at least in part with *E. umbellatum* or *E. heracleoides* (together with *E. sphaerocephalum*, and/or *E. strictum* and others), adult size tends to be smaller, dorsal coloration is browner, tawny females are rare or absent, and ventral coloration is greener. Indeed, differences between populations of *C. s. lemberti* and *C. s. interrupta* in Oregon are minor, and if local patterns of variation are ignored, all populations in southeastern Oregon and at high elevations in the Cascades and Siskiyous could be called *C. s. lemberti* (or *C. s. neoperplexa* if names are applied even more broadly). However, whenever *E. compositum* grows together with *E. umbellatum* and/or *E. heracleoides* and others (W and S Cascades below 6000', Siskiyous below 6000', N slope of Blue and Ochoco mountains), extensive blending of gray and bluish phenotypes with brown and greenish phenotypes occurs. Thus, while there are some general patterns to the geographic variation among populations of *C. sheridanii* in Oregon, correlated with patterns of larval foodplant use, all known populations appear to intergrade with adjacent populations, phenotypically and ecologically, and apparently represent a single ecologically and morphologically variable species.

Additional biological notes: Populations of *Callophrys sheridanii* nr. *dumetorum* in western Oregon can be distinguished from sympatric or closely parapatric populations of *Callophrys perplexa* most easily through adult behaviors and larval foodplant associations, but there are subtle morphological differences between adults of the two species as well. Male *C. sheridanii* mate locate in gullies, ravines, shallow washes, roadside ditches, rocky chutes, and in various other low spots. Males of *C. sheridanii* generally perch on the ground (but may perch on low vegetation on warm days, often on *Eriogonum* foodplants), while male *C. perplexa* perch on high points in the landscape (but not on hilltops), usually on vegetation (see discussion under *C. perplexa*, p. 117). Morphological differences between sympatric or parapatric populations of *C. s.* nr. *dumetorum* and *C. perplexa* include dorsal ground color (grayer in *C. sheridanii* when fresh specimens are compared), the color of the tornus on the ventral forewing (entirely gray in *C. sheridanii*, often with a few or many brassy scales basal of green areas in *C. perplexa*), and in ventral hindwing maculation (dark lining basal of white hindwing spot band is black in *C. sheridanii*, brown or brassy in *C. perplexa*), among others. These characters will be discussed in much greater detail in a future publication on the *C. sheridanii* complex.

All known populations of *Callophrys sheridanii* in Oregon are univoltine, and fly from early March to mid-July, depending on elevation, foodplant preferences, and seasonal conditions. However, all populations fly during vernal environmental conditions, and *C. sheridanii* is always one of the first non-overwintered adult butterflies to appear in its habitats early in the spring. Despite this, adults in most populations of *C. sheridanii* emerge over a long period (see Hiruma et al. 1997), and some individuals can usually be found long after the peak flight of the population has passed. The immature stages of *C. s. dumetorum* were described and figured by Gorelick (1971) and Ballmer & Pratt (1989a: 21, 26, 39-40, 81). The last-instar larva of *C. s. lemberti* from California was briefly described by Ballmer & Pratt (1989a: 26). Ferris (1973) described and figured the early stages of *C. s. sheridanii* from Wyoming, and noted *E. umbellatum* as the larval foodplant there. Also see Downey (1966) and Warren & Robbins (1993).

Callophrys gryneus **(Hübner, [1819])**

_____(E Cascades, Warners, Ochocos, Aldrichs, Blues, Steens; on *Juniperus*) nr. *chalcosiva* Clench, 1981 Recorded: **Ba**, **Cr**, **De**, Gi, **Gr**, **Ha**, **Je**, **Kl** (E), **Lk**, **Mal**, **Mo**, **Was**, **Wh**, Expected: Sh, Um, Un?, Wal

_____(Siskiyous, E & S Cascades; on *Calocedrus decurrens*) *nelsoni* (Boisduval, 1869) (= *acuminata* K. Johnson, 1976, **confirmed synonymy**) Recorded: **Cu**, De (far NW), **Do**, **Ja**, **Je**, (far W), **Jo**, **Kl** (S & W), **La**, Expected: Cos

_____(N Willamette Valley edges, NW Cascades & N Coast Range; on *Thuja plicata*) *plicataria* K. Johnson, 1976 (= *barryi* K. Johnson, 1976, **new synonym**) Recorded: **Clk**, **HR**, [**La**], Lin, Mar, **Mu**, Po, Wan, Expected: Be?, Cls?, Col, Ti?, Ya

Taxonomic and biological notes: The *Callophrys gryneus* complex of taxa in the Pacific Northwest was reviewed by Johnson (1976), who considered populations herein called *C. gryneus* to represent four distinct species, *C. nelsoni*, *C. barryi*, *C. rosneri* and *C. siva* (W. H. Edwards, 1874). Various combinations of these taxa have been treated as full species, or as segregates of the eastern North American *C. gryneus* by subsequent authors (see below). I have paid special attention to this complex in Oregon during field studies between 2001 and 2004. Now that long series (over 1000 specimens) of adults have been examined from over 65 sites in Oregon, and larval foodplant associations are better understood, the overall patterns of geographic variation appear less complex than what Johnson (1976) initially thought. Johnson based his conclusions on a small number of museum specimens, and misinterpreted the locality information associated with some of them. However, the actual number of species involved in this complex in Oregon remains open to interpretation and debate (e.g., Nice & Shapiro 2001, Forister 2004). Areas of contact between populations associated with different larval foodplants require additional study before the relationships between Oregon's three apparent taxa in this complex can be well understood.

A tremendous amount of confusion has surrounded the name *Callophrys barryi* K. Johnson, 1976. As stated by Johnson (1976: 19), the holotype and allotype of *C. b. barryi* are labeled from "Union County, Oregon." However, no adults of any member of the *C. gryneus* complex (*Juniperus*- or *Thuja*-associated) have been recorded from Union County in recent decades (e.g., Hinchliff 1994: 88), despite extensive search (pers. obs. 2001-2004). While *C. gryneus* commonly occurs in association with *Juniperus* to the south of Union County, in the Burnt River drainage of Baker County (e.g., Plano Rd. vic. I-84, ca. 3000', 29 May 2000; East Camp Creek Rd., vic. Hwy. 26, ca. 4800', 20 June 2001; Hinchliff 1994: 88), no significant stands of *Juniperus* have been located in Union County, and searches around small populations of *Juniperus* (and other Cupressaceae) in Union County have not located adults of *C. gryneus*. In Baker County, the earliest known flight date for *C. gryneus* is 9 May (1941, Cave Creek nr. Durkee), but adults are more typically found in late May through late June. The holotype male of *C. barryi*, according to Johnson (1976: 19), is labeled as having been collected on 11 May 1933, and the allotype female on 5 June 1938. Both specimens appear to be rather flight worn (Johnson 1976: 18, Fig. 7), which seems unusual given their early capture dates.

In the original description of *C. barryi*, Johnson (p. 19) reported the ventral coloration of the holotype to be "yellowish browns – Hazel to Tawney…[with] Prouts Brown overcast." In contrast, adults from northeastern Oregon (e.g., Baker Co., associated with *Juniperus*) have a purplish- or pinkish-brown ventral ground color; none appear yellowish or prouts brown unless they are very worn. The wing shape of adults from northeastern Oregon is more angular, and ventral hindwing postmedial lines are usually better developed, than on the holotype and allotype of *C. barryi* as figured by Johnson. The reported dates of capture of the holotype and allotype of *C. barryi* are unusually early for populations in northeastern Oregon, especially when they show wing wear. Since populations of *C. gryneus* have not been located in Union County in recent decades, the collection data for the holotype and allotype of *C. barryi* are suspect. Moreover, the phenotypes of the holotype and allotype apparently do not match that seen in populations of *C. gryneus* in northeastern Oregon near Union County. Therefore, I suspect that the locality data of the holotype and allotype of *C. barryi* was incorrectly interpreted by Johnson. It should be noted that the collector of these two specimens is unknown, and Johnson reportedly obtained them through exchange from the R. W. Dawson collection (Johnson 1976: 19).

The remainder of the type series of *C. barryi* consists of nine specimens from two localities, stated by Johnson (1976: 19) to be in Grant County, and in "Union-Wallowa counties." However, these nine paratypes of *C. b. barryi* are not from those northeastern counties, but are actually from Clackamas County, at the western foot of the Cascades in northwestern Oregon (associated with *Thuja plicata*). All nine specimens were collected by Stanley Jewett. Johnson's locality "Austin Hot Springs, Grant County" actually refers to Jewett's site at Austin Hot Springs, Clackamas County, at 1900'; this is along the upper Clackamas River and Road 46. Johnson apparently confused "Austin Hot Springs" with the community of Austin (or Austin Junction) in Grant County. This is a montane habitat at about 4200', near the headwaters of the John Day River, where no *C. gryneus* are known to occur. Johnson's locality "Eagle Fern Park, Union-Wallowa counties" actually refers to Jewett's site at Eagle Fern Park, Clackamas County, 700'. This is east-southeast of Portland, roughly between the towns of Sandy and Estacada. Johnson apparently confused "Eagle Fern Park," with the "Eagle Cap Wilderness," high in the Wallowa Mountains of Wallowa, Union, and Baker counties. Most of this wilderness is above 5000', and to date, no members of the *C. gryneus* complex are known to occur there. The occurrence of adults of *C. gryneus* in these habitats on or before June 8, any year, would be nearly impossible, due to the heavy winter snowfall this range normally accumulates. It is not known how this confusion over Jewett's localities occurred, since material in OSAC from Jewett's collection, from "Eagle Fern Park," is also labeled from "Clackamas Co." These errors at the county level among paratypes of *C. barryi* have been known to Oregon lepidopterists for some time. Ernst Dornfeld extensively annotated a copy of Johnson's (1976) paper that resides in the OSAC library. He was apparently the first to note that Eagle Fern Park and Austin Hot Springs are in Clackamas County, and not in northeastern Oregon. This, in part, explains Dornfeld's conservative treatment of the *C. gryneus* group (as *Mitoura n. nelsoni*) in 1980 (pp. 89-90).

Curiously, Johnson (1976: 28, fig. 16) indicated records of *Callophrys nelsoni* from the vicinity of Clackamas and Multnomah counties, reportedly in association with *Calocedrus decurrens*. It is not clear whether or not these *C. nelsoni* records are based on specimens that were genitalically determined by Johnson, or how these adults may differ phenotypically from the paratypes of *C. barryi* (no listing of specimens examined was provided by Johnson). If these were determined to be *C. nelsoni* through genitalic dissection, populations in this region, like those in central Oregon (see Ferris 1992: 116-118) and in northern California (Nice & Shapiro 2001: 258), must have highly variable genitalia, since the paratypes of *C. barryi* from Clackamas County dissected by Johnson supposedly have different genitalia than sympatric adults of putative *C. nelsoni*. It should be noted that workers since Johnson (1976) have failed to corroborate the reported genitalic differences between northwestern *C. gryneus* taxa that were used by Johnson to delineate multiple taxa (e.g., Ferris 1992, Layberry et al. 1998: 140, Nice & Shapiro

2001: 258, Forister 2004: 266). Additionally, all known populations in the *C. gryneus* complex in Clackamas and Multnomah counties occur in association with *Thuja plicata*. *Calocedrus decurrens*, the plant Johnson suspected to be the larval foodplant of "*C. nelsoni*" in Clackamas and Multnomah counties, does not occur naturally west of the Cascadian crest in Oregon, north of Lane County (Gilkey & Dennis 2001: 44).

Since nine out of eleven types in the type series of *C. b. barryi* are undoubtedly from Clackamas County, within the range of what is supposedly a different taxon (*C. nelsoni*, *fide* Johnson 1976; *C. g. plicataria*, *fide* Hinchliff 1994: 88), and the holotype of *C. barryi* appears to be phenotypically similar to the other ten paratypes, I suggest that the holotype (and allotype) of *C. barryi* actually originated from northwestern Oregon. In September, 2004, I examined the male holotype of *C. barryi*, deposited at the McGuire Center for Lepidoptera, in Gainesville, Florida (recently moved from the Allyn Museum of Entomology in Sarasota, Florida; the allotype female was stated by Johnson 1976: 19 to be at the American Museum of Natural History, in New York City, and has not been personally examined). The holotype male of *C. barryi* is not of the *Juniperus*-associated phenotype in northeastern Oregon, but is of the northwestern Cascadian phenotype associated with *Thuja plicata*, like the rest of the type series of *C. barryi*. The locality label on the holotype reads "Union, co." A second label reads "Oreg." The date written in pencil on the underside of the first locality label reads "5 VI 38." This is the date Johnson (1976: 19) associated with the allotype female. It is not known if Johnson inadvertently switched collection dates in his text, or if the labels from the holotype and allotype somehow got switched. "Union, co." apparently does not refer to "Union County," as Johnson assumed. The holotype and allotype were almost certainly collected near Portland, along with the other type specimens of *C. barryi*. Because of phenotypic differences between the holotype of *C. barryi* and populations in northeastern Oregon associated with *Juniperus*, and because of information on the holotype's locality label, the type locality of *C. b. barryi* is herein corrected to "near the community or company [not County] of Union Mills, ca. 500', Clackamas County, Oregon." This site is located about 15 air miles southwest of Eagle Fern Park, in an area where *Thuja plicata* was apparently widespread before urbanization, and where *C. gryneus* was very likely to have been present in the 1930's.

The application of the name *Callophrys barryi* since 1976 (e.g., Pyle 1981: 436, Garth & Tilden 1986: 126, Tilden & Smith 1986: 168-169, Ferris 1992, Layberry et al. 1998: 140, Opler 1999: 218, Guppy & Shepard 2001: 213-214, Pyle 2002: 212-213, Davenport 2003: 8, but see Gervais & Shapiro 1999: 153, Nice & Shapiro 2001 and Forister 2004 who did not use the name) has relied on an assumption that the holotype actually originated from somewhere in northeastern Oregon, presumably Union County as stated by Johnson, and that it is phenotypically similar to adults from northeastern Oregon associated with *Juniperus*. Johnson correctly noticed a phenotypic difference between the series he named *C. b. barryi* and "*C. siva*" from eastern Oregon (see below), but erroneously associated his series of *C. b. barryi* with counties in northeastern Oregon. My analysis of the holotype and type series of *C. barryi*, together with recent field studies across Oregon, strongly suggests that Johnson's concept of *C. b. barryi* actually represents *Thuja plicata*-associated populations in the northwestern Cascades, and not the

Juniperus-associated phenotype that occurs throughout eastern Oregon, southern Idaho, far northern Nevada and parts of California. This interpretation explains why Johnson (1976: 28, fig. 16) mapped many populations in eastern Oregon as *C. siva,* surrounding the supposed range of *C. barryi*. Almost all of Johnson's *C. siva* records have been mapped as *C. barryi* by subsequent authors (e.g., Ferris 1992, Hinchliff 1994: 88, Guppy & Shepard 2001: 214). Clearly, Johnson's concept of *C. siva* in eastern Oregon (herein called *C. g.* nr. *chalcosiva*, see below) refers to *C. barryi* of most subsequent authors.

This interpretation of *C. barryi* also helps explain how the population from Butte Falls, Jackson County (TL of *Callophrys barryi acuminata*) was associated with *C. barryi* by Johnson (1976: 20-21). The adult phenotypes in *Thuja*-associated populations from northwestern Oregon, and in *Calocedrus*-associated populations from Jackson County (see below), show some overlap. If genitalia from western Cascadian populations are variable, which they most likely are (see above), worn individuals of these two taxa can be confused (note that the holotype specimen of *C. b. acuminata*, as figured by Johnson 1976: 20, is somewhat worn). Records of *C. b. acuminata* from central Oregon (e.g., [Crook Co.]: "Ochoco Pass" and "16 mi. E of Prineville;" [Jefferson Co.]: "3 mi. E of Culver," see Johnson 1976: 21) refer to pinkish adults of *C. g.* nr. *chalcosiva* (see below), taken in association with *Juniperus* (pers. obs.).

Clench (1981: 11-14) named *Callophrys gryneus chalcosiva* (TL: S Willow Creek, Stansbury Mts., Tooele Co., Utah; described as a segregate of *C. siva*) for populations of mixed, bright green-brown colored adults of C. *gryneus* in the Great Basin. Some adults of topotypical *C. g. chalcosiva* are mostly green below, and resemble populations of *C. g. siva* (W. H. Edwards, 1874) (TL: Wingate, Arizona) further south and east. Other adults of topotypical *C. g. chalcosiva* are mostly brownish below, and resemble adults from further west. While most adults from eastern Oregon are best described as brownish with prominent purplish or pinkish overtones below, some greenish specimens are known (see below), and occasional adults (e.g., Harney Co.) match the phenotype of browner topotypical adults of *C. g. chalcosiva*. However, on average, most adults from eastern Oregon have more pinkish or purplish coloration below than do adults of typical *C. g. chalcosiva*, and rare greenish adults in Oregon are dusky green and not the bright green seen on greenish adults of typical *C. g. chalcosiva*. Until the relationships between typical *C. g. chalcosiva* and populations in eastern Oregon are better understood, the name *Callophrys gryneus* nr. *chalcosiva* is herein applied to all populations in eastern Oregon formerly known as *C. g. barryi* (e.g., Hinchliff 1994: 88). If more than one species in the complex is recognized, these populations could be known as *Callophrys siva* nr. *chalcosiva*.

Much like *C. sheridanii* (see discussion above, pp. 120-125), adult phenotypes of *C. gryneus* in Oregon correspond somewhat with patterns of foodplant use, but patterns blur where larval foodplants overlap. Throughout most of eastern Oregon, populations are referable to *Callophrys gryneus* nr. *chalcosiva* (see above). These occur essentially wherever *Juniperus occidentalis* (or *J. scopulorum*) grow in abundance. Series mostly consisting of individuals with purplish-brown ventral coloration have been examined from Wasco, Wheeler, Baker and northern Malheur counties, while adults from Crook, Grant, Lake and Harney counties tends to be pinker below and slightly larger. However, adults from all populations in eastern Oregon are individually quite variable, and when adults are abundant, many phenotypes can be seen in a single population (see Ferris 1992). When examined in large series, occasional specimens with greenish ventral coloration are seen (e.g., nr. Spray, ca. 1800', Wheeler Co., pers. obs.; Hwy. 20 nr. Lake Co. line, ca. 4700', Harney Co., pers. obs.; 10 mi. N Prineville, Crook Co., OSAC).

Approaching the eastern base of the Cascades in Jefferson County (e.g., Grandview area, 2700') and Deschutes County (between Sisters and Redmond, ca. 3000'), adults are similar to *C. g.* nr. *chalcosiva* of the Ochocos, but tend to be larger, with more rounded wings, and some have shorter hindwing tails. Ventral coloration and maculation on adults in this area is quite variable. Phenotypically, adults in these populations show some characters of *Callophrys gryneus nelsoni* (TL: Hwy. 70 at Chambers Creek, ca. 6 rd. mi. SW Belden, 1850', Plumas Co., California; topotypes examined; see Emmel et al. 1998i: 25), including larger adult size, rounder wings, reduced hindwing tail length, and reduced and/or straighter postmedian ventral hindwing lines. However, these populations are associated with *Juniperus occidentalis* (also see Scott 1992: 66). Just a few miles further west in Jefferson County (e.g., Camp Sherman area, ca. 3000'), *Calocedrus decurrens* becomes dominant, *J. occidentalis* becomes scarce, then absent (to the west). The individually variable, sometimes abundant *C. gryneus* adults in this area are even more variable than they are at lower-elevation sites to the east where only *Juniperus* grows. Some adults in the Camp Sherman area resemble *C. g. nelsoni*, others resemble *C. g.* nr. *chalcosiva*, and many apparent intermediate forms are seen (also see Hinchliff 1994: 176).

A similar situation exists in the southeastern Cascades and Warners. Adults from the Warner Mountains of Lake County, west to about the Bly Mountain area of Klamath County, are mostly of the *C. g.* nr. *chalcosiva* phenotype, but some individuals more closely resemble *C. g. nelsoni*. Throughout this region, adults are associated with *Juniperus occidentalis*, although populations associated with *Calocedrus decurrens* may occur at some sites in the Warner Mountains. From about Klamath Falls (Klamath Co.), west to the CSNM in Jackson County, populations of *C. gryneus* are mostly associated with *Calocedrus decurrens* and most adults resemble *C. g. nelsoni*. However, adults phenotypically similar to *C. g. chalcosiva* are seen here in small numbers. At the CSNM, Jackson County, adult phenotypes remain highly variable, although most resemble *C. g. nelsoni*. Foodplant use here includes *Calocedrus* and *Juniperus*, but adults associated with either tree species apparently do not show consistent morphological differences (Erik Runquist pers. comm. 2004). Specimens examined from elsewhere in Jackson, Josephine, Curry, Douglas and southern Lane counties are phenotypically like *C. g. nelsoni*, where populations are found in association with *C. decurrens* (although some populations in Lane and Douglas counties are associated with *Thuja plicata*). Series of specimens examined from Butte Falls, 200', Jackson County (TL of *C. b. acuminata*), and from nearby parts of southern Douglas County, are typical of *C. g. nelsoni* in adult phenotype, and all known populations in the area are associated with *Calocedrus decurrens*. Because of this, *Callophrys barryi acuminata* is herein treated as a synonym of *Callophrys gryneus nelsoni*.

From central Lane County, northward, adult phenotypes are somewhat similar to *C. g. nelsoni*, but the postmedial hindwing white lines tend to be better developed, wing shape is slightly more angular, hindwing tails tend to be longer and coloration is somewhat richer below. Additionally, adults are larger as they are found farther north in the western Cascades, and occasionally, males are seen that are very tawny above. Specimens from the H. J. Andrews Forest in Lane and Linn counties, from about 2100', are mostly like *C. g. nelsoni*. However, some individuals are considerably darker below, and have better-defined postmedial lines, than do most *C. g. nelsoni*. Unlike *C. g. nelsoni*, the population in the Andrews Forest is associated with *T. plicata*. Adults from east-central Linn County (e.g., Lost Prairie, ca. 3400') are larger, and variably darkened below, closely resembling *C. g. plicataria* (see below). These are associated with *Thuja plicata* and possibly *Chamaecyparis nootkatensis*. Further north, in Clackamas, Multnomah and Hood River counties, adults average very large (the largest in the state), ventral postmedial bands are usually well-developed, and adults are usually darker below than those of *C. g. nelsoni*, yet retain a pinkish blush that fades to yellowish-brown when worn.

All known populations of *C. gryneus* from northern Lane County, north to Hood River County, are primarily associated with *Thuja plicata*. These adults are usually similar to *Callophrys gryneus plicataria* (TL: Cameron Lake, S Vancouver Island, British Columbia) in size, wing shape, and development of ventral maculation. However, a few adults from this region are slightly pinker below with whiter postmedial lines (similar to adults from western Jefferson and Crook counties), when compared to long series of topotypical *C. g. plicataria* (Jon Shepard collection, in OSAC). A few specimens from Multnomah and Clackamas counties are phenotypically intermediate between *C. g. nelsoni* and *C. g. plicataria*, but most closely match *C. g. plicataria*, and without doubt, all populations in this area, like those of typical *C. g. plicataria*, are associated with *T. plicata*. As first reviser (ICZN 1999: 30, article 24.2), the name *C. plicataria* Johnson, 1976 is hereby given precedence over *C. barryi* Johnson, 1976. Due to shared larval foodplants and significant overlap in adult phenotypes, *Callophrys barryi barryi* (TL: vic. Union Mills, Clackamas Co., Oregon; see p. 128) is herein treated as a synonym of *Callophrys gryneus plicataria*. For now, any perceived utility in retaining the name *C. g. barryi* to describe apparent phenotypic intergrades between *C. g. nelsoni* and *C. g. plicataria* seems questionable, and *C. g. barryi* apparently cannot be defined as a distinguishable taxon, on morphological or biological grounds (at least not until data from another source, e.g., DNA sequence data, becomes available; also see Nice & Shapiro 2001).

While populations of *C. gryneus* in Oregon are phenotypically correlated with patterns of larval foodplant use to some extent, adult phenotypes appear to blend where distributions of larval foodplants overlap. The apparent area of intergradation between *C. g. nelsoni* and *C. g. plicataria* is quite broad, and includes much of the west-central Cascades in Oregon. Apparent zones of intergradation between *C. g. nelsoni* and *C. g.* nr. *chalcosiva* include much of the southeastern Cascades (also see Shapiro 1991a: 154), and parts of Jefferson and Deschutes counties. The actual significance of these apparent zones of intergradation remains unknown. These areas may indicate that the taxa involved represent a single morphologically and ecologically variable species, but alternate explanations for these patterns have only recently been investigated in detail (see Nice & Shapiro 2001, Forister 2004). Further studies on the biology of all members of *C. gryneus* in Oregon are badly needed. Until these can be completed, members of the *C. gryneus* complex in Oregon are treated as a single, polytypic species.

Throughout the Pacific Northwest, further studies on the biology of members of the *C. gryneus* complex are needed. Limited rearings of various populations from the northwest have shown that larvae will accept genera of foodplants in the laboratory other than those they are associated with in the wild (e.g., Layberry et al. 1998: 140, Guppy & Shepard 2001: 213, 214, Forister 2004, Jon Pelham pers. comm. 2004, also see Comstock & Dammers 1932d), on which they complete an apparently normal development. In the Seattle area, Washington, some populations of *C. gryneus* that have historically been associated with *Thuja plicata* have also been found use recently introduced, ornamental *Juniperus* as larval foodplants, on which larvae and adults can be found (Pyle 2002: 213, Jon Pelham pers. comm. 2004). Based on this (*contra* Johnson 1972, Ferris 1992: 119), it appears that patterns of larval foodplant use among populations in the *C. gryneus* complex, at least in the Pacific Northwest, are insufficient for the determination of any particular population to the trinomial-level, or to the species-level if the complex is considered to include multiple species. As shown by Forister (2004: 269-270), females of *C. gryneus* from *Juniperus*-associated populations in northern California will readily oviposit on *Calocedrus decurrens*, and larvae apparently perform equally well on both foodplants.

Supposed relictual populations of *C. g.* nr. *chalcosiva* (called "*C. barryi acuminata*") that feed on *Juniperus scopulorum* on Vancouver Island, British Columbia (e.g., Guppy et al. 1994: 33-34, 36, Layberry et al. 1998: 140, but not mentioned by Guppy & Shepard 2001: 213-214), do not appear to differ in adult phenotype from nearby populations associated with *Thuja plicata*. I suggest that these populations are *C. g. plicataria* that are feeding on *Juniperus*. Since *T. plicata*-associated populations in the Seattle area have recently switched to introduced *Juniperus*, the use of *J. scopulorum* by *C. g. plicataria* on Vancouver Island is not surprising or unexpected. While native stands of *J. scopulorum* trees on Vancouver Island may represent relictual populations, I have seen no evidence to suggest that the *Callophrys* feeding on those trees are anything but *C. g. plicataria*. Phenotypically, adults of "*C. barryi acuminata*" (e.g., Layberry et al. 1998: plate 10) and "*C. b. barryi*" (e.g., Layberry et al. 1998: plate 10, Guppy & Shepard 2001: 212-213) from British Columbia are more similar in appearance to *C. g. plicataria* and *C. g. rosneri* K. Johnson, 1976, than they are to adults of *Juniperus*-feeding *Callophrys* populations in eastern Oregon (pers. obs.).

Considering all of this, the relationship of *Callophrys gryneus plicataria* to *Callophrys gryneus rosneri* (TL: 2 mi. S Kaslo, nr. Kootenay Lake, British Columbia) requires additional study. As noted by Layberry et al. (1998: 140), the taxonomic status of these two taxa is unclear (the change of *C. rosneri* to *C. rosnerae* by Pyle 2002: 212-213 is considered to be an incorrect subsequent spelling; see ICZN 1999: 39, art. 32.5.1, p. 42-43, art. 33.2.3, 33.3). *Callophrys g. rosneri* and *C. g. plicataria* share the same larval foodplant, *Thuja plicata*, and phenotypic differences between the taxa are apparently very subtle (Norbert Kondla pers. comm. 2004; pers. obs. 2004). Should further study of patterns of morphological and ecological variation within populations currently assigned to *C. g. plicataria* and *C. g. rosneri* (e.g., Guppy & Shepard 2001: 212) demonstrate considerable overlap, *C. g. plicataria* could be treated as a synonym of *C. g. rosneri* (*C. g. plicataria* was originally described as a trinomial of *C. rosneri*). Under this scenario, the name *Callophrys gryneus rosneri* (with *C. g. plicataria* and *C. g. barryi* as synonyms) would become applicable to populations in northwestern Oregon associated with *Thuja plicata*. It should also be noted that Guppy & Shepard (2001: 213) treated *Callophrys byrnei* K. Johnson 1976 (TL: 5.6 mi. S Emida, Benewah Co., Idaho; feeds on *Thuja plicata*, *fide* J. Lane pers. comm. 2002) as a synonym of *C. g. rosneri*. As first revisers (ICZN 1999: 30, art. 24.2), they established precedence of *C. g. rosneri* over *C. g. byrnei*.

<u>Additional biological notes</u>: Throughout eastern Oregon, adults of *Juniperus*-associated populations of *C. g.* nr. *chalcosiva* can be very common (e.g., Ferris 1992), and sometimes congregate by the hundreds on *Lomatium* or *Eriogonum* flowers (pers. obs., various sites). Adults of *C. g. nelsoni* in the Siskiyous associated with *Calocedrus decurrens* can also be common, where adults visit a wide variety of flowers. Individuals of *C. g. plicataria* in the northwestern Cascades and north Coast Range tend to be much less abundant, and are scarce most years. Throughout Oregon, adults of *C. gryneus* are usually found at flowers, although males can often be seen guarding perches high on their larval foodplants, or at mud, usually in small numbers. When feeding at flowers, adults of *C. gryneus* tend not to be too wary, and can usually be approached with ease. The single annual brood of *C. gryneus* in Oregon flies from late April to early August, depending on elevation, local and seasonal conditions, with most records in May and June.

No details on the early stages of *C. gryneus* have been presented for any populations in Oregon. Boisduval & Le Conte (1829-[1837]: pl. 33) illustrated a full-grown larva and pupa of eastern North American *C. g. gryneus*, and immatures of that taxon have subsequently been figured by various authors (e.g., Tveten & Tveten 1996: 83). The life history of *C. g. nelsoni* in California was described by Comstock & Dammers (1932d: 88-89), who illustrated an egg and a late-instar larva. Those authors reared larvae of *C. g. nelsoni* from a *C. decurrens*-associated population on cultivated *Thuja*. Dammers in Emmel & Emmel (1973: 57) illustrated a full-grown larva and pupa of Californian *C. g. nelsoni*. Subsequently, Ballmer & Pratt (1989a: 25, 41, 81) described and figured the full-grown larva of *C. g. nelsoni* from California. Late-instar larvae and pupae from British Columbian *Juniperus*- and *Thuja*-associated populations were figured by Guppy & Shepard (2001: 212, 214). The life history of *C. g. juniperaria* (J. A. Comstock, 1925) was described and illustrated by Coolidge (1924d, as *Mitoura loki*) and by Comstock (1927: 165-166). Also see Downey (1966), Downey & Allyn (1973, 1981: 29, 1984: 7, 25, 29), Allyn & Downey (1976), Johnson & Borgo (1976) and Johnson (1978).

***Callophrys spinetorum* (Hewitson, 1867)**
_____(Siskiyous, Cascades, Ochocos, Aldrichs, Blues, Wallowas) *spinetorum* Recorded: **Ba**, Clk (E), Cr, **Cu**, De, Do (E), **Gr**, Ha (N), Ja, Je, Jo, **Kl**, La (E), Lin (E), **Lk**, Mo, Um, Un, **Wal**, Was (W), **Wh**, Expected: Gi (far SE), HR, Mal (N), Mar (E)

Taxonomic notes: Subtle geographic variation has been described for *Callophrys spinetorum* (see Shields 1966, Johnson 1986, Robbins 1990). All populations of *C. spinetorum* in Oregon are apparently referable to *Callophrys spinetorum spinetorum* (TL: vic. Gold Lake Lodge, nr. Gold Lake, Sierra Co., California; see Emmel et al. 1998m: 83). Adults of typical *Callophrys spinetorum ninus* (W. H. Edwards, 1871) (TL: 1 mi. E Kenosha Pass, Park Co., Colorado; see Brown 1970a: 57) average smaller, with better-developed white markings below. However, the overall range and taxonomic status of *C. s. ninus* is unclear, and further study is needed to determine if it is even a distinguishable taxon.

Biological notes: While *Callophrys spinetorum* is occasionally found in sympatry with *C. johnsoni*, *C. spinetorum* is usually found in drier forests, and is widely distributed east of the Cascades. It apparently flies in a single annual brood in Oregon, from early May to mid-August, depending on elevation and seasonal conditions. However, progeny reared from spring-flying adults may emerge the same summer under laboratory conditions (*fide* John Lane and Dave McCorkle, pers. comm. 2004; also see Brimble & Beckwith 1994: 330). Records for *C. spinetorum* in Oregon exist from 1400' in Josephine County (Woodcock Creek) to over 7000' (Anthony Lake, Baker Co.). Adults are often encountered at muddy spots on dirt roads, and at flowers, especially of *Prunus, Lomatium* and *Eriogonum*. Like *C. johnsoni* (see discussion on p. 135), adults of *C. spinetorum* apparently spend most of their time in the forest canopy, and are usually encountered as solitary individuals feeding at flowers or at mud. However, also like *C. johnsoni*, *C. spinetorum* has "good years," when it can become locally abundant. On 21 June 2001, I observed approximately 50 adults of *C. spinetorum* in Rock Creek Canyon, Baker County. Some adults appeared to drop out of the forest canopy (ca. 10:30 to 14:00 hrs.) and land around mud puddles in the dirt road, sometimes in shaded spots. A few individuals flew along the dirt road, between one and two meters above ground level, although no attempts at courtship were observed. While adult males of *C. spinetorum* may frequently perch on hilltops in California (e.g., Shields 1966, 1968: 84, Kelson & Minno 1984), I have found them on hilltops in Oregon on only one occasion (nr. Crescent Creek, Klamath Co.), where a few males were feeding at flowers of *Arctostaphylos*.

Larvae of *Callophrys spinetorum* feed on species of *Arceuthobium* growing on various conifers, but in Oregon are most often found on *A. campylopodium* growing on *Pinus ponderosa* (see Grimble & Beckwith 1994) and *P. contorta* var. *latifolia*. McCorkle (1973) reported larvae of *C. spinetorum* to feed on *A. tsugense* (growing on *Tsuga heterophylla*) and *A. abietinum* (on *Abies grandis*) in southwestern Oregon. Additional dwarf mistletoe foodplants for *C. spinetorum* larvae have been reported, including *A. vaginatum* and *A. americanum* (see Remington 1958, Tilden 1960, Shields 1966, Pyle 2002: 211). Comstock & Dammers (1938: 30-31) illustrated the full-grown larva and pupa of *C. spinetorum* from southern California (also see Dammers in Emmel

& Emmel 1973: 57). Ballmer & Pratt (1989a: 21, 25, 41, 73, 78, 81, 1992a: 40, 41, 43) subsequently figured the immature stages. A late-instar larva and pupa of *C. spinetorum* were figured by Guppy & Shepard (2001: 210), and Neill (2001: 88) also figured a full-grown larva. As noted by Ballmer & Pratt (1992b), larvae of *C. spinetorum* from California are facultatively myrmecophilous. Also see Newcomer (1964c: 48-49), Downey (1966) and Hawksworth & Wiens (1972).

***Callophrys johnsoni* (Skinner, 1904)**

_____(Siskiyous, Cascades, N Coast Range, rare in Blues & Wallowas) Recorded: Ba, Clk, Cos, Cu, Do, HR (W), Ja, Je (W), Jo, La, **Lin**, Lk (W), Mar, **Mu** (E), Po, Expected: Cls?, De (W), Kl, Ti?, Un, Wal, Was (W), Ya (W)?

Taxonomic notes: No geographic variation has been described within the range of *Callophrys johnsoni* (TL: British Columbia). The "male" *C. johnsoni* figured by Guppy & Shepard (2001: 211) is a female.

Biological notes: *Callophrys johnsoni* is apparently restricted (or nearly so) to old growth forest habitats in western Oregon (see Pyle 2002: 210), where adults probably spend much of their time in the forest canopy. Because of this, *C. johnsoni* is not often encountered. Timing of the single annual brood is variable, depending on elevation and seasonal conditions, but most records in Oregon are from June and July. Records of *C. johnsoni* in western Oregon exist from as low as 500' (McGowan Creek, Lane Co.) to over 5000' (CSNM, Jackson Co.). Adults are known from about 3400' in Baker County (nr. Baker City). Judging from its occurrence in Baker County, *C. johnsoni* may prove to be more widespread in northeastern Oregon with further search, and should certainly be sought in Union and Wallowa counties. Like its close relative *C. spinetorum*, abundance of *C. johnsoni* adults is highly variable from year to year. Most years, few adults of *C. johnsoni* are seen, and the best way to record the presence of the species is by inspecting *Arceuthobium* plants and rearing larvae (see McCorkle 1962, 1973). However, *C. johnsoni* does have "good years," when it may be locally abundant. Four researchers recorded 92 adults of *C. johnsoni*, during 18-21 March 1972, in Thompson Canyon, Yolo County, California (Scott 1973b, Shields 1986: 22). On 15-16 June 2004, I observed over 130 individuals of *C. johnsoni* at about 2400' in Multnomah County. Adults were mostly feeding at flowers of roadside *Rubus* (probably *R. ursinus*, a low ground-cover), from 10:45 to 15:40 hrs. In this area, a few males were observed guarding roadside perches, about 1.5 meters above ground level. Some adults of *C. johnsoni* that were startled by my approach were observed to fly directly up into the forest canopy, and did not return. Others, upon being startled, lazily flopped around and landed on a nearby *Rubus* flower, where they would feed for several minutes. Elsewhere, adults have been taken at other flower species (e.g., Opler 1963), and at mud (Pyle 2002: 210). While males of *C. johnsoni* have been found on hilltops in California (e.g., Kelson & Minno 1984), I have not yet seen them on hilltops in Oregon.

In Oregon, larvae of *C. johnsoni* feed on *Arceuthobium tsugense* where populations occur in association with *Tsuga heterophylla*, and on *A. abietinum* when associated with *Abies grandis* (McCorkle 1973). Late-instar larvae and pupae of *C. johnsoni* were figured by McCorkle (1973), Guppy & Shepard (2001: 211) and Pyle (2002: 208), and full-grown larvae from California were described by Ballmer & Pratt (1989a: 25, 41, 72, 76). Apparent hybrids between *C. johnsoni* and *C. spinetorum* have been reared from wild-collected larvae, found along the Clearwater River, in Douglas County (McCorkle 1973, pers. comm. 2001). Also see Skinner (1904), Dornfeld (1960), Newcomer (1964c: 49), Downey (1966), Shields (1966) and Ballmer & Pratt (1992a: 40).

***Callophrys augustinus* (Westwood, 1852)**

_____(Cascades, Siskiyous, N Coast Range, Warners, Ochocos, Aldrichs, Blues, Wallowas, SE ranges) *iroides* (Boisduval, 1852) <u>Recorded</u>: **Ba**, **Be**, Clk, Cls, Col, Cos, **Cr**, **Cu**, De, Do, **Gr**, **Ha**, **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, **Li**, **Lin**, **Lk**, **Mal**, Mar, Mo, Mu, **Po**, **Ti**, Um, Un, Wan, **Was**, Ya, <u>Expected</u>: Gi, Sh, Wal, Wh

<u>Taxonomic notes</u>: Very subtle patterns of geographic variation have been detected among populations of *Callophrys augustinus* in Oregon. Populations in western Oregon represent *Callophrys augustinus iroides* (TL: Hwy. 70 at Soda Creek, E branch of N Fork Feather River Canyon, Plumas Co., California; see Emmel et al. 1998i: 10). Adults from the northeastern mountains, from the Ochocos to the Wallowas, tend to be slightly smaller and darker below, on average, than those from the Cascades. These may, in part, represent *Callophrys augustinus concava* (TL: Jacks Creek, 1.3 mi. E Jacks Creek Campground, 2042 m, Independence Mts., Elko Co., Nevada; see Austin 1998f: 545-546). However, adults from all known populations of *C. augustinus* in Oregon are individually variable, and study material from the Ochocos, Blues and Wallowas remains surprisingly scarce. Longer series are needed to determine if populations in northeastern Oregon are referable to *C. a. concava*, although at least some individuals from this area appear to represent that phenotype. Until detailed study of *C. augustinus* populations across Oregon and the Pacific Northwest is possible, all populations in the state are tentatively called *Callophrys augustinus iroides*.

<u>Biological notes</u>: *Callophrys augustinus* is widely distributed in Oregon, and should eventually be found in all 36 counties. Males guard perches on larval foodplants and other nearby plants (mostly between 11:30 and 18:00 hrs.), on hilltops (e.g., N of Beulah Reservoir, Malheur Co.; also see Shields 1968: 83) or at high points under powerline cuts in hilly terrain (e.g., Burnt Woods, Lincoln Co.). Both sexes visit a wide variety of flowers, including willow catkins (Devine Canyon, 5400’, Harney Co.). In Oregon, *C. augustinus* flies in a single annual brood, from mid-February (11 February 2005, Josephine Co.) through July, depending on elevation and seasonal conditions. Adults are frequently encountered in western Oregon, but appear to be much less common in the northeastern mountains. Records of *C. augustinus* from Crook, Grant, Wheeler, Morrow and Union counties are all very recent (see Hinchliff 1994: 89).

Callophrys augustinus occurs in association with many different foodplants (see Powell 1968b, Ballmer & Pratt 1989a: 66, 69 and Pyle 2002 for extensive lists of foodplants outside of Oregon). Along the coast (e.g., north of Pacific City, Tillamook

Co.) *C. augustinus* uses *Arctostaphylos uva-ursi* as a larval foodplant, probably in addition to *Gaultheria shallon*. Further inland in the north Coast Range (e.g., Burnt Woods, ca. 900', Lincoln Co.; Bald Mt., Polk Co., ca. 1800'), *C. augustinus* is frequently associated with *Gaultheria shallon*, although some populations occur in association with *Mahonia* (e.g., above Fitton Green, ca. 1300', Benton Co.). In Washington, Jon Pelham (pers. comm. 2004) has found *C. augustinus* in close association with *Mahonia nervosa* and *M. aquifolium*. In the Siskiyous and Cascades of western Oregon, *C. augustinus* is frequently found in association with *Ceanothus velutinus* (a favorite local foodplant), *C. integerrimus*, and bushy *Arctostaphylos* (manzanita). *Ceanothus cuneatus* is apparently used as a larval foodplant in drier parts of the CSNM, Jackson County (Erik Runquist pers. comm. 2004). In the Ochocos, *C. augustinus* has been found in association with *C. velutinus*, and further northeast, it is also found in association with *Arctostaphylos uva-ursi* (e.g., Dixie Summit, Grant Co., ca. 5000'). In non-forested areas east of the Cascades, larval foodplants include *Purshia tridentata* (e.g., Sprague River, ca. 4400', Klamath Co.; N of Beulah Reservoir, ca. 4800', Malheur Co.), and possibly other plants. Henry Edwards (1878) and Scudder (1889b: 844) described the late-instar larva and pupa of *C. a. iroides* from California. Comstock & Dammers (1933b: 77-79; also see Dammers in Emmel & Emmel 1973: 60) described the early stages of *C. a. iroides*, also from California, and illustrated an egg, larvae of various instars, and a pupa. Larvae of *C. augustinus* were subsequently described and/or figured by Ballmer & Pratt (1989a: 21, 26, 40, 78, 81), Guppy & Shepard (2001: 216) and Miller & Hammond (2003: 35). Ballmer & Pratt (1992b) reported *C. augustinus* to be facultatively myrmecophilous in California. Also see Ziegler (1953), Powell (1964, 1968a), Downey & Allyn (1973) and Scott (1973b).

Callophrys mossii **(Hy. Edwards, 1881)**

_____(N Coast Range interior, Columbia River Gorge) *mossii* <u>Recorded</u>: Cls, Po, <u>Expected</u>: Be?, Col, HR (W), Li (E), Mu (E), Ti, Wan, Ya

_____(N immediate coast) <u>Recorded</u>: Li, Ti, <u>Expected</u>: Cls?, La?

_____(W Cascades, S Willamette Valley, Umpqua River drainage to S coast) nr. *mossii* <u>Recorded</u>: Cu (W), **Do**, **Jo** (far N), **La**, **Lin** (E), **Mar** (E), <u>Expected</u>: Clk (E), Cos

_____(Siskiyous) nr. *windi* (Clench, 1943) <u>Recorded</u>: **Jo**, Ja (S), <u>Expected</u>: Cu (E)

_____(Ochocos, Blues, Wallowas) *schryveri* (Cross, 1937) <u>Recorded</u>: Ba, **Cr**, Gi, **Gr**, Mo, Um, Un, **Wal**, Wh, <u>Expected</u>: Ha (N)?, Je (E), Mal (N)

_____(NE Cascades) <u>Recorded</u>: Was, <u>Expected</u>: Je (NW), HR (E)

<u>Taxonomic and biological notes</u>: *Callophrys mossii* is highly variable across its distribution in Oregon. Adults from the north Coast Range in Polk County (e.g., Rickreall Creek, ca. 1000', assoc. *Sedum oreganum*) and Clatsop County (Saddle Mt., ca. 1800'-2700', assoc. *S. oreganum* and *S. spathulifolium*), as well as those along the Columbia River Gorge (e.g., vic. Stevenson, Skamania Co., Washington, assoc. *S. spathulifolium*), match those of typical *Callophrys mossii mossii* (TL: Esquimault, Vancouver Island, British Columbia, assoc. *S. spathulifolium*; see Hardy 1957, Guppy 1960). A population of *C. m. mossii* also occurs on the *S. spathulifolium*- and *S. oreganum*-covered rock face at Kalama, 50', Cowlitz County, Washington, just across

the Columbia River from Columbia County, Oregon. Adults of *C. m. mossii* are large and tend to be dark on the ventral surface (e.g., Dornfeld 1980: 201, #2d), sometimes with paler markings towards the base of the ventral hindwing. While individuals of *C. m. mossii* from northwestern Oregon show some individual variation, they are rather uniform in comparison to those from further south (see below). Adults of *C. mossii* from the immediate coast (e.g., Cape Foulweather, Lincoln Co.; Cascade Head, Tillamook Co., assoc. *S. oreganum*; see Dornfeld 1980: 201, #2a,b) are smaller and frostier below than any others in Oregon, but are otherwise similar to *C. m. mossii.*

Populations of *C. mossii* in the western Cascades, the southern end of the Willamette Valley, the Umpqua River drainage, and near the coast in Curry County (e.g., Rd. 33, mi. 12.5), are associated with *S. spathulifolium,* and individual variation is extreme. Adults are usually large as in *C. m. mossii*, and some are dark below, matching the phenotype seen in *C. m. mossii*. Most individuals, however, have some amount of brick red coloration below, and some have brick red color covering the entire ventral hindwing and most of the ventral forewing. Rare individuals in these populations approach the phenotype of *C. mossii* that occurs in the Siskiyous (see below). Herein, these highly variable populations in west-central Oregon are called *Callophrys mossii* nr. *mossii*. In the Rogue River drainage (ca. 900'-1200', mostly assoc. *S. spathulifolium*) of northern Josephine County, adults of *C. mossii* average intermediate between the variably reddened populations of *C. m.* nr. *mossii* to the north, and the distinctive golden brown phenotype of *C. mossii* further south in the Siskiyous. Adults of *C. mossii* from the Rogue River drainage are so variable that essentially no two look just alike.

Further south in the Siskiyous, populations of *C. mossii* herein called *Callophrys mossii* nr. *windi* are known from Josephine (Illinois River Valley, ca. 1300') and Jackson (Palmer Creek Rd., ca. 2700', also CSNM) counties. Larval foodplants in these areas include *Sedum laxum* (at least in Josephine Co.; see Pyle 2002: 216) and *S. obtusatum* (CSNM, *fide* Erik Runquist; also see Emmel & Emmel 1974: 347), possibly among other *Sedum* species such as *S. spathulifolium*. Adults of *C. m.* nr. *windi* lack the brick red ventral coloration seen on individuals to the north, and are similar to Sierra Nevadan *Callophrys mossii windi* (TL: Placer Co., California) in ventral pattern. However, adults of *C. m.* nr. *windi* are considerably larger than those of typical *C. m. windi*, ventral hindwing black markings are less distinct, and ventral coloration is much richer. These populations may be of the same phenotype called *C. m.* "nr. *windi*" by Emmel et al. (1998f: 164). Further study of these populations is needed to determine their relationship to other segregates of *C. mossii* in Oregon and California.

Throughout the mountains and foothills of northeastern Oregon, from the Ochocos to the Wallowas, populations of *C. mossii* phenotypically similar to *Callophrys mossii schryveri* (TL: Chimney Gulch, [Jefferson Co.], Colorado) occur at most sites where *Sedum lanceolatum* grows in abundance. Occasional individuals in these populations differ from typical *C. m. schryveri* in being somewhat duller and paler below. However, until study of *C. mossii* across southern Idaho is possible, following Hinchliff (1994: 90), *C. mossii* in northeastern Oregon is herein called *Callophrys mossii schryveri*.

Adults of *C. mossii* along the northeastern foot of the Cascades (e.g., Mill Creek Canyon, ca. 1500', Wasco Co.) average phenotypically intermediate between *C. m. schryveri* and *C. m. mossii*. Some adults in these populations resemble the extreme named phenotypes, while others appear intermediate (e.g., Howe 1975: pl. 53, #3). *Sedum* species used as larval foodplants for these populations of *C. mossii* have not been determined, but *Sedum spathulifolium* or *S. stenopetalum* is suspected. With further search, similar populations of *C. mossii* might be found at the eastern end of the Columbia River Gorge (E Hood River Co.) where various *Sedum* species occur, or in northwestern Jefferson County.

<u>Additional biological notes</u>: *Callophrys mossii* is one of the earliest flying non-overwintered butterfly species in Oregon (excluding populations in parts of the Siskiyous and high Cascades). In western Oregon, *C. mossii* flies as early as mid-February and early March, weather permitting, at low-elevation sites. Because of its early flight, combined with its highly localized populations, *C. mossii* is seldom encountered in western Oregon. Populations of *C. mossii* sometimes occur in very small areas. Despite this, adults can be very common within their local populations. Typical low-elevation habitats for *C. mossii* include vertical or nearly vertical south-facing rocky areas, with abundant *Sedum*, especially when these habitats occur along riparian corridors. In these settings, males of *C. mossii* perch on vegetation at the base of rock faces, or on parts of the rock face. Females of *C. mossii* in western Oregon spend much of their time on rock faces with *Sedum*, although they sometimes fly along the base rocky habitats, possibly to attract mates, especially in the afternoon.

Populations of *C. mossii* at higher elevations (e.g., 5500', S Lane Co.) are usually situated on rocky outcroppings, and adults may fly long before the snow in forested areas below has melted (I have had to hike a considerable distance over snow to reach populations *C. mossii* on more than one occasion). These montane populations of *C. mossii* fly from early May to late June, depending on snow pack. Adults of *C. m.* nr. *windi* in the Siskiyous fly mostly in mid- to late May, and adults tend to be scarce.

In northeastern Oregon, populations of *C. m. schryveri* are more numerous and widespread than those of *C. mossii* in western Oregon. Adults of *C. m. schryveri* are commonly found in gullies, ravines, or roadsides near dense stands of *Sedum lanceolatum*, usually below 5000'. Adults of *C. m. schryveri* usually begin to fly in late March or April, weather permitting, and stragglers may be seen until late June (e.g., Gumboot Creek at upper Imnaha River, Wallowa Co., 24 June 2001). Populations of *C. mossii* on the northeastern slope of the Cascades in Oregon are highly localized, and adults are usually found from mid-March to mid-April.

Larvae of early-flying populations of *C. mossii* in western Oregon feed on leaf tissues of their *Sedum* foodplants, while larvae of *C. m.* nr. *windi* in the Siskiyous feed on the flower heads of *S. laxum* and/or *S. obtusatum*. This apparently accounts for the later adult flight time of *C. m.* nr. *windi* in the Siskiyous (Dave McCorkle pers. comm. 2001). Ballmer & Pratt (1992b) reported larvae of *C. mossii* to be facultatively myrmecophilous in California. Males of *C. mossii* in Oregon visit mud in small numbers, and both sexes visit flowers, especially *Lomatium* and *Taraxacum*. For information on the taxonomy and life history of *C. mossii* populations outside of Oregon, including descriptions and figures of immatures, see Hardy (1957), Guppy (1960), R. M. Brown (1970), Ferris & Stanford (1970), Emmel & Ferris (1972), Newcomer (1973: 13), Arnold (1983a), Orsak & Whitman (1987), Ballmer & Pratt (1989a: 26, 40, 76, 78), Emmel et al. (1998f) and Guppy & Shepard (2001: 217).

***Callophrys polios* (Cook & Watson, 1907)**
_____(immediate coast) *maritima* J. Emmel, T. Emmel & Mattoon, 1998 Recorded: Li, Cu, Expected: Cls?, Cos, Do, La, Ti?
_____(Blue Mts.) Recorded: Ba, **Gr**, Mo, **Um**, **Un**, Wal, Wh, Expected: Cr (E)?, Ha (N)?

Taxonomic notes: Populations of *Callophrys polios* along Oregon's coast are referable to *Callophrys polios maritima* (TL: flats nr. S end of Lake Earl, Del Norte Co., California). Adults of *C. p. maritima* are darker below, and have a broader dark ventral hindwing median area than adults of any other segregate of *C. polios*. Additionally, adults of *C. p. maritima* have more rounded wings and darker ventral "frosting" than those of other *C. polios* populations, and in *C. p. maritima*, the ventral forewing postmedian line is situated closer to the wing margin than it is in other segregates.

Populations of *C. polios* in the Blue Mountains were called *Callophrys polios obscurus* (TL: Lookout Mt., Jefferson Co., Colorado) by Hinchliff (1994: 91). However, comparison of series of *C. polios* from northeastern Oregon with topotypical adults of *C. p. obscurus* shows that adults from Oregon average larger, and are much grayer above and below. Adults of *C. polios* from northeastern Oregon have more gray overscaling on the ventral surface, less brownish coloration on the ventral forewing, and are grayer above, when compared to all other populations *C. polios*. The overall geographic distribution of the phenotype of *C. polios* found in northeastern Oregon is not currently known, and adults from northeastern Oregon have not yet been carefully compared to *C. polios* from Idaho and eastern Washington. *Callophrys polios obscurus* from Colorado is phenotypically intermediate between typical eastern North American populations of *Callophrys polios polios* (TL: Lakewood, New Jersey), and populations of *C. polios* in northeastern Oregon. Also see Ferris & Fisher (1973) and Emmel et al. (1998b).

Biological notes: *Callophrys polios* is found in immediate association with its larval foodplant, *Arctostaphylos uva-ursi*, throughout its range. Coastal populations of *C. p. maritima* fly from late April to mid-May, in open areas on dunes with *Arctostaphylos*, usually near stands of *Pinus contorta* var. *contorta*. Despite the existence of seemingly appropriate habitats at various sites along the coast, only two highly localized populations of *C. p. maritima* are known in Oregon, in Lincoln (N of Waldport) and Curry (vic. mouth of Pistol River) counties. Both of these populations have been nearly or entirely extirpated due to habitat loss and degradation (pers. obs., David McCorkle pers. comm. 2004). Hopefully, more populations will be found with further search. A larva of *C. p. maritima* from Lincoln County was figured by Guppy & Shepard (2001: 218).

The segregate of *C. polios* in the Blue Mountains is widespread above 4000', wherever *A. uva-ursi* grows in abundance. Adults in these populations may be locally common, and fly shortly after snowmelt. Male *C. polios* guard perches on leaves of *A. uva-ursi*. Both sexes visit flowers of *A. uva-ursi*. Adults of *C. polios* in Oregon and elsewhere fly in a single annual brood, from late April through May, depending on snowmelt (northeast) and local conditions. *Callophrys polios* often occurs in the company of *C. augustinus*, which frequently uses *A. uva-ursi* as a larval foodplant. I found adults of *C. polios* flying together with those of *C. augustinus*, *C. eryphon* and *C. mossii* near Dixie Summit, Grant County, on 14 May 2003. Complete details on immature stages of *C. polios* have not been presented, but part of the egg was figured by Downey & Allyn (1984: 34), and Scott (1992: 65) described the egg and first-instar larva of *C. p. obscurus* from Colorado.

***Callophrys eryphon* (Boisduval, 1852)**

_____(Cascades, Siskiyous, Warners, NE ranges) *eryphon* Recorded: **Ba**, Clk (E), **Cr**, **De**, **Do**, Gi, **Gr**, **Ha** (N), **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, **Lin** (E), **Lk**, **Mal** (N), Mar (E), Mo, **Um**, **Un**, **Wal**, Wan, **Was**, **Wh**, Ya, Expected: Be?, Col?, Cos (W), Cu (E), Mu (E)?, Po?

_____(immediate coast) *purpurascens* (Austin & J. Emmel, 1998) Recorded: Cos, Cu, **La**, **Li**, **Ti**, Expected: Cls, Do

Taxonomic notes: Across most of Oregon, *Callophrys eryphon* shows little geographic variation, and all populations away from the coast are herein called *Callophrys eryphon eryphon* (TL: Hwy. 70 at Soda Creek, E branch N Fork Feather River Canyon, Plumas Co., California; see Emmel et al. 1998i: 11). Below, adults of *C. e. eryphon* are rich brownish with violet highlights. Some adults of *C. eryphon* from the northeastern Cascades (Jefferson, Wasco, Hood River counties) and the Ochoco, Aldrich, and Blue mountains, are somewhat larger than those of topotypical C. *eryphon*. Some individuals examined from northeastern Oregon are the largest I have seen from anywhere in the range of *C. eryphon*. However, these large adults are usually found together with smaller individuals, and the taxonomic significance of these large individuals is questionable. For now, all of these populations are included in the concept of *Callophrys eryphon eryphon*, until a more detailed study of all western populations of *C. eryphon* can be conducted. Specimens upon which records of *C. eryphon* from Washington County (Gate Creek, 7 May 1966; 9 mi W Portland, 1 April 1969), Yamhill County (Baker Creek, 26 July 1930) and western Lane County (W of Veneta, 29 April 1981, 1983; also see Hinchliff 1994: 92) are based have not been personally examined. These records are tentatively associated with *C. e. eryphon*, but study of these specimens may indicate that they represent *C. e. sheltonensis* (see below). It also seems possible that some or all of these records represent temporary, human-assisted introductions, since they have not been duplicated in recent years.

Populations of *C. eryphon* along the immediate coast were formerly known as *Callophrys eryphon sheltonensis* (F. Chermock & Frechin, 1949) (TL: Shelton, [Mason Co.], Washington), but were named *Callophrys eryphon purpurascens* (TL: Samoa, Humboldt Co., California) by Austin & Emmel (1998b: 508). Compared to topotypical

C. e. sheltonensis (also see Chermock & Frechin 1949), adults from along the coast in Oregon (long series examined from many sites in Tillamook, Lincoln and Lane counties) are darker and more purplish below. Topotypical *C. e. sheltonensis* are paler, red-brown below, with violet highlights, and are more similar to *C. e. eryphon.* Typical *C. e. sheltonensis* differs from *C. e. eryphon* by its slightly smaller size (on average), and more richly colored ventral surface, but the relationship of *C. e, sheltonensis* to other Cascadian populations of *C. eryphon* is unclear. Until an intensive study of all populations of *C. eryphon* in the Pacific Northwest is conducted, the name *C. e. sheltonensis* is not applied to any populations in Oregon.

Biological notes: Adults of *Callophrys eryphon* fly in a single annual brood, from early April to mid-July, depending on elevation, seasonal and local conditions. Coastal populations of *C. e. purpurascens* fly from early April to mid-May, but most records are from late April. In Oregon, *C. eryphon* occurs from sea level (many sites) to over 7000' (Warner Mts., Lake County). Adults of *C. eryphon* on the coast, and east of the Cascadian crest, can be locally common, but records from the western Cascades and Siskiyous are based on small numbers of individuals. Both sexes of *C. eryphon* visit a wide variety of flowers, including catkins of *Salix* on the coast (e.g., Hardy 1960, pers. obs. 2002). Males of *C. eryphon* guard perches on small pines, and perch at the tips of pine branches or on other vegetation, usually less than two meters above ground level, but occasionally higher. Females are usually seen at flowers or near larval foodplants.

Callophrys eryphon uses *Pinus ponderosa* as a larval foodplant at many sites in Oregon, but uses *P. contorta* var. *latifolia* in much of Klamath County (e.g., Gilchrist, 4400'), and may use additional coniferous foodplants as well, possibly including non-native *Pinus* species (see Powell 1997). Larvae of *C. e. purpurascens* feed on *Pinus contorta* var. *contorta*, and adults are seldom found anywhere but on or near pines growing in various dune habitats along the immediate coast. Hardy (1960b) described the early stages of *C. eryphon* from British Columbia (that fed on *P. contorta*), and Newcomer (1973: 13-14) described the immature stages from Washington. Full-grown larvae of *C. eryphon* were subsequently described and figured by Ballmer & Pratt (1989a: 26, 40, 81, 1992a: 42) and Guppy & Shepard (2001: 220). Also see Downey & Allyn (1973).

***Satyrium fuliginosa* (W. H. Edwards, 1861)**

_____(E Siskiyous, high elevations) *tildeni* Mattoon & Austin, 1998 Recorded: **Ja** (S), Expected: Jo (SE)

_____(far SW Cascades) Recorded: **Ja** (far SE), Expected: Kl (far SW)?

Taxonomic notes: Surprisingly, the interesting patterns of phenotypic variation seen in *Satyrium fuliginosa*, as well as in *S. semiluna* (see pp. 144-146 herein), have not been studied in detail until recently. Dornfeld (1980: 86) implied two sets of populations in Oregon (one he considered to be near typical *S. semiluna*), but Hinchliff (1994: 76) mapped all records from Oregon as *Satyrium fuliginosa fuliginosa*. Mattoon & Austin (1998) briefly reviewed *S. fuliginosa* (including *S. semiluna*), and named several new segregates. One of these new taxa, *Satyrium fuliginosa tildeni* (TL: slopes and summit of Dry Lake Mt., [forest Rte. 40S01], 5500'-6775', T47N R9W S19, Siskiyou Co., California; see Mattoon & Austin 1998: 683) refers in part to Dornfeld's concept of *S. f. fuliginosa*. These are the populations in the Siskiyous that he referred to as being "very dark" on the upper side. However, dark Cascadian adults that Dornfeld associated with populations in the Siskiyous are of *S. semiluna* (see below). In Oregon, *S. fuliginosa tildeni* occurs in habitats at and above about 6800' in Jackson County, from Mount Ashland in the east to Dutchman Peak in the west.

In 1990, Erik Runquist discovered a distinctive segregate of *S. fuliginosa* on rocky bluffs in the CSNM, Jackson County. This population was studied more extensively by Erik Runquist and myself between 2002 and 2004. Like *S. f. tildeni* and *S. f. fuliginosa* (TL: Norden, El Dorado Co., California; see Opler in Brown 1970a: 28), males of this segregate lack any trace of forewing stigmata, and share other structural characters of those taxa. The population in the CSNM, however, has smaller adults that average narrower wings and grayer coloration, above and below, when compared to *S. f. tildeni* and *S. f. fuliginosa*. Ventrally, these adults resemble *Satyrium fuliginosa albolineatum* Mattoon & Austin, 1998 (TL: 3.6-5.0 rd. mi. S of Hull Mt., Forest Route 1N02, above 1350 m on ridgeline of Boardman Ridge, Lake Co., California), but above, adults from the CSNM are considerably grayer than that taxon. In overall phenotype, *S. f. albolineatum* is essentially intermediate between *S. f. tildeni* and the segregate in the CSNM, although it is perhaps closer to *S. f. tildeni*. The complete geographic range of the segregate at the CSNM remains unknown, although it may extend into southwestern Klamath County, and possibly represents the specimen reported by Shapiro (1991a: 145) from the west side of Ball Mountain, Siskiyou County, California. Also see discussions herein under *S. semiluna* (pp. 144-146).

Biological notes: The segregate of *S. fuliginosa* in the CSNM flies from mid-June to mid-July, on rocky outcroppings at about 5800'. Males guard perches on the tips of *Artemisia tridentata* plants. To date, males at the CSNM have not been found perching on hilltops, and have not yet been seen seeking nectar from flowers. In Oregon, *S. f. tildeni* occurs in subalpine habitats at or above about 6800', on peaks and ridges in the eastern Siskiyous, and flies from early July to mid-August. Males perch on shrubby (ca. 0.5-1.0 m) *Arctostaphylos* (manzanita), usually at the lower end of a dense hillside patch of *Arctostaphylos* plants, near *Lupinus*. Males of *S. f. tildeni* have not been seen perching on hilltops in Oregon.

Adults of *S. fuliginosa* at the CSNM, Jackson County, are reportedly associated with *Lupinus albicaulis* (E. Runquist pers. comm. 2004). Shapiro et al. (1981: 108) reported *Lupinus croceus* and *L. albicaulis* as larval foodplants for *S. fuliginosa* in the Trinities of northern California (also see Ballmer & Pratt 1989a: 67). The full-grown larva of *S. fuliginosa* from California was described and figured by Ballmer & Pratt (1989a: 27, 44-45, 71, 77, 81). Larvae of *S. fuliginosa* (and presumably *S. semiluna*) in California are very frequently tended by ants, at least including *Camponotus vicinus* Mayr, and two *Formica* species (Ballmer & Pratt 1992b: 103).

***Satyrium semiluna* Klots, 1930, new status**

_____(Mt. Hood area) Recorded: **Clk**, **HR**, Was (high elevations)
_____(E-central Cascades) Recorded: **De** (W), Je (SW), Kl (N), Expected: La (far NE), Lin (far E), Mar (far SE)?
_____(Pine Mountain, Deschutes Co.) Recorded: **De**
_____(Ochocos, Blues, Wallowas, Steens, Warners and vic.) nr. *semiluna* Recorded: **Ba**, Cr, Gr, **Ha**, [Kl (S)?], **Lk**, **Mal**, Un, Wal, Expected: Um, Wh (S)
_____(Columbia Basin) Recorded: [Gi], **Je** (C), [Mo], **Was**, [Wh], Expected: Sh, Um (N)?

Taxonomic and biological notes: *Satyrium semiluna* (TL: Half Moon Ranch, Moose P.O., Jackson Hole, [Teton Co.], Wyoming) is separated from *S. fuliginosa* based on research that Paul Opler and I are currently completing. Extensive details on the separation of these two species will appear in a future publication. Basically, males from all populations of *S. semiluna* have forewing stigmata, which vary from being vestigial to well-developed, while males of *S. fuliginosa* lack any trace of forewing stigmata (also see Pyle 2002: 195). There are other subtle, but consistent differences in structure and wing shape between the two species. In Oregon, adult phenotypes of *S. semiluna* are geographically variable. Perhaps the most distinctive of the Cascadian populations are those on Mt. Hood and nearby ridges (Hood River, Clackamas and W Wasco counties). These occur near (ca. 6000') and above treeline, mostly in sub-alpine habitats, in close association with a tall (ca. 0.2-0.5 m) species of *Lupinus*, possibly *L. sericeus*. Adults in this area average small and very dark above, and are usually nearly immaculate below, with light gray overscaling. Males have highly reduced, vestigial forewing stigmata. Females are similar to males, but are paler above, and gray overscaling below is reduced or absent. Adults of *S. semiluna* on and near Mt. Hood fly from late July through August. Males guard perches on *Lupinus* plants, but not on hilltops.

To the south, adults of *S. semiluna* in the east-central Cascades (known from vic. Three Creeks Meadow, 6400'-7000'; Lava Lake, 4700', both Deschutes Co.; and by single individuals from Suttle Lake, Jefferson Co., 3400', and Gilchrist, Klamath Co., 4500') average larger, with better-developed black spots below against a darker ground color. These populations occur in small openings dominated by *Lupinus sericeus* within *Pinus contorta* var. *latifolia* forests, and adults fly from late July to early September. Males guard perches on *Lupinus* plants, or on nearby *Pinus* branch tips. Adults near Three Creeks Meadow may be very common locally, and both sexes will apparently travel a considerable distance from patches of *Lupinus* to visit flowers. This segregate (from "Deschutes Co.") was said to be similar to *S. fuliginosa tildeni* by Mattoon & Austin (1998: 683), yet all males from east-central Cascadian populations have vestigial forewing stigmata, and adults also differ from *S. f. tildeni* in size and wing shape. Dornfeld (1980: 196, #4c,d) figured a female of this segregate (also see Dornfeld 1980: 9). Adults near Three Creeks Meadow do not fly in subalpine habitats, were not found above about 7000', and males do not perch on hilltops (pers. obs. 2004). The populations of *S. semiluna* on and near Mt. Adams, in southern Washington, are phenotypically similar to those in the east-central Cascades of Oregon.

The population of *S. semiluna* on Pine Mountain, at about 6400'-6600', Deschutes County, is unique. Phenotypically, adults are intermediate in all observable characters between those from further west at Three Creeks Meadow (6400'-7000'), those further east in the Ochocos and Blue Mountains, and those from lower elevations in the Columbia Basin to the north (see below). Adults on Pine Mountain are found mostly on windblown hillsides, ridgelines, and hilltops. Males perch on the tips of *Artemisia tridentata* on hilltops, as well as on roadside *Lupinus*. Records of *S. semiluna* on Pine Mountain range from late June to mid-July.

East of the Pine Mountain area, throughout the Ochoco, Blue, Wallowa, Steens and Warner mountains (including vic. Winter Ridge, Lake Co.), populations of *S. semiluna* are all rather similar. Mattoon & Austin (1998: 685-686) named *Satyrium semiluna maculadistinctum*, **new combination** (TL: W slope of East Sister, 2633 m, Sweetwater Mts., Lyon Co., Nevada) for populations at the western fringe of the Great Basin. The original description of *S. s. maculadistinctum* was incomplete in stating how that taxon is separable from *S. s. semiluna*, and did not define the universal ranges of the two taxa. On the underside, adults of typical *S. s. semiluna* and *S. s. maculadistinctum* are individually variable, and can be difficult to separate. Above, males from western Nevada and all of eastern Oregon have narrower forewing stigmata, on average, than do males of topotypical *S. s. semiluna*. Forewing stigmata on typical *S. s. maculadistinctum* appear similar to those of typical *S. s. semiluna*. Some topotypical males of *S. s. semiluna* have narrow and reduced forewing stigmata, but most have more rounded, well-developed stigmata. However, forewing stigmata on males of *S. semiluna* in eastern Oregon are usually not as reduced as on males from high Cascadian and Columbia Basin populations. Because of ambiguity over the application of the names *S. s. semiluna* and/or *S. s. maculadistinctum* to populations in eastern Oregon, these populations are tentatively called *Satyrium semiluna* nr. *semiluna*. However, further research may show that one or both trinomials may apply to populations of *S. semiluna* in eastern Oregon.

Throughout eastern Oregon, adults of *S. s.* nr. *semiluna* are frequently found on windswept hilltops and ridgelines, with abundant stands of *Lupinus*. Males guard perches on *Artemisia tridentata* plants growing on hilltops. Adults of *S. s.* nr. *semiluna* fly from early June through August, depending on elevation and seasonal conditions. Both sexes of *S. s.* nr. *semiluna* are sometimes found in large numbers (e.g., vic. Light Peak, ca. 8000', Warner Mts.; Steens Mt., ca. 7400'-8500', Harney Co.). Most populations of *S. s.* nr. *semiluna* in Oregon are situated above 4000'. I have not examined specimens from southern Klamath County (Klamath Falls area, ca. 4400'; Klamath River Canyon, ca. 3500'; see Hinchliff 1994: 76). These are tentatively associated with *S. s.* nr. *semiluna*, although they may actually refer to *S. fuliginosa* (see above), or to *S. s. maculadistinctum*. Shapiro (1991a: 145) reported two phenotypes of "*S. fuliginosa*" on Ball Mountain, Siskiyou County, California, which might represent both *S. semiluna* and *S. fuliginosa*.

A final set of *S. semiluna* populations is found in the Columbia Basin in Jefferson (1800'-3200') and Wasco (1200'-2400') counties (at least), and north into Washington. Adults in these populations average larger than those of other *S. semiluna* populations in Oregon, have longer forewings, and fly earlier in the year, usually from mid-May through mid-June. Ventral maculation on adults is usually poorly developed. Males have narrow, vestigial forewing stigmata. Dorsal ground color of adults from the Columbia Basin is darker than that of *S. s.* nr. *semiluna* from further east, but is considerably paler than that of Cascadian *S. semiluna* at higher elevations to the west. Males of Columbia Basin populations perch on large *Chrysothamnus* (on lower hillsides) and *Artemisia tridentata* (on higher hillsides), often in close proximity to *Lupinus* plants. However, males have not been observed to perch on hilltops. Columbia Basin populations of *S. semiluna* were described by Dornfeld (1980: 86) as being phenotypically intermediate between pale segregates in eastern Oregon, and darker segregates in the Cascades. However, adults from low elevations in Wasco and Jefferson counties average considerably larger than those of *S. semiluna* from higher elevations in the Cascades, and *S. s.* nr. *semiluna* from eastern Oregon. Adults from the Pine Mountain population (Deschutes Co., see above) are more closely intermediate between those from high elevations in the Cascades and eastern Oregon.

Specimens of *S. semiluna* from Gilliam (S of Condon, 2500'; vic. Lonerock, 3000'), Morrow (vic. Heppner, ca. 2000') and Wheeler counties have not been personally examined. These are tentatively associated with the Columbia Basin segregate, due to apparently similar habitats. However, examination of these specimens may reveal that they are phenotypically closer to populations called *S. s.* nr. *semiluna*, discussed above. The "female" *S. semiluna* figured by Guppy & Shepard (2001: 202) is actually a male. Guppy & Shepard (2001: 202) figured a late-instar larva and pupa of *S. semiluna* from Modoc County, California. Scott (1992: 65) described the egg of *S. semiluna* (presumably from Colorado), and reported various species of *Lupinus* as possible larval foodplants there.

***Satyrium behrii* (W. H. Edwards, 1870)**
Recorded: Ba, Clk (far E), Cr, **De**, Do (E), Gr, Ha, Ja, **Je**, **Kl**, La (far NE), **Lk**, Mal, Sh, **Was**, Expected: HR, Jo, Lin (far E), Mar (far E), Un, Wal, Wh
_____(mostly E of Cascadian crest) *behrii*

Taxonomic notes: Populations of *Satyrium behrii* in Oregon have been called *Satyrium behrii behrii* (TL: Mono Lake, [Mono Co.], California; see Opler in Brown 1970a: 34-36) by some authors (e.g., Dornfeld 1980: 87), and *Satyrium behrii columbia* (McDunnough, 1944) (TL: Fairview, British Columbia) by others (e.g., Hinchliff 1994: 75). Series of *S. behrii* specimens (mostly in OSAC) have been examined from near the type locality of *S. b. columbia*, the type locality of *S. b. behrii*, and from several sites in the Cascades of Oregon and Washington. Very little difference can be seen between series from these different areas. Specimens of *S. behrii* from Chelan County, Washington, northward, might average slightly larger and deeper orange on top, compared to series from further south. No consistent phenotypic differences were detected between typical *S. b. behrii* and series of *S. behrii* examined from Oregon. Until a more thorough study of variation in *S. behrii* is conducted, all populations in Oregon are called *Satyrium behrii behrii*, and it is suggested that *S. b. columbia* can be considered a synonym of *S. b. behrii*.

Populations of *S. behrii* in eastern Oregon, from the Ochocos of Crook County, east to Baker County, and in the southeastern ranges, have not been well sampled (e.g., Clench 1962, Tilden 1963a, Crowe 1964). Available specimens from this region suggest that adults are similar to *S. b. behrii*, or perhaps, may be slightly paler above and below. Further study of *S. behrii* populations east of the Cascades in Oregon is needed before phenotypic variation there can be understood. The "male" *S. behrii* figured by Guppy & Shepard (2001: 201) is a female.

Biological notes: In Oregon, *Satyrium behrii* is most often encountered along the eastern slope of the Cascades and in the Warners, and is less frequently seen further east or west. This species flies in a single annual brood in Oregon and elsewhere, with records from early May to late August, but mostly from late June and July. *Satyrium behrii* occurs from about 200' (Deschutes River, Sherman Co.) to over 7000' (Steens Mt., Harney Co.), although most records are from between 2000' and 5000'. While seemingly absent from the eastern part of the Columbia Basin and the north slope of the Blue Mountains in Oregon, *S. behrii* should eventually be found in Union and Wallowa counties. On pumice flats where its larval foodplant dominates (e.g., Sand Creek area, Klamath Co.), adults of *S. behrii* may be abundant. Males perch on the tips of *Purshia* or other plants, and sometimes on hilltops (Shields 1968: 84). Both sexes frequently visit flowers, especially *Eriogonum umbellatum*, *E. nudum* and *E. compositum* in Oregon.

The larval foodplant of all known populations of *S. behrii* in Oregon is *Purshia tridentata* (also see Newcomer 1973: 13 and Emmel et al. 1971: 240). Comstock (1928a) illustrated the egg of Californian *S. behrii*, and Comstock (1928b: 63-64) illustrated a late-instar larva and pupa from California (also see Dammers in Emmel & Emmel 1973: 53). Details on the life history of *S. behrii* from Washington were provided by Newcomer (1973: 13). Downey & Allyn (1981: 19) figured the egg in great detail. Ballmer & Pratt (1989a: 27, 44, 74, 77, 81) described and figured a full-grown larva from California, and Guppy & Shepard (2001: 201) figured a late-instar larva and pupa of *S. behrii* from California. As noted by Ballmer & Pratt (1992b), larvae of *S. behrii* in California are facultatively myrmecophilous. Also see Newcomer (1964c: 48) and Downey (1966).

Satyrium titus **(Fabricius, 1793)**

Recorded: Ba, Cr, Gi, Gr, Ha, Je (W), Kl (S), Lk, Mo, Un, Wal, Was,
Expected: De, Mal, Sh, Um, Wh
_____(Blues, Wallowas, [Steens]) *immaculosus* (W. P. Comstock, 1913)
_____(SE basins, possibly also in Columbia Basin) *occidentalis* (Austin & J. Emmel, 1998)

Taxonomic notes: Previous authors (e.g., Dornfeld 1980: 86, Hinchliff 1994: 74) called all populations of *Satyrium titus* in Oregon *Satyrium titus immaculosus* (TL: Provo, [Utah Co.], Utah). However, Austin & Emmel (1998b: 507) named *Satyrium titus occidentalis* (TL: Star Creek Canyon, 5-6 rd. mi. W Nevada State Rte. 400, 1890 m, Humboldt Range, Pershing Co., Nevada) for populations at the western extreme of the species' range in Nevada and northeastern California. Compared to *S. t. immaculosus*, adults of *S. t. occidentalis* differ by having enlarged black spots on the ventral wing surfaces, a paler ground color below, and females with fewer marginal orangish spots on the upper wing surfaces. In addition, adults of *S. t. occidentalis* average somewhat larger than those of *S. t. immaculosus*. In Oregon, adults of *S. titus* from Lake County (vic. Summer Lake, 4200') are phenotypically like *S. t. occidentalis*. Specimens from Klamath County (Klamath Falls area) have not been personally examined, but probably represent *S. t. occidentalis*. Additionally, specimens of *S. titus* from Jefferson (lower Metolius River) and Wasco (vic. Tygh Valley, ca. 1500') counties have not been personally examined. These populations are tentatively associated with *S. t. occidentalis*, since series examined from further north, along the eastern base of the Cascades in Washington (e.g., Kittitas Co.), are superficially similar to *S. t. occidentalis*.

Adults of *S. titus* from Steens Mountain, Harney County (ca. 7000'), average smaller and darker than those from Lake County, and ventral hindwing spots are not as bold. These appear phenotypically intermediate between *S. t. occidentalis* and *S. t. immaculosus*. Adults of *S. titus* from northern Harney County (Devine Canyon, ca. 4800'), Grant County (Canyon Creek area, 3500'), Baker County (N of Halfway, 3300'-4000') and Wallowa County (Hurricane Creek, 5000'), are phenotypically similar to *S. t. immaculosus*, which have poorly-developed spots below. Specimens of *S. titus* from Gilliam (Lonerock area, ca. 3000') and Morrow (vic. Heppner, ca. 1900') counties have not been personally examined. Clearly, further study of *S. titus* populations in Oregon is needed before patterns of geographic variation can be well understood. Because so few specimens of *S. titus* from Oregon have been personally examined, the distributional summary provided above has not been broken down into geographic segregates. The single record of *S. titus* from Jackson County (details not available) requires verification. For now, Jackson County is not included in the distribution of *S. titus*.

<u>Biological notes</u>: I have not observed *Satyrium titus* during fieldwork in Oregon, and no life history details from the state are available. This species seems unusually scarce in most of Oregon, although it may be encountered with some regularly on Steens Mountain, and in the Wallowas. Undoubtedly, more populations of *S. titus* will be found once lower-elevation sites with abundant *Prunus* are carefully searched. *Satyrium titus* apparently flies in a single annual brood in Oregon, from late June through August. In the Pacific Northwest, *S. titus* reportedly visits a wide variety of flowers (Pyle 2002: 192), and males of *S. titus* in some areas (e.g., Colorado, pers. obs.) perch on hilltops. I found adults of *S. t. immaculosus* to be strongly attracted to flowers of *Apocynum* in Bonneville County, Idaho (early August 2001, 2002), where adults were fairly common.

Throughout most of the range of *S. titus*, *Prunus virginiana* is the primary larval foodplant (e.g., Scott 1992: 62). In Washington, larvae of *S. titus* feed on *Prunus virginiana* var. *melanocarpa* and probably *Rosa woodsii* var. *ultramontana* (Jon Pelham pers. comm. 2002). At least *Prunus virginiana* var. *melanocarpa* is suspected as a primary larval foodplant of *S. titus* in Oregon. Larvae of *S. titus* in some areas are known to be facultatively myrmecophilous (Harvey & Webb 1981, Ballmer & Pratt 1992b). Ballmer & Pratt (1989a: 27, 42-43, 71, 77, 81) and Guppy & Shepard (2001: 200) described and figured the late-instar larva of *S. t. occidentalis*. Boisduval & Le Conte (1829-[1837]: pl. 34), Saunders (1869c: 96-98) and Scudder (1889b: 811-812, 1889c: pls. 65, 68, 75, 84; also see Klots 1951: pl. 5) described and illustrated the immature stages of *S. titus* from the eastern United States. Emmel et al. (1992: 58) figured a last-instar larva and pupae of *S. titus* from Colorado, and Allen (1997: 313) figured a larva of *S. titus* from West Virginia. Downey & Allyn (1981: 20, 24) figured the egg of *S. titus* in great detail. Also see Downey (1966).

***Satyrium californica* (W. H. Edwards, 1862)**
Recorded: Ba, Cr, De, Do (S & E), Gr, Ha, **Ja**, Je, **Jo**, Kl, **Lk**, Mal, Um, **Was**, Wh,
Expected: Cos (S), Cu, Gi, HR, Mo, Sh, Un, Wal
_____(S & E Cascades, Siskiyous, Warners) *californica*
_____(NE ranges, Steens & SE desert ranges) *obscurafacies* Austin, 1998

Taxonomic notes: *Satyrium californica* displays subtle geographic variation in Oregon, but well-defined patterns have not yet been identified. Populations of *S. californica* in the Cascades and Siskiyous apparently represent *Satyrium californica californica* (TL: Capell Creek, along State Hwy. 121, 9 air mi. NNE of Napa, Napa Co., California; see Opler in Brown 1970a: 41-43). Adults are phenotypically variable, but dorsal coloration averages tawnier than on individuals from further to the northeast.

In general, adults of *S. californica* from the northeastern ranges, Steens Mountain, and the Warners tend to be slightly darker above and below than adults from the Cascades and Siskiyous, but few specimens from northeastern Oregon have been personally examined. Austin (1998f: 543-544) named *Satyrium californica obscurafacies* (TL: Baker Creek Campground, 2150', Snake Range, White Pine Co., Nevada) for the dark phenotype of *S. californica* in the Great Basin, with adults that reportedly average larger than those of *S. c. californica*. Austin (1998f: 544) suggested that populations in "southeastern Oregon" fit within the concept of *S. c. obscurafacies*. While the name *S. c. obscurafacies* may be applicable to some or all populations of *S. californica* in eastern Oregon, from the Ochocos, eastward, it has not thus far been possible to determine the overall distribution of *S. c. obscurafacies* in Oregon. Significant individual variation among adults of *S. californica* in the Cascades and Siskiyous complicates the delineation of *S. c. californica* and *S. c. obscurafacies*, and no attempt has been made to separate these taxa in the distributional listing given above.

Austin (1998f: 544) applied the name *Satyrium californica cygnus* (W. H. Edwards, 1871) (TL: 3 mi. SW of Virginia City, Storey Co., Nevada; see Opler in Brown 1970a: 43-46), long considered a synonym of *S. c. californica* (e.g., Miller & Brown 1981: 101), to populations in the Sierra Nevada of California. Austin (1998f) stated that *S. c. cygnus* apparently blends with *S. c. obscurafacies* in the Warner Mountains. The few specimens of *S. californica* I have examined from the Warner Mountains are highly variable. Until patterns of geographic and individual variation among populations of *S. californica* in Oregon are better understood, populations in the Warner Mountains are tentatively called *Satyrium californica californica.*

Due to confusion with individuals of *S. sylvinus*, which are superficially very similar to those of *S. californica* in some areas, distributional and ecological data for these two species taken from literature reports must be interpreted with caution. In Oregon, adults of *S. californica* and *S. sylvinus* can be very difficult to separate. Adult phenotypes of these two species are confusingly similar across most of Oregon, and in many cases voucher specimens must be sampled to ensure reliable determinations. Not all photographic images of these two species, taken in the field in Oregon, can be reliably identified. The "male" of *S. californica* figured by Dornfeld (1980: 199, #2a,b) is a female.

<u>Biological notes</u>: *Satyrium californica* occurs in a variety of chaparral and forested habitats. This species is infrequently encountered across most of Oregon, but can sometimes be found in large numbers at flowers, especially at *Apocynum* (e.g., Jackson and Josephine counties), *Eriogonum* (e.g., Wasco Co.) and *Purshia*. Adults of *S. californica* fly in a single annual brood, with records extending from early June to early August, and from about 900' (Rogue River drainage, Josephine Co.) to 8000' (Light Peak, Warner Mts., Lake Co). Records of *S. californica* from Clackamas County (9 mi. SW Timothy Lake, 3400', and Timberline Rd., Mt. Hood, 5800') most likely refer to misdetermined *S. sylvinus*, but these specimens have not been personally examined. Until it can be verified there, Clackamas County has been excluded from the distribution of *S. californica* in Oregon. The record of *S. californica* from the Jefferson-Linn County line (vic. Hoodoo Butte, see Shepard 2002: 7) refers to a specimen of *S. sylvinus* (pers. obs. 2001).

The most widely used larval foodplant of *S. californica* in Oregon is *Purshia tridentata*, although *Ceanothus velutinus* var. *velutinus*, possibly *Quercus garryana* (CSNM, Jackson Co.; Rogue River Community College, Josephine Co.), or other plants may be used at some sites (also see Ballmer & Pratt 1989a: 67, 69). Records of *S. californica* using willow (*Salix*) species as a larval foodplant (e.g., Pyle 2002: 196) require verification, and probably refer to *S. sylvinus*. The full-grown larva and pupa of *S. californica* from California has been described and figured by various authors (e.g., Comstock 1933: 114-117, Dammers in Emmel & Emmel 1973: 55, Ballmer & Pratt 1989a: 27, 44, 71, 77, 81, Guppy & Shepard 2001: 203; also see Miller & Hammond 2003: 41). As noted by Ballmer & Pratt (1992b), larvae of *S. californica* from California are facultatively myrmecophilous.

Satyrium sylvinus **(Boisduval, 1852)**
_____(Siskiyous, N Coast Range, Cascades, Ochocos, Blues, Wallowas) *nootka* Fisher, 1998 <u>Recorded</u>: Ba, **Be**, Clk, Cls, Col, Cr, Do, Gr, Ha (N), HR, **Ja**, Je, **Jo**, Kl, **La**, **Lin**, **Lk** (N), Mar, Mal, Mo, Ti, Um, Un, **Wal**, Wan, Was, Wh, Ya, <u>Expected</u>: Cos, Cu, De, Gi, Li, Mu, Po, Sh
_____(Warners) nr. *sylvinus* <u>Recorded</u>: **Lk** (S)
_____(far S Harney Co.) *megapallidum* Austin, 1998 <u>Recorded</u>: Ha (S), <u>Expected</u>: Lk (far SE)?, Mal (S)

Taxonomic notes: Populations of *Satyrium sylvinus* in Oregon were called *Satyrium sylvinus sylvinus* (TL: Queen Lily Campground, nr. Belden, N Fork Feather River Canyon, 2400', Plumas Co., California; see Emmel et al. 1998i: 9) by Dornfeld (1980: 88), and were called *S. s. sylvinus* and *Satyrium sylvinus putnami* (Hy. Edwards, 1877) (TL: Mt. Nebo, Utah) by Hinchliff (1994: 78). In 1998, the name *Satyrium sylvinus nootka* (TL: Wellington, Vancouver Island, British Columbia) was proposed for "dark" northwestern populations that had formerly been known as *S. s. sylvinus* or *S. s. putnami* (see Fisher in Scott 1998b: 4-5). Therefore, all populations of *S. sylvinus* in Oregon, other than those in the southern parts of Lake and Harney counties, are herein called *Satyrium sylvinus nootka*. Adults of *S. s. nootka* are similar to those of *S. s. sylvinus*, but average darker above and below.

Adults of *S. sylvinus* in the Warner Mountains of Lake County are highly variable. In addition to darker phenotypes resembling *S. s. nootka*, adults are also found that are somewhat paler than *S. s. nootka*, and resemble the phenotype of *S. s. sylvinus*. While adults in the Warners are individually variable, pale individuals are frequently seen. Because of this variability, populations of *S. sylvinus* in the Warner Mountains are tentatively called *Satyrium sylvinus* nr. *sylvinus*, but further study of phenotypic variation in this range is needed.

Austin (1998f: 544-545) described *Satyrium sylvinus megapallidum* (TL: 12th Street at Humboldt River, Elko, 1536 m, Elko Co., Nevada) for populations in northern Nevada composed of very pale individuals. Adults of topotypical *S. s. megapallidum* usually lack hindwing tails, but some individuals in all known populations of that taxon are tailed, and as explained by Austin (pers. comm. 2004), some populations exist where adults are predominantly tailed. Adults of *S. sylvinus* from southern Harney County (e.g., Trout Creek area; see Hinchliff 1994: 78) are pale below, like those of *S. s. megapallidum*, and all examined to date are tailed (although some have shortened tails). Adults in these populations are also paler above than those from other segregates of *S. sylvinus* in Oregon. Herein, populations in southern Harney County are called *Satyrium sylvinus megapallidum*. The relationship of *S. s. megapallidum* to *S. s. nootka* deserves further study, but a series of *S. sylvinus* from the Catlow Valley (central Harney Co., 4550', in OSAC) appears intermediate between *S. s. nootka* and *S. s. megapallidum*. Nothing similar to the very pale phenotype of *S. sylvinus* occurring in the Columbia Basin of central Washington (Pyle 2002: 197, "*sylvinum*") has been seen from northern Oregon, but *S. sylvinus* has not been well studied in eastern Oregon, north of the Blue Mountains. The "female" *S. sylvinus* figured by Pyle (2002: 197, upper right) is a male.

Biological notes: *Satyrium sylvinus* is widespread in Oregon, and should eventually be recorded from all 36 counties. Adults of *S. sylvinus* are frequently encountered as single individuals, but they may congregate at flowers in large numbers, especially at *Apocynum* and *Asclepias* in Jackson and Josephine counties. Adults can apparently travel a considerable distance from larval foodplants to find nectar (pers. obs.). *Satyrium sylvinus* flies in a single annual generation in Oregon and elsewhere, with records from mid-May (but usually mid-June) to mid-September. Most reports of *S. sylvinus* in Oregon are from July and early August. The earliest report of *S. sylvinus* from

Oregon is from Yamhill County (Baker Creek Valley, 300'), from 18 May 1930 (see Fender 1931). Populations of *S. sylvinus* in Oregon are found in a variety of riparian and forested habitats, from near sea level in northwestern counties, to over 7200' on Steens Mountain (vic. Fish Lake).

Larval foodplants of *S. sylvinus* in Oregon include species of *Salix*, but details for most populations have not been presented. Populations of *S. s. megapallidum* use *Salix exigua* as a larval foodplant in Harney County, and probably elsewhere (also see Scott 1992: 64). Where *Salix* is abundant, males guard perches over the canopy of a patch, and sometimes perch on leaves growing on the very tallest branches. Dyar (1894, as *Thecla californica*) provided a brief description of the last-instar larva and pupa of *S. s. sylvinus* from Yosemite, California, reared on *Salix*. Comstock & Dammers (1935a: 136-138) described the early stages of *S. sylvinus* from Riverside, California, and illustrated its egg, late-instar larva, and pupa (also see Dammers in Emmel & Emmel 1973: 53). Emmel & Emmel (1968) illustrated the first instar larva of *S. sylvinus* from Santa Clara County, California. Subsequently, Ballmer & Pratt (1989a: 28, 45, 77, 81) and Guppy & Shepard (2001: 204) described and figured late-instar larvae of *S. sylvinus*, also from California. Hardy (1962b) described the early stages of *S. s. nootka* from British Columbia, where they were found on *Salix*. Ballmer & Pratt (1992b) reported *S. sylvinus* to be facultatively myrmecophilous in California. Also see Maeki & Remington (1961a: 130), Downey (1966) and Emmel & Emmel (1968).

Satyrium auretorum **(Boisduval, 1852)**
_____(far S Cascades, [Warners]) *auretorum* Recorded: **Ja**, Kl, Lk, Expected: Jo

Taxonomic notes: Individuals of *Satyrium auretorum* in Oregon appear to represent *Satyrium auretorum auretorum* (TL: Queen Lily Campground, nr. Belden, N Fork Feather River Canyon, 2400', Plumas Co., California; see Emmel et al. 1998i: 9).

Biological notes: *Satyrium auretorum* has only recently become known as a member of Oregon's butterfly fauna. The first report of *S. auretorum* from Oregon was by Austin & Albright (1986: 342), who cited three female specimens from Lake County. These individuals were sampled along Crane Creek (ca. 2 mi. S of Lakeview) on 1 June 1981, by Ray Albright (I examined these in October, 2004, at the McGuire Center, Gainesville, Florida). No additional adults of *S. auretorum* have subsequently been found at this locality, despite repeated search. The next records of *S. auretorum* from Oregon were of two males from the Klamath River Canyon, 3500', Klamath County, taken on 22 June 1985, by M. Peterson, J. Pearson and S. Fujikawa. More recently, *S. auretorum* has been observed in Jackson County, by Erik Runquist, every year since 2001 (Hwy. 66, ca. 2700'; CSNM, ca. 3000'-5800'; also see Shepard 2002: 7). The year 2003 was a "good year" for *S. auretorum* in Jackson County, when Erik Runquist and I observed several dozen adults on *Apocynum* flowers along Highway 66, east of Ashland (8-9 July). Most of these individuals had rather worn wings, but a few fresh adults were sampled. Davenport (2004a: 7) reported a population "explosion" of *S. auretorum* in southern California.

Larval foodplants of *S. auretorum* in Oregon have not been documented, but *Quercus garryana* is a probable foodplant, at least in Jackson County and far southwestern Klamath County. Garth & Tilden (1986: 122) and Ballmer & Pratt (1989a: 67) reported various species of *Quercus* as larval foodplants of *S. auretorum* in California, where the species is univoltine. Comstock & Dammers (1934b: 79-81) described the early stages of *S. auretorum spadix* (Hy. Edwards, 1881) from the San Bernardino Mountains, California, and illustrated its egg, full-grown larva, and pupa (also see Dammers in Emmel & Emmel 1973: 57). Ballmer & Pratt (1989a: 28, 43, 77, 81) subsequently described and figured the full-grown larva of Californian *S. auretorum*. As noted by Ballmer & Pratt (1992b), larvae of *S. auretorum* are facultatively myrmecophilous in California. Also see Downey (1966).

***Satyrium tetra* (W. H. Edwards, 1870)**
_____(Siskiyous, SE Cascades, Warners) Recorded: **Ja** (S), Jo, Kl (S), **Lk**, Expected: Cu (E)

Taxonomic notes: No geographic variation has been formally described within the primarily Californian range of *Satyrium tetra*, but subtle patterns of variation apparently exist. Compared to topotypical *Satyrium tetra* (TL: Arroyo Bayo, Santa Clara Co., California; see Brown & Clench in Brown 1970a: 36), adults of *S. tetra* from Oregon average larger and darker, above and below. This suggests that patterns of geographic variation seen in *S. tetra* deserve further study.

Biological notes: *Satyrium tetra* can be abundant at sites in Lake County (many records from the Warners, ca. 5000', and the Summer Lake area, 4200'-5000'), but tends to be less common further west in Klamath (3450'-4250'), Jackson (ca. 3000'-5800') and Josephine (Deer Creek W of Selma, ca. 1400') counties. Adults of *S. tetra* are often seen at flowers (*Apocynum* in Jackson Co.; *Chrysothamnus* in Lake Co.), or around *Cercocarpus* plants, where males defend perches. The single annual brood of *S. tetra* in Oregon extends from early July to late August, but most records from Lake County are from late July.

In Oregon, adults of *S. tetra* are closely associated with *Cercocarpus montanus* var. *glaber* (= *C. betuloides*), which is undoubtedly the larval foodplant in Lake, Klamath and Jackson counties. Shapiro et al. (1981: 108) reported *Cercocarpus ledifolius* as a larval foodplant of *S. tetra* in the Trinities of northern California, and this plant may also serve as a larval foodplant for *S. tetra* in southwestern Oregon. Comstock & Dammers (1936: 211-212; also see Dammers in Emmel & Emmel 1973: 57) described and illustrated a late-instar larva and pupa of *S. tetra* from San Bernardino County, California. Later, Comstock (1937: 19) described and illustrated the egg of *S. tetra* from the same area. Ballmer & Pratt (1989a: 27, 45-46, 77, 81) also described and figured the full-grown larva of *S. tetra* from California. Larvae of *S. tetra* from California were reported to be facultatively myrmecophilous by Ballmer & Pratt (1992b). Also see Downey (1966) and Johnson (1980).

***Satyrium saepium* (Boisduval, 1852)**
_____(Siskiyous, N Coast Range, Cascades, Ochocos, Blues, Wallowas) *saepium*
Recorded: Ba, Be, Clk (E), Cr, Cu, De, Do, Gr, HR, **Ja**, **Je**, **Jo**, **Kl**, **La**, Lin, **Lk**, Mal (N), Mar (E), Mo (S), Po, Um, Un, Wal, Wan, **Was** (W), Expected: Cos, Ha (N), Mu (E), Ti (E), Wh, Ya (W)

Taxonomic notes: All populations of *Satyrium saepium* in Oregon appear to represent *Satyrium saepium saepium* (TL: Queen Lily Campground, nr. Belden, N Fork Feather River Canyon, 2400', Plumas Co., California; see Emmel et al. 1998i: 9). No geographic variation has been detected among populations of *S. saepium* compared from distant parts of the state. No adults of *S. saepium* resembling the phenotype of *Satyrium saepium obscurafuscum* Austin 1998 (TL: Rd. to Success Mine, 0.5 mi. S Bonanza Gulch, 2423 m, Jarbidge Mts., Elko Co., Nevada) have been seen from southeastern Oregon (see Austin 1998f: 545). The taxon *Satyrium saepium okanagana* (McDunnough, 1944) (TL: Peachland, British Columbia) is herein treated as a synonym of *S. s. saepium*, based on an examination of topotypical adults of *S. s. okanagana* (in OSAC), compared to series of *S. saepium* from Washington, Oregon and northern California.

Biological notes: *Satyrium saepium* flies in a single annual generation in Oregon and elsewhere, from late June through September, but adults tend to be most common in August. Most records of *S. saepium* in Oregon are from between 900' and 7000', although records exist from as low as about 400' in Polk County (vic. Falls City). Males of *S. saepium* guard perches on the leaves of *Ceanothus velutinus* or other plants, and are often found perching on hilltops in small numbers (e.g., Shields 1968: 84, pers. obs.). Females of *S. saepium* are frequently found within the canopy of *C. velutinus* plants. Both sexes visit a wide variety of flowers, and are often seen at *Apocynum* in Jackson County (e.g., CSNM and vicinity). As noted by Dornfeld (1980: 87), adults of *S. saepium* can be extremely common along the eastern slope of the Cascades where *C. velutinus* grows in abundance (e.g., western Jefferson, Deschutes and Klamath counties, pers. obs.).

Larval foodplants of *S. saepium* in Oregon include *Ceanothus velutinus* across most of Oregon, but apparently also include *C. integerrimus* and *C. cuneatus* at lower elevations in Josephine and Jackson counties (pers. obs., Scott 1992: 64). Ballmer & Pratt (1989a: 69) listed six species of *Ceanothus* as larval foodplants of *S. saepium* in California. Comstock & Dammers (1933a: 105-107) illustrated the egg, late-instar larva and pupa of *S. saepium* from California (also see Emmel & Emmel 1973: 55-56). Newcomer (1973: 14-15) described immatures of *S. saepium* from Washington. Downey & Allyn (1981: 19, 24) figured the egg of *S. saepium* in great detail. The full-grown larva of Californian *S. saepium* was later described by Ballmer & Pratt (1989a: 28, 45, 77). Guppy & Shepard (2001: 206; also see Miller & Hammond 2003: 42) figured late-instar larvae and a pupa of *S. saepium* from British Columbia. Also see Downey (1966) and MacNeill (1967).

***Strymon melinus* Hübner, 1818**
Recorded: Ba, **Be**, **Clk**, Cls, Cos, Cu, **Cr**, **De**, **Do**, Gi, **Gr**, Ha, **HR**, **Ja**, **Je**, **Jo**, Kl, **La**, Li, Lin, **Lk**, **Mal**, **Mar**, **Mo**, Mu, **Po**, **Sh**, **Um**, Un, **Wal**, Wan, **Was**, **Wh**, Expected: Col, Ti, Ya
_____(N Coast Range, Willamette Valley, W Cascades, Siskiyous) *atrofasciata* (Hy. Edwards, 1877)
_____(E of Cascades) *setonia* McDunnough, 1927

Taxonomic notes: Subtle patterns of geographic variation have been observed in *Strymon melinus* across Oregon, although this variation is mostly obscured by individual, seasonal, and sexual variation seen at any given site. The application of trinomials to Pacific Northwestern populations of *S. melinus* to describe this variation should be considered tentative, since *S. melinus* has not received special attention in field or laboratory studies in Oregon, or in the recent literature (e.g., Emmel 1998). Across the state, adults of *S. melinus* from early in the spring (e.g., March and April) are small and dark above and below, usually with well-developed ventral black markings, and sometimes with reduced orange coloration (see Dornfeld 1980: 199, #3a,b, which is a female, not a male as indicated). Abdominal coloration of early spring males is usually entirely gray. Summer adults from east of the Cascades average larger than those to the west, with more pointed wings, and are frequently pale to almost whitish below. Variation in black ventral markings is extensive in summer adults of *S. melinus* across the state, and occasional individuals from throughout Oregon may have increased red backing to the ventral hindwing postmedial line, usually associated with a reduction in the width of the black line. Ventral orange coloration is sometimes fairly extensive on summer individuals of *S. melinus*. On males of summer broods, the distal half of the abdomen is generally yellowish (females of all broods have gray abdomens). In summer broods of *S. melinus*, sexual dimorphism is more pronounced than in the first annual brood, with females often being considerably paler below than males, regardless of geographic location. This dimorphism is seen to some extent in early spring broods of *S. melinus*, but is not so pronounced. In general, later generations of *S. melinus* show more geographic variation than do spring broods.

Considering all this variation, adults of *S. melinus* from west of the Cascadian crest appear to average smaller and darker than those from east of the Cascades, with somewhat more rounded wings, at least during summer broods. The name *Strymon melinus atrofasciata* (TL: Wellington, British Columbia) can be applied to populations of *S. melinus* in western Oregon (note that the “male” of *S. m. atrofasciata* figured by Guppy & Shepard 2001: 221, is a female). For populations of *S. melinus* to the east of the Cascades, with larger, paler summer adults, the name *Strymon melinus setonia* (TL: Seton Lake, Lillooet, British Columbia) can be applied. The application of these names to most Cascadian populations is problematic, since adults from the Cascades tend to be too variable to be assigned to any particular segregate (also see below). Therefore, no attempt has been made to divide the distributional listing for *S. melinus*, given above, into regional segregates. As noted above, occasional individuals from throughout the state have better-developed red backing to the black ventral hindwing postmedial line, and in this respect resemble Californian *Strymon melinus pudica* (Hy. Edwards, 1877) (TL:

Contra Costa Co., [California]). However, since these represent a minority of individuals, and central Californian populations examined (in OSAC) are consistently of the *S. m. pudica* phenotype, the name *S. m. pudica* is not herein applied to any populations of *S. melinus* in Oregon. However, the existence of occasional individuals phenotypically similar to *S. m. pudica* is acknowledged, and these may represent, in part, seasonal immigrants. Further study of variation in *S. melinus* from the Pacific Northwest is needed.

<u>Biological notes</u>: *Strymon melinus* is by far the most widely distributed hairstreak species in Oregon, and may be found from sea level (Clatsop Co.) to at least 8000' (E slope of Broken Top Mt., Deschutes Co., 11 August 2004). Records of *S. melinus* from Oregon extend from late March to early October. This species appears to fly in at least two annual broods in Oregon, although three or more broods may be produced at low elevations. Adults of *S. melinus* are usually encountered as solitary individuals, in fight or at flowers. East of the Cascadian crest, males of *S. melinus* are frequently found perching on hilltops (also see Shields 1968: 84), but males also perch in a variety of other settings, such as on *Juniperus* trees in gullies (e.g., Tygh Valley, Wasco Co., where they also hilltop), and along roadside ditches, throughout the day. Both sexes of *S. melinus* visit a wide variety of flowers (Pyle 2002: 220). Adults of *S. melinus* can apparently wander large distances, and seasonal movements of adults are suspected in some parts of its range (e.g., Tveten & Tveten 1996: 87). *Strymon melinus* is the only species of lycaenid that is regularly seen in yards and town gardens in the central and southern Willamette Valley (e.g., Corvallis, Benton Co.; Eugene, Lane Co.).

Larval foodplants of *S. melinus* include a tremendous diversity of native and introduced plants (e.g., Ballmer & Pratt 1989a: 66-69, Scott 1992: 68, Shapiro 2002: 37-38, Graves & Shapiro 2003: 426-427). In Oregon, suspected and confirmed larval foodplants include flowers and fruits of species of *Astragalus*, *Eriogonum* (especially *E. nudum* and *E. elatum*), *Lupinus*, *Malva*, *Sidalcea*, *Fragaria*, *Rubus*, and no doubt many others (also see Guppy 1959, Emmel et al. 1971: 240). In western Oregon, *S. melinus* is often seen in association with *Eriogonum nudum* and *Sidalcea* species, where adults can be fairly common (e.g., Lane Co., many sites). Jon Pelham (pers. comm. 2004) has also reported *Salsola kali* and *Lotus crassifolius* var. *crassifolius* as larval foodplants of *S. melinus* in Washington. In the eastern United States, S. *melinus* may be an economic pest on a variety of crops (Harris 1862, Heitzman & Heitzman 1987: 135). *Strymon melinus* is easily reared, and as summarized by Scott (1992: 69), the color of last-instar larvae is extremely variable. Scudder (1889b: 852-853, 1889c: pls. 65, 68, 75, 84) described and illustrated the early stages of *S. melinus* from the eastern United States, and (p. 854) reported *Humulus* and *Crataegus* as larval foodplants. Comstock (1927: 158) illustrated the egg, late-instar larva and pupa of *S. melinus*, presumably from California. Dammers in Emmel & Emmel (1973: 52; also see Garth & Tilden 1986: pl. 1, c, d) illustrated a full-grown larva and pupa of *S. melinus* from California. Downey & Allyn (1981: 20, 25, 28) figured the egg of *S. melinus* in great detail. Ballmer & Pratt (1989a: 27, 46, 78) provided additional descriptions of the full-grown larva, and Ballmer & Pratt (1992a: 39) provided a setal map of the larva. Allen (1997: 315, 339) figured a full-grown larva and pupa of *S. melinus* from West Virginia, and Tveten & Tveten (1996: 89) figured a larva from Texas. Recently, a late-instar larva and pupa of *S. melinus* were figured by Guppy & Shepard (2001: 221), and another late-instar larva was figured by Miller & Hammond (2003: 43). Ballmer & Pratt (1992b) reported larvae of *S. melinus* from California to be facultatively myrmecophilous, where they are tended at least by *Iridomyrmex humilis* (Mayr). Also see Maeki & Remington (1961a: 130), Samuelson (1961), Downey (1966), Downey & Allyn (1978: 7) and Alcock & O'Neill (1987).

<u>Polyommatini</u>: (25 species)

Leptotes marina (Reakirt, 1868)

_____(rare stray) <u>Recorded</u>: De, Do, Je

<u>Taxonomic notes</u>: No geographic variation has been described for *Leptotes marina* (TL: Orizaba, [Veracruz], Mexico).

<u>Biological notes</u>: *Leptotes marina*, much like *Brephidium exilis* (see below), is a powerful and regular emigrant out of the southwestern North American deserts. Unlike *B. exilis*, however, *L. marina* does not seem capable of establishing temporary populations as far north as Oregon. All four known records of *L. marina* from Oregon are of single individuals, from different years and localities (see Pyle 2002: 223). Judging from experience in other areas where *L. marina* is an immigrant (e.g., Colorado), adults could appear in Oregon any time between May and October, in any habitat type, but should never be expected.

Larvae of *Leptotes marina* feed on a large variety of plants, including *Astragalus* (Comstock 1927: 177), *Medicago sativa* (alfalfa) and others (see Emmel & Emmel 1973: 64, Garth & Tilden 1986: 138, Ballmer & Pratt 1989a: 66-69, Scott 1992: 69, Graves & Shapiro 2003: 422). Careful search of alfalfa fields and their margins late in the summer may generate more records of *L. marina* from Oregon. Comstock (1927: 176-177) described the immature stages of *L. marina*, and illustrated a last-instar larva and pupa. Subsequently, Dammers in Emmel & Emmel (1973: 65) illustrated a full-grown larva and pupa of *L. marina*, and Ballmer & Pratt (1989a: 28, 53, 71) figured a last-instar larva from California. Larvae of *L. marina* in California are facultatively myrmecophilous, and are tended at least by *Iridomyrmex humilis* (Mayr) (Brown 1990, Ballmer & Pratt 1992b). Also see Downey (1966).

Brephidium exilis (Boisduval, 1852)

_____(sporadic breeding immigrant) *exilis* <u>Recorded</u>: Ba, Cr, Gr, Ha, Kl (S), Lk, Mal, Mo (N), Wh, <u>Expected</u>: De (E), Gi, Je (E), Sh, Um (NW), Was

<u>Taxonomic notes</u>: All populations of *Brephidium exilis* from the western United States represent *Brephidium exilis exilis* (TL: Sacramento, Sacramento Co., California; see Emmel et al. 1998i: 13).

<u>Biological notes</u>: *Brephidium exilis* is probably not a permanent breeding resident in Oregon. As elsewhere near the northern limits of its range (e.g., northern Colorado, pers. obs.), immigrants of *B. exilis* establish temporary populations in eastern Oregon during the late summer and fall (also see Pyle 1981: 484). These populations may persist until late fall, but are killed off during all but perhaps the very mildest of winters. As a result, *B. exilis* is not reported from Oregon every year. Years when *B. exilis* is present in Oregon, adults may be abundant in the southeastern deserts, from mid-July through September. Occasionally, adults of *B. exilis* may be taken in central Oregon (Crook, Grant and Wheeler counties, e.g., Shepard 1998: 7), and temporary populations may be established as far north as the Columbia River (Umatilla NWR, Morrow Co., 4 September 2004, Neil Björklund). Adults of *B. exilis* fly over the tips of low plants, especially larval foodplants, and visit flowers (e.g., *Chrysothamnus*, see Pyle 2002: 224).

Larval foodplants of *B. exilis* in eastern Oregon at least include species of *Atriplex*, *Chenopodium* and *Salsola kali* (also see Emmel et al. 1971: 240, Garth & Tilden 1986: 138 and Ballmer & Pratt 1989a: 66). Shapiro (1973d) reported four species of *Atriplex* and a species of *Suaeda* as larval foodplants of *B. exilis* in central California. William H. Edwards (1894) described the full-grown larva and pupa of *B. exilis* from New Mexico, which fed on *Atriplex canescens*. Coquillett (1899: 211) and Coolidge (1924c) described the immature stages of *B. exilis* from California in detail. Comstock (1927: 179-180) illustrated the egg, full-grown larva and pupa. Dammers in Emmel & Emmel (1973: 65) and Ballmer & Pratt (1989a: 28, 47, 81) also described and figured full-grown larvae and pupae of *B. exilis* from California. Larvae of *B. exilis* from California were reported to be facultatively myrmecophilous by Ballmer & Pratt (1992b). Also see Gunder (1925: 2), Downey (1966), Johnson (1984) and Haeger (1988).

***Cupido comyntas* (Godart, [1824])**

_____(Siskiyous, N Coast Range, Willamette Valley, S & W Cascades, NE valleys and ranges) *sissona* (W. G. Wright, 1905) <u>Recorded</u>: Ba, **Be**, Clk, Cls, Col, Cu, **Do**, Gr, Ja, **Jo**, Kl, **La**, **Li**, **Lin**, Lk (N), Mal, Mu, **Po**, Un, **Wal**, Wan, Ya, <u>Expected</u>: Cos, Cr?, De?, Ha?, HR?, Je?, Mar, Mo?, Ti, Um, Was?, Wh?

<u>Taxonomic notes</u>: *Cupido comyntas*, along with *C. amyntula* (see below), were formerly placed in *Everes* Hübner, [1819] (e.g., Dornfeld 1980: 102-103, Hinchliff 1994: 96-97). However, Kudrna (1986: 194), and many authors since (see Opler & Warren 2002: 26), considered *Everes* to be a synonym or subgenus of *Cupido* Schrank, 1801. Austin (2002b: 292) determined that the type specimen of *Lycaena sissona* (TL: Sisson [now called Mt. Shasta City, Siskiyou Co.], California; see Tilden 1975: 37) is conspecific with *Cupido comyntas* (see Pyle 2002: 227), and applied that name to all far-western North American populations of *C. comyntas*. These display subtle morphological differences that separate them from other populations of *C. comyntas* (e.g., Mexico, eastern United States), which suggests that western *C. comyntas* probably did not originate from a human-assisted agricultural introduction (*contra* Pyle 1981: 492, 2002: 227). All populations of *C. comyntas* in western Oregon are clearly referable to *Cupido comyntas sissona*. Small series examined to date of *C. comyntas* from

northeastern Oregon are also of the *C. c. sissona* phenotype, but further study of these populations is needed. Also see Meiners (1936).

Biological notes: *Cupido comyntas* is usually found in somewhat disturbed habitats in Oregon, including roadsides and open fields, but also occurs in relatively undisturbed settings. Populations of *C. comyntas* are common and widespread in the north Coast Range, Willamette Valley, and at lower elevations in the western Cascades and Siskiyous. Throughout western Oregon, *C. comyntas* flies in two annual broods, from mid-April to mid-June, and from July through September. Records of *C. comyntas* in Oregon range from near sea level (Harbor, Curry Co.) to at least 4000' (southern Jackson Co.). East of the Cascadian crest, *C. comyntas* has only been recorded from a few counties, and its status in this region is not entirely clear. Sufficient records are lacking to determine the number of annual broods in northeastern Oregon (also see Guppy & Shepard 2001: 223-224). Ken Smith found a population of *C. comyntas* within the town of Halfway (2500', at his residence and on Storage Ave.) in early and mid-July 1983, and from late May to late June, 1990. Dan Thackaberry found an adult of *C. comyntas* along Catherine Creek in Union County, on 7 July 2003 (pers. comm. 2004). On 27 June 2004, I found a dozen fresh adults of *C. comyntas* along the margins of Highway 82 near Minam (ca. 3000'), in Wallowa County, representing what appeared to be an established population. Because of the uncertainty over the status of *C. comyntas* populations in eastern Oregon, most eastern counties have been listed above as "expected," so that more effort will hopefully be made to locate populations. There is a single record of *C. comyntas* from north-central Jefferson County (see Hinchliff 1994: 96), but there is no supporting data for this record in Hinchliff's data notebooks (in OSAC). Three *Cupido* specimens were located in OSAC, labeled from "Warm Springs, Oregon, 24 May 1964" from the Elmer Griepentrog collection. These are apparently the source of the Jefferson county dot for *C. comyntas* plotted by Hinchliff (1994: 96). However, these specimens are of the European *Cupido agriades* (Pallas, 1771), or a related taxon, and are clearly mislabeled. Therefore, until new records come to light, Jefferson County has been deleted from the distribution of *C. comyntas*.

Boisduval & Le Conte (1829-[1837]: pl. 36) and W. H. Edwards (1876b) described the early stages of *C. comyntas* from eastern North America. Scudder (1889b: 913-914, 1889c: pls. 65, 68, 75, 79, 84; also see Klots 1951: pl. 5, 6) also described and illustrated the immature stages of *C. comyntas* from the eastern United States, and reported *Lespedeza capitata*, *Desmodium marylandicum*, *Galactia*, and others as larval foodplants there. Subsequently, early stages of *C. comyntas* from Illinois were described in great detail by Downey (1962) and Lawrence & Downey (1967). Downey & Allyn (1981: 22) figured the egg, and Scott (1992: 70) briefly described the immatures of *C. comyntas* from Colorado. Recently, Tveten & Tveten (1996: 97) figured a larva of *C. comyntas* feeding on *Trifolium* in Texas, and Allen (1997: 317) figured a full-grown larva from West Virginia being tended by an ant (also see Ballmer & Pratt 1992b). The full-grown larva of *C. c. sissona* from California was described by Ballmer & Pratt (1989a: 30, 50), and figured by Guppy & Shepard (2001: 224). Larval foodplants of *C. comyntas* in Oregon apparently include a variety of legumes, at least including *Lotus unifoliolatus* var. *unifoliolatus*, *L. corniculatus*, *Astragalus* and *Trifolium* species. Shapiro (1975a:

203) reported *Lotus u.* var. *unifoliolatus* (as *L. purshiana*), *L. strigosus* and *Vicia sativa* as larval foodplants of *C. comyntas* in central California (also see Shapiro 2002: 38, Graves & Shapiro 2003: 421).

I have found adults of *C. comyntas* flying in sympatry and synchrony with *C. amyntula* at many sites in western Oregon (Benton, Lincoln, Lane and Josephine counties) during May and June. In such situations, unless very worn, dorsal and ventral phenotypes of the two species are distinctive and genitalic dissection is not usually required for identification. Elsewhere in the ranges of *C. comyntas* and *C. amyntula* (e.g., Colorado, pers. obs.; Nevada, G. Austin pers. comm. 2001), when they occur together, the also resemble each other much more closely than they do in Oregon, and genitalia usually must be dissected to ensure reliable determinations (see Bethune-Baker 1913, Dornfeld 1980: 103, Austin 2002b). Males of *C. comyntas* are distinctive in that they frequently have a small, dark discal spot on the dorsal forewing (especially those from the summer brood), which males of *C. amyntula* from Oregon lack. Also see Maeki & Remington (1961a: 130), Downey (1966) and Downey & Allyn (1978: 10).

***Cupido amyntula* (Boisduval, 1852)**

_____(most of state) *amyntula* Recorded: all counties except two, Expected: Gi, Sh

Taxonomic notes: *Cupido amyntula* is in need of a thorough review. Complex patterns of variation are seen in *C. amyntula* populations outside of Oregon, in wing morphology and in male and female genitalia. However, within Oregon, patterns of geographic variation are subtle and difficult to define, due to great individual variation in wing markings and adult size within most populations. Adults of *C. amyntula* from the Siskiyous, Warners and southern Cascades are clearly referable to *Cupido amyntula amyntula* (TL: Bucks Lake Rd. at White Creek, 2 rd. mi. W Quincy, 3437', Plumas Co., California; see Emmel et al. 1998i: 13). Below, these adults are highly variable, but tend to have small yet well-developed ventral hindwing spots. Some individuals of *C. amyntula* in this area, however, have nearly immaculate ventral wing surfaces, resembling populations from to the northwest. Adults of *C. amyntula* from the north Coast Range, edges of the Willamette Valley, and northwestern Cascades tend to have highly reduced ventral spotting, and many individuals are chalky white and nearly immaculate below. Nevertheless, some better-spotted individuals of *C. amyntula* can be found in this region when long series are examined.

Along the northeastern slope of the Cascades and throughout Oregon's northeastern mountains, adults of *C. amyntula* are highly variable. In most populations, adults with nearly immaculate ventral wing surfaces are common, but well-spotted individuals and all types of intermediate forms fly in sympatry. However, no adults consistently as dark or as well spotted as *Cupido amyntula albrighti* (Clench, 1944) (TL: Kings Hill, Montana) have been seen from northeastern Oregon. A long series of *C. amyntula* I sampled at Fields Creek Canyon, Grant County (May and June, 2001), displays an interesting diversity of phenotypes, representing all forms seen throughout the state. This variation, however, is not restricted to Grant County, but occurs throughout northeastern Oregon, wherever *C. amyntula* occurs. Further study of this variation is needed. To date, no alpine or subalpine populations of *C. amyntula* are known from Oregon, although darker, heavily spotted alpine segregates of *C. amyntula* are known to occur in parts of Nevada (Austin 1998f: 549) and California (Shapiro 1977d: 447, Shapiro et al. 1981: 116).

Biological notes: *Cupido amyntula* is found in a wide variety of mesic habitats in Oregon, from near sea level (Tillamook, Tillamook Co.) in the north Coast Range, to about 6000' (Mt. Ashland Rd., Jackson Co.). The species seems to avoid xeric habitats in the Columbia Basin and southeastern deserts. Throughout Oregon, *C. amyntula* appears to fly in a single spring generation, from late April through July, depending on elevation and seasonal conditions. Males of *C. amyntula* frequently congregate at mud and scat, and both sexes visit flowers (see Pyle 2002: 226).

Larval foodplants of *Cupido amyntula* in Oregon apparently include species of *Astragalus*, *Lathyrus*, *Lotus* and *Vicia*, and adults are closely associated with *Thermopsis* in Grant County (Fields Creek Canyon). In Washington, Jon Pelham (pers. comm. 2004) has recorded *Astragalus miser* var. *serotinus*, *Lathyrus lanszwertii* var. *lanszwertii*, *L. pauciflorus* var. *pauciflorus* and *Vicia sativa* var. *nigra* as larval foodplants of *C. amyntula*. Shapiro et al. (1981: 116) reported *Vicia americana* ssp. *americana* (as *Vicia californica*), *Lathyrus jepsonii* ssp. *californicus* and *Astragalus whitneyi* var. *siskiyouensis* as larval foodplants of *C. amyntula* in the Trinities of northern California. Wright (1885) provided a brief description of the immatures of *C. amyntula* from California, which were reported to feed on *Astragalus crotalariae*. Coquillett (1899: 211) provided a description of the full-grown larva of *C. amyntula*. Comstock & Dammers (1936: 218-219) described the early stages of *C. amyntula* from southern California, and illustrated a late-instar larva and pupa (also see Dammers in Emmel & Emmel 1973: 65). Ballmer & Pratt (1989a: 18, 29, 50, 78) provided further descriptions of the late-instar larva, and Guppy & Shepard (2001: 225) figured a full-grown larva and pupa of *C. amyntula* from separate Californian populations. Larvae of *C. amyntula* frequently bore into and feed inside the fruits of larval foodplants (*fide* David Nunalee). Ballmer & Pratt (1992b) noted that larvae of *C. amyntula* in California are facultatively myrmecophilous, where they are tended at least by *Conomyrma vicinus* Mayr, *Formica obscuripes* Forel, an undetermined *Formica* species, and *Lasius niger* (L.). Also see Maeki & Remington (1961a: 130) and Frechin (1969).

***Celastrina echo* (W. H. Edwards, 1864)**

_____(Siskiyous, Cascades, Willamette Valley, coast, N Coast Range, Warners, Ochocos, possibly NE ranges) *echo* Recorded: Ba, **Be**, **Clk**, Cls, Col, Cos, **Cr**, **Cu**, De, **Do**, **Gr**, **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, **Li**, **Lin**, **Lk**, **Mar**, **Mu**, **Po**, Ti, Wal, Wan, **Was**, Ya

_____(NE Cascades, Ochocos, Aldrichs, Blues, Wallowas) *nigrescens* (Fletcher, 1903) Recorded: **Ba**, **Clk**, **Cr**, [Gi (S)], **Gr**, **Ha**, **HR**, **Je**, [Mal], **Sh**, **Um**, **Un**, **Wal**, **Was**, Wh, Expected: Mo (S)

Taxonomic and biological notes: The taxonomic status of many *Celastrina* populations in Oregon is currently a mystery. With one known exception (see below), west of the Cascadian crest, populations represent *Celastrina echo* (TL: San Francisco, [San Francisco Co.], California; see Brown 1970b: 429). *Celastrina* populations in the southeastern Cascades, from Deschutes County to the Warner Mountains (Lake Co.), are also typical of *C. echo*. Adults of *C. echo* average large, with long wings, compared to populations of *Celastrina* in northeastern Oregon. There is very little variation in ventral maculation or coloration on adults of *C. echo*. Ventral coloration is generally clear white, often with a bluish hue (see Pyle 2002: 229). Above, males of *C. echo* are clear purplish-blue. Both sexes of *C. echo* tend to have nearly immaculate, white wing fringes, although some darkening of the fringes may be seen at vein ends, and near the forewing and hindwing apex. Female *Celastrina* from all parts of Oregon are individually variable in the hue and extent of blue coloration and darkened areas above. Based on a small sample from coastal Lincoln County, males of *C. echo* from dunes on the immediate coast may be slightly darker purplish-blue above than males from further inland, but additional series from coastal localities are required to confirm this. Populations of *C. echo* in western Oregon are widespread and adults are generally common in the spring. Males congregate in large numbers at mud, damp ashes and scat, and both sexes visit a wide variety of flowers. Two annual generations of *C. echo* fly in western Oregon, from late January (21 January 2005, Chetco River, 3 mi. E Brookings, Curry Co., D. & K. Munson) through early June (but mostly in April and May), and in July and August. However, most years, summer individuals are uncommon. Larval foodplants for *C. echo* in western Oregon include flowers and fruits of a wide variety of plants (see Dornfeld 1980: 106, Pyle 2002: 230), including *Ceanothus velutinus*, *Holodiscus discolor*, *Spiraea pyramidata*, *Arctostaphylos uva-ursi*, *Cornus nuttalli* and *C. sericea* ssp. *occidentalis* (pers. obs., Jon Pelham pers. comm. 2004), among others.

From the northeastern Cascades, through the Ochocos, Blues and Wallowas, patterns of adult variation in *Celastrina* populations become extremely complex, and it is possible that more than one species occurs in the region. All *Celastrina* records from the northwestern part of Oregon indicate a single annual brood, from mid-April to July, depending on elevation and seasonal conditions. On average, *Celastrina* adults from the northeastern mountains are smaller than those of western *C. echo*, with shorter and rounder wings. Most males in northeastern Oregon are somewhat hazy blue above, and appear paler and not as lustrous as *C. echo* from western Oregon. Female *Celastrina* in northeastern Oregon are often extensively darkened above. Wing fringes on adults from this area may be slightly or extensively darkened, and hindwing fringes are usually strongly checkered. Below, ground color of *Celastrina* adults from northeastern Oregon is highly variable, ranging from whitish like western *C. echo*, to somewhat duskier than *C. echo*, to cold gray, along with intermediate forms. Ventral hindwing maculation on *Celastrina* adults from northeastern Oregon is extremely variable. Some individuals are spotted as on *C. echo*, but most adults have larger, darker spots than do *C. echo*. Dark markings along the margins of the wings, below, may or may not be well-developed. Frequently, the discal hindwing spots are swollen and elongated on adults from northeastern Oregon (e.g., Pyle 2002: 231), and all ventral spots may be greatly expanded and/or fused into each other (e.g., Dornfeld 1980: 211, #7d). The name *Celastrina lucia*

(W. Kirby, 1837) (TL: possibly Cumberland House, Saskatchewan; see Klots 1951: 170) has been applied to these darkened forms (e.g., Dornfeld 1980: 106, Pyle 2002: 230). However, that name should not be used to refer to these forms in Oregon, since *C. lucia* refers to a separate species that has not (yet) been found in the state (see images of *C. lucia* in Guppy & Shepard 2001: 228; also see p. 15 herein).

All of these smaller, duskier *Celastrina* adults from northeastern Oregon (Ochocos to Wallowas), with super-variable ventral coloration and maculation, may represent a single species. Two names are potentially applicable to these populations. The name *Celastrina nigrescens* (TL: Kaslo, on Kootenay Lake, British Columbia) apparently applies to populations composed of small, dusky males, with highly variable ventral coloration and maculation, similar to those in northeastern Oregon (see Fletcher 1903, 1904). The other name is *Celastrina bakeri*, proposed by Clench (1944) for adults from Baker [now mapped as Baker City], [Baker County], Oregon. I have not examined Clench's type series of *C. bakeri*, but I have studied *Celastrina* populations in the vicinity of Baker City. On 21 June 2001, *Celastrina* adults from Rock Creek Canyon, 5400'-5700', about 12 air miles northeast of Baker City, were like those from other populations in northeastern Oregon (as defined above), in size, shape and extreme variability of ventral markings. No phenotypes resembling *C. echo* from western Oregon were seen, among about 60 adults sampled. If *Celastrina* populations throughout Baker County, and elsewhere in northeastern Oregon, are all similar to topotypical *C. nigrescens*, *C. bakeri* could be treated as a synonym of *C. nigrescens*.

However, the situation in northeastern Oregon may be far more complex. In most northeastern counties, individuals resembling *C. echo* from western Oregon can also be found. Compared to other *Celastrina* adults from northeastern Oregon, the adults resembling *C. echo* are larger, have longer wings, and have poorly maculated ventral wing surfaces with a whitish coloration. Additionally, males in these populations are darker, purplish-blue above, compared to *C. nigrescens*, and wing fringes are less patterned. In every way, these individuals from northeastern Oregon resemble typical *C. echo*. While apparently scarce, when adults of the *C. echo* phenotype are found in northeastern Oregon (e.g., Dixie Summit, ca. 5000', Grant Co., 14 May 2003; T9S R36E S23, 5400', Baker Co., 28 May 2002), adults show little individual variation, and appear to be separable from short-winged forms of *C.* "*nigrescens*" occurring nearby. While more intensive study of these populations is needed, and larger samples should be obtained, it seems possible that more than one species of *Celastrina* occurs in northeastern Oregon. One of these species may be nearly uniform in its facies (*C. echo*), while the other (possibly *C. nigrescens*) is quite variable. Further taxonomic studies, including various rearings (see below), will be needed to clarify the situation. Additionally, the type specimens and type series of *C. bakeri* and *C. nigrescens* must be examined to determine which phenotype(s) they represent, before the synonymy among these taxa can be determined. Until this is done, association of *Celastrina* populations in northeastern Oregon with any species-level name will remain somewhat speculative. Since the true identity of *C. bakeri* is unclear, that name cannot yet be applied to any populations with confidence. For now, most populations of *Celastrina* in northeastern Oregon are herein called *Celastrina nigrescens*, until additional information becomes available. As noted above, it is not clear if *C. nigrescens* from Oregon should be associated with *C. echo* at the species-level.

On 21 June 2001, at Rock Creek Canyon, Baker County, females of *C. nigrescens* were closely associated with *Ceanothus velutinus* var. *velutinus*, and one oviposition on a flower bud of *C. velutinus* was observed. Similarly, females found in the Aldrich Mountains of Grant County (Fields Creek Canyon and road to Aldrich Mt., 4200'-5000', 30 May 2001, 13 May 2003), were closely associated with *C. velutinus*. However, further south in Harney County, adults of *C. nigrescens* were not found in association with *C. velutinus*. Adults of *C. nigrescens* found in Devine Canyon (Hwy. 395, ca. 5000', 14 May 2002) flew among the fresh leaf buds and catkins of *Salix* bushes, along a small, shaded creek (no *C. velutinus* was found nearby). Adults of both sexes were observed to land on willow catkins, presumably to feed. Similarly, in the Ochoco Mountains of Crook County (vic. Hwy. 26 ca. 4600', 13-14 May 2003), adults of *C. nigrescens* flew among *Salix* bushes bordering a small creek, and no plants of *C. velutinus* could be found nearby. Larval foodplants for these populations remain unknown, but both are associated with *Cornus* species. In Wallowa County (between the towns of Wallowa and Troy), I found several females of *C. nigrescens* in association with *Holodiscus discolor* and *Ceanothus velutinus*.

Celastrina adults phenotypically like *C. nigrescens* also occur along the northeastern slope of the Cascades, from near Camp Sherman, Jefferson County, north to Hood River County. Here, the separation of *C. nigrescens* and *C. echo* seems even fuzzier, at first glance. Apparent contrast in overall wing shape between *C. echo* and *C. nigrescens* in this region is not as obvious as in populations from northeastern Oregon. Typical *C. echo* phenotypes are abundant in the northeastern Cascades, while *C. nigrescens* phenotypes tend to be uncommon. After examining specimens of various *C. nigrescens* phenotypes labeled from "Camp Sherman, Jefferson Co." (in OSAC), I conducted extensive field studies in that area during late May, 2001. Since *C. echo* is frequently common around large stands of *C. velutinus* in the western Cascades (see above), two days were spent in open coniferous forest habitats with a thick under story of *C. velutinus*, just south of Camp Sherman. Over 120 mostly fresh male and female *Celastrina* adults were sampled, representing "pure" *C. echo*. All adults sampled were found in immediate association with *C. velutinus*, or at mud nearby (0-2 mi. below Metolius Spring). A third day was spent at and below the "lower bridge" of the Metolius River, about 3 miles further north (downstream). Here, a few male *C. nigrescens* were found at mud, mixed with many males of *C. echo*. Subsequently, numerous females of *C. nigrescens* were flushed from *Holodiscus discolor* bushes growing along the riverbank. About 40 individuals obtained in this manner were all *C. nigrescens*. Most adults flushed from *Holodiscus* bushes were females, but a few males were taken, and most individuals had somewhat worn wings. No adults of *C. echo* were flushed from these *Holodiscus* bushes, although males of *C. echo* were sampled at mud and in flight nearby. It wasn't until several days later when I noticed that Pyle (2002: 231, photo) documented a female *C. nigrescens* ovipositing on *Holodiscus* at Camp Sherman (probably from near the "lower bridge").

While adult phenotypes of *C. echo* and *C. nigrescens* appear less distinct in the Camp Sherman area than they do further to the northeast, the two taxa appear to have different preferred larval foodplants there. Populations of *C. nigrescens* apparently associated with *Holodiscus* extend, at least, into the lower Deschutes River (vic. Sherar's Falls, ca. 700', Wasco Co.; Jones Canyon, ca. 700', Sherman Co.). *Celastrina nigrescens* phenotypes are known from the Warm Springs Indian Reservation, Jefferson-Wasco counties (Warm Springs River Rd., W of Simnasho, 2500', OSAC), but recent field studies there have not been conducted. At Mill Creek Canyon (ca. 2000'), Wasco County, I have sampled over 300 *Celastrina* adults, yet only a single worn male of *C. nigrescens* was taken, at mud together with dozens of fresh male *C. echo*. *Holodiscus* is rare in Mill Creek Canyon, and *C. echo* at this site are associated at least with *Ceanothus integerrimus* and *Cornus*. Just over the ridge to the west of Mill Creek Canyon, in Hood River County (Neal Creek Canyon, ca. 1500'), at least 15% of *Celastrina* adults sampled were *C. nigrescens* phenotypes (over 150 *Celastrina* sampled). Larval foodplants in Neal Creek Canyon have not been determined, but *Holodiscus discolor* and *C. integerrimus* are common plants there. West of the Cascadian crest, *C. nigrescens* is only know from one site, in the Clackamas River Canyon of Clackamas County (ca. 900'), where it was first found by Stanley Jewett in May, 1958. I relocated Jewett's "Big Eddy" site (Big Eddy is the name of an old picnic area along Hwy. 224, now closed) on 11 June 2001. Worn *C. nigrescens* adults were found among *Holodiscus* bushes along the riverbank, while fresh *C. echo* males were common at mud and in flight nearby. The situation here appeared similar to that at Camp Sherman, Jefferson County, on the east side of the Cascades. Much additional study of *Celastrina* populations in Oregon is required to determine the significance of these observations.

Because of uncertainties over what names to apply to phenotypes of *Celastrina* east of the Cascadian crest, county distributions listed above refer only to material that I have personally examined, and material directly referred to as "*lucia*" in Hinchliff's data notebooks (OSAC). Records of uncertain status are listed between brackets. Apparently, it will be some time before the taxonomy and biology of Pacific Northwestern *Celastrina* populations can be well understood. As discussed above, *Celastrina lucia* is apparently a species-level taxon, which does not occur in Oregon. However, populations conspecific with or closely related to *C. lucia* occur along the eastern slope of the Cascades in Washington (e.g., Cowiche Canyon, Yakima Co.), where they occur in sympatry with *C. echo* and *C. nigrescens*. Populations of *C. lucia* could also exist in Oregon, and observers are encouraged to sample large series of *Celastrina* whenever adults are found in abundance, anywhere east of the Cascadian crest.

The full-grown larva of *C. echo* from California was described and figured by Ballmer & Pratt (1989a: 28, 47-48, 71, 74, 81). Larvae of *C. echo* in California were reported to be facultatively myrmecophilous by Ballmer & Pratt (1992b, also see Harvey & Webb 1981). For additional information on North American *Celastrina*, see W. H. Edwards (1876c, 1878b,c, 1884d: [315-317], pl. [50]), Scudder (1889b: 934-935, 1889c: pls. 65, 68, 75, 79, 84), Clench & Miller (1980), Eliot & Kawazoé (1983), Scott (1992: 71-80), Pratt et al. (1994), Layberry (1996) and Guppy & Shepard (2001: 226-228).

***Glaucopsyche piasus* (Boisduval, 1852)**
_____(Siskiyous, far SW Cascades) nr. *piasus* Recorded: **Do** (S), **Ja**, [Kl (SW)], Expected: Jo
_____(most of state E of Cascadian crest) *toxeuma* F. M. Brown, 1971 Recorded: Ba, **Cr**, **De**, Gi, **Gr**, **Ha**, **HR**, **Je**, Kl, Lin, **Lk**, Mal, Mo, Sh, **Um**, **Un**, **Wal**, **Was**, Wh, Expected: Clk (far E), La (far NE), Mar (far E), Mu (far E)

Taxonomic notes: As noted by Brown (1971), populations of *Glaucopsyche piasus* in Oregon require careful taxonomic study (also see Dornfeld 1980: 105). Obvious patterns of geographic variation have not been detected across populations of *G. piasus* in Oregon, but subtle patterns of variation do seem to exist. Brown (1971: 242) considered specimens from Butte Falls, Jackson County, to represent *Glaucopsyche piasus piasus* (TL: Hwy. 70 at Soda Creek, E branch of N Fork Feather River Canyon, Plumas Co., California; see Emmel et al. 1998i: 16). Below, adults of *G. p. piasus* have small spots against a rather pale ground color. Above, males have narrow dark wing margins, and blue coloration is pale. To date, I have only examined a small series of *G. piasus* from southwestern Oregon (e.g., nr. town of Days Creek, Douglas Co.; Mt. Ashland; Medford; Gold Lake; CSNM, Jackson Co.). On average, these adults are slightly darker below than topotypical *G. p. piasus*, but are otherwise similar to that taxon and are not as dark above or below as those of *G. p. toxeuma.* For now, populations in southwestern Oregon are called *Glaucopsyche piasus* nr. *piasus* (also see Hinchliff 1994: 101), until these can be studied in more detail. Specimens of *G. piasus* examined from southern Klamath County (e.g., Bly Mt. area; vic. Olene) and western Lake County (e.g., Summer Lake area) are phenotypically closer to *G. p. toxeuma* than to *G. p. piasus*, but some paler adults approaching the phenotype of *G. p. piasus* have been seen from these areas. Similarly, adults of *G. piasus* from the Warner Mountains are highly variable. Some adults are pale below and resemble *G. p. piasus*, and females from the Warners seem to average bluer above than those of typical *G. p. toxeuma.* However, some adults from the Warner Mountains are indistinguishable from *G. p. toxeuma.*

Individuals of *G. piasus* from throughout the northern half of Oregon are referable to *Glaucopsyche piasus toxeuma* (TL: Garnett Valley, Summerland, British Columbia). These adults average larger, males have broader dark wing margins above, and the hindwing ground color below is darker, in comparison to *G. p. piasus*. Below, dark spots are well-developed (sometimes appearing somewhat aberrant), and whitish markings contrast sharply with the dark ground color. Adults of *G. p. toxeuma* are superficially similar to those of *Glaucopsyche piasus daunia* (W. H. Edwards, 1871) (TL: Turkey Creek, Jefferson Co., Colorado; see Brown 1970b: 412), and study is needed to further define differences between the two. Occasional adults from the central Cascades (e.g., Three Creeks Meadow, ca. 6400', Deschutes Co.) are slightly paler and less contrasting below, somewhat approaching the phenotype of *G. p.* nr. *piasus*, but most adults in this area are closer to the phenotype of *Glaucopsyche piasus toxeuma.*

I have examined very few specimens of *G. piasus* from southern Harney and Malheur counties. These specimens average smaller than those of *G. p. toxeuma* from elsewhere in Oregon, males apparently have wider dark wing margins above, and the ventral ground color is very dark, with reduced light markings. These populations may possibly represent *Glaucopsyche piasus nevada* F. M. Brown, 1975 (TL: Bob Scott Campground, Toiyabe National Forest, Lander Co., Nevada; see Brown 1975a: 501-503), or may be phenotypically intermediate between *G. p. toxeuma* and *G. p. nevada*. Because of the small number of specimens examined from this area to date, the name *Glaucopsyche piasus nevada* is not herein used until populations in southern Harney and Malheur counties can be studied in more detail.

Biological notes: *Glaucopsyche piasus* is seldom seen in large numbers in Oregon, as noted by Dornfeld (1980: 105). Despite this, adults can be found in a wide variety of habitats, from roadsides and xeric gulches to riparian corridors and mesic montane meadows. Males are frequently encountered at mud and damp ashes. Females are often found near patches of *Lupinus*, and both sexes visit a wide variety of flowers. There is a single annual brood of *G. piasus* in Oregon, from mid-April to early August, depending on elevation and seasonal conditions, but most records are from April through June. Records exist from about 200' (Spanish Hollow S of Biggs, Sherman Co.) to over 8000' (Light Peak, Warner Mts., Lake Co.).

Jon Pelham (pers. comm. 2004) reported *Lupinus arbustus* ssp. *calcaratus* as a larval foodplant of *G. piasus* in Washington (also see Ballmer & Pratt 1989a: 67), but species of *Lupinus* foodplants have not yet been reported for populations in Oregon. Newcomer (1912b: 31, pl. II) described and illustrated the full-grown larva of *G. piasus* from California, and noted associations of larvae with two species of ants. Coolidge (1923) subsequently described the early stages of *G. piasus* from California. Comstock (1927: 196) illustrated the egg of *G. piasus*, followed by Downey & Allyn (1981: 22). Dammers in Emmel & Emmel (1973: 75) illustrated a full-grown larva, Ballmer & Pratt (1989a: 30, 50-51, 71, 81) described and figured another full-grown larva, and Guppy & Shepard (2001: 231) figured late-instar larvae and pupae of *G. piasus* from separate Californian populations. Ballmer & Pratt (1992b: 103) noted that larvae of *G. piasus* in California are facultatively myrmecophilous, where they are tended at least by *Formica francoeuri* Bolton (formerly known as *F. pilicornis* Emery) and a species of *Conomyrma*.

***Glaucopsyche lygdamus* (Doubleday, 1841)**

Recorded: all counties

_____(Siskiyous, N Coast Range, Willamette Valley, W Cascades) *incognitus* Tilden, 1974

_____(E Cascades, Ochocos, Aldrichs, Blues, Wallowas, Columbia Basin) *columbia* (Skinner, 1917)

_____(SE deserts) *oro* (Scudder, 1876) Recorded: **Ha** (S), [**Lk** (E)], **Mal** (C & S)

Taxonomic notes: Subtle patterns of phenotypic variation exist across populations of *Glaucopsyche lygdamus* in Oregon. Males from the Siskiyous, north Coast Range and Willamette Valley are dusky blue above, with wide dark wing margins. Females are dark above, with or without a flush of blue scales near the wing bases. Adults in these populations match topotypical *Glaucopsyche lygdamus incognitus* (TL: Alum Rock Park, Santa Clara Co., California). Throughout the Cascades in Oregon, most adults of *G. lygdamus* are phenotypically intermediate between *G. l. incognitus* and *Glaucopsyche lygdamus columbia* (TL: Port Columbia [= Brewster], [Okanogan Co.], Washington). Males of *G. l. columbia* are slightly more lustrous above, and average slightly narrower dark wing margins, compared to *G. l. incognitus*. Females of *G. l. columbia* average bluer above than those of *G. l. incognitus*. Adults phenotypically similar to *G. l. columbia* occur throughout the Columbia Basin and Oregon's northeastern ranges, at least to Adams County, Idaho (specimens in OSAC). It has not been possible to relate every Cascadian population to either *G. l. incognitus* or *G. l. columbia*, since phenotypic differences between the two are so subtle, and individual variation in most Cascadian populations is considerable. Therefore, no attempt has been made herein to define the distributions of these two phenotypes by county.

Adults of *G. lygdamus* from Oregon's southeastern deserts (e.g., N of Alvord Desert, ca. 4200', Harney Co.) are brighter above than those from other populations in the state, and appear to represent *Glaucopsyche lygdamus oro* (TL: [Fairplay, Park Co.], Colorado). Males are bright lustrous blue above, with very narrow dark wing margins. Females may be entirely blue above, although the amount of dorsal blue coloration on females is variable. Adults of *G. lygdamus* from the south end of the Blue Mountains (e.g., Devine Canyon, Harney Co.; N of Beulah Reservoir, Malheur Co.) and in much of central and western Lake County (e.g., vic. Summer Lake; Warner Mts.) are phenotypically intermediate between *G. l. columbia/incognitus* and *G. l. oro*. Also see Skinner (1917), Tilden (1974a) and Langston (1969a).

<u>Biological notes</u>: *Glaucopsyche lygdamus* is common and widespread in Oregon, and occurs in every county, in a wide variety of habitats. Populations occur in xeric canyons in the Columbia Basin, on desert hillsides in southeastern Oregon, and *G. lygdamus* is fairly ubiquitous in montane areas, in mesic and xeric habitats. While *G. lygdamus* has not been found on the immediate coast in Oregon, records extend from about 400' (S Fork Coquille River, Coos Co.) to over 9000' (Steens Mt., Harney Co.). The single annual brood in Oregon flies from late March to mid-August, depending on elevation and seasonal conditions, but adults always fly in vernal settings. Males frequently visit mud and scat, and both sexes visit flowers.

In Oregon, suspected and confirmed larval foodplants of *G. lygdamus* include various species of *Lupinus*, *Lotus*, *Astragalus*, *Vicia*, *Lathyrus* and probably other legumes (see Pyle 2002: 238). In Washington, Jon Pelham (pers. comm. 2004) has recorded *Lupinus latifolius* ssp. *latifolius*, *L. arcticus* ssp. *subalpinus*, *L. sellulus* ssp. *sellulus* var. *lobbii*, *L. sericeus* ssp. *sericeus* var. *sericeus*, *L. s. s.* var. *flexuosus*, *L. sulphureus*, *Lotus crassifolius* var. *crassifolius*, *Vicia villosa* and *V. sativa* var. *nigra* as larval foodplants of *G. lygdamus*, and others are used elsewhere (e.g., Emmel et al. 1971: 241, Shapiro 1977d: 449, Ballmer & Pratt 1989a: 66-67, Scott 1992: 80-81, Graves & Shapiro 2003: 422). Early stages of Californian *G. l. incognitus* were described by Williams (1908), who reared them on *Lupinus*, and noted *Lotus glaber* and an *Astragalus* species as additional larval foodplants. Comstock & Dammers (1935b: 127-128) described and illustrated the full-grown larva and pupa of *G. l. australis* F. Grinnell, 1917 from southern California. Emmel et al. (1992: 64) figured a last-instar larva of *G. l. oro* from Colorado, feeding on *Oxytropis*, and Scott (1992: 81) briefly described immatures of *G. l. oro* from Colorado. Guppy & Shepard (2001: 232) figured a late-instar larva of *G. lygdamus* from British Columbia, feeding on *Hedysarum boreale*. Additional descriptions and/or figures of *G. lygdamus* immatures have been provided by various authors (e.g., W. H. Edwards 1897: [419], Bower 1911, Emmel & Emmel 1973: 75, Downey & Allyn 1973: 31, 1984: 11, 29, Ballmer & Pratt 1989a: 30, 50-51, 81). Larvae of *G. lygdamus* are frequently tended by ants (e.g., Tilden 1947, Harvey & Webb 1981, Pierce & Easteal 1986, Spomer & Hoback 1998), including *Formica neoclara* Emery, *Myrmecocystus semirufus* Emery and *Tapinoma sessile* (Say) in California (Ballmer & Pratt 1992b: 103). Also see Shields et al. (1970: 32), Breedlove & Ehrlich (1972), Dolinger et al. (1973), Dirig & Cryan (1991) and Carey (1994).

Philotiella leona **Hammond & McCorkle, 2000**

_____(Antelope Desert, E-central Cascades) Recorded: **Kl** (central), Expected: De?, Lk

Taxonomic notes: *Philotiella leona* (TL: US Hwy. 97 [nr. Sand Creek], Klamath Co., Oregon) was recently discovered and described (see Hammond & McCorkle 2000). While *P. leona* is abundantly distinct from all segregates of *Philotiella speciosa* (Hy. Edwards, 1877) with which it has been compared, its relationship to *Philotiella speciosa bohartorum* (Tilden, [1969]) (TL: Briceburg, Mariposa Co., California; see Tilden 1969) has not been investigated. Until *P. s. bohartorum* can be rediscovered and compared to *P. leona*, the latter is treated as a species-level taxon. Paratypes of *Philotiella speciosa septentrionalis* Austin, 1998 (TL: Fort Churchill Rd., 12.3 rd. mi. S (= E) of US Hwy. 50, 1341 m, Lyon Co., Nevada; see Austin 1998f: 557) recently examined at the McGuire Center for Lepidoptera, Gainesville, Florida, are superficially similar to *P. s. speciosa*, and are phenotypically quite different from *P. leona*. Also see Shields (1974, 1987) and Priestaf & Emmel (1998).

Biological notes: *Philotiella leona* was first discovered by Harold Rice in 1995, and was named after his wife, Leona Rice. These tiny blues fly from mid-June to late July, depending on seasonal conditions. To date, *P. leona* is only known from the general vicinity of its type locality. Further exploration is required to locate additional populations of this butterfly in Oregon (or California). In the ten years since *P. leona* was discovered, numerous series of adults have been sampled from its type locality, but more effort is needed to search for populations in other areas.

Philotiella leona occurs in close association with its larval foodplant, *Eriogonum spergulinum* var. *reddingianum*. I located a large population of *E. spergulinum* var. *reddingianum* halfway up the road to Drake Peak Lookout (NFD 019) in the Warner Mountains (ca. 7200', Lake Co.), on 16 July 2003. While no adults of *P. leona* were encountered on that date, this site should be searched again in the future for the possible presence of *P. leona*. David McCorkle recently reared *P. leona* (pers. comm. 2003), but details on its immature stages have not yet been published. Comstock & Dammers (1932d: 90-91) described the early stages of *P. speciosa* from California, and illustrated a late-instar larva and pupa. Dammers in Emmel & Emmel (1973: 72) subsequently illustrated a full-grown larva and pupa of *P. speciosa*, and a last-instar larva from California was described and figured by Ballmer & Pratt (1989a: 18, 28, 54-55, 72, 81). Also see Downey & Allyn (1973: 46).

Genus *Euphilotes* Mattoni, [1978]

The genus *Euphilotes* requires a special introduction. I conducted extensive studies on *Euphilotes* and their *Eriogonum* foodplants in the Pacific Northwest during 2002 and 2003 (see Warren 2003). Adult *Euphilotes* phenotypes were mapped, as they corresponded with larval foodplants. A great deal of complexity was revealed, both in patterns of larval foodplant use and adult *Euphilotes* morphology. Two *Euphilotes* segregates identified below, which feed on *Eriogonum heracleoides* and *E. marifolium*, apparently represent undescribed species, but are not formally described herein. Should further studies currently being conducted corroborate the arrangement herein, suggesting that these are distinct species-level entities, they will be formally described as such elsewhere. The taxonomic arrangement of *Euphilotes* presented herein mostly follows Warren (2003), but should be considered tentative. Most likely, additional ecologically and morphologically distinct populations of *Euphilotes* will be found in Oregon, possibly including a segregate of *E. pallescens* (Tilden & Downey, 1955) in the southeastern deserts, and future research will hopefully better define relationships among known populations. With data only from adult morphology and larval foodplants, the species-level status of some of the taxa delineated below remains somewhat speculative. Due to confusingly similar wing patterns displayed by many of the putative species in the *E. battoides* complex, a detailed molecular study will probably be necessary to build upon the taxonomic hypotheses presented herein. However, if only two species in this genus are acknowledged in Oregon, *E. enoptes* and *E. battoides* (e.g., Hinchliff 1994), a tremendous amount of biological complexity is obscured, and the species-level delineations are rather meaningless.

Frequently in Oregon and elsewhere, a member of the *Euphilotes enoptes* group flies in sympatry and synchrony with a superficially similar member of the *E. battoides* group. When this occurs, the two taxa are invariably associated with different *Eriogonum* larval foodplant species. *Euphilotes* adults must be carefully observed in the field to determine the *Eriogonum* species they are associated with, whenever multiple *Eriogonum* species are present, and larval foodplant specimens should always be sampled along with adults of *Euphilotes* (the plants often must be keyed in order to be determined). Male *Euphilotes* patrol among the flower heads of their *Eriogonum* foodplant species, and pay less attention to the flowers of sympatric *Eriogonum* species that do not serve as larval foodplants. However, males and females of most *Euphilotes* will at times seek nectar from the flowers of non-foodplant *Eriogonum* species. The best ways to document larval foodplant use are through observing oviposition events, and rearing immatures found on flower heads of various *Eriogonum* species. Larvae of *Euphilotes* species are facultatively myrmecophilous (e.g., Ballmer & Pratt 1992b), and the presence of ants on *Eriogonum* flower heads usually indicates the presence of larvae.

In some members of the *E. enoptes* group (e.g., *E. enoptes* at CSNM, Jackson Co.), several sympatric species of *Eriogonum* are apparently used as larval foodplants, although no members of the *E. battoides* group have yet been shown to use more than a single *Eriogonum* species as a larval foodplant at any given locality in Oregon (even though some populations might).

Males of most *Euphilotes* taxa may travel a considerable distance from their larval foodplants in search of mud, where they sometimes congregate in large numbers. In such situations, determining the identities of these males in absence of larval foodplant information can be difficult. Rarely, females also visit mud. Without detailed prior knowledge of what *Euphilotes* segregates in both species groups occur in any given area, *Euphilotes* adults found at mud sometimes cannot be reliably identified in the field, even when voucher specimens are sampled. The male genitalia of *Euphilotes* are easily extruded from the abdomen in freshly sampled material, with a pair of forceps, and can be examined in the field with the naked eye, or a small magnifying lens. Due to the strikingly different shapes of male valvae in the *E. enoptes* and *E. battoides* groups (see Ehrlich & Ehrlich 1961: 238, Dornfeld 1980: 104, Pratt & Emmel 1998: 232, Guppy & Shepard 2001: 229), determination of males to species-group in the field is always possible. Subtle differences in the valvae among taxa in the same species-group apparently exist (pers. obs., Paul Opler pers. comm. 2003), but I have not yet performed extensive genitalic preparations in the lab on samples from Oregon to verify this.

Information on *Euphilotes* taxa gleaned from the literature must be used with caution, due to confusion between similar species, the complex taxonomy of their *Eriogonum* foodplants, and the large number of museum specimens that are incorrectly determined to species-group (in these cases, male valvae usually have not been examined). Only populations and specimens I have personally studied are discussed below. Also see Barnes & McDunnough (1917), Williams (1918), Mattoni (1954, 1978, 1989), Langston (1964, 1965, 1969b, 1970, 1975b), Comstock & Henne (1965), Langston & Comstock (1966), Reveal (1969), Emmel & Emmel (1973), Shields (1973, 1975a, 1977), Arnold (1983b), Pratt (1987, 1988, 1994, 1999), Pratt & Ballmer (1987, 1993), Shields & Reveal (1988), Ballmer & Pratt (1989a), Austin (1998f), Pratt & Emmel (1998) and Davenport (2002).

***Euphilotes battoides* (Behr, 1867) GROUP**

***Euphilotes* [on *Eriogonum marifolium*]**
_____(C [& S] Cascades, above 6000') <u>Recorded</u>: **De** (W), Do (E)?, Lin (E), <u>Expected</u>: Ja (far E)?, Je (far W), Kl (NW, for confirmation), La (far E), Mar (far E)?

<u>Taxonomic and biological notes</u>: This *Euphilotes* segregate is found in close association with *Eriogonum marifolium*, its larval foodplant. The relationship of this segregate to typical *Euphilotes battoides* (Behr, 1867) (TL: nr. Mono Pass, 12,000', NW Inyo Co., California; see Emmel et al. 1998h: 102) is unclear. Some adults of this segregate, especially females, somewhat resemble adults of nominate *E. battoides*.

However, ventral spots on adults of the *E. marifolium*-feeding segregate are usually not square-shaped, as they often are on *E. battoides*, and may be fused into each other to form irregular dark blotches. Adults of the *E. marifolium*-feeding segregate average smaller in size than those of *E. battoides*, and males are much deeper blue above.

Some males and females of the *E. marifolium*-feeding segregate resemble dwarfed versions of *E. glaucon oregonensis*, a taxon that occurs at lower elevations to the east. The relationship of *E. marifolium*-feeders to *E. g. oregonensis* requires careful study throughout Klamath and Deschutes counties where *E. umbellatum* and *E. marifolium* overlap or approach each other's distributions. In Deschutes County, *E. glaucon* (a population phenotypically intermediate between *E. g. glaucon* and *E. g. oregonensis*, see p. 174) occurs in the immediate vicinity of the town of Sisters, in association with *E. umbellatum*, and adults fly mostly in early to mid-June. *Eriogonum marifolium*-feeding populations occur above these *E. glaucon* populations (ca. 15 air miles to the south) on the Tam McArthur Rim, where adults fly in July and August. However, adult phenotypes of the two *Euphilotes* segregates do not seem to intergrade in this region (various long series examined).

I first encountered the *E. marifolium*-feeding segregate at Dutchman Flat, 6450', Deschutes County, on 17 July 2002. Females were fairly numerous, although males were scarce and worn. Adults were found flying between *E. marifolium* plants growing on pumice flats. On 5 July 2003, I found adults in greater abundance, and in fresh condition, at the same and nearby sites. On that date, there were still patches of snow on the ground near where adult blues were flying. Since then (11-12 August 2004) I found this segregate to occur extensively in the Three Sisters Wilderness, on the Tam McArthur Rim, and on the east slope of Broken Top Mountain, up to almost 8000'. A single specimen of the *E. marifolium*-feeding segregate was found in museum collections examined, from "Hoodoo," [Hoodoo Butte], Linn County, 13 July 1970 (C. W. Nelson collection, OSAC).

This segregate may also occur on Mt. Thielsen, Douglas County, since the illustration of a male "*E. battoides oregonensis*" in Howe (1975: pl. 61, # 17) resembles the *E. marifolium*-feeding segregate, not *E. glaucon oregonensis*. All museum specimens of *Euphilotes* examined to date from "Crater Lake," Klamath County (TL of *E. g. oregonensis*) are of *E. g. oregonensis* (an *E. umbellatum*-feeder, see below). However, the *E. marifolium*-feeding segregate is likely to occur at high elevations in the Crater Lake area. Tilden & Huntzinger (1977: 186) mentioned *Euphilotes* adults from the slopes of Mt. Scott (Crater Lake National Park), from August, which most likely refer to the *E. marifolium*-feeding segregate. Further study in the Crater Lake area is required to clarify the taxonomic status of *Euphilotes* populations there. Reports of *E. g. oregonensis* using *E. marifolium* as a larval foodplant in Klamath County (Shields 1977: 44-45) are in error, as the plant at those localities is *E. umbellatum*. Populations of the *E. marifolium*-feeding segregate may also occur on Mt. McLoughlin, Jackson County. A population possibly representing the *E. marifolium*-feeding segregate is known from the high slopes of Mt. Shasta, Siskiyou County, California (Gordon Pratt pers. comm. 2002; also see Shields 1977: 42). Additionally, the *E. marifolium*-feeding segregate may possibly range as far south as the Mt. Lassen area of Shasta County, California (see Crabtree 1998: 85). Shields (1977: 42) reported adults of *Euphilotes g. intermedia* from *E. marifolium* at two Californian sites. It is unclear exactly which *Euphilotes* segregate these records represent, or if the plants were correctly determined.

Euphilotes glaucon **(W. H. Edwards, 1871), new status**

_____(foothills of NE Cascades, SE deserts and ranges) *glaucon* Recorded: **De**, **Ha**, [**Ja** (far SE)], **Je** (W), **Kl** (S), **Lk**, Expected: Ba?, Cr, Gr, Mal, Um?, Un?, Wal?, Wh?
_____(E-central Cascades, population in Warners is similar) *oregonensis* (Barnes & McDunnough, 1917) Recorded: [**De** (W)], [**Ja** (far SE)], **Kl** (N & C)
_____(W Siskiyous) nr. *intermedia* (Barnes & McDunnough, 1917) Recorded: Cu, [Ja (SW)?], **Jo**, Expected: Cos (S)?
_____(W Cascades, ca. 5500') Recorded: **La** (E), Expected: Do (E), Ja (far N)?, Lin (E)?
_____(Mt. Hood area) nr. *glaucon* Recorded: **Clk** (far NE), **HR** (S), Expected: Was (W)

Taxonomic and biological notes: To date, all *Euphilotes* populations that have been found in association with *Eriogonum umbellatum* in Oregon are members of the *E. battoides* group, although taxa in the *E. enoptes* group (see p. 184) are known to use *E. umbellatum* in parts of Nevada (e.g., G. Austin pers. comm. 2003), California (e.g., Pratt & Emmel 1998: 214) and elsewhere (e.g., Fisher 1981b: 217). All *E. umbellatum*-feeding populations of *Euphilotes* in Oregon appear to represent a single, geographically variable species. The use of the name *Euphilotes glaucon* for this taxon is tentative, and awaits formal verification that *Euphilotes* populations at the type locality of *E. glaucon* (TL: nr. Virginia City, Storey Co., Nevada; see Brown 1970b: 406-409 and Shields 1975a: 21) also use *E. umbellatum*. Personal communication with George Austin (2004) and Paul Opler (2004) indicates that *E. umbellatum* is probably the larval foodplant of *E. glaucon* at its type locality, but other *Eriogonum* species are present. Unfortunately, I have not yet determined the varieties of *E. umbellatum* used by various segregates of *E. glaucon* in Oregon, and it is thus far unknown to what extent geographic variation of *E. glaucon* phenotypes may parallel the use of specific varieties of *E. umbellatum* as larval foodplants. While the relationship of *E. glaucon* to typical *E. battoides* requires further study, the two taxa appear to be distinct entities in California, and Mattoni (1989: 175) noted that *E. glaucon* was likely a species-level taxon. In California, the two taxa reportedly use different larval foodplants (John Emmel pers. comm. 2004), and apparently occur in sympatry at some sites (e.g., Castle Peak, Nevada Co., California, see Pratt & Emmel 1998: 220; vic. Warren Creek, 9000'-9500', E of Tioga Pass, Mono Co., California, see Davenport 2004b: 28). Until evidence is presented that contradicts this treatment, *Euphilotes glaucon* is considered to be a species-level taxon.

In Oregon, *Euphilotes glaucon glaucon* mostly occurs southeast of the Cascades, at sites where *E. umbellatum* is abundant. Its overall distribution in far eastern and southeastern Oregon is undetermined (see p. 176). At lower elevations, *E. g. glaucon* flies mainly in early and mid-June (e.g., Millican, Deschutes Co.; Hwy. 20, ENE Glass Buttes, Lake Co., both 9 June 2003, ca. 4400'), although singletons may be found earlier (e.g., Kelley Creek Rd., Warner Mts., ca. 5800', 2 May 2004). I found a population of

Euphilotes glaucon associated with *E. umbellatum* along the east side of Green Ridge, Jefferson County (ca. 3200'), which was near the end of its flight on 19 May 2003. The small series of adults sampled there are most similar in phenotype to *E. g. glaucon* from further southeast, but have somewhat heavier black markings ventrally (also see Shields 1977: 44).

As noted by Langston (1975b: 325; also see Shields 1977: 44), *Euphilotes glaucon glaucon* intergrades into *Euphilotes glaucon oregonensis* (TL: Crater Lake, [Klamath Co.], Oregon; images of holotype examined) in south-central Oregon. Phenotypically intermediate populations occur at several sites along the eastern slope of the Cascades (e.g., Camp Sherman area, ca. 3000', Jefferson Co.; Sisters area, ca. 3200', Deschutes Co.; Keno area, ca. 4000', Klamath Co.; all pers. obs.). In these populations, adult phenotypes are unusually variable, and adults similar to *E. g. glaucon* and *E. g. oregonensis* are found flying together, with all types of intermediate forms, when examined in series. In addition, the small series of adults thus far examined from the Warner Mountains (Lake Co., 5000'-6000'), are essentially intermediate in phenotype between *E. g. glaucon* and *E. g. oregonensis* (also see also see Shields 1977: 36, 42, 44), and require further study.

Typical *Euphilotes glaucon oregonensis* occurs in the pumice flats and low hills of central Klamath County (e.g., Sand Creek area, ca. 4800'; south entrance to Crater Lake National Park), north to extreme southwestern Deschutes County (also see Shields 1977: 44). It occupies the "Sand Creek" distribution of taxa occurring in the shadow of Mt. Mazama's eruption (see Tilden 1963c). As with other *E. glaucon* populations, *E. g. oregonensis* is associated with *Eriogonum umbellatum.* Reports of *E. g. oregonensis* using *E. marifolium* as a larval foodplant (e.g., Shields 1977: 44-45) are in error, as the *Eriogonum* species at all reported localities is *E. umbellatum* (pers. obs.). Adults of *E. g. oregonensis* fly mostly from mid-June to mid-July. Males are dark blue above, usually with very wide dark wing margins. Below, *E. g. oregonensis* has a paler ground color than does *E. g. glaucon*, and spot size averages somewhat larger.

In southern Jackson County (e.g., CSNM area, ca. 5000'-6000'; Mt. Ashland, 6300'-7000'), adults of *E. glaucon* are phenotypically quite variable. Some adults resemble *E. g. glaucon*, occasional individuals resemble *E. g. oregonensis*, and other adults resemble *E. g.* nr. *intermedia* occurring further to the west (see below; also see Shields 1977: 42). Together with these more "typical" phenotypes, a wide range of intermediate phenotypes is seen in this area, when long series are examined. Nowhere else in Oregon have I seen such extreme intrapopulational variation in *E. glaucon*. I have not examined specimens of *E. glaucon* from anywhere between Dutchman's Peak (S-central Jackson Co.) and the Josephine County line, and information on phenotypic variation in that area would be of interest.

Populations of *E. glaucon* from Josephine (e.g., Little Grayback Mt.; Wimer Rd. SW of O'Brien; Bolan Mt.; Rd. 3836 off Eight Dollar Mt. Rd.) and Curry (Vulcan Lake; below Onion Camp) counties differ from those further east in being paler blue above, having males with narrower dark wing margins above, and in having significantly reduced spot size and a paler ground color below. In overall phenotype, adults from these populations are intermediate between *E. g. glaucon*/*oregonensis* blends and *Euphilotes glaucon intermedia* (TL: Shasta Co., California; series examined from Placer Co., California). Adults from Josephine and Curry counties differ from typical *E. g. intermedia* by having somewhat better-developed dark wing margins and darker blue males above, and in having slightly bolder spots below. The two taxa share the same pale ventral ground coloration. Herein, populations of *E. glaucon* in Josephine and Curry counties are called *Euphilotes glaucon* nr. *intermedia*. Records of *E. g.* nr. *intermedia* are mostly from late June to late July, and range from about 3300' (Wimer Rd.) to at least 4500' (Little Grayback Mt.). Adults of *E. g.* nr. *intermedia* are frequently confused with the phenotype of *E. enoptes* occurring in the same region, and when foodplant associations cannot be noted (e.g., most museum specimens or adults at mud), male genitalia must be examined in order to separate the two species.

Along the western slope of the Cascades, a unique population, apparently related to *E. g.* nr. *intermedia*, was found by Don and Paul Severns in Lane County (ca. 5500'). Like other populations of *E. glaucon*, this population uses *E. umbellatum* as a larval foodplant. Adults from this population average larger than those of *E. g.* nr. *intermedia*, and males are darker blue above, with somewhat wider dark wing margins. Below, adults of the Lane County segregate have very small discal spots (some spots are occasionally absent), and ground color is whitish, even paler than that of *E. g.* nr. *intermedia*. However, ventral hindwing aurorae are bold and well-developed on adults in Lane County, and contrast strongly with the otherwise mostly immaculate ventral surface. To date, adults of this segregate have been found only in July, and only one population has been located. With further exploration, other populations will undoubtedly be located in eastern Lane, eastern Douglas and possibly eastern Linn or extreme northern Jackson counties, at similar elevations. Phenotypically, this segregate is dramatically different from adults of *Eriogonum marifolium*-feeding populations (see discussion above, pp. 171-172) that occur at higher elevations to the east, along the spine of the Cascades.

A population of *Euphilotes glaucon* occurs at the north end of the Cascades in Oregon, at and above treeline on Mt. Hood (Clackamas and Hood River counties, ca. 6000') and nearby ridges (e.g., Lookout Mt., 6600'). These populations occur in association with a dwarfed variety of *E. umbellatum*, somewhat resembling *E. marifolium* (which does not grow in the Mt. Hood area), and adults are phenotypically most similar to *E. g. glaucon*. However, adults from the Mt. Hood area differ from *E. g. glaucon* in having paler blue males, wing fringes not as strongly checkered, and a somewhat darker ventral coloration (the specimen from Mt. Hood figured by Shields 1977: 35, #27 is an aberration, and is not typical of the population). Adults fly well into August on Mt. Hood, and probably begin to fly shortly after the snow has melted in their habitats, the timing of which is variable from year to year. Herein, this segregate of *E. glaucon* is called *Euphilotes glaucon* nr. *glaucon*. Similar populations of *E. glaucon* also occur in the vicinity of Mt. Adams in Yakima County, Washington (e.g., vic. Bird Meadows), and perhaps further north on the eastern slope of the Cascades Washington. Adults of *E. g.* nr. *glaucon* from the Mt. Hood area are considerably different in phenotype from the *E.*

marifolium-feeding *Euphilotes* segregate, which occupies similar high Cascadian habitats to the south. Series from Mt. Hood differ most dramatically from the *E. marifolium*-feeders in being paler below, averaging smaller ventral spots, and in having males that are much paler blue above, without dark scaling along the wing veins.

I have not studied *Euphilotes* on Steens Mountain (Harney Co.), and it is unknown which larval foodplants are used, or which *Euphilotes* segregates occur there. Adult phenotypes of most museum specimens from Steens Mountain suggest to me that *Euphilotes* populations there consist at least of *E. umbellatum*-feeding *E. glaucon* (especially those from near the summit), although a segregate feeding on *E. heracleoides* (see below) may also fly on the mountain (perhaps around Fish Lake). Both of these plants, in addition to many other *Eriogonum* species, occur on Steens Mountain (Mansfield 2000: 268-272). Careful field study is required to elucidate the identity of *Euphilotes* populations on Steens Mountain.

The overall distribution of *E. glaucon* in eastern Oregon is poorly known. *Euphilotes glaucon* has not yet been confirmed in Oregon from anywhere northeast of the Lake-Deschutes-Harney County line, but *E. umbellatum*-feeding populations potentially conspecific with *E. glaucon* occur in Montana (Steve Kohler pers. comm. 2002). Previous records of *E. glaucon* (e.g., Shields 1977: 36-37) from northeastern Oregon and Idaho are mostly or entirely of the *E. heracleoides*-feeding segregate (pers. obs.). However, it seems likely that *E. umbellatum*-feeding populations of *Euphilotes glaucon* will eventually be found throughout far eastern and northeastern Oregon, with further exploration. To date, the only *Euphilotes* taxa in the *E. battoides* group I have found in northeastern Oregon were associated with *E. heracleoides* (see below), but Shields (1977: 36) suggested that some populations in Grant and Wallowa counties may be associated with *E. umbellatum*. These populations, if on *E. umbellatum*, are likely to represent *E. glaucon*. Clearly, much more study of *E. glaucon* in eastern Oregon and elsewhere is needed.

***Euphilotes* [on *Eriogonum heracleoides*]**

_____(Columbia Basin, Ochocos) <u>Recorded</u>: **Cr** (N), Je (E), **Sh**, **Was**, Wh (S)
_____(Blues, Wallowas) <u>Recorded</u>: **Ba**, Gi (S), **Gr**, Ha (N), **Mal** (N), **Mo** (S), **Um**, **Un**, **Wal**, <u>Expected</u>: Wh (N)
_____(Pine Mt., Deschutes Co.) <u>Recorded</u>: **De**
_____(Warners, high elevations) <u>Recorded</u>: **Lk** (S)

<u>Taxonomic and biological notes</u>: To date, all *Euphilotes* populations that have been found in association with *Eriogonum heracleoides* (all varieties) in Oregon are members of the *Euphilotes battoides* group, although taxa in the *Euphilotes enoptes* group (see p. 184) are known to use *E. heracleoides* in parts of Idaho, Nevada, and possibly elsewhere. In Oregon, all known *Euphilotes* populations using *E. heracleoides* as the larval foodplant appear to be conspecific, but apparently represent a separate species, distinct from *E. umbellatum*-feeding populations of *Euphilotes glaucon.* Where this apparent species co-occurs or occurs in parapatry with *E. umbellatum*-feeding

populations of *E. glaucon* in Oregon, adults of *E. glaucon* tend to fly earlier than those of the *E. heracleoides*-feeders, and the *E. heracleoides*-feeders tend to have a paler ventral ground color. The universal distribution of the *Eriogonum heracleoides*-feeding species is unclear (see discussions below). Specimens examined from Montana (Steve Kohler collection, 2002), taken in association with *E. heracleoides* var. *heracleoides*, appear indistinguishable from those associated with the same plant from northeastern Oregon. Populations in parts of Idaho (e.g., Boise Co.) appear to be of the same taxon. Adults apparently representing this species in British Columbia (see Guppy & Shepard, 2001: 229-230) are reportedly associated with *E. heracleoides* (Norbert Kondla pers. comm. 2003), although long series of specimens from British Columbia have not yet been compared to those assembled from Oregon.

Eriogonum heracleoides-feeding populations of *Euphilotes* along the lower northeastern slope of the Cascades and in the Columbia Basin (e.g., Tygh Valley area, Wasco Co., 1500'-2400'; Deschutes River Canyon, Sherman Co., ca. 800'; vic. Warm Springs, Jefferson Co., ca. 1500') and Ochocos (Crook Co., vic. Hwy. 26, 4500'), are associated with *E. heracleoides* var. *angustifolium.* Adults in these populations are distinguished by their small size, fairly heavy ventral black markings against a nearly whitish ground color below, and brighter blue males, compared to those of *E. glaucon* and *E. heracleoides* var. *heracleoides*-feeding populations to the northeast. This segregate also occurs in the Columbia Basin and along the lower eastern slopes of the Cascades in Washington (Jon Pelham pers. comm. 2002, specimens examined in the Burke Museum, University of Washington, Seattle). *Euphilotes* adults associated with *E. h.* var. *angustifolium* fly from late April to late June, with most records from late May and early June at low elevations, and from mid-June in the Ochocos. An aberration of this segregate was figured by Shields (1977: 35, #28). Populations of *Euphilotes* in Washington using *Eriogonum douglasii* var. *douglasii* as a larval foodplant (e.g., Colockum Pass Rd., Kittitas Co., ca. 2600') are tentatively associated with the Columbia Basin segregate feeding on *E. h.* var. *angustifolium*, due to overall morphological similarity of adults. However, further study of these populations is required to clarify their taxonomic status. Populations using *E. douglasii* var. *douglasii* as a larval foodplant have not yet been confirmed from Oregon, but probably occur in the Columbia Basin.

Populations of *Euphilotes* in the Aldrich, Blue and Wallowa mountains associated with *E. heracleoides* var. *heracleoides* are widespread and numerous, and are by far the most frequently observed *Euphilotes* in northeastern Oregon. This segregate apparently occurs to the northeast at least to Montana (Steve Kohler pers. comm. 2002), and presumably occurs in parts of Idaho (e.g., Boise Co.). Adults of this segregate differ from those of the *E. h.* var. *angustifolium*-feeding populations in the Columbia Basin by averaging slightly larger, having a darker ventral ground color, and in having slightly darker blue males. Records of this segregate from Oregon extend from late May to early August, but most are from late June and early July. Most large populations of *E. h.* var. *heracleoides* in northeastern Oregon that I have surveyed support populations of this *Euphilotes* segregate. Areas with *E. h.* var. *heracleoides* on Steens Mountain, Harney County (e.g., Fish Lake area) should be surveyed for the possible presence of this segregate (also see discussion under *E. glaucon*, p. 176).

An interesting population of this species occurs near the summit of Pine Mountain, Deschutes County, around 6300'-6500', where adults fly in late June through mid-July. While this population is associated with *E. h.* var. *angustifolium*, adults are phenotypically unique. Adults average larger than those from the Columbia Basin feeding on *E. h.* var. *angustifolium*, and have larger and bolder ventral markings against a similar whitish background. Males from Pine Mountain usually have wider dark wing margins above than those from the Columbia Basin. These adults also average larger than those of *E. g. glaucon*, are paler blue above, and are whiter below. This population flies in sympatry or close parapatry with *E. g. glaucon*, which occurs at the north base of Pine Mountain, near Millican (see discussion on p. 173). Further study of *Euphilotes* populations in the Pine Mountain area is needed (also see *E. baueri*, below).

A population of this species, similar to the one on Pine Mountain, is found in association with *E. heracleoides* near the summit of Light Peak and nearby areas, in the Warner Mountains of Lake County. Similar populations probably extend south in the Warners into Modoc County, California. Adults here fly above 7500', from early July to early August. These adults differ from Pine Mountain adults mostly by averaging slightly smaller and having narrower dark wing margins above, on males. Further study of this population is needed to determine its taxonomic status. This segregate is narrowly sympatric or parapatric with populations of *E. glaucon* (phenotypically intermediate between *E. g. glaucon* and *E. g. oregonensis*, see discussion under *E. glaucon*, p. 174) that occur at lower elevations in the Warners, which are associated with *E. umbellatum*.

***Euphilotes baueri* (Shields, 1975)**

_____(SE deserts) Recorded: **Ha**, Mal (S), Expected: Lk (SE)
_____(Ochoco gap) Recorded: **Cr** (W), **De** (NE), Expected: Je, maybe Columbia Basin?

Taxonomic and biological notes: All populations of *Euphilotes* in Oregon that are known to use *Eriogonum ovalifolium* var. *ovalifolium* as the larval foodplant are tentatively considered to be conspecific with *Euphilotes baueri* (TL: W side Gilbert Pass, 6200', Inyo Co., California), mainly because of their foodplant association (see Pratt & Emmel 1998: 225). To date, *Euphilotes* populations associated with *E. o.* var. *ovalifolium* are known from two regions in Oregon, and populations in each of these areas are phenotypically distinct.

The *Euphilotes* segregate in the Alvord Desert of Harney County, associated with *E. o.* var. *ovalifolium*, flies from early May to early June. Adults are phenotypically similar to those of the recently described *Euphilotes battoides fusimaculata* Austin, 1998 (TL: Peavine Creek Campground, 2012 m, Toiyabe Mts., Nye Co., Nevada; see Austin 1998f: 551) and *Euphilotes baueri orientis* Austin, 1998 (TL: US Hwy. 93, 12.5 rd. mi. N Pioche, 1826 m, Bristol Mts., Lincoln Co., Nevada; see Austin 1998f: 550). Adults from the Alvord Desert are small and ventral maculation is variable, but some individuals are like *E. b. fusimaculata*, and some females have scattered blue overscaling above. Austin (1998f: 552) stated that the larval foodplant at the type locality of *E. b. fusimaculata* is *Eriogonum umbellatum*, but noted that some populations considered to be *E. b.*

fusimaculata (e.g., Garden Pass) were associated with *E. ovalifolium.* To complicate matters, a segregate of *E. baueri*, reportedly distinguishable from *E. b. fusimaculata*, occurs in sympatry with *E. b. fusimaculata* in parts of Nevada (G. Austin pers. comm. 2003), and the correct species-level placement of *E. b. fusimaculata* is unclear. Although *E. b. fusimaculata* was described as a trinomial of *E. battoides*, *E. battoides* has recently been used as a "catch-all" for various members of the *E. battoides* complex of uncertain taxonomic status (e.g., Austin 1998f, Pratt & Emmel 1998). Because of this, and the observation that some Nevadan populations of *E. glaucon* may also feed on *E. ovalifolium* (George Austin pers. comm. 2003), the taxonomic placement of the *E. ovalifolium*-feeding segregate in the Alvord Desert is uncertain, and no trinomial is associated with it.

I found *Euphilotes* populations associated with *E. ovalifolium* var. *ovalifolium* along both sides of the Crook – Deschutes County line, east of Redmond, in early June, 2003. Adults in these populations differ from those in the Alvord Desert, on average, by being larger and having heavier black markings below. However, due to their association with *E. o.* var. *ovalifolium*, in similar habitats, they seem ecologically equivalent to the populations in the Alvord Desert. Compared to parapatric and potentially sympatric populations of *E. glaucon* and *E. heracleoides*-feeders, males from Crook and Deschutes counties associated with *E. o.* var. *ovalifolium* average paler blue above, but show few other consistent differences, other than a slightly earlier adult flight time. Adults are phenotypically most similar to those of *E. g. glaucon*, and it is possible that they represent a segregate of that species associated with *E. ovalifolium*. However, a similar pattern is seen in members of the *E. battoides* complex in Montana that have been found using *E. ovalifolium* var. *ovalifolium*, *E. heracleoides* var. *heracleoides* and *E. umbellatum* as larval foodplants (Steve Kohler pers. comm. 2002). Extensive research on these *Euphilotes* segregates is required before their taxonomy can be settled. Populations in the *E. battoides* group occurring in the central Columbia Basin that fly in early May (e.g., vic. Richland, Benton Co., Washington; vic. Hermiston, Morrow Co., Oregon) have not been personally studied, and it is unknown which *Eriogonum* species they use for a larval foodplant, or with which *Euphilotes* segregate they should be associated.

***Euphilotes enoptes* (Boisduval, 1852) GROUP**

***Euphilotes enoptes* (Boisduval, 1852)**

_____(Warners, SE Cascades) *enoptes* <u>Recorded</u>: [**Ja** (SE)], Kl, **Lk**, <u>Expected</u>: De (S)
_____(Siskiyous) <u>Recorded</u>: Cu, Do (SW), **Ja**, **Jo**, <u>Expected</u>: Cos (S)
_____(W Cascades, low elevations) <u>Recorded</u>: **Clk**, Do, **La**, [**Mar** (E)], <u>Expected</u>: Mu?
_____(W Cascades, high elevations) <u>Recorded</u>: **La** (E), **Lin** (E), [**Mar** (E)], <u>Expected</u>: Do (far E)
_____(N Coast Range) nr. *bayensis* (Langston, 1964) <u>Recorded</u>: **Po**, Ya

<u>Taxonomic and biological notes</u>: In contrast to the *Euphilotes battoides* group of species, geographic variation in adult phenotypes among members of the *E. enoptes* group in Oregon does not seem to directly parallel patterns of larval foodplant use. In

Oregon, *Euphilotes enoptes* occurs in most areas where *Eriogonum nudum* grows in abundance. However, some populations of *E. enoptes* in the state apparently also use *E. compositum* var. *compositum* and/or *E. elatum* as larval foodplants, although usually in combination with *E. nudum*. Observations by Erik Runquist and I in the CSNM of Jackson County indicate that while *E. nudum* is probably the preferred larval foodplant of *E. enoptes* in the area, populations also apparently use *E. compositum*, and adults are sometimes associated with blooming *E. elatum*. While bloom times of these *Eriogonum* species overlap, flowers of *E. elatum* persist the longest, and the latest *E. enoptes* records in Oregon are of adults associated with *E. elatum*. While I have not searched for larvae on *E. compositum* or *E. elatum* at the CSNM, it seems certain that at least *E. compositum* and probably also *E. elatum* are used as larval foodplants there, in addition to *E. nudum*. No consistent phenotypic differences have been observed between these different putative "host races" (sensu Pratt & Emmel 1998) of *E. enoptes* flying in sympatry, and following the results of Peterson (pers. comm. 2004, see p. 183), hidden chemical differences between them are not expected. Reports herein of *E. enoptes* using *E. compositum* as a larval foodplant (best seen at and near the CSNM) contrast with previous reports that *E. enoptes* is restricted to the *Eucycla* subgenus of *Eriogonum* (including *E. nudum* and *E. elatum*), and that it does not utilize any species in the *Oligogonum* subgenus of *Eriogonum* (which includes *E. compositum*). The use of *Oligogonum* species by members of the *E. enoptes* group had previously been reported only for *Euphilotes ancilla* (see Pratt & Emmel 1998: 213). Thus, our observations in the CSNM were unexpected. However, as stated above, most populations of *E. enoptes* elsewhere in Oregon occur in sole association with *Eriogonum nudum*, and apparently use all color forms and varieties of *E. nudum* that occur in the state as larval foodplants.

Populations apparently conspecific with *E. enoptes* occur in western Nevada in sole association with *E. elatum*. These were named *Euphilotes enoptes aridorum* Austin 1998 (TL: Peavine Peak Rd. at US 395, 1646 m, Washoe Co., Nevada; see Austin 1998f: 554-555). Adults of *E. e. aridorum* are phenotypically similar to those of *E. e. enoptes*, but are somewhat larger, paler below, and males are less lustrous above. It is unclear at this time if any populations of *E. enoptes* in southern Oregon occur in strict and sole association with *E. elatum*. Adults of the typical *E. e. enoptes* phenotype from the Klamath Falls area, Klamath County, from late July and early August (e.g., 8 August 1938, S. Jewett, in OSAC) were most likely associated with *E. elatum*. However, spring-flying adults in that area are probably associated with *E. compositum*. Pending further study, the name *Euphilotes enoptes aridorum* is not applied to any populations of *E. enoptes* in Oregon.

Across Oregon, populations of *E. enoptes* display considerable phenotypic variation. Populations in Lake and Klamath counties represent *Euphilotes enoptes enoptes* (TL: Hwy. 70 between Gansner Bar and Queen Lily Campground, nr. Belden, N Fork Feather River Canyon, Plumas Co., California; see Emmel et al. 1998i: 15). Males of *E. e. enoptes* are dark blue with broad dark wing margins above, and both sexes frequently have a yellowish tint to the ventral ground color. Spots below are small and poorly developed. Females above are often nearly immaculate, and when dorsal hindwing aurorae are present, they are poorly developed. While *E. e. enoptes* is scarce in central and northern Klamath County (e.g., Gilchrist area), adults fly in great abundance at several sites in the Warner Mountains (e.g., Warner [= Bullard] Canyon). This segregate should eventually be found in south-central Deschutes County, where *E. nudum* grows. Records of *E. e. enoptes* in Oregon extend from early June to early August, depending on elevation and foodplant, and populations occur from 4400' to about 7500'.

Throughout the CSNM area, Jackson County, adults of *E. e. enoptes* intergrade phenotypically into the segregate of *E. enoptes* occupying the Siskiyous. Males at the CSNM average slightly paler blue above with narrower dark wing margins, compared to *E. e. enoptes*, and have a somewhat darker ground color to the ventral wing surfaces. Throughout western Jackson, Josephine, southern Douglas and Curry counties, males of *E. enoptes* average pale blue above with narrow marginal wing borders, and adults are grayish below, with well-developed spots, usually lacking a yellowish tint. Females are mostly like those of *E. e. enoptes* above, but average somewhat better developed hindwing aurorae. While these populations were previously mapped as *E. e. enoptes* by Hinchliff (1994: 100), they are phenotypically unlike *E. e. enoptes*, and adults resemble *E. e. bayensis* (see below) more closely than they do *E. e. enoptes*. In Oregon, populations of this segregate occur from near sea level (Rocky Point, reared by Dave McCorkle; Humbug Mt., Dana Ross, both Curry Co.), to at least 4000' (nr. Whetstone Butte on the Curry-Josephine County line, Dana Ross), usually in association with *Eriogonum nudum*. Records span from mid-April to July, depending on elevation, local larval foodplants and seasonal conditions.

Populations of *E. enoptes* at low elevations along the western slope of the Cascades (e.g., Lane Co., 880'; Clackamas River Canyon, Clackamas Co., 940') are phenotypically similar to those in the Siskiyous, except that adults average smaller, and generally have a slight yellowish tint to the ventral ground color (like that seen in typical *E. e. enoptes*). These populations are locally distributed, and occur on isolated rocky outcroppings where *E. nudum* grows. Adults fly from late May through mid-July, depending on seasonal conditions. Populations of *E. enoptes* from between about 2000' and 3500' (e.g., vic. Breitenbush Hot Springs, ca. 2300', Marion Co.) appear phenotypically intermediate between low- and high-elevation Cascadian populations.

At elevations above about 4000' on the western slope of the Cascades (e.g., Echo Mt. and Tombstone Pass summit area, Hwy. 20, Linn Co., 4400' to 5000'; southern Lane Co., 5400'), populations of *E. enoptes* are phenotypically distinct. Adults in this area average larger than those from other segregates of *E. enoptes* in Oregon. Above, males are more lustrous, and have narrower dark wing margins than those from lower elevations in the western Cascades. Below, both sexes have a whitish ground color, with small spots. On Echo Mountain, between 4500' and 5200', Linn County, *E. enoptes* occurs on rocky slopes with *E. nudum* only, as well as on slopes primarily dominated by *E. compositum* var. *compositum*, containing just a few *E. nudum* plants. It is suspected that this population uses both *E. nudum* and *E. compositum* as larval foodplants. However, this has not been confirmed by rearings, and adults here associated with *E. compositum* may actually be *E. nudum*-feeders. Adults in these populations fly from mid-June through July, depending on elevation and seasonal conditions.

Populations of *E. enoptes* in the northern Coast Range (Rickreall Ridge, 900'-2400', Polk Co.) are highly localized and phenotypically unique. Males have virtually no dark wing margins above, and are light, hazy blue in color. Ventrally, both sexes display a unique spotting pattern, and the ground color has a yellowish tint (when fresh). In all respects, this segregate is similar to *Euphilotes enoptes bayensis* (TL: China Camp, nr. Point San Pedro, Marin Co., California; topotypical material examined). However, because of the large disjunction in the distributions of typical *E. e. bayensis* and the north Coast Range segregate, between which phenotypically different populations of *E. enoptes* occur (see above), these populations are herein called *Euphilotes enoptes* nr. *bayensis*. While *E. nudum* and *E. compositum* var. *compositum* both grow on Rickreall Ridge, adults of *E. enoptes* there fly in strict association with *E. nudum*, and were not observed near *E. compositum*. Repeated search for this segregate among *E. nudum* plants on Mary's Peak, Benton County, has been unsuccessful. Records of this segregate from Yamhill County are based on two female specimens from "McMinnville, 12 June 1932, K. Fender" (OSAC) and four males from the same locality (date not given, in Los Angeles County Museum) cited by Shields (1977: 28). Presumably, the population from which these specimens were sampled has long since been extirpated, but further search in Yamhill County for other populations of *E. enoptes* is needed. Records of *E. e.* nr. *bayensis* are from early June to late July.

All reports of *E. enoptes* from Washington (e.g., Shields 1977: 21, Pratt & Emmel 1998: 209) refer to *E. columbiae* (see below), although *E. enoptes* should be sought in the Cascades of southwestern Washington, wherever *E. nudum* grows. Langston & Comstock (1966) reported life history details of *E. e. bayensis* from California, and Comstock & Henne (1965; also see Dammers in Emmel & Emmel 1973: 71) described and illustrated a full-grown larva and pupa of *E. e. dammersi* (J. A. Comstock & Henne, 1933) from southern California. Also see Opler (1968).

Euphilotes columbiae **(Mattoni, 1954), new status**
_____(Columbia and Snake River basins) *columbiae* <u>Recorded</u>: Ba, Gi, **HR**, Je (N), Mal (N), Mo, **Sh**, Um, **Wal**, **Was**, **Wh**, <u>Expected</u>: Gr, Un (requires confirmation)
_____(Ochocos, upper Deschutes River drainage) <u>Recorded</u>: **Cr** (N), **Je** (S), <u>Expected</u>: De (N)

<u>Taxonomic and biological notes</u>: *Euphilotes columbiae* (TL: Columbia River nr. Brewster, Okanogan Co., Washington) was formerly considered to be conspecific with *E. enoptes* (e.g., Dornfeld 1980: 105, Hinchliff 1994: 100) or *E. ancilla* (e.g., Pratt & Emmel 1998: 213-214). *Euphilotes columbiae* is associated with *Eriogonum compositum* var. *compositum* and *E. c.* var. *leianthum*, wherever they grow in abundance in the Columbia and lower Snake River basins. Larvae also feed on *E. elatum* at some sites, either exclusively (e.g., various sites in Kittitas Co., Washington, *fide* Jon Pelham and Merrill Peterson; potentially also in Oregon), or in combination with *E. compositum* (e.g., W side of Green Ridge and W end Lake Billy Chinook, Jefferson Co.; several sites in NE Hood River Co.; many sites in Washington). Adults from populations of *E. columbiae* using *E. compositum* as the larval foodplant fly from mid-April to late June, and adults

from populations using *E. elatum* fly from late June through mid-August. Depending on locality and annual weather patterns, flight times of sympatric host races of *E. columbiae* may or may not overlap. Despite the later flight time of exclusively *E. elatum*-feeding populations, no consistent differences in adult phenotype or allozyme composition (Merrill Peterson pers. comm. 2004) have been observed between these host races.

Patterns of foodplant use in *Euphilotes columbiae* suggest a close relationship with the *Euphilotes enoptes*. However, all populations of *E. columbiae*, even those occurring within 30 air miles of *E. enoptes* populations (e.g.; Clackamas Co. *E. enoptes* vs. Skamania Co., WA *E. columbiae*; Linn Co. *E. enoptes* vs. Jefferson Co. *E. columbiae*), are phenotypically distinguishable from *E. enoptes*, and there is no indication that the two taxa intergrade at all, anywhere. The adult morphology of *E. columbiae* is distinctive. Adults of *E. columbiae* average larger, males are more lustrous blue above, both sexes have more angular, less rounded wings, and better developed, more prominent hindwing aurorae on females, when compared to nearby populations of *E. enoptes*.

Euphilotes columbiae is remarkably consistent in phenotype across its known range, which includes essentially all of the Columbia Basin in northern Oregon and eastern Washington. Populations of *E. columbiae* along the Snake River (e.g., nr. Huntington, Baker Co.) are phenotypically identical to those in the Columbia River Basin and Gorge (e.g., Wasco and Hood River counties, also Skamania and Klickitat counties, Washington). The only geographic variation seen in *E. columbiae* is among populations at the southwestern edge of its range, in Crook County (e.g., Ochoco Mts., Hwy. 26 ca. 4500'), and to a lesser extent in southern Jefferson County (e.g., E side of Green Ridge and W end of Lake Billy Chinook, ca. 1700'-2300'). Adults from these populations have slightly bolder ventral spots, compared to other populations of *E. columbiae*. In addition, males average darker blue above, with slightly wider dark wing margins, compared to populations of *E. columbiae* elsewhere. This subtle difference does not seem to suggest intergradation with any nearby *Euphilotes* populations (*E. enoptes* in Linn Co., *E. enoptes* in Klamath Co., *E. ancilla* in Harney Co.), although the territory between the Ochoco Mountains, and Burns, Harney County (see next species), remains largely unexplored for *Euphilotes*. In addition, the areas between Burns and the Snake River have not been extensively explored for *Euphilotes*. Shields (1977: 29) reported *E. columbiae* from Malheur County (Simmons Gulch at Malheur River, 23 rd. mi. E Juntura), associated with *E. compositum*. Simmons Gulch and Burns are less than 60 air miles apart. Further investigation in these areas will be necessary to elucidate the relationship between *E. columbiae* and *E. ancilla*. However, due to dramatic phenotypic differences between the two taxa in Oregon (see below), and very different patterns of larval foodplant use, they are herein considered to be separate species.

I have not seen any phenotypically intermediate forms between *E. columbiae* and *E. ancilla* from the northern Blue Mountains (*contra* Shields 1977: 17), and reports of *E. enoptes* by Shields (1977: 21) from Gilliam County (4.5 mi. S Condon, 2500'), and Klickitat County, Washington, are undoubtedly of *E. columbiae*, taken in association with *E. compositum* and/or *E. elatum*. Likewise, specimens reported by Shields (1977: 28) as *E. columbiae* from Santiam Pass, Linn County, and McMinnville, Yamhill County, undoubtedly refer to *E. nudum*-associated populations of *E. enoptes* (see p. 182). The eastern distributional limits of *E. columbiae* remain undetermined. The easternmost specimens I have examined are from the mouth of the Wildhorse River, Adams County, Idaho (12 May 1959, Stan Jewett, 2 males, 3 females, OSAC). Fieldwork in northern Nevada, Idaho and Utah will be needed to determine the relationships between *E. columbiae* and other members of the *E. ancilla* group in the Rocky Mountains.

***Euphilotes ancilla* (Barnes & McDunnough, 1918)**
_____(SE deserts and ranges) <u>Recorded</u>: **Ha**, <u>Expected</u>: Cr (S), De (far E), Lk (E), Mal

<u>Taxonomic and biological notes</u>: Shields (1977: 13-14, 17) considered *Euphilotes* populations in northern Harney County to be "*E. enoptes ancilla*." This segregate has thus far been found in Oregon only in association with *Eriogonum sphaerocephalum* var. *sphaerocephalum* (pers obs.). These adults are unique among members of the *E. enoptes* complex in Oregon, in that ventral wing spots are large and bold, and females have prominent, very well-developed hindwing aurorae. Adults resemble boldly-spotted members of the *E. battoides* group, and are superficially quite unlike other members of the *E. enoptes* group in Oregon. However, male genitalia clearly place them in the *E. enoptes* complex. Use of the species name *Euphilotes ancilla* for these populations is tentative, and awaits formal documentation of larval foodplants and elaboration of adult phenotypes at the type locality of *E. ancilla* (TL: Eureka, [Juab Co.], Utah). However, Shields (1977: 14-15) reported *E. ancilla* in association with *E. heracleoides* var. *heracleoides* in Bear Lake County, Idaho, and Elko County, Nevada.

Long series of the recently described *Euphilotes ancilla gilvatunica* (TL: Nevada State Rte. 341, 3.3 rd. mi. E of US Hwy. 395, 1525 m, Washoe Co., Nevada; see Austin 1998f: 553) have not yet been carefully compared to the segregate in Harney County. However, *E. a. gilvatunica* reportedly uses *Eriogonum umbellatum* and *E. lobbii* (Shields 1977: 15, G. Austin pers. comm. 2003) as larval foodplants, and spot size below in the specimens of *E. a. gilvatunica* so far examined (about 30 individuals) averages considerably smaller than on adults from Harney County. In addition, no member of the *Euphilotes* fauna in Nevada has yet been found in association with *E. sphaerocephalum* (G. Austin pers. comm. 2003). For now, the name *Euphilotes ancilla gilvatunica* is not applied to any population in Oregon. Until careful study of segregates across Utah, Idaho and northern Nevada can be completed, taxonomy for these blues will be tentative, and the relationships between these populations will remain mostly unknown.

Before 2003, this segregate of *E. ancilla* was known from just a few specimens, all from Harney County, collected in late May and early July (Burns, 4400', C. R. Crowe; Catlow Valley, S. Jewett; SH 206, 0.5 mi. S Frenchglenn, J. Hinchliff; ca. 30 mi. W Burns [on Hwy. 20], S. Jewett, all OSAC; top of Home Creek, Steens Mt., 2 July 1999, Dana Ross; also see Shields 1977: 13-14). Many of these specimens, whose genitalia had not previously been examined, were mixed with individuals of the *E. battoides* complex in the OSAC collection. The identity of a single female specimen (in OSAC) sampled by Stanley Jewett about 30 miles west of Burns (29 May 1930, presumably along Hwy. 20), had been unclear, until a visit to that site on 10 June 2003 confirmed the existence of a population of *E. ancilla* there associated with *E. sphaerocephalum*. On 9 June 2003, I located large populations of *E. ancilla* within the city limits of Hines and Burns (these populations were previously sampled by C. R. Crowe in 1964). Between 16:30 and 19:45 hrs., hundreds of *Euphilotes* adults were observed among dense stands of *E. sphaerocephalum* var. *sphaerocephalum*. *Eriogonum strictum* was also present at the site in Burns, but was ignored by *Euphilotes* adults. After about 19:15 hrs., adults were mostly perched on tips of *E. sphaerocephalum* plants, apparently for the night.

The overall distribution of this segregate is unclear. As noted above, it remains unknown from Nevada and is also unknown from Idaho. Populations of *E. sphaerocephalum* var. *sphaerocephalum* in Deschutes County (E of Sisters on Hwy. 20; E of Redmond on Hwy. 26) and Jefferson County (ca. 7 mi. SW of Madras; vic. Pelton Dam) that I have searched, to date, have not been found to support *Euphilotes* populations. Likewise, the whitish-flowered variety of *E. sphaerocephalum* in the Siskiyous, *E. s.* var. *halimioides* (e.g., CSNM area, Jackson Co.; adjacent parts of SW Klamath Co.) has not been found to support any species of blue (pers obs., also Erik Runquist pers. comm. 2003).

***Plebejus idas* (Linnaeus, 1761)**
_____(Ochocos, Aldrichs, Blues, Wallowas, top of Steens) nr. *atrapraetextus* Field, 1939
<u>Recorded</u>: Ba, Cr, Gr, Ha, Um, **Un**, **Wal**, Wh, <u>Expected</u>: Je (far SE), Mal (N), Mo (S)

<u>Taxonomic notes</u>: Application of the name *Plebejus idas* (TL: [Sweden]; see ICZN 1954a: 14) to blue populations in North America should be considered tentative. This species was formerly called *P. argyrognomon* Bergsträsser, [1779] (e.g., Dornfeld 1980: 98-99, Miller & Brown 1981: 121-122), but Higgins (1986: 145-146) noted that North American populations are not that taxon, and were best called *P. idas*. Until detailed studies on North American and Eurasian populations called *P. idas* can be conducted, application of the name *P. idas* to populations in northeastern Oregon is somewhat speculative. While the name *P. idas* was once broadly applied to *Plebejus* populations in Oregon (e.g., Hinchliff 1994: 103), Guppy & Shepard (2001: 235-237) treated *P. anna* and *P. idas* as separate species, an arrangement followed herein. This arrangement restricts *P. idas* in Oregon to the northeastern ranges, from the Ochocos to the Wallowas, and on the top of Steens Mountain. To date, I have not studied the genitalia of *Plebejus* populations from Oregon in great detail, and conclusions drawn herein are based mostly on external adult phenotypes (see introduction) and ecological data (but see Nabokov 1949).

Plebejus idas in northeastern Oregon has been poorly understood. Shepard (1964) and Downey (1975: 340) considered these populations to be *Plebejus idas atrapraetextus* Field, 1939 (TL: Priest River, [Bonner Co.], Idaho). Dornfeld (1980: 98-99, pl. 209, figs. 3a-d) considered them to be *Plebejus melissa*, based on his comparison of specimens from Oregon with topotypical *P. i. atrapraetextus*, and a small number of male genitalia dissections (in OSAC). Morphological and ecological characteristics of populations in northeastern Oregon suggest that they are not *P. melissa*, even though some adults are superficially similar to that taxon. However, Dornfeld (1980: 98-99) was correct that most adults from northeastern Oregon are somewhat different from topotypical *P. i. atrapraetextus* specimens in OSAC (also see Field 1939). Typical males of *P. i. atrapraetextus* have broad dark wing margins above, while wing borders on males from northeastern Oregon are usually narrower.

Populations herein called *P. idas* occur in the Ochocos, Aldrichs, Blues and Wallowas, usually above 4000' (these were mostly mapped as *P. melissa* by Hinchliff 1994: 104). Across this range, no consistent geographic variation has been observed, although adults in most populations are individually variable. Some adults in this area are phenotypically similar to *Plebejus idas longinus* (Nabokov, 1949) (TL: Jackson Hole, [Teton Co.], Wyoming), but tend to have bolder dark spots and aurorae below. Some males resemble *P. i. atrapraetextus*, with wide dark wing margins above, and many adults are phenotypically intermediate between *P. i. longinus* and *P. i. atrapraetextus*. On average, blue-purple coloration on males from northeastern Oregon averages darker than on *P. i. longinus* from Wyoming. Dark wing margins above average slightly wider on males from Oregon than those from Wyoming. As with typical *P. i. longinus*, many adults from northeastern Oregon closely resemble *P. melissa*, but males of *P. idas* in Oregon average deeper blue above with more pointed wings, and usually have somewhat wider dark wing margins above. Females of *P. idas* from northeastern Oregon can be superficially similar to *P. melissa*, but usually have narrower and less brilliant orange submarginal aurorae, above and below. Adults of *P. idas* from northeastern Oregon are like *P. i. atrapraetextus* in having bold ventral markings, and some males with wide dark wing margins above. Herein, all populations of *P. idas* in northeastern Oregon are called *Plebejus idas* nr. *atrapraetextus*, until populations throughout the Rocky Mountain region can be studied in greater detail.

Adults from the Blue Mountains of northern Harney County (e.g., King Mt., ca. 6600') are apparently of *P. i.* nr. *atrapraetextus*, as are adults examined from near the summit of Steens Mountain (ca. 9500'), in southern Harney County. However, adults examined from lower elevations in Harney County (e.g., Frenchglenn; Catlow Valley) are clearly of *P. melissa*. Adults I have examined from Malheur County (e.g., Juntura area, in OSAC) are of *P. melissa*, but *P. idas* may occur high in the Trout Creek Mountains. A population of *P. i.* nr. *atrapraetextus* occurs in the Silver City area of Owyhee County, Idaho (Paul Hammond pers. comm. 2003).

A phenotypically perplexing population of *Plebejus* occurs on the Sheldon Antelope Range of Washoe County, Nevada, just south of the Oregon border. The series I examined of these was sampled by George Austin (deposited at the McGuire Center for Lepidoptera, Gainesville, Florida), and consists mostly of males. Above, males are similar to *P. melissa* in size, wing shape, and coloration. However, on the underside, aurorae are highly reduced, sometimes almost absent on the ventral forewing, and lunules are pale orange to yellowish, unlike the deep orange aurorae on *P. melissa*. In addition, the metallic spots capping the hindwing aurorae are larger and more lustrous (greenish) on the males from Sheldon, compared to those of *P. melissa*. It could be that these populations are related to *P. idas*, or more likely, they may be related to *Plebejus melissa fridayi* F. H. Chermock, 1945 (TL: Mammouth [*sic*], [Mono Co.], California), a taxon that is probably a species-level entity (Paul Opler pers. comm. 2002; also see Davenport 2004b: 32). To date, I have not examined any specimens of this segregate from Oregon, although it is likely to occur in southern Lake County, at least. I have not examined the specimen upon which the eastern Lake County record of *P. idas* in Hinchliff (1994: 103) is based (Hart Mt. Antelope Refuge on rd. S of Harts, 2 August 1963, Newcomer), and for now, it cannot be assigned to any particular species.

Biological notes: In Oregon, *Plebejus idas* is found in montane and transition zone habitats from the Ochocos, northeast to the Wallowa Mountains. Adults tend to be scarce at most sites, but various researchers have sampled long series from the Ochoco Mountains. Adults are often found in dry meadows and along roadsides in coniferous forests. In Oregon, records of *P. idas* range from about 3800' (Horse Creek, Wallowa Co.), to over 8000' (Ice Lake, Wallowa Co.). A single annual brood of *P. idas* flies in Oregon, from late June through late August. Males patrol through sunny areas, and visit mud. Both sexes feed at a variety of flowers.

No details on larval foodplants of *P. idas* in Oregon are available, although Jon Pelham (pers. comm. 2004) reported *Astragalus canadensis* var. *mortonii* as a foodplant of *P. i. atrapraetextus* in northeastern Washington. However, Guppy & Shepard (2001: 236) said that *P. idas* larvae, presumably in British Columbia, feed only on ericaceous plants (e.g., *Vaccinium*). Guppy & Shepard (2001: 235) figured a late-instar larva of *P. idas* from British Columbia.

Plebejus anna **(W. H. Edwards, 1861)**
_____(Cascades, Siskiyous) *ricei* Cross, 1937 Recorded: Clk (E), **De**, Do (E), HR, **Ja**, Je (W), Jo, **Kl**, **La** (E), **Lin** (E), Mar (E), Mu (E), Was (W), Expected: Cos (S)?, Cu
_____(Warners) Recorded: [De (S-central)], [Kl (E)], **Lk**

Taxonomic notes: Guppy & Shepard (2001: 235-237) treated *Plebejus anna* as a species separate from *P. idas*, and described variation among both taxa in British Columbia. In Oregon, populations of *P. anna* in the Cascades and Siskiyous represent *Plebejus anna ricei* (TL: Big Cultus Lake, [Deschutes Co.], Oregon), named for Harold Rice (see Cross 1937: 88). Adults in these populations are highly variable in the development of ventral spotting. Some individuals have a "complete" set of ventral spots and complete hindwing aurorae, while others are nearly immaculate below, lacking most spots and aurorae. At many sites, both of these forms, and various intermediates, fly in sympatry. In general, females of *P. a. ricei* have poorly developed submarginal aurorae above, and on many females, aurorae are absent. Adults from northern Klamath (Gilchrist) and south-central Deschutes (Paulina Lake, in OSAC) counties average more strongly maculated below than those from other Cascadian populations, perhaps representing influence from populations in Lake County. All known specimens of *P. a. ricei* reported from Crook County (e.g., Ochoco State Park, 12 July 1968; Little Hay Creek, 4200', various dates; Marks Creek at Viewpoint Rd., 29 July 1974; see Hinchliff

1994: 103; also "Maupin [Wasco Co.], 19 May 1973," in OSAC) were labeled by Elmer Griepentrog. Since no other examples of *P. anna* are known from Crook County, mislabeling is suspected. Crook County has therefore been excluded from the range of *P. anna* in Oregon, until its occurrence there can be verified.

Populations of *P. anna* in the Siskiyous are perhaps more variable in adult phenotype than those in most of the Cascades. Occasional females have well-developed submarginal orange aurorae above (e.g., Pyle 2002: 245), resembling females of *Plebejus anna anna* (TL: Truckee, Nevada Co., California; see Brown 1970b: 366-367). However, other females in the region are more like *L. a. ricei*, with reduced orange aurorae above. Below, variation in spotting parallels that seen in Cascadian populations of *P. i. ricei*. Downey (1975: 338) suggested that *L. a. ricei* and *L. a. anna* intergrade between Mt. Shasta, California, and Crater Lake, Oregon. Shapiro et al. (1981: 113) and Shapiro (1986: 339) reported "intergrades" between *P. a. anna* and *P. a. ricei* in the Trinity Alps of Trinity County, and on Ball Mountain, Siskiyou County, California. Until populations of *P. anna* in southwestern Oregon can be studied in more detail, they are all herein considered to represent *Plebejus anna ricei*, although the presence of occasional individuals that are phenotypically similar to *P. a. anna* is acknowledged.

Adults of what is apparently *P. anna* in the Warner Mountains, and in western Lake County, are extraordinarily variable. Most adults are slightly smaller than those of Cascadian *P. a. ricei*, and wing shape averages slightly more angular. Below, individuals may be nearly immaculate, resembling some *P. a. ricei*, or may be strongly maculated, closely resembling *P. m. melissa* and *P. m. fridayi*. All types of intermediate forms are seen in the Warners, and some of the poorly maculated individuals have ventral spots that appear smudged. Females from the Warners sometimes have blue scaling above, concentrated near the wing bases. The taxonomic status of these populations is unclear. Details of male genitalia suggest they are related to the *P. idas* group (Nice & Shapiro 1999: 941, 945), even though wing phenotypes are somewhat intermediate between those of *P. a. ricei* and *P. melissa*. Conspecificity of these populations with *P. anna* seems likely, since *P. melissa* occurs in the lower canyons of the Warner Mountains, and a separate entity, possibly *P.* [*melissa*] *fridayi*, occurs east of the Warners in Washoe County, Nevada, and probably adjacent parts of Oregon (see discussion under *P. idas*, pp. 186-187). Clearly, much further study of these populations is needed. Also see Nabokov (1944a,b, 1949) and Fordyce et al. (2002).

<u>Biological notes</u>: In the Cascades, *Plebejus anna* is common in various types of meadows and along roadsides, but it is more locally distributed in the Siskiyous. Males visit mud, sometimes in large numbers. Both sexes visit a wide variety of flowers. The single annual brood of *P. anna* in Oregon flies from late June to early September, depending on elevation and seasonal conditions, although most records are from July. Records of *P. anna* from the Cascades and Siskiyous range from 1300' (nr. Wemme, Clackamas Co.), to over 7000' (Mt. Ashland, Jackson Co.). Populations in the Warner Mountains occur at higher elevations, from about 7000'-8200'. Adults in the Warners fly in July and August, and usually occur in rather xeric habitats, including dry hillsides and meadows.

Larval foodplants of *P. a. ricei* at Lost Prairie, Linn County, were noted to include *Lathyrus torreyi* and *Vicia ludoviciana* ssp. *ludoviciana* (reported as *Vicia exigua* by Shields et al. 1970: 32 and Downey 1975: 339). Jon Pelham (pers. comm. 2004) reported *Lupinus arcticus* ssp. *subalpinus* as a probable larval foodplant of *P. anna* in Washington (based on ovipositions witnessed). Shapiro et al. (1981: 113) reported larval foodplants of *P. anna* in the Trinities of northern California to include *Lotus oblongifolius* var. *oblongifolius* (reported as *L. o.* var. *nevadensis*) and *Astragalus whitneyi* var. *siskiyouensis* (also see Ballmer & Pratt 1989a: 67 and Scott 1992: 82). No details on larval foodplants are available from the Warner Mountains. The last-instar larva of *P. anna* from California was described by Ballmer & Pratt (1989a: 30, 53-54), and larvae were noted to be facultatively myrmecophilous by Ballmer & Pratt (1992b).

***Plebejus melissa* (W. H. Edwards, 1873)**
_____(most of state E of Cascades, low elevations) Recorded: **Ba**, Cr, De, Gi, Gr, Ha, HR, Ja, **Je**, Jo, **Kl** (S), **Lk**, Mal, **Mo**, **Sh**, Um, Un, Wal, **Was**, Wh, Expected: Do (S)?

Taxonomic notes: Multivoltine populations of *Plebejus melissa* throughout eastern Oregon match what has usually been called *Plebejus melissa melissa* (TL: La Plata Peak, nr. Twin Lakes, Lake Co., Colorado; see Brown 1970b: 372). However, populations of nominotypical *P. melissa* are univoltine, occur at high-elevations, and are phenotypically somewhat different from multivoltine populations in Oregon (see Brown 1970b: 372-375). The historical range of low-elevation populations of *P. melissa* in Oregon, before widespread cultivation of *Medicago sativa* (alfalfa, see below), is unknown (see Nice et al. 2002). Apparently univoltine populations of *P. melissa* at Satus Pass, Klickitat County, Washington (2900’-3200’, and potentially in Oregon), are phenotypically like multivoltine populations found nearby, associated with *M. sativa*. The amount of dorsal blue scaling on females of *P. melissa* is variable, but spring-flying females average bluer than those of later generations. Much additional study on Pacific Northwestern populations of *P. melissa*, *P. anna* and *P. idas* will be required before the relationships within and between these taxa can be well understood, and unresolved taxonomic issues surrounding some populations can be settled. Also see Lane & Weller (1994), Nice & Shapiro (1999), Fordyce et al. (2002) and Graves & Shapiro (2003).

Biological notes: *Plebejus melissa* is found in disturbed and natural settings in Oregon, including open fields and roadside ditches at low elevations, and canyons and open meadows at higher elevations. Populations at lower elevations are bi- or trivoltine, with adults flying from early May to late June, and from July through September. Populations at higher elevations (e.g., Warner Canyon, Lake Co., ca. 5000’) may be univoltine, flying in late June through August (also see below). In Oregon, *P. melissa* flies from about 85’ (vic. The Dalles, Wasco Co.) to over 7400’ (Fish Lake, Steens Mt., Harney Co.), but most populations occur below 4500’. Males frequently visit mud, and both sexes feed at a wide variety of flowers.

Throughout eastern Oregon and elsewhere in western North America, populations of *P. melissa* frequently use *Medicago sativa* (alfalfa) as a larval foodplant, probably in addition to various native legumes. Jon Pelham (pers. comm. 2004) reported *Lotus nevadensis* var. *douglasii*, *Astragalus inflexus*, *A. lentiginosus* var. *lentiginosus*, *A. canadensis* var. *brevidens*, *A. purshii* var. *glareosus* and *Sphaerophysa salsula* as additional larval foodplants in Washington (also see Downey 1975: 341). Populations in eastern Oregon may also use *Glycyrrhiza lepidota* as a larval foodplant. Shapiro et al. (1981: 114) reported *P. melissa* from *Medicago sativa* at lower elevations, and from *Astragalus whitneyi* var. *siskiyouensis* at higher elevations in the Trinities of northern California (also see Ballmer & Pratt 1989a: 66-67). Other larval foodplants have been reported from elsewhere (Scott 1992: 82-84). A population of *P. melissa* at Satus Pass, Klickitat County, Washington, is apparently univoltine (Jon Pelham pers comm. 2003), and clearly specializes on *Lotus nevadensis* as a larval foodplant (pers. obs. 2004). While not confirmed, similar populations probably exist in association with *L. nevadensis* in Oregon, at least in Wasco and Jefferson counties.

William H. Edwards (1884) described the life history of *P. melissa* from Pueblo, Colorado. Comstock (1928b: 66) illustrated the egg of *P. melissa*, followed in greater detail by Downey & Allyn (1981: 22, 25). Comstock (1929b: 24) illustrated a late-instar larva and pupa of *P. melissa* from California, reared on *Glycyrrhiza lepidota*. Ballmer & Pratt (1989a: 30, 53-54, 71, 81) described and figured a full-grown larva of *P. melissa* from California, and Guppy & Shepard (2001: 238) figured a late-instar larva from California, being tended by *Formica* ants. Ballmer & Pratt (1992b) noted that larvae of *P. melissa* in California are facultatively myrmecophilous, and are tended by *Formica neogagates* Emery. Also see Maeki & Remington (1961a: 130) and Downey (1966).

***Plebejus saepiolus* (Boisduval, 1852)**

_____(E Oregon, Cascades, Warners, Siskiyous) *rufescens* (Boisduval, 1869) <u>Recorded</u>: **Ba**, Be, Clk (E), **Cr**, **Cu** (E), **De**, **Do**, **Gr**, Ha (see below), HR, **Ja**, **Je**, **Jo**, **Kl**, **La** (E), **Lin** (E), **Lk**, **Mal**, Mar, **Mo** (S), **Um**, **Un**, **Wal**, **Was**, **Wh**, <u>Expected</u>: Gi (SE), Mu (E)

_____(N coast) nr. *insulanus* Blackmore, 1920 <u>Recorded</u>: La, Li, <u>Expected</u>: Cls, Cos?, Do?, Ti

_____(S coast) *littoralis* J. Emmel, T. Emmel & Mattoon, 1998 <u>Recorded</u>: Cu, <u>Expected</u>: Cos?

<u>Taxonomic notes</u>: Previously, all populations of *Plebejus saepiolus* in Oregon, away from the coast, have been called *Plebejus saepiolus saepiolus* (e.g., Hinchliff 1994: 105). However, Emmel et al. (1998i: 14) changed the type locality of *P. saepiolus* to the central Californian coast (TL: Bear Valley, nr. Olema, Marin Co., California; see Emmel et al. 1998i: 14). Austin (1998i) reviewed populations of *P. saepiolus* in Nevada, and concluded that the name *Plebejus saepiolus rufescens* (TL: Gold Lake, Sierra Co., California; see Emmel et al. 1998i: 28) represents the widespread inland taxon formerly called *P. s. saepiolus* (e.g., Hinchliff 1994: 105). Emmel et al. (1998i: 103), however, treated *P. s. rufescens* as a synonym of *Plebejus saepiolus aehaja* (Behr, 1867) (TL: Tioga Pass, Mono Co., California; see Emmel et al. 1998h: 103), an arrangement followed by Pyle (2002: 246-247). My examination of series in OSAC and elsewhere from various populations of *P. saepiolus* from the Cascades and Sierra Nevada of

California suggests that *P. s. aehaja* and *P. s. rufescens* represent two different phenotypes, as explained by Austin (1998i: 819-820, 823-824). Pending further study of Californian populations, Austin's (1998i) conclusions are followed herein, and inland populations of *P. saepiolus* in Oregon are called *Plebejus saepiolus rufescens*. Three worn males of *P. saepiolus* in OSAC labeled from Corvallis, Benton County (see below), might also be referable to *P. s. rufescens*, but evaluation of their phenotype is difficult.

Very little geographic variation has been detected across populations of *P. s. rufescens* in Oregon, although adults in most populations are individually variable in size, intensity and hue of blue coloration in males, and in the development of ventral spots (also see Shapiro 1991a: 149). Some adults from southern Harney County (vic. Steens Mt.) are larger and paler than most *P. s. rufescens*, and have larger and bolder spots below. These resemble *Plebejus saepiolus maculosus* Austin, 1998 (TL: Snake Creek, Snake Range, 7200'-8300', White Pine Co., Nevada; see Austin 1998i: 820). However, as noted by Austin (1998i: 820), *P. s. rufescens* and *P. s. maculosus* appear to intergrade in the Humboldt River drainage of northern Nevada, and nearby areas. Since populations of *P. saepiolus* in adjacent parts of Nevada are considered to be phenotypically intermediate between the two taxa, and since adults in Harney County resembling *P. s. maculosus* fly together with adults resembling *P. s. rufescens* and intermediates, the name *Plebejus saepiolus maculosus* is not applied to populations in southern Harney County (although they could be called *P. s.* nr. *maculosus*). Guppy & Shepard (2001: 239) considered populations of *P. saepiolus* in northern Oregon to be of *Plebejus saepiolus amica* (W. H. Edwards, 1863) (TL: Fort Simpson, Northwest Territories; see Brown 1970b: 377). However, adults from Oregon average larger, better marked below, and males are deeper blue above than those of *P. s. amica*. Females of *P. s. amica* often have bluish scaling above, while females of *P. s. rufescens* essentially never do.

The few specimens of *P. saepiolus* that exist from Oregon's northern coast (e.g., Delake, 62', Lincoln Co., 31 May 1934; Rock Creek Meadows, Lane Co., 26 May to 10 June, 1986 and 1987, all in OSAC) are phenotypically similar to *Plebejus saepiolus insulanus* (TL: Victoria, British Columbia; see Kondla & Guppy 2002a), a name applied to them by Hinchliff (1994: 105). However, due to uncertainty over the application of that name (see Kondla & Guppy 2002a), these populations are herein called *Plebejus saepiolus* nr. *insulanus*. Adults of *P. s.* nr. *insulanus* are small and poorly marked below, and males are pale blue above. Coastal populations of *P. saepiolus* in Curry County (e.g., Cape Blanco; 2 mi. N Gold Beach) are similar, but apparently approach the phenotype of *Plebejus saepiolus littoralis* (TL: sand dunes at W end of Kellogg Rd., N end of Lake Earl, 2 rd. mi. W Fort Dick, 15', Del Norte Co., California; see Emmel et al. 1998c: 178-179). Adults of *P. s. littoralis* average larger than those of *P. s.* nr. *insulanus*, spots below are somewhat bolder, and males are somewhat darker blue above. Further study of coastal populations of *P. saepiolus* is needed to determine their overall distribution and taxonomic status. The figure of a "male" *P. saepiolus* in Pyle (2002: 240, lower right) is of a female, and the figure of a "female" *P. saepiolus* (p. 247, bottom right) is of a male.

<u>Biological notes</u>: Throughout the Siskiyous, Cascades, Warners and northeastern mountains, *Plebejus saepiolus* is a common species in mesic habitats, especially in wet

meadows and along creeks and rivers. Males visit mud, and both sexes visit a wide variety of flowers. Records of *P. saepiolus* in Oregon extend from sea level to over 9500' (Steens Mt., Harney Co.). Adults fly from mid-May through August, depending on elevation and seasonal conditions, in a single annual brood. Populations of *P. saepiolus* along the coast are very local. Records are from mid-May to mid-June. Adults of *P. s.* nr. *insulanus* have not been observed in recent years in Lincoln or Lane counties, and known populations there might have been extirpated. Records from Corvallis, Benton County, are from 2 June 1898, 4 June 1899 and 30 June 1912 (OSAC), and *P. saepiolus* has presumably been extirpated from there. There is not an extant population of *P. saepiolus* on Mary's Peak, *contra* Pyle (2002: 247). The single record of *P. saepiolus* from Clatsop County (see Hinchliff 1994: 105, Pyle 2002: 247) refers to a specimen labeled by Elmer Griepentrog, and mislabeling is suspected. Therefore, Clatsop County has been deleted from the distribution of *P. saepiolus*, until new records become known.

Larval foodplants of *P. saepiolus* in Oregon have not been reported, but presumably include various *Trifolium* species. In Washington, *P. saepiolus* uses *T. wormskioldii*, *T. longipes*, *T. repens*, *T. hybridum* and probably *T. thompsonii* as larval foodplants (Jon Pelham pers. comm. 2004). The ability of *P. saepiolus* to feed on non-native *Trifolium* species (e.g., *T. repens*, *T. hybridum*) has undoubtedly allowed it to expand into formerly unoccupied areas (Pyle 1981: 508, Graves & Shapiro 2003: 425). Comstock (1955a) described the egg and first-instar larva of *P. saepiolus* from southern California, where the larval foodplant was reported to be *T. wormskioldii* (as *Trifolium involulcratum*). Tom Emmel & J. Emmel (1963: 34) reported *Trifolium hybridum* as a larval foodplant of *P. saepiolus* in the Sierra Nevada of California, and other *Trifolium* species are used there and elsewhere (e.g., Emmel & Emmel 1962: 34, Shields et al. 1970: 32, Emmel et al. 1971: 240, Shapiro 1977d: 449, Ballmer & Pratt 1989a: 67, Scott 1992: 84-85). Ballmer & Pratt (1989a: 30, 55) described the last-instar larva of *P. saepiolus* from California. Guppy & Shepard (2001: 239) figured a late-instar larva from San Bernardino County, California. Full life history details from any single population of *P. saepiolus* have not been presented. Also see Downey (1966), Sharp & Parks (1973) and Downey & Allyn (1981: 25).

***Plebejus icarioides* (Boisduval, 1852)**

_____(Siskiyous and vic.) *icarioides* Recorded: **Ja**, Jo, Kl (SE), Expected: Cos (S)?, Cu

_____(Willamette Valley) *fenderi* Macy, 1931 Recorded: Be, La (N-central), Mar (W), Po, Ya, Expected: Clk (SW)?, Do (N-central)?, Li (E)?, Lin (W), Wan?

_____(Mt. Hebo, Tillamook Co.) nr. *fenderi* Recorded: Ti, Expected: Ya (far W)

_____(Mary's Peak, Benton Co.) Recorded: **Be**

_____(N Cascades, high elevations) Recorded: **Clk** (E), **De** (far NW), **HR** (S), **Je** (far W), **La** (NE), **Lin** (E), Mar (E), Mu (E), Was (far W)

_____(S Cascades, high elevations) Recorded: De (far SW), **Do** (far E), Kl (NW), **La** (SE), Expected: Ja (far NE)?

_____(E Cascades, eastward) *pembina* (W. H. Edwards, 1862) Recorded: **Ba**, Col (rare stray), **Cr**, **De** (E), Gi, **Gr**, **Ha**, **HR** (N), **Je**, **Kl** (SE), **Lk**, **Mal**, **Mo**, **Sh**, **Um**, **Un**, **Wal**, **Was**, **Wh**

Taxonomic notes: *Plebejus icarioides* shows considerable geographic variation across Oregon. Adults from the Siskiyous and far southern end of the Cascades (e.g., CSNM, Jackson Co.) are large, and males are bright blue above with narrow dark marginal borders. Below, ground color is usually tan, and spots may be small or well-developed, with or without white rims. Females of *P. icarioides* from this area are brown above, with or without blue overscaling. Since Emmel et al. (1998a: 834) did not list *Plebejus icarioides helios* (W. H. Edwards, 1871) (TL: Fawn Lodge, Trinity Co., California, see Brown 1970b: 392) in their list of butterflies from California, it is assumed that they considered it to be synonymous with *Plebejus icarioides icarioides* (TL: Hwy. 70 at Soda Creek, E branch of N Fork Feather River Canyon, 2500', Plumas Co., California; see Emmel et al. 1998i: 14). Note, however, that Shapiro (1981: 114) described adults from the Trinities of northern California as being more heavily marked below, on average, than adults from the Sierra Nevada. Further study of *P. icarioides* in northern California is needed to settle the taxonomic status of *P. i. helios* (but see Downey 1975: 344-345). Until then, populations in the Siskiyous and far southern Cascades of Oregon are herein called *Plebejus icarioides icarioides*. Most adults of *P. icarioides* from between Klamath Falls, Klamath County, and the CSNM, Jackson County, are phenotypically intermediate between *P. i. icarioides* and *P. i. pembina* (see below).

Populations of *P. icarioides* in the Willamette Valley represent *Plebejus icarioides fenderi* (TL: 6 mi. SE McMinnville, [Yamhill Co.], Oregon, see Macy 1931). Adults of *P. i. fenderi* are similar to those of *P. i. icarioides* in the development of ventral spotting, but the ventral ground color is considerably darker. Above, males and females of *P. i. fenderi* average consistently darker than those of *P. i. icarioides*. Males of *P. i. fenderi* have wider marginal wing borders above than those of *P. i. icarioides*, and females of *P. i. fenderi* usually lack blue overscaling above (but some females have a trace of blue scales above, near the wing bases). In general, adults of *P. i. fenderi* closely resemble those of *Plebejus icarioides pardalis* (Behr, 1867) (TL: Lake Chabot, Alameda Co., California; see Emmel et al. 1998h: 102), and some authors (e.g., Downey 1975: 345) consider *P. i. fenderi* to be a synonym of *P. i. pardalis*. However, the two taxa are disjunctly distributed. The population of *P. icarioides* on Mt. Hebo, Tillamook County, is phenotypically similar to *P. i. fenderi* (specimens in OSAC), but adults average slightly smaller, and females have better developed pale tornal markings above. Herein, the population on Mt. Hebo is called *Plebejus icarioides* nr. *fenderi*. Its presence on the part of Mt. Hebo in western Yamhill County requires verification, but seems likely.

Adults of *P. icarioides* from Mary's Peak, Benton County, average smaller than those of *P. i. fenderi*, and ventral ground color averages paler. Ventral spots are often heavily ringed with white on adults from Mary's Peak, and are frequently suppressed, sometimes appearing somewhat smeared. Females from Mary's Peak average paler above and below than those of *P. i. fenderi*, and sometimes have a trace of blue overscaling above, concentrated towards the bases of the wings. Occasional females from Mary's Peak are phenotypically similar to *P. i. fenderi*, but are usually smaller. Adults of *P. icarioides* from Mary's Peak phenotypically resemble those of *Plebejus icarioides blackmorei* Barnes & McDunnough, 1919 (TL: Goldstream, Vancouver Island, British Columbia) more closely than they do *P. i. icarioides* (*contra* Hinchliff 1994: 106). However, various morphological differences exist between adults from Mary's Peak and those of *P. i. blackmorei* (see Guppy & Shepard 2001: 240, pers. obs.), including dorsal and ventral coloration of both sexes. For now, no trinomial is associated with the population of *P. icarioides* on Mary's Peak.

Adults of *P. icarioides* in the northwestern Cascades, above about 3000' (e.g., Hwy. 20 vic. Tombstone Prairie, ca. 3600', Linn Co.; Mt. Hood, ca. 5000'-6000', Clackamas Co.), are somewhat similar to those from Mary's Peak, but spots below average better defined, females are paler above and below, and many females have blue overscaling above. Males from the northwestern Cascades average slightly paler blue above than those from Mary's Peak. These populations occur from northern Lane County, north to the Mt. Hood area. Guppy & Shepard (2001: 240) called these populations *Plebejus icarioides montis* Blackmore, 1923 (TL: Mt. McLean, nr. Lillooet, British Columbia), but adults from the northern Cascades of Oregon tend to be paler below than typical *P. i. montis*, and other morphological differences apparently exist. For now, no trinomial is associated with populations of *P. icarioides* in the northern Cascades of Oregon. On the northeastern slope of the Cascades, some populations of *P. icarioides* are phenotypically intermediate between the high-elevation segregate, and *P. i. pembina* to the east (e.g., Hoodoo Ski area, ca. 4800', Linn Co.; Camp Sherman, ca. 3000', Jefferson Co. [these mostly of the *P. i. pembina* phenotype], Rd. 48 ca. 3000', Wasco Co.; Neal Creek Canyon, ca. 1600', Hood River Co.).

Most adults of *P. icarioides* from high elevations in the southern Cascades are phenotypically different than those from further north. Individuals from southern Lane County (ca. 5500') and eastern Douglas County (Diamond Lake area) are small, like their northern Cascadian counterparts, but males average deeper blue above, with wider dark marginal wing borders. Below, adults from the southern Cascades average more heavily spotted than those from further north. These adults do not resemble *P. i. icarioides* (*contra* Hinchliff 1994: 106), and for now, no trinomial is associated with them. Individuals from lower elevations in the western Cascades of Lane County (vic. Hills Creek Reservoir, ca. 1600'), appear phenotypically intermediate between the high-elevation phenotype of *P. icarioides* in the southern Cascades, and *P. i. fenderi*. Both sets of high-elevation Cascadian segregates of *P. icarioides* intergrade where they meet in western Lane County and far eastern Deschutes County. Like the northern Cascadian segregate, populations of *P. icarioides* in the southern Cascades appear to intergrade with populations of *P. i. pembina* at lower elevations to the east. For example, adults from northern Klamath County (e.g., Gilchrist, ca. 4400') appear to be phenotypically intermediate between the high-elevation segregate of the southern Cascades, and *P. i. pembina*.

The widespread segregate of *P. icarioides* to the east of the Cascades is *Plebejus icarioides pembina* (TL: Lost Horse Rd., Bitter Root Mts., Ravalli Co., Montana; see Downey in Brown 1970b: 401). The relationship between *P. i. pembina* and *Plebejus icarioides fulla* (W. H. Edwards, 1870) (TL: Sonora Pass, 9700', Mono Co., California; see Downey in Brown 1970b: 386) is unclear. Dornfeld (1980: 100) considered *P. i. fulla* (as *P. i. ardea* (W. H. Edwards, 1871), a junior synonym of *P. i. fulla*) to occur in the southeastern deserts of Oregon, but noted that populations there were perhaps best considered to be intermediates between *P. i. fulla* and *P. i. pembina*. Adults of *P. icarioides* from throughout eastern Oregon are individually quite variable. Many populations at lower elevations include adults that superficially resemble both *P. i. pembina* and *P. i. fulla*. Adults from throughout the Blues and Wallowas closely resemble *P. i. pembina*. Until patterns of variation among *P. icarioides* populations in eastern Oregon can be studied in greater detail, the senior name, *Plebejus icarioides pembina*, is applied to all populations east of the Cascades.

The single female of *P. icarioides* sampled by Vern Covlin in Columbia County (2 mi. W of pavement on Bunker Hill Rd., 1 mi. S Hilard Rd. Guard Station, 19 May 1990, leg. Vern Covlin; examined in 2004) is of *P. i. pembina* (*contra* Hinchliff 1994: 106). This specimen was apparently a stray or temporary colonist from the east end of the Columbia River Gorge, since subsequent searches in Columbia County have failed to locate additional individuals (Vern Covlin pers. comm. 2004). I have not examined the single specimen of *P. icarioides* reported from Clatsop County (Hwy. 26 at Rock Creek, 16 July 1974; see Hinchliff 1994: 106). However, it was reportedly labeled by Elmer Griepentrog, and mislabeling is suspected. Until populations of *P. icarioides* can be confirmed there, Clatsop County has been deleted from the distribution of *P. icarioides* in Oregon. The dorsal image of a male "*P. i. pembina*" in Pyle (2002: 250) is of a male *P. anna ricei*. Also see Hovanitz (1937a) and Tilden (1973).

Biological notes: In eastern Oregon, *Plebejus icarioides* is widespread and can be locally abundant. Populations exist in a wide variety of habitats, essentially wherever suitable larval foodplants grow in abundance. In western Oregon, populations of *P. icarioides* are much more locally distributed, but adults may be common at some occupied sites (e.g., Mary's Peak). No populations of *P. icarioides* are known from the immediate coast in Oregon. The single annual brood in Oregon flies from late April to early September, depending on elevation and seasonal conditions, but most records are from mid-May to mid-July. Elevational records for *P. icarioides* in the state extend from about 85' (vic. Rowena, Wasco Co.) to over 9000' (Steens Mt., Harney Co.). Males visit mud, sometimes in large numbers, and both sexes visit a wide variety of flowers. Females spend most of their time in the immediate vicinity of larval foodplants.

Many authors have described and/or figured the early stages of various segregates of *P. icarioides* from California (e.g., Newcomer 1911, Comstock & Dammers 1935c: 82-84, Downey & Fuller 1961, Downey 1962a,b, Downey & Dunn 1964, Dammers in Emmel & Emmel 1973: 68, Downey & Allyn 1981: 22, Ballmer & Pratt 1989a: 30, 53, 67). Newcomer (1912b: 31), Downey (1962b) and Ballmer & Pratt (1992b) noted that larvae from some Californian populations of *P. icarioides* are facultatively myrmecophilous. Populations of *P. i. fenderi* in the Willamette Valley use *Lupinus oreganus* var. *kincaidii* (sometimes called *L. sulphureus* var. *kincaidii*) as their larval foodplant (see Crone & Schultz 2003 and Schultz et al. 2003). In Washington, Cascadian populations of *P. icarioides* have been recorded to use *Lupinus arcticus* ssp. *subalpinus*, *L. sellulus* ssp. *sellulus* var. *lobbii* and *L. laxiflorus* var. *laxiflorus* as larval foodplants

(Jon Pelham pers. comm. 2004). In the Cascades of central Oregon (e.g., Three Creeks Meadow, Deschutes Co.), *P. icarioides* apparently uses *L. sericeus* as a larval foodplant (pers. obs. 2004). The population of *P. icarioides* on Mary's Peak, Benton County, uses *L. argenteus* ssp. *argenteus* var. *laxiflorus* as the larval foodplant (Paul Severns pers. comm. 2004). Populations of *P. i. pembina* in Washington (Jon Pelham pers. comm. 2004) have been recorded to use *Lupinus arbustus* ssp. *calcaratus*, *L. sericeus* ssp. *sericeus* var. *sericeus*, *L. s. s.* var. *flexuosus* and *L. sulphureus* as larval foodplants. Guppy & Shepard (2002: 241) figured a late-instar larva of *P. i. montis* from British Columbia, and a full-grown larva of *P. i. fenderi* was figured by Miller & Hammond (2003: 34). Also see Maeki & Remington (1961a: 128), T. Emmel & J. Emmel (1963), Downey (1966), Frechin (1969), Arnold (1983a) and Anonymous (2000).

***Plebejus shasta* (W. H. Edwards, 1862)**

Recorded: Cr, **De**, Gr (S), Ha, Je (SW), **Kl** (N), **Lk**, Wh (S), Expected: Ba, Do (far E), La (far E), Lin (far E), Mal

_____(Cascades, at least) *shasta*

_____(Warners to Steens) nr. *shasta*

Taxonomic notes: *Plebejus shasta* is poorly known in Oregon, and further study of populations in the state is needed. Populations along the eastern slope of the Cascades, in Jefferson, Deschutes, Klamath and western Lake counties apparently represent *Plebejus shasta shasta* (TL: S slope above Donner Pass, 7500', Placer Co., California; see Austin et al. 1998: 115-116). Adults in these populations are large, and males have wide, dark wing margins above. Below, most adults are pale with moderately well-defined spots. Emmel et al. (1998h: 102-103) considered *P. s. shasta* and *Plebejus shasta calchas* (Behr, 1867) (TL: Mono Lake, Mono Co., California; see Emmel et al. 1998h: 102) to be distinguishable taxa, but did not define their ranges in northern California, and did not explain in detail how the two taxa may be consistently separated. Further study may show that some populations of *P. shasta* in Oregon are best called *P. s. calchas*. However, until populations in California and Oregon can be studied in more detail, the name *P. s. calchas* is not applied to any populations in Oregon.

Adults of *P. shasta* I have examined from the Warner Mountains (e.g., vic. Light Peak, 8200', Lake Co.), and from Steens Mountain (9700', Harney Co.), average smaller with narrower dark wing margins above on males, and both sexes are somewhat darker below, with darker and slightly larger spots, compared to those from the Cascades. These populations apparently refer, in part, to the "*minnehaha*" segregate of *P. shasta* from the Warner Mountains of California and elsewhere, discussed by Emmel & Shields (1980: 135, 137). However, no populations approaching the phenotype of typical *Plebejus shasta minnehaha* (Scudder, 1874) (TL: State Rd. 49, vic. Jct. Heart River, 1800', Grant Co., North Dakota; see Ferris 1970: 204) have been found in Oregon. Typical adults of *P. s. minnehaha* have poorly developed ventral spots, and average somewhat paler below than adults from southeastern Oregon. Austin (1998f) described *Plebejus shasta pallidissima* (Austin, 1998) (TL: vic. Stella Lake, 3170 m, Snake Range, White Pine Co., Nevada; see Austin 1998: 559) for populations of *P. shasta* in the Great Basin with small spots below on a pale background. Personal examination of paratypes of *P. s. pallidissima* has shown that adults from southeastern Oregon are considerably darker below, with larger dark spots, than those of *P. s. pallidissima*. Therefore, the name *P. s. pallidissima* is not applied to any populations of *P. shasta* in Oregon. Until the taxonomic status of *P. shasta* populations in the Warners, and on Steens Mountain, is better understood, they are herein called *Plebejus shasta* nr. *shasta*.

Unfortunately, specimens of *P. shasta* from northern Harney County (Devine Canyon), Grant County (Dry Soda nr. Izee), Wheeler County (Hwy. 26 vic. Keyes Creek Summit) and Crook County (vic. Big Summit Prairie) have not been personally examined. Because of uncertainty over which trinomials to apply to most populations of *P. shasta* in Oregon, and because no specimens from the Ochocos or Blue Mountains have been personally examined, no attempt has been made herein to list the distributions of putative geographical segregates in the state. Also see Tilden (1973) and Ferris (1976b).

<u>Biological notes</u>: *Plebejus shasta* is infrequently encountered in Oregon. It usually occurs in rather barren, windswept habitats, such as pumice flats, rocky ridges and dry mountain summits, from about 3000' (nr. Camp Sherman, Jefferson Co.) to over 9700' (summit of Steens Mt., Harney Co.). *Plebejus shasta* flies in a single annual brood, from mid-June to late August, depending on elevation and seasonal conditions. Males visit mud (but rarely encounter it in their habitats), and both sexes visit various low flowers.

No details on the biology of *P. shasta* from Oregon are available. However, populations in central Klamath County (Sand Creek area), and at high elevations in Deschutes County (Three Sisters Wilderness, 7000'-8000'), are partly associated with a dwarfed variety of *Lupinus* (pers. obs. 2000, 2004), which might be a larval foodplant. Emmel & Shields (1980, also see Ballmer & Pratt 1989a: 67) reported 13 species of leguminous plants in four genera as foodplants of *P. shasta* in California, Nevada, Utah and Colorado, including species of *Astragalus*, *Oxytropis*, *Trifolium* and *Lupinus*. The same authors provided brief life history notes for Californian populations of *P. shasta*, figured a late-instar larva (p. 139), and noted associations between post-diapause larvae and four species of ants (also see Ballmer & Pratt 1992b). A full-grown larva of Californian *P. shasta* was subsequently described and figured by Ballmer & Pratt (1989a: 30, 52, 81). Scott (1992: 86) briefly described the immatures of *P. shasta* from the Rocky Mountains of Colorado.

***Plebejus acmon* (Westwood, [1851])**

_____(Siskiyous, N Coast Range, Willamette Valley, Cascades, Warners, low elevations E of Cascades) <u>Recorded</u>: **Ba**, **Be**, **Clk**, Cr, **Cu**, **De**, **Do**, Gi, Gr, Ha, **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, **Li**, Lin, **Lk**, [Mal?], **Mar**, **Mo**, Mu, Po, **Sh**, Wal, Wan, **Was**, **Wh**, Ya, <u>Expected</u>: Cls, Col, Cos, Mal (for confirmation), Ti, Um, Un?, Wal

Taxonomic notes: At the moment, no trinomials are applied to populations of *Plebejus acmon* (see Opler 2003). All specimens examined from Oregon closely match topotypical *P. acmon* (TL: San Francisco, San Francisco County, California; see Opler 2003: 3). Also see Comstock (1922) and discussions below (pp. 199-203).

Biological notes: *Plebejus acmon* is widespread and sometimes common in Oregon at elevations below about 3000'. Two or possibly three annual broods are produced at lower elevations, where adults fly from mid-April through June, and in late July through September. Apparently, only a single annual brood is produced at high elevations (above about 4000' in the Cascades and above about 7000' in the Warners), where adults fly from late June through August. Records of *P. acmon* in Oregon range from near sea level (e.g., ca. 85', The Dalles, Wasco Co.) to almost 8000' (Tam McArthur Rim, Deschutes Co.; Warner Mts., Lake Co.). Adults of *P. acmon* are frequently found in dry gullies, washes, along roadsides, and in open fields in western Oregon and the Columbia Basin (including southern Klickitat Co., Washington, pers. obs.). Males visit mud, and both sexes visit a wide variety of flowers. Tilden & Huntzinger (1977) did not report *P. acmon* from Crater Lake National Park, Klamath County (they did report *P. lupini*), but a specimen of *P. acmon* from the park is housed in OSAC (Pole Bridge Meadows, 6000', 15 August 1930, H. A. Scullen).

In Oregon, larvae of *P. acmon* feed on a variety of *Eriogonum* species (at least *E. nudum* and probably *E. compositum*), as well as *Lotus corniculatus* (Lane Co.), *Astragalus* species, and possibly other legumes and *Polygonum* species. Populations of *P. acmon* in the Warner Mountains (e.g., Warner Canyon, 5000') and Cascades (e.g., Linn, Lane, Douglas and Jackson counties, 4000'-6500') apparently feed mostly on *Eriogonum nudum* (also see Emmel & Emmel 1962: 35). Populations in the Siskiyous (e.g., Rogue River drainage) are also very frequently found in association with *E. nudum*. A population of *P. acmon* in Wheeler County, near Spray, (ca. 1800'), is closely associated with *E. compositum* var. *leianthum*. Rare but freshly eclosed adults of *P. acmon* are found in Cascadian pumice flats between 6400' and 8000' (Deschutes, Douglas, Klamath and Jackson counties). Larval foodplants used in these areas have not been determined. Shapiro et al. (1981: 115) reported *P. acmon* to use *E. nudum*, *Lotus unifoliatus* var. *unifoliatus* (as *L. purshianus*), *L. humistratus* and *L. denticulatus* as larval foodplants in the Trinities of northern California, and Shapiro (1975a: 203) reported larvae of *P. acmon* feeding on *Polygonum aviculare* in central California (also see Shapiro 2002: 38). Comstock (1927: 188) illustrated an egg of *P. acmon*. Dammers in Emmel & Emmel (1973: 68, also see Garth & Tilden 1986: pl. 1, a, b) illustrated a full-grown larva and pupa of *P. acmon* from California, and Ballmer & Pratt (1989a: 30, 52, 71) described and figured the full-grown larva. Recently, a late-instar larva of *P. acmon* from southern California, and a pupa from Baja California Norte, Mexico, were figured by Guppy & Shepard (2001: 242). As first noted by Opler (1968), larvae of *P. acmon* are facultatively myrmecophilous in California. Ballmer & Pratt (1992b) noted that larvae of *P. acmon* in California are tended at least by *Aphaenogaster occidentalis* Emery, *Formica lasioides* Emery, *F. francoeuri* Bolton (formerly known as *F. pilicornis* Emery) and *Iridomyrmex humilis* (Mayr). Also see Downey (1966), Gorelick (1969), Goodpasture (1973b) and Shapiro (1974b).

In many parts of Oregon, *Plebejus acmon* flies in sympatry, and often in partial synchrony, with members of the *Plebejus lupini* complex (e.g., CSNM, Jackson Co.; Rogue River drainage, Josephine Co.; southern Lane Co., ca. 5500'; near Hood River, Hood River Co.; Wasco Co., many sites; Jefferson Co., many sites; Ochoco Mts., Crook Co.; northern Blue Mountains, Morrow Co.; southern Blue Mountains, Harney Co.). In addition, *P. acmon* has been found flying in sympatry and synchrony with the superficially quite different, undescribed Cascadian *Plebejus* species discussed after *P. lupini* (see pp. 202-203), at four sites. Despite this, adults of *P. acmon* and *P. lupini* can usually be separated based on adult phenotype and phenology, as well as patterns of larval foodplant use. Adults of *P. acmon* tend to be smaller than those of the *P. lupini* complex, except at very high elevations. Males of *P. lupini* usually have orangish dorsal hindwing aurorae, often with dark scales defining their basal borders. Males of *P. acmon* usually have pinker dorsal hindwing aurorae, and have dark scales along the basal borders of the aurorae less often. However, details of the hindwing aurorae of both species are individually variable. Because of confusion over the identities of *P. acmon* and *P. lupini* in older literature reports (see discussion under *P. lupini*), only specimens I have personally examined are included in the distributional listings for these taxa, with the following exception. Specimens of *P. acmon* from northern Malheur County (see Hinchliff 1994: 108) have not been personally examined, and it is unclear what species these records represent. For now, these records are tentatively associated with *P. acmon*, but the status of *P. acmon* in the Snake River drainage requires further elaboration. A series of *P. acmon* exists from the mouth of the Wildhorse River, Adams County, Idaho (26 May 1959, Stan Jewett, OSAC), suggesting that *P. acmon* may occur elsewhere in the Snake River Basin at low elevations.

***Plebejus lupini* (Boisduval, 1869)**

_____(N Coast Range, on *E. compositum* var. *compositum*) <u>Recorded</u>: **Po**
_____(Siskiyous, S & W Cascades, on *E. compositum* and/or *E. umbellatum*) <u>Recorded</u>: **Ja**, **Jo**, **La** (E), **Lin** (E), <u>Expected</u>: Cls (E)?, Cos (S), Cu, Do (E), Mar (E)?, Mu (E)?
_____(E-central Cascades, on *E. umbellatum*) <u>Recorded</u>: **De**, [Do (far E)], **Kl**, **Lk**
_____(foot of NE Cascades, Columbia River Gorge & lower Columbia Basin, on *E. compositum*, at least) nr. *lutzi* <u>Recorded</u>: Gi (N), **HR**, **Je**, Sh (W), **Was**
_____(Ochocos, Aldrichs, Blues, low-elevation Wallowas, [Steens?], on *E. heracleoides*, at least) *lutzi* dos Passos, 1938 <u>Recorded</u>: **Ba**, **Cr**, Gi, **Gr**, Ha, **Mo**, **Um**, **Un**, **Wal**, **Was**, Wh, <u>Expected</u>: De (E)?, Je (SE), Lk?, Mal (N), Sh (S)?
_____(SE deserts and ranges on *E. sphaerocephalum*) <u>Recorded</u>: **Ha**, <u>Expected</u>: Lk, Mal
_____(Wallowas, high elevations) <u>Recorded</u>: Wal (S), <u>Expected</u>: Ba (NE), Un (E)

<u>Taxonomic and biological notes</u>: Scott (1998b: 5-6) suggested that *Plebejus lupini* (TL: Gold Lake, Sierra Co., California; see Emmel et al. 1998i: 27) represents a widespread, polytypic species that includes taxa such as *P. lutzi* (see below), and others (see Goodpasture 1973a, 1974, Tilden 1973, Bálint & Johnson 1997 and Opler 2003: 4). Some of the taxa Scott (1998b) considered to be conspecific with *P. lupini* are most likely species-level entities (see Davenport 2003: 28-29, Opler 1999: 252-253, 2003), and the status of several taxa recently described in the *P. acmon-lupini* group from California and

Nevada (e.g., Austin 1998f: 560, Emmel et al. 1998c: 190, 191, 192) is uncertain. Recent study of this group by various researchers has shown that patterns of variation in adult phenotype and larval foodplant use are very complex. Paul Opler is currently conducting a thorough review of the *P. acmon-lupini* group. Until his results are presented, the arrangement of taxa presented herein should be considered tentative. It is entirely possible that, even after recognizing the segregate feeding on *Eriogonum pyrolifolium* var. *coryphaeum* in the high Cascades as a species-level taxon (see pp. 202-203), more than one species in Oregon is being represented by the name *Plebejus lupini* (also see Davenport 2004a: 11). As far as I know, all populations herein included with *P. lupini* are univoltine, but apparently bivoltine populations in the *P. lupini* complex are known from parts of Washington (Jon Pelham pers. comm. 2004). Only populations that I have personally studied in the field are discussed below. All counties listed above are based on specimens I have examined, except for a few cases, which are discussed below. Observers are urged to sample adults in the *P. lupini* complex, as well as the *Eriogonum* foodplants they are found in association with, in order to help further our understanding of this group. Also see Goodpasture (1973b) and notes on *Euphilotes* (pp. 170-171).

In western Oregon, populations of *P. lupini* occur locally in the Siskiyous, western Cascades and north Coast Range, where adults fly from late May to late July. Adults from the north Coast Range (Rickreall Ridge, Polk County, ca. 2400'; these have been reared many times by David McCorkle) generally have small black spots on the wings below, hindwing aurorae are narrow, and males have narrow black marginal borders above. This population uses *Eriogonum compositum* var. *compositum* as the larval foodplant. Adults from the western Cascades and western Siskiyous have larger, bolder spots below, thicker hindwing aurorae, and on average, males have slightly wider dark marginal wing borders above, compared to adults from Polk County. In the Rogue River drainage of Josephine County (900'-1500'), populations of *P. lupini* use *E. compositum* var. *compositum* as the larval foodplant. Populations of *P. lupini* in the western Cascades are associated either with *E. compositum* (e.g., Hwy. 20 above Tombstone Prairie, ca. 4200', Linn Co.) or *E. umbellatum*, and frequently occur at sites where both plants grow in sympatry (e.g., southern Lane Co., ca. 5500'). Because of confusion over exactly which population in the *P. lupini* complex in California is nominotypical (Paul Opler pers. comm. 2004), for now, "*lupini*" is not applied as a trinomial to any populations in Oregon (also see Emmel et al. 1998i: 72, figs. 192-193).

Populations of *P. lupini* at the CSNM, Jackson County, are mostly associated with *E. umbellatum*, and are variable in the development of ventral spotting. Most individuals have fairly large ventral spots, and males have variably widened dark marginal wing borders above. These adults appear phenotypically intermediate between those of *P. lupini* from the western Cascades, and those from central Klamath County. Throughout Klamath County (e.g., Sand Creek area), adults average large in size, and have big, bold spots below. Like most other species of blues in the region, males of *P. lupini* from central Klamath County usually have wide dark marginal wing borders above, which are wider than those on males from elsewhere in the state. Populations of *P. lupini* in Klamath County are found in strict association with *E. umbellatum*, and adults fly from late May to late July, depending on elevation and seasonal conditions. This appears to be the segregate that Tilden & Huntzinger (1977: 185-186) reported as *P. lupini* from Crater Lake National Park, although the following species (see pp. 202-203) probably also occurs there (all specimens in OSAC from Crater Lake National Park are of *P. lupini*). Similar populations of *P. lupini* exist in the Sisters area, Deschutes County, north to the Camp Sherman area, Jefferson County, also in association with *E. umbellatum*. To date, few specimens of *P. lupini* have been examined from the top of the Warner Mountains (vic. Light Peak, ca. 8000', Lake Co.), or Pine Mountain, Deschutes County (ca. 6600'), where both *E. umbellatum* and *E. heracleoides* var. *angustifolium* grow. Until details of larval foodplant use at these sites are known, and phenotypic variation in these populations is better understood, these populations are tentatively associated with boldly spotted *E. umbellatum*-feeders in the southeastern Cascades.

From the northeastern foot of the Cascades (e.g., Mill Creek Canyon, ca. 900', Wasco Co.), through the lower Columbia Basin (e.g., Spanish Hollow, Sherman Co.; I-84 at mi. post 145, Gilliam Co.) and into the Columbia River Gorge (e.g., town of Hood River, Hood River Co.), adults of *P. lupini* average large, with very large, bold spots below. Ventral spots average larger than those on adults from any other population associated with *P. lupini* in Oregon. Males from this area have narrow dark marginal wing borders above, and average paler blue above than those associated with *E. umbellatum* further to the south. These populations fly in association with *E. compositum* (and/or *E. strictum*, *E. douglasii* var. *douglasii*, *E. elatum*), and adults are found from mid-May to mid-June, depending on locality and seasonal conditions. As noted by Peterson (1993), larvae in these populations are facultatively myrmecophilous, and are tended by *Tapinoma sessile* (Say), *Formica neogagates* Emery and an undetermined species of *Formica*, in Yakima County, Washington. For now, these populations are called *Plebejus lupini* nr. *lutzi*.

To the east and southeast, *E. compositum* frequently grows with *E. heracleoides* var. *angustifolium* (e.g., vic. Tygh Valley, ca. 1500', Wasco Co; Hwy. 26 ca. 4600', Ochoco Mts., Crook Co.). At these localities, *P. lupini* adults are highly variable in size, but average smaller than adults of *P. l.* nr. *lutzi* from lower in the Columbia Basin. Additionally, adults in these populations usually have smaller spots below than those of *P. l.* nr. *lutzi*. Since these adults are mostly similar to *Plebejus lupini lutzi* (see below), they are aligned with that taxon herein, but further study of these populations is needed. Throughout the Aldrich, Blue and Wallowa mountains (and possibly on Steens Mountain, see p. 176), adults of *P. lupini* are usually found in close association with *E. heracleoides* var. *heracleoides*. These adults are referable to *Plebejus lupini lutzi* (TL: Snowslide Canyon, nr. Montpelier, [Bear Lake Co.], Idaho). Records of *P. l. lutzi* in Oregon are from mid-June to early August, depending on elevation and seasonal conditions. Individuals of *P. l. lutzi* can be very common, and occur at most sites in northeastern Oregon where *E. heracleoides* is abundant. Males sometimes visit mud in large numbers.

I found an interesting population in the *P. lupini* complex in and near Burns, Harney County, on 9 June 2003 (see discussion under *Euphilotes ancilla*, pp. 184-185). These adults average slightly larger than those of *P. l. lutzi* from the southern Blue Mountains, and males are somewhat paler blue above. These occur in strict association with *Eriogonum sphaerocephalum* var. *sphaerocephalum*. Adults fed at the flowers of *E. sphaerocephalum*, and perched on the tips of *E. sphaerocephalum* plants for the night, after about 19:15 hrs. The overall distribution of this segregate is unknown, and the relationship of this segregate to populations of *P. l. lutzi* feeding on *E. heracleoides* var. *heracleoides* in the Blue Mountains remains to be investigated.

One additional segregate in Oregon, at high elevations in the Wallowa Mountains, may be associated with *P. lupini*. To date, only a small series of these has been sampled, by Harold Rice and others (ca. 8000', August). The larval foodplants of this segregate have not been documented, but are likely to include *Eriogonum ovalifolium* var. *nivale*, *E. caespitosum*, *E. chrysops* and/or *E. flavum* (see Mason 2001: 121-123). Adults from the high Wallowas are small, and are dusky below. Since this segregate is apparently parapatric or narrowly sympatric with *P. l. lutzi* of lower elevations, it may represent a species-level taxon, possibly related to similar high-elevation populations in the northern Rocky Mountains. Until more information on this segregate in Oregon is available, it is tentatively associated with *Plebejus lupini*, but no trinomial is associated with it. While the name *Plebejus lupini spangelatus* Burdick, 1942 (TL: Gray Wolf Ridge, Olympic Mts., Callam Co., Washington; see Burdick 1942a) has been applied to superficially similar populations at high elevations in the Rocky Mountains (e.g., Scott 1986: 411, 1992: 87-88) and Cascades (Downey 1975: 348), *P. l. spangelatus* actually appears to be endemic to high elevations in the Olympic Mountains of Washington (pers. obs., Paul Opler, pers. comm. 2004).

The complete life history of *P. lupini* has not been reported. Ballmer & Pratt (1989a: 30, 52, 78) described and figured the last-instar larva of *P. lupini* from California. As noted by Ballmer & Pratt (1992b), larvae of *P. lupini* in California are facultatively myrmecophilous, and are tended by *Formica francoeuri* Bolton (formerly known as *F. pilicornis* Emery), probably among other ant species.

***Plebejus* [on *Eriogonum pyrolifolium* var. *coryphaeum*]**
_____(Cascades, high elevations) Recorded: **De** (W), Do (far E), Ja (E), Kl (NW), Expected: Je (far W)?, La (far E), Lin (far E)?, Mar (far E)?

Taxonomic notes: This unnamed taxon is being studied by Paul Opler, who first recognized it as a unique entity, and plans to describe it as a new species. Males of this taxon were figured by Goodpasture (1973: 480, figs. 6, 10), from Mt. Batchelor, Deschutes County (15 July 1931 and 24 July 1966). Reports of *Plebejus lupini spangelatus* from the Cascades of Oregon (e.g., Downey 1975: 348) refer to this taxon. To date, I have examined specimens of this species from the Mt. Batchelor area (6400', plus 1 specimen from Sparks Lake at 5400') and the Three Sisters Wilderness (7000'-8000') in Deschutes County, Cowhorn Peak (7000') in Klamath County, Diamond Lake (ca. 5200') in Douglas County, and Mt. McLoughlin (ca. 9000') in Jackson County. The record of "*P. acmon lupini*" from Mt. Thielsen, Douglas County (Shields 1963: 114), probably refers to this taxon. Populations of this species most likely occur on additional high Cascadian peaks where *E. pyrolifolium* var. *coryphaeum* grows. Two female specimens in OSAC from above Bird Creek Meadows, Mt. Adams, Washington (7-13 August, sampled by Stanley Jewett), appear to be of this species, or of a closely related taxon. A population on the south side of Mt. St. Helens, Washington, may also be related to this taxon (Jon Pelham pers. comm. 2003, also see Pyle 1981: 513). This species flies together with *P. acmon*, which is usually much less abundant, at most sites where it is currently known to occur (e.g., vic. Mt. Batchelor, Sparks Lake, Three Sisters Wilderness, Diamond Lake, etc., see above), but the two species are easily separated based on wing phenotypes.

Biological notes: This species occurs in strict association with *Eriogonum pyrolifolium* var. *coryphaeum*, its larval foodplant. Where this plant is abundant, adults can be very common. While its universal distribution, on high peaks along the spine of the Cascades, is apparently rather restricted, this is often the most abundant butterfly species in sub-alpine habitats in the high Cascades of Oregon. Males visit mud at the base of melting snow banks, and both sexes visit the flowers of their larval foodplants. The single annual brood flies from early July to mid-August or possibly early September, depending on elevation and seasonal conditions.

***Plebejus podarce* (C. Felder & R. Felder, 1865)**
_____(S Cascades, E Siskiyous) *klamathensis* (J. Emmel & T. Emmel, 1998) Recorded: Do (far E), **Ja**, Kl (far W), Expected: Jo (SE)?

Taxonomic notes: *Plebejus podarce* was reviewed by Emmel & Emmel (1998a), who discussed its taxonomic history, and proposed its species-level separation from related North American taxa. All populations in Oregon are referable to *Plebejus podarce klamathensis* (TL: Waterdog Lake, N Trinity Mt., Humboldt Co., California), a taxon first discussed by Shapiro et al. (1981: 116) and Shapiro (1986: 344-345). No populations of *Plebejus cassiope kelsoni* (Emmel & Emmel 1998a) (TL: SE above Caribou Lake, 7000'-7100', Trinity Alps, Siskiyou Co., California) have thus far been located in Oregon. The foodplant of *P. c. kelsoni*, *Cassiope mertensiana*, grows in the Three Sisters Wilderness in Deschutes County. However, searches there to date have failed to find *Plebejus* populations associated with that plant.

Biological notes: In Oregon, *Plebejus podarce* occurs in wet meadows from about 5100' (Diamond Lake, Douglas Co.) to over 6500' (nr. summit, Mt. Ashland, Jackson Co.). Adults can be abundant where they occur, but populations are locally distributed in Oregon. Adults fly in a single annual brood, from late June to early August, depending on local conditions. Males visit mud, and both sexes visit flowers.

Shapiro et al. (1981: 116) reported *Dodecatheon jeffreyi* as the larval foodplant of *P. podarce klamathensis* in the Trinities of northern California, and Emmel & Emmel (1998a: 292) speculated that *D. alpinum* may also be used as a larval foodplant at some sites. Larval foodplants of *P. podarce* in Oregon have not been reported. Emmel & Emmel (1998a: 301) figured a late-instar larva and pupa of *P. podarce* from the California (also see Ballmer & Pratt 1989a: 18-19, 29, 47, 81).

RIODINIDAE: (1 species)

Riodininae: (1 species)

***Apodemia mormo* (C. Felder & R. Felder, 1859)**
_____(basin habitats, mostly E of Cascades, also in Siskiyous) *mormo* Recorded: Ba, Cos (S), Cr, De, Gi, Gr, Ha (S), HR (N), Ja (S), Je, Kl (S), Lk, Mo, Sh, Um, Wal, **Was**, Wh, Expected: Cu, Do (S), Jo, Mal, Un (NE)

Taxonomic notes: To date, no geographic variation has been detected across populations of *Apodemia mormo* in Oregon. All populations in Oregon apparently represent *Apodemia mormo mormo* (TL: Davis Creek Park, W of Washoe Lake, Washoe Co., Nevada; see Emmel et al. 1998g: 89). Emmel et al. (1998i: 31) demonstrated that *Apodemia mormo mormonia* (Boisduval, 1869) (TL: Davis Creek Park, W of Washoe Lake, Washoe Co., Nevada), a name formerly used for populations in Oregon (e.g., Powell 1975: 268, Dornfeld 1980: 84), is a junior synonym of *A. m. mormo*. Further study of populations in far eastern Oregon may show that some of these are referable to *Apodemia mormo parva* Austin 1998 (TL: Nevada State Rte. 46, 0.8 mi. N Eureka, 1951 m, W slope of Diamond Mts., Eureka Co., Nevada; see Austin 1998f: 562-563), which was characterized as being smaller and darker below than *A. m. mormo*. In addition, further study of Columbia Basin populations may show that adults there average slightly larger than those of *A. m. mormo* (e.g., Powell 1975: 268). Davenport (2003: 30-32, 2004a: 11-13) provided detailed discussions of the complexity seen in this group of species in southern California. Also see Opler & Powell (1962) and Pratt & Ballmer (1991).

Biological notes: *Apodemia mormo* flies in a single annual brood in Oregon, from late July to late September, and probably into early October. Populations occur from about 150’ (S Fork Coquille River, Coos Co.) or lower (Starvation Creek State Park, ca. 100’, Hood River Co.), to at least 6640’ (Grizzly Peak on Winter Ridge, Lake Co.). Males patrol desert washes and dry hillsides, and both sexes visit a variety of flowers. As noted by Dornfeld (1980: 111), *A. mormo* is probably more widespread in Oregon than current records suggest, but it is infrequently encountered, due in part to its late flight time.

At the CSNM, Jackson County, Erik Runquist has found *A. mormo* in association with various *Eriogonum* species at about 5800’ (including *E. umbellatum* and *E. elatum*). In the Deschutes River drainage (Sherman and Wasco counties, ca. 700’), adults of *A. mormo* are associated with *E. microthecum* var. *laxiflorum*, *E. elatum*, *E. compositum* var. *compositum* and *E. sphaerocephalum* var. *sphaerocephalum*, all of which are likely larval foodplants. *Eriogonum microthecum*, *E. sphaerocephalum* and *E. elatum* have been recorded as larval foodplants for *A. mormo* in Washington (Jon Pelham pers comm. 2004). Elsewhere in Oregon (e.g., Minam, Wallowa Co., ca. 3000’), adults are apparently associated with *E. heracleoides* var. *heracleoides* and/or *E. compositum* var. *leianthum*. Other species of *Eriogonum* are used as larval foodplants by *A. mormo* elsewhere (e.g., Emmel et al. 1971: 239). Coolidge (1925b: 324-329, also see Comstock

1927: 148, 150, 1930b: 22) described and illustrated immatures of *Apodemia virgulti* (Behr, 1865), a related southern Californian species. Dammers in Emmel & Emmel (1973: 48, also see Garth & Tilden 1986: pl. 1, m, n) illustrated a full-grown larva and pupa of *A. virgulti* from southern California. Ballmer & Pratt (1989a: 15, 19, 22, 32-33, 72-73, 76, 78, 81) described and figured the last-instar larva of *A. "mormo"* from California. Guppy & Shepard (2001: 247) figured a late-instar larva of *A. mormo* from Washington and a pupa from California, and Neill (2001: 106) figured eggs. Also see Downey (1966), Downey & Allyn (1973: 31, 33) and Ballmer & Pratt (1992b).

NYMPHALIDAE: (51 species)

Danainae: (2 species)

***Danaus plexippus* (Linnaeus, 1758)**
_____(breeding immigrant) *plexippus* Recorded: all counties but one, Expected: Col

Taxonomic notes: No geographic variation is seen in *Danaus plexippus* within its migratory range in North America. These monarchs represent *Danaus plexippus plexippus* (TL: Kendall, New York; see ICZN 1954b: 225).

Biological notes: In Oregon, *Danaus plexippus* can be found in essentially any habitat. Monarchs are regular breeding immigrants wherever their larval foodplants, various *Asclepias* species, occur. Larval foodplants in Oregon mostly include *A. speciosa* and *A. fascicularis*, but additional *Asclepias* species are most likely used in the Siskiyous. Adults are seldom common in western Oregon, north of the Siskiyous (e.g., Dornfeld 1980: 58), and probably do not breed to any significant degree in the northwestern quarter of the state (Bob Pyle pers. comm. 2005). Monarch abundance throughout Oregon is variable from year to year. While two or three annual broods may be produced in Oregon during spring and summer months, this species definitely does not survive winters in the state. Oregon-bred adults migrate south and overwinter along the Pacific coast in California, or in central Mexico (see Pyle 1999). Records in Oregon extend from late May to early October, and from sea level (Tillamook, Tillamook Co.) to over 9000' (Steens Mt., Harney Co.).

A tremendous amount of ecological, behavioral and genetic information is known about the monarch. Its life history and famous migrations in North America have been carefully studied, and immatures have been figured in many dozens of books and articles (first illustrated in detail by Smith & Abbot 1797: pl. 6, also see Saunders 1869b: 74-75, 1873, W. H. Edwards 1878a). *Danaus plexippus* has been the subject of hundreds of scientific studies (e.g., Ackery & Vane-Wright 1984: 201-204). No attempt is made herein to summarize previous literature related to the monarch, as it would take many pages, but see Brower (1958), Ehrlich & Davidson (1961), Urquhart et al. (1965), Urquhart (1976), Urquhart & Urquhart (1976), Brower (1995) and references in Luis et al. (2003: 116-137).

***Danaus gilippus* (Cramer, 1776)**
_____(rare stray) *thersippus* (H. W. Bates, 1863) Recorded: Ha (S)

Taxonomic notes: *Danaus gilippus* from Mexico and western North American has been called *Danaus gilippus strigosa* (H. W. Bates, 1864) (TL: Guatemala) by most authors, including dos Passos (1964: 98), Miller & Brown (1981: 205), Tilden & Smith (1986: 57) and Ferris (1989c: 99). However, Austin (1998j, also see Iftner et al. 1992: 150) explained that the correct name for these populations is *Danaus gilippus thersippus* (TL: Lion Hill, Panama), following Ackery & Vane-Wright (1984: 108).

Biological notes: The single record of *Danaus gilippus* from Oregon is a sight record by Dana Ross, from Steens Mountain, Harney County, 25 August 1999 (Shepard 2000: 12). The observed individual was flying high over the southwest end of Steens Mountain, heading south (Dana Ross pers. comm. 1999), indicating that it may have originated from further north. *Danaus gilippus thersippus* is well known as a stray or migrant far north of its permanent breeding range (e.g., Gilbert 1960, Ferris 1981b: 291, Iftner et al. 1992: 150, Bouseman & Sternberg 2001: 224-225), and may occasionally produce a small brood in these areas (e.g., Brown et al. 1957: 37). Additional encounters with *D. gilippus* in Oregon are expected, but cannot be predicted.

The life history of *D. g. thersippus* is well known (e.g., Coolidge 1925c, Comstock 1932a: 16), and immatures of *D. gilippus* have been figured in many books (including Smith & Abbot 1797: pl. 7). Larval foodplants in western North America include several *Asclepias* species (e.g., Ackery & Vane-Wright 1984: 209). See Ackery & Vane-Wright (1984: 208-209) for a summary of literature related to *D. gilippus*.

Heliconiinae: (12 species)

***Euptoieta claudia* (Cramer, 1776)**
_____(rare stray) *claudia* Recorded: De, Li

Taxonomic notes: *Euptoieta claudia* in North America represents *Euptoieta claudia claudia* (TL: Jamaica). Also see Brown & Heineman (1972: 208-209).

Biological notes: *Euptoieta claudia* is a highly successful but irregular dispersalist in North America (e.g., Howe 1975: 210, Tilden & Smith 1986: 86, Klassen et al. 1989: 120, Shapiro et al. 1990, Iftner et al. 1992: 116, Acorn 1993: 84, Bird et al. 1995: 245, Gochfeld & Burger 1997: 177, Layberry et al. 1998: 166-167, Guppy & Shepard 2001: 271, Pyle 2002: 261), that may wander large distances during warm months (e.g., Forbes 1960: 146). The single reported capture of *E. claudia* in Oregon was at Three Creeks Meadow, Deschutes County, on 19 July 2003, by Cara Benfield (Shepard 2004: 9). One earlier sighting of *E. claudia* in Oregon exists, by Harold Rice, from near Halsey, Linn County, in about 1985. Additional encounters with *E. claudia* are expected in Oregon, but cannot be predicted.

The life history of *E. claudia* is well known, and many authors have described and/or figured immatures (e.g., Boisduval & Le Conte 1829-[1837]: pl. 44, W. H. Edwards 1880c, Scudder 1889a: 523-525, pls. 64, 67, 75, 79, 84, Klots 1951: pl. 5, 6, Comstock 1955b, Emmel & Emmel 1973: 28, Bird et al. 1995: 246, Neck 1996: pls. 6, 13, Tveten & Tveten 1996: 132, Allen 1997: 319, 339). Larval foodplants in the eastern United States include *Podophyllum*, *Passiflora*, and *Viola tricolor* (Scudder 1889a: 525-526, Fletcher 1902: 102), among others. Larval foodplants in Arizona (Comstock 1955b) reportedly include *Boerhavia intermedia* and *Cynanchum arizonicum* (reported as *Metastelma arizonicum*); also see Tilden & Smith (1986: 86). Emmel et al. (1971: 239) found larvae of *E. claudia* in Utah feeding on *Linum rigidum*, and Scott (1992: 57-58) reported species of *Linum* as larval foodplants in Colorado. Also see Geddes (1885) and Mather (1974).

***Speyeria cybele* (Fabricius, 1775)**

_____(Siskiyous, N Coast Range, W Cascades) *pugetensis* F. Chermock & Frechin, 1947
Recorded: **Be**, Clk, Cls, Col, Cos, Cu, Do, HR, **Ja**, **La**, Lin, Mar, Mu, Po, Wan, Ya,
Expected: Jo, Li, Ti

_____(E Cascades, Warners, Ochocos, Aldrichs, Blues, Wallowas) *leto* (Behr, 1862)
Recorded: Ba, **Cr**, De (NW), Gr, Je, Ha, Kl, **Lk**, Mal, Mo, Um, Un, **Wal**, **Was**, Wh,
Expected: Gi (SE), HR (E)?

Taxonomic notes: Geographic variants of *Speyeria cybele* in Oregon are separated by the crest of the Cascades. West of the Cascadian crest flies *Speyeria cybele pugetensis* (TL: Stimson Creek, nr. Belfair, Mason Co., Washington; see Chermock & Frechin 1947). Adults of *S. c. pugetensis* average darker, above and below, than those from further east. Populations east of the crest of the Cascades represent *Speyeria cybele leto* (TL: nr. Carson City, Nevada; see dos Passos & Grey 1947: 7-8). It is currently unknown if these two taxa intergrade in the Columbia River Gorge. No populations referable to *Speyeria cybele eileenae* J. Emmel, T. Emmel & Mattoon, 1998 (TL: Bear River Ridge Rd., 0 to 5 mi. E Jct. Wildcat Rd., 7 air mi. SE of Ferndale, 2300', Humboldt Co., California; see Emmel et al. 1998e) have been found in Oregon. While rare individuals from Curry and Coos counties may approach the phenotype of *S. c. eileenae*, most adults in this area are typical of *S. c. pugetensis*. Therefore, *S. c. eileenae* is not herein considered to be part of Oregon's fauna. The ventral image of a "female" *S. c. pugetensis* presented by Pyle (2002: 256, lower right) is of a male.

Biological notes: In Oregon, *Speyeria cybele* is widely distributed and locally common. Populations occur in a variety of forested habitats, especially along riparian corridors. Throughout Oregon, *S. cybele* flies in a single annual brood, from mid-June to early October, with most records in July and August. Records extend from near sea level (25', Sixes River at Edson Creek County Park, Curry Co.) to over 6000' (various sites, e.g., Warner Mts., Lake Co.). Males patrol sunny areas, and both sexes visit flowers, especially species of *Cirsium* (e.g., Dornfeld 1980: 76, Pyle 2002: 264, pers. obs.).

Larvae of *P. c. pugetensis* feed mostly on *Viola glabella* in western Oregon (Pyle 2002: 264), and on *V. adunca* var. *adunca* in western Washington (Jon Pelham pers. comm. 2004). Larval foodplants of *S. c. leto* include *V. adunca*, *V. glabella*, *V. nuttalli* and *V. sempervirens* in Washington (Jon Pelham pers. comm. 2004). Dornfeld (1980: 76) briefly described the larvae of *S. cybele* from Oregon. Guppy & Shepard (2001: 272) figured a full-grown larva and pupa of *S. c. pugetensis* from Benton and Polk counties, Oregon. The early stages of eastern North American *S. cybele* were described by W. H. Edwards (1880b, also see Klots 1951: pl. 5). Also see Maeki & Remington (1961b: 180), Mattoon et al. (1971) and Brittnacher et al. (1978).

***Speyeria coronis* (Behr, 1864)**
Recorded: Ba, Clk (E), **Cr**, **De**, Do (far E), **Gr**, Ha, HR, **Ja**, Je, **Jo**, Kl, Lin (E), **Lk**, Mal, Mar (E), **Mo**, Um, **Un**, **Wal**, **Was**, Wh, Expected: Cos (S), Cu, Gi, La (far E), Mu (far E), Sh
_____(N Cascades) *simaetha* dos Passos & Grey, 1945
_____(Blues, Wallowas, Steens) *snyderi* (Skinner, 1897)
_____(Siskiyous) nr. *coronis* Recorded: **Ja**, **Jo**, Expected: Cos, Cu, Do (S)

Taxonomic notes: Subtle patterns of geographic variation are displayed by *Speyeria coronis* in Oregon. However, these patterns are largely obscured by great individual variability seen in most populations in eastern Oregon. As noted by Dornfeld (1980: 76-77), most adults of *S. coronis* east of the Cascadian crest are phenotypically intermediate between *Speyeria coronis simaetha* (TL: Black Canyon, nr. Brewster, [Okanogan Co.], Washington) and *Speyeria coronis snyderi* (TL: City Creek Canyon, Salt Lake City, Salt Lake Co., Utah; see dos Passos & Grey 1947: 12). Adults of *S. c. simaetha* are smaller than those of *S. c. snyderi*, with narrower pale submarginal bands on the ventral hindwings. Adults of both taxa sometimes have a slight greenish tint to the otherwise pale ventral ground color, especially when fresh. Populations composed mostly of adults resembling *S. c. simaetha* occur along the northeastern slope of the Cascades (e.g., Wasco Co.). South and east of there, adults gradually take on more characteristics of *S. c. snyderi*. In Harney, Malheur, Baker, Union and Wallowa counties, adults are most similar to *S. c. snyderi* (e.g., Hinchliff 1994: 113). Shapiro (1986: 341) considered adults of *S. coronis* from Ball Mountain, Siskiyou County, California, to be phenotypically intermediate between *S. c. simaetha* and *S. c. snyderi*. Because of the variability seen within populations of *S. coronis* in Oregon east of the Cascades, following Dornfeld (1980: 77), most populations are considered to be intermediate between *S. c. simaetha* and *S. c. snyderi*. Therefore, no attempt has been made herein to separate the distributions of these two taxa in Oregon. Unlike most other species of *Speyeria* found in the Sand Creek area of Klamath County (see Tilden 1963c), adults of *S. coronis* from central and northern Klamath County are not dwarfed, and perhaps represent seasonal immigrants from further east (see below).

Adults of *S. coronis* from the Siskiyous show less individual variation than those from further east. Most adults from Josephine and Jackson counties are large, lack any hint of greenish coloration below, and resemble *Speyeria coronis coronis* (TL: Gilroy, [Santa Clara Co.], California; see W. H. Edwards 1897: [98] and Miller & Brown 1981: 139), a name used by Hinchliff (1994: 113). However, most adults from this region are somewhat larger and darker, above and below, than those of nominate *S. coronis*. These are herein called *Speyeria coronis* nr. *coronis*. Also see Hovanitz (1937b).

Biological notes: *Speyeria coronis* is widely distributed east of the Cascades, but is more locally distributed in the Siskiyous. Records of *S. coronis* from west of the Cascadian crest, north of the Siskiyous (e.g., E Marion Co.; Clackamas Co., various sites near Mt. Hood; Linn Co., Lost Lake on Santiam Pass; see Hinchliff 1994: 113), represent vagrants from further east. As noted by Jon Pelham (in Pyle 2002: 267), adults of *S. coronis* (away from the Siskiyous) in the Pacific Northwest apparently wander considerable distances in search of resources. Adults seem to move uphill shortly after eclosion, probably in search of nectar. Females, at least, apparently return to basin habitats later in the season to deposit eggs. The single annual brood flies from mid-May to mid-September, and records exist from about 1300' (vic. Eight Dollar Mt., Josephine Co.; vic. Tygh Valley, Wasco Co.) to over 7700' (vic. Strawberry Mt., Grant Co.).

According to Pyle (2002: 267), an important larval foodplant of *S. coronis* in eastern Oregon is *Viola beckwithii*, although larvae may also feed on *V. nuttalli*. In Washington, *S. coronis* larvae feed mostly on *Viola trinervata* (Jon Pelham pers. comm. 2004). Dornfeld (1980) provided a brief description of the full-grown larva of *S. coronis* from Oregon, based on rearings by David McCorkle. Comstock & Dammers (1931: 44) described and illustrated the full-grown larva and pupa of *Speyeria coronis semiramis* (W. H. Edwards, 1886) from southern California. Also see Maeki & Remington (1961b: 180-182) and Brittnacher et al. (1978).

***Speyeria zerene* (Boisduval, 1852)**

_____(E Siskiyous, far S Cascades, Warners) *zerene* Recorded: **Ja** (S & E), **Kl** (S), **Lk**
_____(E-central Cascades) nr. *zerene* Recorded: De, Do (far E), **Kl** (N), La (far E), Lk (far NW)
_____(W Siskiyous) *gloriosa* Moeck, 1957 Recorded: **Cu**, Ja (far SW), **Jo**, Expected: Cos (S), Do (far SW)?
_____(S coast) nr. *gloriosa* Recorded: Cos, Cu
_____(C and N coast) *hippolyta* (W. H. Edwards, 1879) Recorded: Cls, La, Li, Ti, Expected: Ya (SW)
_____(Willamette Valley) nr. *bremnerii* (W. H. Edwards, 1872) Recorded: Be, La (W), Mar (W), Po, Ya, Expected: Col (W)?, Ti (E)?, Wan (W)?
_____(N Cascades, Ochocos, Aldrichs, Blues, Wallowas) *picta* (McDunnough, 1924) Recorded: **Ba**, Clk (far E), **Cr**, [De (NW)], Gi, **Gr**, Ha (N), HR, **Je**, [La (far E)], **Lin** (E), **Mo**, Sh, Um, **Un**, **Wal**, Was (W), Wh, Expected: Mal (far NW), Mar (far E), Mu (far E)
_____(SE ranges) *gunderi* (J. A. Comstock, 1925) Recorded: Ha (S), Lk (SE), Mal

Taxonomic notes: As summarized by Dornfeld (1980: 77-78), *Speyeria zerene* displays rather striking patterns of geographic variation in Oregon. Populations of *S. zerene* from the Warners (variably, see below), southern Cascades and eastern Siskiyous were formerly called *Speyeria zerene conchyliatus* (J. A. Comstock, 1925) (TL: Mt. Shasta, Siskiyou Co., California) by Dornfeld (1980: 77) and Hinchliff (1994: 114). However, Emmel et al. (1998i: 16-17) corrected the type locality of *Speyeria zerene zerene* (TL: Hwy. 70 at Chambers Creek, N Fork Feather River, Plumas Co., California) to within the former range of *S. z. conchyliatus*, so *S. z. conchyliatus* became a subjective synonym of *S. z. zerene*. Adults of *Speyeria zerene zerene* in Oregon are individually variable, but average large and somewhat purplish below, and may be silvered, partly silvered, or unsilvered. Adults of *S. zerene* to the north of this area in northern Klamath, far northwestern Lake, far eastern Douglas (Diamond Lake area), far eastern Lane, and much of Deschutes counties are mostly like *S. z. zerene*, but average somewhat dwarfed (also see Tilden 1963c, Dornfeld 1980: 77). Herein, these are called *Speyeria zerene* nr. *zerene*. Shields (1963: 115) noted that the population of *S. zerene* near Paulina Lake, Deschutes County, is phenotypically intermediate between *S. z.* nr. *zerene* and *S. z. picta* (see below). Adults from northern Deschutes and far eastern Lane counties are also essentially intermediate between those two taxa.

Adults of *S. zerene* in the western Siskiyous (vic. Illinois and Applegate valleys) are large like *S. z. zerene*, but are considerably paler below, and are almost always silvered. These are *Speyeria zerene gloriosa* (TL: [Illinois River Rd.], W of Selma, 1100’-1600’, Illinois River Valley, Josephine Co., Oregon; also see Shields 1963). Populations of *S. z. gloriosa* also occur in eastern Curry County (e.g., Wimer Rd. SW of O’Brien; Rogue River nr. Agness). On the immediate coast of southern Coos and Curry counties flies *Speyeria zerene* nr. *gloriosa*. Dornfeld (1980: 77) called these populations *S. z. behrensii* (TL: Mendocino, [Mendocino Co.,] California; also see Brown 1965: 269-271), but topotypical adults of that taxon are somewhat smaller and darker than those from the south coast of Oregon. Adults of *S. z.* nr. *gloriosa* are smaller than those of *S. z. gloriosa*, and are phenotypically somewhat intermediate between *S. z. gloriosa* and *S. z. behrensii* (see Hammond & McCorkle 1984: 223, McCorkle & Hammond 1988: 193).

Along the north coast, adults of *S. zerene* are fairly similar to those of *S. z.* nr. *gloriosa*, and mostly occur in similar habitats. These are *Speyeria zerene hippolyta* (TL: Oceanside, Tillamook Co., Oregon; see dos Passos & Grey 1947: 13). On average, adults of *S. z. hippolyta* differ from those of *S. z.* nr. *behrensii* in being somewhat smaller, and in being darker, above and below. Phenotypically, adults of *S. z. hippolyta* are very similar to those of *Speyeria zerene bremnerii* (TL: San Juan Island, [San Juan Co., Washington]; also see dos Passos & Grey 1947: 13), and differences between the two taxa are mostly ecological (see McCorkle 1980).

Former populations of *S. zerene* on the west side of the Willamette Valley were mapped as *Speyeria zerene bremnerii* by Dornfeld (1980: 243), Hinchliff (1994: 114) and Guppy & Shepard (2001: 274). However, adults from this area are phenotypically different from typical populations of *S. z. bremnerii* in the Puget Sound. Adults from the edges of the Willamette Valley are considerably larger and paler, above and below, than those of *S. z. bremnerii* (also see Pyle 2002: 268), and some adults lack silvering below (Dornfeld 1980: 78). Ventral images of a male and female of this segregate were provided by Dornfeld (1980: 181), and McCorkle & Hammond (1988: 187) figured the upperside of a male. Herein, these former populations are called *Speyeria zerene* nr. *bremnerii*, but this segregate is now apparently extinct (see below).

Along the northeastern slope of the Cascades (barely spilling over to the west slope, at high elevations), and throughout the Ochocos, Aldrichs, Blues and Wallowas flies *Speyeria zerene picta* (TL: Aspen Grove, British Columbia). Adults of *S. z. picta* are individually quite variable, but are essentially always silvered or mostly silvered below. Ventral ground color of *S. z. picta* varies from brick red to tan. Paler individuals of *S. zerene* from northeastern Oregon were formerly called *Speyeria zerene garretti* (Gunder, 1932) (TL: Cranbrook, British Columbia) by Dornfeld (1980: 78) and Guppy & Shepard (2001: 275). However, due to the considerable amount of individual variation seen within populations of *S. zerene* from southern British Columbia to northeastern Oregon, *S. z. garretti* is herein considered to be a synonym of *S. z. picta* (also see Hinchliff 1994: 114, 1996: 95, Pyle 2002: 268). Hinchliff (1994: 114) mapped populations of *S. zerene* from Crook, southern Wheeler, southern Grant and northern Harney counties as intermediate between *S. z. picta* and *Speyeria zerene gunderi* (see below). However, while occasional adults in this region are pale like *S. z. gunderi*, most adults fall within the normal range of variation seen in *S. z. picta*, and populations throughout this region are herein considered to represent *S. z. picta*.

From the Warner Mountains (variably), eastward through southern Harney and Malheur counties, flies a very pale phenotype called *Speyeria zerene gunderi* (TL: above Davis Creek ranger station, N of Alturas, [Warner Mts.], Modoc Co., California). Ground color below on *S. z. gunderi* is pale yellow with very little contrast between paler marginal and darker basal areas, and spots below are silvered. While populations of *S. z. gunderi* are fairly uniform in phenotype throughout southern Harney and Malheur counties, adults in the Warner Mountains are highly variable. As noted by Grey & Moeck (1962) and Shapiro (1991a: 145), populations in the Warner Mountains apparently represent a blend zone between *S. z. zerene* and *S. z. gunderi*. Some adults from the Warners resemble the extreme named phenotypes, and all kinds of intermediate forms occur. Also see dos Passos & Grey (1947) and Grey (1975, 1989: 3). The mating pair of "*S. zerene*" figured by Neill & Hepburn (1976: 29) and Neill (2001: 109) is of *S. mormonia*, and the captions for the "male" (upper right) and "female" (middle right) figures of *S. z. picta* in Pyle (2002: 269) are reversed.

<u>Biological notes</u>: *Speyeria zerene* is widely distributed in Oregon. While it is often quite abundant from the east slope of the Cascades, eastward, it is very locally distributed in western Oregon along the coast, and north of the Siskiyous. Most coastal populations of *S. z. hippolyta* have been extirpated (see McCorkle 1975, 1980, Hammond & McCorkle 1984, McCorkle & Hammond 1988). Apparently only three populations of *S. z hippolyta* still exist, in Lane and Tillamook counties (Hammond & McCorkle 1984: 222). One of these populations is ecologically atypical (Mt. Hebo, Tillamook Co.), in that it occurs on a mountaintop, and not in coastal salt-spray meadows (Hammond 1980). Populations of *S. z.* nr. *bremnerii* along the western edge of the Willamette Valley appear to be extinct. As noted by Hammond & McCorkle (1984: 221; also see McCorkle & Hammond 1988: 189), the last known individuals of *S. z.* nr. *bremnerii* were seen in the

1970's, in Benton County. An attempt in the 1980's to reestablish populations of *S. zerene* on Mary's Peak, Benton County, with stock of typical *S. z. bremnerii*, was ultimately unsuccessful. However, the introduced population did persist for several years, with the last adults seen in about 1990. Curiously, most adults from the final two or three years that the introduced population was extant were somewhat melanic above.

All populations of *S. zerene* in Oregon are univoltine. Adults away from the coast fly from mid-June to mid-September, with most records in July and August. Adults of *S. zerene* on the immediate coast fly later, from late July to late September. Populations of *S. zerene* in Oregon exist from near sea level (various sites, *S. z.* nr. *gloriosa* and *S. z. hippolyta*) to about 9000' (*S. z. gunderi* on Steens Mt., Harney Co). Males patrol sunny areas (but not on hilltops), visit mud, and both sexes visit a wide variety of flowers.

Along the northern coast, *S. z. hippolyta* uses *Viola adunca* var. *adunca* as a larval foodplant, and its life history is well known (McCorkle 1975, 1980, Hammond & McCorkle 1984, McCorkle & Hammond 1988). Extirpated Willamette Valley populations of *S. z.* nr. *bremnerii* also fed on *V. a.* var. *adunca* (McCorkle pers. comm. 2003). Hardy (1958b) described the early stages of *S. z. bremnerii* from Vancouver Island in great detail, where he reported *Viola palustris* as a larval foodplant. In eastern Oregon and Washington (Jon Pelham pers. comm. 2004), larvae of *S. z. picta* feed on *Viola glabella*, *V. adunca* and *V. nuttallii*. Also see Maeki & Remington (1961b: 182) and Brittnacher et al. (1978).

***Speyeria callippe* (Boisduval, 1852)**

_____(NE Cascades, Ochocos, Aldrichs, Blues, Wallowas, Warners) *semivirida* (McDunnough, 1924) Recorded: **Ba**, Cr, **De** (N & E), **Gr**, Ha (N), Je, **Lk**, **Mal** (N), **Mo**, Um, **Un**, **Wal**, Was, Wh, Expected: Gi (SE), HR, Kl (SE), Sh

_____(E-central Cascades) nr. *semivirida* Recorded: De (SW), Kl (N), Lk (far NW)

_____(SE ranges) nr. *harmonia* dos Passos & Grey, 1945 Recorded: Ha (S), Mal (S)

_____(low elevations, S Siskiyous, far S Cascades) *elaine* dos Passos & Grey, 1945 Recorded: **Ja**, Jo (S), Kl (S)

_____(high elevations, S Siskiyous) Recorded: **Ja** (S), Jo (S)

_____(low elevations, N Siskiyous, W Cascades) Recorded: **Do**, **Jo** (N), **La** (S), Expected: Cos (N), Cu (N), Ja (far NW)

_____(high elevations, W Cascades) Recorded: Do (far E), **La** (E), **Lin** (far E), Expected: Clk (E)?, Mar (E)?

_____(W edge Willamette Valley) Recorded: Be, Expected: Po?

Taxonomic notes: *Speyeria callippe* displays complex patterns of geographic variation in Oregon. Most populations of *S. callippe* east of the Cascadian crest are referable to *Speyeria callippe semivirida* (TL: Aspen Grove, British Columbia). Populations of *S. c. semivirida* occur throughout the northeastern slope of the Cascades, Lake County, and the northeastern ranges. Adults are greenish below and fully silvered, with occasional brownish highlights interrupting the green coloration. Some individuals, usually females, are mostly brownish below. In the shadow of Mt. Mazama's blast, in northern Klamath and southwestern Deschutes counties, flies a form of *S. callippe* that is superficially like *S. c. semivirida*. Like most other *Speyeria* species in the area, these adults of *S. callippe* are dwarfed (also see Tilden 1963c, Dornfeld 1980: 185). Herein, these are called *Speyeria callippe* nr. *semivirida*. In the desert ranges of southeastern Oregon, adults of *S. callippe* average greener and paler below, and lack the brownish highlights of *S. c. semivirida*. These adults are phenotypically similar to *Speyeria callippe harmonia* dos Passos & Grey, 1945 (TL: Mt. Wheeler, [Snake Range, White Pine Co.], Nevada). However, as noted by Hinchliff (1994: 115), adults in this area average phenotypically intermediate between *S. c. semivirida* and *S. c. harmonia*. For now, these populations are called *Speyeria callippe* nr. *harmonia*.

Populations of *S. callippe* in southeastern Klamath County (e.g., Bly Mt. area; Klamath Falls area) are highly variable in adult phenotype. Some adults resemble *S. c. semivirida*, while others resemble *S. c. elaine*, and various intermediates are seen. Populations of *S. callippe* west of the Cascadian crest, and in southern Klamath County, have been called *Speyeria callippe elaine* (TL: Butte Falls, [Jackson Co.], Oregon) by Dornfeld (1980: 79) and Hinchliff (1994: 115). However, as noted by Hammond (1991: 58), populations formerly called *S. c. elaine* are composed of five somewhat different segregates that show subtle average morphological differences. Typical *S. c. elaine* occurs at low elevations (below about 5000') in southwestern Klamath, most of Jackson, and southeastern Josephine counties. Adults of *S. c. elaine* are highly variable in the amount of ventral silvering, and range from completely silvered to unsilvered. Above, adults generally have extensive black maculation, and below, ground color of *S. c. elaine* varies from tan to cinnamon.

Adults of *S. callippe* from higher elevations (above about 5000') in the Siskiyous (e.g., vic. Bolan Mt., Josephine Co.; see Howe 1975: pl. 29, #15) average somewhat smaller and darker than those from low elevations, and tend to have less ventral silvering. Howe (1975: 234) stated that *S. c. elaine* and *Speyeria callippe rupestris* (Behr, 1863) (TL: Moore Creek Rd., 1.5-2 rd. mi. S of Hwy. 120, 3200', Mariposa Co., California; see Emmel et al. 1998e: 148-149, 157) intergrade at the "Siskiyou Summit," in Jackson County. Shapiro (1986: 341) considered adults of *S. callippe* from Ball Mountain, Siskiyou County, California, to be phenotypically intermediate between *S. c. rupestris* and *Speyeria callippe juba* (Boisduval, 1869) (TL: Downieville, Sierra Co., California; see dos Passos & Grey 1947: 15 and Emmel et al. 1998i: 33, 76). Clearly, there is no consensus on how broadly the names *S. c. elaine* and *S. c. rupestris* should be applied. Compared to the average phenotype of low-elevation populations of *S. c. elaine* in the Siskiyous of Oregon, adults of *S. c. rupestris* usually have less hindwing silvering below, and are somewhat paler above and below. Compared to *S. c. elaine*, adults of *S. c. juba* average paler, often yellowish below, and are usually silvered.

Along the western slope of the Cascades, populations of *S. callippe* also show elevational variation. Adults of *S. callippe* from elevations below about 5000' in northern Josephine, Douglas and southern Lane counties are similar to *S. c. elaine* in that adults may be fully silvered, partly silvered or unsilvered, but coloration averages paler, and some individuals appear somewhat greenish below. Adults from above about 5000' in eastern Douglas and southern Lane counties, and above about 4000' in western Lane County, average smaller and considerably darker above and below than those from lower elevations. Below, adults vary from completely silvered to unsilvered, and many have extensive, dark, greenish coloration along with variable amounts of brownish scaling. Above, some adults of *S. callippe* from high elevations in the western Cascades appear melanic.

Old records for *S. callippe* exist from the Corvallis area, Benton County (also see Hammond & McCorkle 1984: 221 and Pyle 2002: 270). These were mapped by Hinchliff (1994: 115) as *S. c. elaine*. All four known extant specimens are in OSAC. Evaluation of their phenotype is difficult since most specimens are somewhat damaged, and only four of them exist. These adults are mostly unsilvered, and are rather pale, above and below, compared to other populations of *S. callippe* in western Oregon. All four specimens are from Benton County, labeled as follows: "Corvallis, 21 July 1897" (1 female); "Corvallis, Sept. 1906, Buchanan" (1 male); "Corvallis, 15-21 June 1926, Ella Thompson" (1 female); "McDonald Forest, 3 July 1965, Dornfeld" (1 male). While this segregate appears to be extinct, and no population has ever been located, the existence of a single modern record from 1965 suggests that continued search for populations in the north Coast Range should be conducted. Indeed, more research on all segregates of *S. callippe* in western Oregon is needed. Also see Hovanitz (1943), dos Passos & Grey (1947), Arnold (1983c, 1985), Hammond (1986) and Grey (1989: 4, 7-8). The images of "female" *S. callippe* Pyle (2002: 267, upper right photo; 271, right side) are of males.

Biological notes: East of the Cascadian crest, *Speyeria callippe* is widely distributed. West of the Cascadian crest, *S. callippe* is more locally distributed, but adults may be extremely common in parts of the Siskiyous (e.g., CSNM area), where it is often the most abundant butterfly species in June and July. Populations of *S. callippe* are univoltine, and generally fly earlier than other sympatric species of *Speyeria* (except *S. coronis*, which often flies even earlier). Adults fly from late May to early September, depending on elevation and seasonal conditions, with most records in June and July. A single record exists from 4 May (1968, Kinney Creek, Jackson Co., D. McCorkle). Records of *S. callippe* in Oregon extend from about 300' (Corvallis, Benton Co.) to over 9700' (Steens Mt., Harney Co.). Males of *S. callippe* frequently patrol on hilltops (Shields 1968: 82), but also patrol in other sunny areas, especially over rocky outcroppings and along roads in forested areas. Both sexes visit a variety of flowers, and *S. c. elaine* sometimes congregates by the hundreds on *Apocynum* flowers at the CSNM in Jackson County.

In Washington (Jon Pelham pers. comm. 2004), larvae of *S. c. semivirida* feed on *Viola nuttallii* and *V. sempervirens*, perhaps among other *Viola* species. William H. Edwards (1897: [96]) described the egg and young larva of *S. callippe* from a Californian population, and Comstock & Dammers (1931: 41-43) described and illustrated the full-grown larvae and pupae of two other Californian segregates of *S. callippe*. A full-grown larva and pupa of *S. c. semivirida* from Washington were figured by Guppy & Shepard (2001: 277). Also see Maeki & Remington (1961b: 182) and Brittnacher et al. (1978).

***Speyeria egleis* (Behr, 1862)**

_____(vic. Warners) nr. *egleis* Recorded: **Lk**, Expected: Kl (far SE)
_____(S Cascades) *oweni* (W. H. Edwards, 1892) Recorded: Ja (far E), Kl (S)
_____(Siskiyous) *mattooni* J. Emmel & T. Emmel, 1998 Recorded: Cu, **Ja** (S), Jo, Expected: Cos (S)?, Do (far SW)?
_____(E-central Cascades) *moecki* Hammond & Dornfeld, 1983 Recorded: **De**, Do (far E), Je (W), **Kl** (N), Lk (NW), Expected: La (far E), Lin (far E)?
_____(Ochocos, Aldrichs, Blues, Wallowas) nr. *macdunnoughi* (Gunder, 1932) Recorded: **Ba**, Cr, Gr, Ha (N), Um, **Un**, **Wal**, Wh, Expected: Je (E), Mal (far NW), Mo (S)
_____(SE ranges) *linda* (dos Passos & Grey, 1942) Recorded: Mal (central)

Taxonomic notes: *Speyeria egleis* displays a considerable amount of geographic variation in Oregon. Adults from the Warner Mountains are pale, and vary from completely silvered to unsilvered below. These were mapped as *Speyeria egleis egleis* (TL: vic. Gold Lake, Sierra Co., California; see dos Passos & Grey 1947: 17 and Emmel et al. 1998h: 97) by Hinchliff (1994: 116). However, as noted by Emmel & Emmel (1998c: 439-440), who considered these populations to be "undescribed," adults of *S. egleis* from the Warners and elsewhere in southwestern Lake County are paler below, and usually have more ventral hindwing silvering than do those of typical *S. e. egleis*. Herein, these populations are called *Speyeria egleis* nr. *egleis*.

To the west, in southern Klamath County (e.g., vic. Lake of the Woods; also Bly Mt. area) and far eastern Jackson County (e.g., vic. Mt. McLoughlin area), adults of *S. egleis* are smaller and average darker, above and below, than those of *S. e.* nr. *egleis*. In addition, adults are usually silvered below. These populations are referable to *Speyeria egleis oweni* (TL: Mt. Shasta, [Siskiyou Co., California]). While Dornfeld (1980: 79) applied the name *S. e. oweni* to all populations of *S. egleis* in southern Oregon, from the Siskiyous to the Warners, Emmel & Emmel (1998c) described subtle variation across this area, and greatly restricted the distribution of *S. e. oweni*. Further west, adults of *S. egleis* average slightly darker than those of *S. e. oweni* and are mostly unsilvered. These were recently named *Speyeria egleis mattooni* (TL: US Forest Service Rd. 40S01, Dry Lake Mt., Siskiyou Co., California; see Emmel & Emmel 1998c: 438). Populations of *S. e. mattooni* occur in southern Jackson (e.g., Mt. Ashland; Dutchman's Peak; nr. Applegate Valley) and Josephine (vic. Bolan Lake Rd.; vic. Oregon Caves) counties. A single record of *S. e. mattooni* exists from northern Curry County (Bear Camp, nr. Josephine Co. line, 13 July 1972, D. McCorkle; I have not examined specimens upon which this record is based).

Throughout the Sand Creek area of Klamath County, in the shadow of Mt. Mazama's blast (see Tilden 1963c), flies *Speyeria egleis moecki* (TL: Skookum Meadow, Walker Rim, Klamath Co., Oregon). This taxon was first recognized as a distinctive segregate by Moeck (1957) and Shields (1963); also see Hammond (1983), Hammond & Dornfeld (1983) and Pyle (1984b: 326). Adults of *S. e. moecki* are smaller than those of any other segregate of *S. egleis*, but are otherwise superficially similar to, although somewhat darker than *S. e. oweni*, and adults are usually mostly silvered below.

Populations of *S. e. moecki* extend from central Klamath County into northwestern Lake County, far eastern Douglas County (Diamond Lake area), much of southern and western Deschutes County, and southwestern Jefferson County (e.g., Camp Sherman area).

Adults of *S. egleis* from Oregon's northeastern ranges average considerably larger than those from elsewhere in the state. They tend to be dark above, and often have a greenish-brown ventral ground color. These were called *Speyeria egleis macdunnoughi* (TL: [Upper Gallatin Canyon, ca. 7000'], Gallatin Co., Montana) by Dornfeld (1980: 79) and Hinchliff (1994: 116). However, when compared to topotypical *S. e. mcdunnoughi*, adults from northeastern Oregon average considerably greener below, possibly due to influence from *Speyeria egleis linda* (TL: Heyburn Peak, Sawtooth-Boise, 9500'-10,000', [Custer Co.], Idaho). Until geographic variation of *S. egleis* in eastern Oregon and Idaho can be studied in more detail, populations throughout the Ochoco, Aldrich, Blue and Wallowa mountains are herein called *Speyeria egleis* nr. *mcdunnoughi*. Adults of *S. egleis* from central Malheur County (Schafer Butte, ca. 40 mi. W of Nampa, Idaho) closely resemble *Speyeria egleis linda*, and were mapped as that taxon by Hinchliff (1994: 116). The "male" and "female" captions (upper left and upper right) for images of "*S. e. mcdunnoughi*" in Pyle (2002: 273) are reversed. In addition, the male "*S. e. mcdunnoughi*" in Pyle (2002: 273, lower right) is apparently a male of *S. hydaspe* or *S. zerene*.

<u>Biological notes</u>: In Oregon, *Speyeria egleis* is locally common in the Siskiyous, southeastern Cascades, Warners and northeastern ranges. Adults are perhaps more abundant in the Warner Mountains than elsewhere in Oregon. Males patrol in sunny meadows, along ridgelines and often on hilltops, and both sexes visit flowers (e.g., Dornfeld 1980: 79). As elsewhere, *S. egleis* in Oregon flies in a single annual brood, with adults from mid-June to late August, but most records are from July. Records of *S. egleis* in Oregon extend from about 2000' (Kinney Creek, Jackson Co.) to over 9800' (Matterhorn Mt., Wallowa Co.). Pyle (2002: 272) noted that *S. e. moecki* is found mostly in pumice flats of central Klamath County, but males also hilltop up to over 7500' (e.g., Tam McArthur Rim, Deschutes Co., 11-12 August 2004).

Lembert (1894: 45) reported *Viola* as a larval foodplant of *S. egleis* in California. No details on larval foodplants of *S. egleis* in Oregon have been presented, although Pyle (2002: 272) reported *Viola nuttalli*, *V. purpurea* and *V. adunca* as larval foodplants, presumably in the Pacific Northwest. Early stages of *S. egleis* from Nevada were described and illustrated by W. H. Edwards (1879a, 1897: [130-132], pl. [18]). Also see Lembert (1893), Maeki & Remington (1961b: 182) and Brittnacher et al. (1978).

***Speyeria hesperis* (W. H. Edwards, 1864)**
_____(Siskiyous, Cascades, Ochocos, Aldrichs, Blues, Wallowas) *dodgei* (Gunder, 1931) <u>Recorded</u>: **Ba**, Clk (E), **Cr**, **De**, Do (E), Gr, Ha (S), **Ja**, **Je**, **Jo**, **Kl** (W), **La** (E), **Lin** (E), Mu (E), **Um**, **Un**, **Wal**, **Wh**, <u>Expected</u>: Cos (S), Cu, Ha (N), HR, Mal (far NW), Mar (far E), Mo (S), Was (far W)
_____(Warners) *cottlei* (J. A. Comstock, 1925) <u>Recorded</u>: **Lk**, <u>Expected</u>: Kl (SE)

<u>Taxonomic notes</u>: *Speyeria hesperis* has at times been considered conspecific with *Speyeria atlantis* (W. H. Edwards, 1862) (e.g., Dornfeld 1980: 80, Hinchliff 1994: 117). However, Howe (1975: 219-224), Klassen et al. (1989: 127-129), Bird et al. (1995: 249-250) and Scott et al. (1998) treated the taxa as separate species (but see Scott 1988b). While some authors still consider *S. hesperis* and *S. atlantis* to be conspecific (e.g., Pyle 2002: 274-275), they behave as separate species across large parts of the American west (Howe 1975: 219-224, Ferris 1983, Bird et al. 1995, Scott et al. 1998, Opler 1999: 279-280, Guppy & Shepard 2001: 278-280, pers. obs.), and are herein considered to be separate species (also see Opler & Warren 2002: 31). Populations throughout Oregon, excluding Lake County, are referable to *Speyeria hesperis dodgei* (TL: Diamond Lake, Douglas Co., Oregon). Despite some individual variation within most populations, adult phenotypes of *S. h. dodgei* are remarkably consistent across Oregon, from the Wallowas to the Siskiyous. Occasional individuals from northeastern Oregon resemble *Speyeria hesperis viola* dos Passos & Grey, 1945 (TL: Trail Creek, 7400', Sawtooth Mts., Idaho), but most individuals are considerably darker, and phenotypically closer to *S. h. dodgei*. The single male specimen of *S. hesperis* examined from Harney County (Fish Lake, Steens Mt., 25 July 1972, R. Albright, OSAC) is somewhat paler than most *S. h. dodgei*, but is not as pale as *Speyeria hesperis elko* Austin, 1984 (TL: Wildhorse Creek Campground, ca. 10 mi. S Mountain City, Owyhee River Valley, Elko Co., Nevada). For now, the putative population on Steens Mountain is considered to represent *Speyeria hesperis dodgei*.

Populations of *S. hesperis* in Lake County (W part of Co., also Warner Mts.) represent *Speyeria hesperis cottlei* (TL: nr. Alturas, [Warner Mts.], Modoc Co., California; see Emmel et al. 1998e: 151). These were called *Speyeria hesperis irene* (Boisduval, 1869) (TL: Gold Lake, Sierra Co., California; see Emmel et al. 1998i: 33) by Hinchliff (1994: 117), which might be a synonym of *Speyeria egleis egleis* (see Emmel et al. 1998h: 109, 1998i: 75). Adults of *S. h. cottlei* average larger and darker, above and below, than those of *S. h. dodgei*. Also see Tilden (1963c).

<u>Biological notes</u>: *Speyeria hesperis* is widely distributed and locally abundant in Oregon, mostly in cool, forested habitats. The single annual brood flies from mid-June to early September, with most records in July and a single record from 23 May (1977, Crook Co., J. Hinchliff). Records of *S. hesperis* in Oregon range from about 1500' (nr. O'Brien, Josephine Co.) to over 8000' (various sites). Males patrol sunny meadows, ridges and hilltops, visit mud, and both sexes feed at flowers.

The larval foodplant of *S. hesperis* at Lost Prairie, Linn County, was reported to be *Viola adunca* (as *V. bellidifolia* by Shields et al. 1970: 32). Other suspected larval foodplants in Oregon and Washington include *V. nuttallii*, *V. sempervirens* and *V. purpurea*, possibly among others (Jon Pelham pers. comm. 2004). Emmel et al. (1971) reported *Viola purpurea* as a foodplant for *S. hesperis* in Siskiyou County, California. Dornfeld (1980: 80) briefly described the larva of *S. h. dodgei* from Oregon. William H. Edwards (1888) described immatures of *S. h. hesperis* from Colorado. Also see Grey (1959), Maeki & Remington (1961b: 182), Moeck (1968) and Brittnacher (1978).

***Speyeria hydaspe* (Boisduval, 1869)**
Recorded: all counties except one, Expected: Sh?
_____(Siskiyous, Cascades, Ochocos, Aldrichs, Blues, Wallowas.) *rhodope* (W. H. Edwards, 1874)
_____(E-central Cascades) nr. *rhodope*
_____(Warners, far SE Cascades) nr. *hydaspe*
_____(N Coast Range)

Taxonomic notes: In Oregon, *Speyeria hydaspe* displays subtle patterns of geographic variation. These patterns, however, are largely obscured by individual variation seen within most populations. Hinchliff (1994: 118) recognized three geographic segregates of *S. hydaspe* in Oregon, and mapped broad zones of intergradation between them. Populations of *S. hydaspe* throughout northeastern Oregon were formerly called *Speyeria hydaspe sakuntala* (Skinner, 1911) (TL: Kaslo, British Columbia) by Hinchliff (1994: 118). However, as explained by Kondla (2001), *S. h. sakuntala* is a synonym of *Speyeria hydaspe rhodope* (TL: Cariboo District, British Columbia; see dos Passos & Grey 1947: 21, Brown 1965: 313-316). Therefore, populations in northeastern Oregon are referable to *Speyeria hydaspe rhodope*. As discussed by Kondla (2001), adult phenotypes of *S. h. rhodope* are highly variable. Populations of *S. hydaspe* in the northeastern ranges, Cascades, and western Siskiyous of Oregon are all comparable, even if some adults from the Cascades and Siskiyous average somewhat darker, above and below. For now, the name *Speyeria hydaspe rhodope* is herein applied to all populations of *S. hydaspe* in the Cascades and northeastern ranges of Oregon, with the following exception. Adults of *S. hydaspe* in the Sand Creek area of Klamath County (see Tilden 1963c) are somewhat dwarfed, in comparison to surrounding populations, but are otherwise similar to *S. h. rhodope*. These are herein called *Speyeria hydaspe* nr. *rhodope*.

Throughout southwestern Oregon, adults of *S. hydaspe* are more variable than those from further north and northeast. From the Warners to the Siskiyous, occasional adults of *S. hydaspe* are unusually pale below, and approach the phenotype of *Speyeria hydaspe hydaspe* (TL: Gold Lake, Sierra Co., California; see Emmel et al. 1998i: 34). These were previously called *Speyeria hydaspe purpurascens* (TL: Soda Springs, Siskiyou Co., California; see dos Passos & Grey 1947: 21) by Hinchliff (1994: 118). However, Emmel et al. (1998i: 34) moved the type locality of *S. h. hydaspe* further north from its former site in Mariposa County, California, into the range of *S. h. purpurascens*, making *S. h. purpurascens* a subjective synonym of *S. h. hydaspe*. At all known sites where pale adults occur in Oregon, darker forms are also found, as well as various types of intermediates. For now, because of the variability seen in adults of *S. hydaspe* from southwestern Oregon, they are herein called *Speyeria hydaspe* nr. *hydaspe*, until the situation can be studied in more detail. However, no attempt has been made to define the distributions, by county, of *S. h. rhodope* or *S. h.* nr. *hydaspe* in Oregon.

As noted by Dornfeld (1980: 80-81), adults of *S. hydaspe* in the north Coast Range average larger and darker above, especially towards the wing bases. Hinchliff (1994: 118) mapped these populations as *S. h. rhodope*. However, with *S. h. rhodope* now applied to populations east of this area, no name is clearly applicable to north Coast Range populations. Adults in this area are larger and darker above than those of *Speyeria hydaspe minor* dos Passos & Grey, 1947 (TL: Mt. McLean, 5000', [nr. Lillooet], British Columbia; see Kondla 2001), although some individuals are indistinguishable from those of *S. h. rhodope* further east. For now, no name is associated with these populations.

Biological notes: *Speyeria hydaspe* is one of the most widely distributed species of *Speyeria* in Oregon. It occurs in a variety of forested habitats, but is seldom found in unforested areas (it is unknown from Steens Mt., Harney Co.). The single annual brood flies from mid-June to late September, with most records in July and August. Records of *S. hydaspe* in Oregon extend from near sea level (Newport area, Lincoln Co.), to over 8300' (Wallowa Mts., Wallowa Co.). Males frequently patrol hilltops (Shields 1968: 82, pers. obs.) and visit mud, and both sexes visit a wide variety of flowers.

Larval foodplants of *S. hydaspe* in Oregon and Washington (Jon Pelham pers. comm. 2004) at least include *Viola glabella*, *V. adunca*, *V. nuttallii* and *V. sempervirens*. The full-grown larva of *S. hydaspe* was briefly described by Dornfeld (1980): 81), and a larva of *S. hydaspe* from British Columbia was figured by Guppy & Shepard (2001: 281). Also see Maeki & Remington (1961b: 182-184) and Brittnacher et al. (1978).

***Speyeria mormonia* (Boisduval, 1869)**

_____(Cascades, Ochocos, Blues, Wallowas) *erinna* (W. H. Edwards, 1883) Recorded: Ba, Clk (far E), Cr, **De**, Do (far E), **Gr**, Ha (N), HR, Ja (N), **Je**, **Kl**, La (far E), **Lin** (far E), Lk (NW), Mal (N), Mo (S), **Um**, Un, Wal, Wh, Expected: Gi (SE), Mar (far E), Was (far W)
_____(Steens, Trout Creek Mts.) *artonis* (W. H. Edwards, 1881) Recorded: Ha (S), Expected: Mal (S)
_____(Warners) Recorded: Lk (S)

Taxonomic notes: Most populations of *Speyeria mormonia* in Oregon are referable to *Speyeria mormonia erinna* (TL: Spokane Falls, [Spokane Co.], Washington; see dos Passos & Grey 1947: 23). Adults of *S. m. erinna* are usually silvered below, and the ventral ground color varies from yellowish to red-brown, with or without a variable amount of greenish scaling. These occur throughout the Cascades in Oregon, as well as in the Ochocos, Blues, Aldrichs and Wallowas. A somewhat darker and greener (below) segregate of *S. mormonia* occurs in the Cascades of Washington, *Speyeria mormonia washingtonia* (Barnes & McDunnough, 1913) (TL: Mt. Ra[i]nier, 7000', [Pierce Co.], Washington). However, adults of *S. mormonia* from Wasco and Hood River counties, Oregon, are typical of *S. m. erinna*.

In the Trout Creek Mountains and on Steens Mountain, Harney County, a very pale form of *S. mormonia* occurs, *Speyeria mormonia artonis* (TL: Wells, Elko Co., Nevada; see dos Passos & Grey 1947: 23). Adults of *S. m. artonis* are pale above and below, and almost always lack silver spotting below. A distinctive population of *S. mormonia* occurs in the Warner Mountains. These were considered to be "undescribed" by Emmel et al. (1998e: 145-146). Many adults from the Warners are phenotypically somewhat intermediate between those of *S. m. erinna* and *S. m. artonis*, but average darker below than *S. m. artonis*, and are usually silvered, like *S. m. erinna*. The population of *S. mormonia* on Ball Mountain, Siskiyou County, California (see Shapiro 1986: 341-342; 1991a: 145), is reportedly similar (but not identical) to the population of *S. mormonia* in the Warner Mountains. The dorsal image of a male "*S. m. washingtonia*" figured by Pyle (2002: 278, upper left) is apparently of *S. zerene picta*. Also see Owen (1893).

Biological notes: In Oregon, *Speyeria mormonia* is locally distributed in montane habitats. Adults may be found in great abundance at some sites (see Dornfeld 1980: 80). Adults fly in wet meadows and over dry hillsides, but not hilltops. *Speyeria mormonia* is univoltine, with adults flying from late June to mid-September or later (see Pyle 2002: 277), but most records are from July and August. Records of *S. mormonia* in Oregon extend from about 2400' (nr. Kahler Creek Guard Sta., Wheeler Co.) to over 9000' (Steens Mt., Harney Co.). Both sexes of *S. mormonia* visit a wide variety of flowers.

In Washington, larval foodplants of *S. mormonia* include *Viola palustris*, *V. adunca*, *V. nuttallii* and *V. sempervirens*, possibly among other *Viola* species (Jon Pelham pers. comm. 2004). Emmel et al. (1971: 239) reported *V. adunca* as a larval foodplant of *S. mormonia* in Colorado. The egg of *S. mormonia* was illustrated by W. H. Edwards (1884d: [22]). Dornfeld (1980: 80) briefly described the full-grown larva. A late-instar larva of *S. mormonia* from British Columbia was figured by Guppy & Shepard (2001: 282). Also see Maeki & Remington (1961b: 184), Perkins (1973), Brittnacher et al. (1978), Boggs (1987a,b, 2003) and Boggs & Ross (1993).

***Boloria selene* ([Denis & Schiffermüller], 1775)**

_____(Ochocos, Blues, S Wallowas) Recorded: Ba, Cr, Gr, Expected: Mo?, Um?, Un, Wal, Wh

Taxonomic notes: North American populations of *Boloria selene* were reviewed by Kohler (1977), who did not apply any trinomial to populations in Oregon, but (p. 247, 255) considered them to be intermediate between *Boloria selene albequina* (Holland, 1928) (TL: White Horse Pass, Yukon Territory) and *Boloria selene tollandensis* (Barnes & Benjamin 1925) (TL: Tolland, ca. 10,000', [Gilpin Co.], Colorado). Ferris (1971: 46) considered populations in northwestern Wyoming to be intermediate between *B. s. tollandensis* and *Boloria selene atrocostalis* (Huard, 1927) (TL: Chicoutimi, [Quebec]), and treated *B. s. albequina* as a synonym of *B. s. atrocostalis*. Dornfeld (1980: 74) considered populations of *B. selene* in Oregon to represent *B. s. tollandensis*, but Hinchliff (1994: 120), Guppy & Shepard (2001: 285) and Pyle (2002: 281) called them *B. s. atrocostalis*. Further study is needed to determine if North American populations of *B. selene* are even conspecific with typical populations in Europe (TL: Wienergegend).

Boloria selene was first reported from Oregon by Albright (1961), from Big Summit Prairie (ca. 4600'), Crook County. Since then, various populations have been found in the Big Summit Prairie area, as well as in central Grant County (by Harold Rice) and in Baker County (N of Halfway, Ken Smith). A population of *B. selene* also exists in south-central Washington, at Moxee Bog, Yakima County (see Newcomer & Rogers 1963, Pyle 2002: 281). The average adult phenotype of the Moxee Bog population and the Crook and Grant County populations differs, and neither is a perfect match to any of the trinomials that have been applied to them by previous authors. Adults at Moxee bog average somewhat smaller and paler above than those from Crook and Grant counties. The small series of *B. selene* I have examined from Baker County (in OSAC) consists of adults that are phenotypically intermediate between those from the Moxee Bog and the Crook-Grant County populations. Until morphological and ecological (see below) differences between populations of *B. selene* in Oregon and elsewhere in the Pacific Northwest are better understood, and search for additional colonies has been made, no available trinomial is applied to any of them. Also see Oliver (1977) and Bird et al. (1995: 244).

<u>Biological notes</u>: *Boloria selene* is locally distributed in Oregon. As noted above, only three sets of populations are known in the state, all in open riparian areas dominated by *Salix* bushes and larval foodplants. Adults fly in sunny, mesic habitats between *Salix* bushes, and visit flowers (e.g., Pyle 2002: 281). Populations in the vicinity of Big Summit Prairie, Crook County (ca. 4600'-5200'), and in central Grant County (ca. 4000', see Shepard 1997: 8), fly from early June to mid-August, in what is apparently a single annual brood. Records from Baker County (ca. 3000') are from mid- and late May, and two annual broods are likely there. The population at Moxee Bog (ca. 1200'), Yakima County, Washington, apparently flies in two or three annual broods (Pyle 2002: 281), from mid-April to early September.

No information on immature stages of *B. selene* from Oregon has been presented. Newcomer & Rogers (1963: 172) suspected *Viola nephrophylla* as a larval foodplant for *B. selene* at Big Summit Prairie. Jon Pelham (pers. comm. 2004) has recorded *Viola nephrophylla*, *V. palustris* and *V. glabella* as larval foodplants in Washington. Guppy & Shepard (2001: 286) figured a full-grown larva and pupa of *B. selene* from Yakima County, Washington (also see Bird et al. 1995: 244). Scott (1992: 49) briefly described the full-grown larva and pupa of *B. s. tollandensis* from Colorado. The life history of eastern North American *Boloria selene myrina* (Cramer, 1777) is well known (e.g., Saunders 1869a: 55-57, W. H. Edwards 1875, 1876a, Gruber 1884: 91, Scudder 1889a: 596-597, 1889c: pls. 64, 67, 72, 75, 79, 84, 86). Recently, Allen (1997: 319, 339) figured a full-grown larva and pupa of *B. s. myrina*. Also see Maeki & Remington (1961b: 184), Pyle (1973) and LaBonte et al. (2001).

Boloria bellona **(Fabricius, 1775)**

_____(N Blues) <u>Recorded</u>: Um, <u>Expected</u>: Ba, Gr, Mo (S), Un, Wal

<u>Taxonomic notes</u>: Populations of *Boloria bellona* (TL: America boreali) in Oregon and Washington have been called *Boloria bellona toddi* (Holland, 1928) (TL: St. Margarets River, [vic. Lac-Walker], Quebec) by previous authors (e.g., Hinchliff 1994:

121, Guppy & Shepard 2001: 286, Pyle 2002: 282). However, very few specimens from these states are known to exist, and the relationships between populations in Oregon and Washington to typical *B. b. toddi*, *Boloria bellona jenistai* D. Stallings & Turner, 1947 (TL: vic. Rivercourse, Alberta; see Kondla 1996) and *B. bellona* in the southern Rocky Mountains (e.g., Ferris 1981b: 297) is uncertain at this time. Until further studies across the range of the species are conducted, no available trinomial is applied to the population of *B. bellona* in Oregon. Also see Ferris (1971: 45).

<u>Biological notes</u>: While *Boloria bellona* is common in many parts of the eastern United States (e.g., Holland 1931: 112), and is apparently expanding its range in some areas (e.g., Covell 1999: 76), it is local and rare in the Pacific Northwest. In Oregon, *B. bellona* is known from a single population, near Lehman Springs (ca. 4350'), in Umatilla County. It was first discovered in 1982, and small numbers of adults were sampled in late May, June and early July of 1982, 1983 and 1984, in a moist riparian habitat with *Salix*, surrounded by coniferous forest. I don't know of any records of *B. bellona* from Oregon since 1984, despite efforts to relocate this population by several individuals. Available records indicate a single annual brood in Oregon, although the possibility of a second brood cannot yet be ruled out. Some western populations of *B. bellona* are apparently double brooded (e.g., Bird et al. 1995: 234, Guppy & Shepard 2001: 287). Additional populations of *B. bellona* should be sought in all northeastern counties in Oregon, in various riparian habitats.

No details on the immature stages or larval foodplants are available for the population of *B. bellona* in Oregon. Scudder (1889a: 611-613, 1889c: pls. 64, 67, 75, 79, 84) described and illustrated the immature stages of eastern North American *B. bellona* in great detail. Scott (1992: 51-52) described the early and late instar larva, and the pupa of *B. bellona* from Colorado. Allen (1997: 319, 339) figured a full-grown larva and pupa from West Virginia. Guppy & Shepard (2001: 287) reported *Viola canadensis* as the larval foodplant for populations of *B. bellona* in British Columbia, and Jon Pelham (pers. comm. 2004) reported *V. canadensis* as a larval foodplant in Washington. Also see LaBonte et al. (2001).

***Boloria epithore* (W. H. Edwards, 1864)**

_____(Cascades, Warners, Siskiyous, N Coast Range) *chermocki* E. & S. Perkins, 1966
<u>Recorded</u>: **Be**, **Clk**, **Cls**, Col, Cos, Cu, **De**, **Do**, **HR**, **Ja**, **Je**, Jo, **Kl**, **La**, **Li**, **Lin**, Lk, **Mar**, **Mu**, **Po**, Ti, Wan, **Was**, **Ya**
_____(N Blues, Wallowas) <u>Recorded</u>: **Ba** (N), Gr (NE), **Mo** (S), **Um**, **Un**, **Wal**, <u>Expected</u>: Wh (NE)

<u>Taxonomic notes</u>: Previous authors have considered populations of *Boloria epithore* in Oregon to consist of one, two, or three geographic segregates. Perkins & Perkins (1966a) and Perkins & Meyer (1973) reviewed *Boloria epithore*. They considered populations in western Oregon to represent *Boloria epithore chermocki* (TL: 0.5-2.9 mi. E Dolph, Yamhill Co., Oregon). Adults in these populations tend to have thick black markings on the basal half of the wings above, and are pale, bright orange

above, especially on the discal and marginal parts of the wings. Perkins & Meyer (1973) considered some populations of *B. epithore* in the Warner Mountains, Lake County, and scattered (but unspecified) sites in Klamath and Jackson counties, to represent *Boloria epithore sierra* E. Perkins, 1973 (TL: Sentinel Dome, Yosemite National Park, Mariposa Co., California). However, they noted (map 1, p. 9; p. 10) that these populations were composed of "intergradations" between *B. e. sierra* and *B. e. chermocki*. According to their list of specimens examined (pp. 19-20), very few adults from southeastern Klamath or Lake counties were examined. Since 1973, the taxonomic status of *B. epithore* populations in Jackson, Klamath and Lake counties has not been commented upon (e.g., Dornfeld 1980: 74-75, Hinchliff 1994: 122; Pyle 2002: 283), and apparently, the issue has not been studied in detail (see Pike 1981: 161). For now, all populations of *B. epithore* in western Oregon are considered to represent *Boloria epithore chermocki*, but further study of populations in the Warner Mountains, and in southern Klamath and Jackson counties, is needed to determine the status of the name *B. e. sierra* in Oregon.

Populations of *B. epithore* in the northern Blue and Wallowa mountains of northeastern Oregon were called *Boloria epithore borealis* E. Perkins, 1973 (TL: Shingle Creek Rd., Keremeos, British Columbia) by Perkins & Perkins (1973) and Dornfeld (1980: 75). As noted by Koçak (1984, also see Guppy & Shepard 2001: 290, Pyle 2002: 283), the name *B. e. borealis* is a homonym, and *Boloria epithore uslui* Koçak, 1984 is its replacement name (see Koçak, 1984: 96). However, as noted by Guppy & Shepard (2001: 290, also see Pyle 2002: 283), the Perkins' (in Perkins & Perkins 1973: 7) choice of a type locality for this taxon was unfortunate, since topotypical adults apparently represent a variable population, phenotypically closest to *B. e. chermocki*. Indeed, the type specimen of *B. e. borealis* (see Perkins & Perkins 1973: 12-13) appears to be closer in overall phenotype to *B. e. chermocki* than it is to adults of *B. epithore* from northeastern Oregon (e.g., Dornfeld 1980: 175). Individuals from northeastern Oregon consistently have a reduced infusion of dark scaling towards the bases of the wings above, which is prominent on *B. e. chermocki* from western Oregon. Black markings above are narrower on adults from northeastern Oregon, and don't appear "swollen," as on *B. e. chermocki*. Additionally, adults from northeastern Oregon are darker orange above and below, and have more extensive but poorly defined marginal wing markings above, compared to those of *B. e. chermocki*. Since the name *B. e. uslui* is apparently best considered a synonym of *B. e. chermocki* (see above), no trinomial is applied herein to populations of *B. epithore* in northeastern Oregon.

<u>Biological notes</u>: In the northwestern fourth of the state and throughout the Cascades, *B. epithore* is widespread and common in a variety of habitats, including hillside and hilltop meadows, sunny openings along creeks and rivers, and roadsides in forested settings. At some localities in the western Cascades and north Coast Range (e.g., top of Mary's Peak, Benton Co.), adults may be very common, and dozens of individuals may be observed simultaneously. Populations in the Siskiyous and in northeastern Oregon tend to be more locally distributed. Both sexes visit a wide variety of flowers (e.g., Pyle 2002: 283). *Boloria epithore* flies in a single annual brood. In western Oregon, adults fly from early May to mid-August, depending on elevation and seasonal conditions, from near sea level (many sites) to over 6500' (Mt. Ashland, Jackson Co.). In

northeastern Oregon, adults fly from mid-June to late August, and from about 3200' (N of Halfway, Baker Co.) to 8000' (Wallowa Mts., Wallowa Co.).

Detailed notes on immature stages or larval foodplants of *B. epithore* from Oregon have not been presented. Perkins & Meyer (1973: 5) noted that *B. e. chermocki* is frequently found in association with *Viola sempervirens* and *V. glabella*. In Washington, Jon Pelham (pers. comm. 2004) has recorded *V. adunca* var. *adunca*, *V. glabella* and *V. sempervirens* as larval foodplants of *B. epithore*. Apparently, *Viola ocellata* is used as a larval foodplant in parts of California (e.g., Lembert 1894: 45, Perkins & Meyer 1973: 2, Pyle 2002: 283). William H. Edwards (1892: 108-109) described the fourth-instar larva of *B. epithore* from Washington, but additional details on the early stages, surprisingly, have not been presented.

<u>Nymphalinae</u>: (26 species)

Chlosyne leanira **(C. Felder & R. Felder, 1860)**
_____(W Siskiyous) *leanira* <u>Recorded</u>: **Cu**, Jo (W), <u>Expected</u>: Cos?
_____(E Siskiyous, far S Cascades, Warners) *oregonensis* Bauer, 1975 <u>Recorded</u>: Do (S), **Ja**, Jo (N and E), Kl (S), Lk (S)
_____(SE deserts) *basinensis* (Austin & M. Smith, 1998) <u>Recorded</u>: **Ha**, Lk (S), Mal

<u>Taxonomic notes</u>: *Chlosyne leanira* was reviewed by Smith & Brock (1988) and Austin & Smith (1998), whose taxonomic arrangements are followed herein. According to Austin & Smith (1998: 334, 356), *Chlosyne leanira leanira* (TL: Hwy. 70 at Chambers Creek, N Fork Feather River Canyon, 1850', Plumas Co., California; see Emmel et al. 1998g: 89) flies in the western Siskiyous of Curry and western Josephine counties. The small series I have examined to date from this area is composed of adults that average paler below, with reduced black markings, and with less orange above than most adults of *Chlosyne leanira oregonensis* (TL: Mt. Ashland, Loop Rd., Jackson Co., Oregon). Adults from northern Josephine, southern Douglas, Jackson and Klamath counties represent *Chlosyne leanira oregonensis*. This taxon is also known from Siskiyou County, California, where it reportedly intergrades with *C. l. leanira*, and from the southern Warner Mountains of Modoc County, California (Austin & Smith 1998: 337). Harold Rice has sampled *C. l. oregonensis* on one occasion in the Warner Mountains of Lake County, Oregon (pers. comm. 2004). Adults of *C. l. oregonensis* are dark above like those of *C. l. leanira*, but average better-developed orange markings on the dorsal forewing apex, and average slightly wider dark bands on the ventral hindwing. However, adults in all populations are individually variable, and more study of putative differences between populations in Oregon assigned to *C. l. leanira* and *C. l. oregonensis* is needed.

From the eastern foot of the Warner Mountains in Lake County (Austin & Smith 1998: 342, 356), eastward to the Snake River drainage of Malheur County (e.g., Succor Creek), adults of *C. leanira* are mostly bright orange above, and represent *Chlosyne leanira basinensis* (TL: Nevada State Rte. 338, 1.0 mi. NE California state line, Sweetwater Mts., Lyon Co., Nevada). These were previously called *Chlosyne leanira alma* (Strecker, [1878]) (TL: NW Mohave Co., Arizona; see Austin & Smith 1998: 340) by Dornfeld (1980: 70) and Hinchliff (1994: 123). Further study of the relationship between *C. l. oregonensis* and *C. l. basinensis* in Lake County is needed. Also see Higgins (1960), Bauer (1975: 166-168) and Wahlberg & Zimmerman (2000).

Biological notes: In Oregon, *Chlosyne leanira* occurs in the southern part of the state, and all populations are univoltine. In the Siskiyous, *C. l. leanira* and *C. l. oregonensis* fly in dry gullies, sometimes along roadsides, over serpentine outcroppings, and over dry hillsides, from about 1200' (Jumpoff Joe Creek, Josephine Co.) to 5000' (S side Mt. Ashland, Jackson Co.). Adults of *C. l. oregonensis* fly from mid-June to late July, depending on elevation and seasonal conditions. Both sexes visit flowers (e.g., *Apocynum* in Jackson Co., also see Austin & Smith 1998). Adults of *C. l. basinensis* fly from mid-May to mid-June in gullies and over desert flats (e.g., Dornfeld 1980: 14), with most records from about 4200'.

The early stages of *C. l. oregonensis* and *C. l. basinensis* remain mostly undescribed. Neill (2001: 119) figured a late-instar larva and pupa of *C. l. basinensis*. Austin & Smith (1998: 342) reported *Castilleja applegatei* ssp. *martinii* (as *C. chromosa*) as a larval foodplant of *C. l. basinensis*. Bauer (1975: 167) briefly described the full-grown larva of *C. l. leanira*, and noted that most populations feed on *Castilleja* species, although some are reported to feed on *Cordylanthus* species (see Austin & Smith 1998: 334). Austin & Smith (1998: 334-335) described the early stages of *C. l. leanira* in more detail, and reported *Castilleja foliolosa*, *C. a.* ssp. *martinii* and *C. affinis* as larval foodplants (also see Scott 1992: 38). Comstock & Dammers (1932a: 9-12) described and illustrated the early stages of Californian *Chlosyne leanira wrighti* (W. H. Edwards, 1886) in detail (also see Dammers in Emmel & Emmel 1973: 37).

Chlosyne palla **(Boisduval, 1852)**

_____(Siskiyous, W Cascades) *eremita* (W. G. Wright, 1905) Recorded: **Cu**, **Do**, **Ja**, **Jo**, **Kl** (far SW), **La** (E), Lin (E), Expected: Clk (E)?, Cos (S), Mar (E)?
_____(far SE Cascades, E to Warners) *palla* Recorded: **Kl** (S), **Lk** (S)
_____(E-central Cascades) Recorded: De, Do (far E), Je (W), **Kl** (N), Expected: La (far E)?
_____(Ochocos, Aldrichs, Blues, Wallowas, Steens) Recorded: **Ba**, Cr, **Gr**, Ha, **Mo** (S), **Um**, **Un**, **Wal**, Expected: Je (E), Mal (N), Wh (NE or S)
_____(E side Columbia River Gorge) Recorded: HR, **Was**

Taxonomic notes: *Chlosyne palla* is represented in Oregon by five phenotypically identifiable groups of populations. Emmel et al. (1998e: 141) proposed using the name *Chlosyne palla eremita* (TL: San Rafael, Marin Co., California; see Wright 1905: 55 and Emmel et al. 1998e: 141) as a trinomial for far western Californian populations in which dark (mostly black dorsal ground color) females predominate over pale (mostly orangish dorsal ground color) females. Populations of *C. palla* in western Oregon are referable to *Chlosyne palla eremita*. Those from the Mt. Ashland area, Jackson County, west to

Curry County, and along the western Cascades north at least to Linn County, are composed primarily of dark females. However, pale and dusky (mostly orangish above with expanded dark areas) female forms are known, in small numbers, from all sites in western Oregon from which adequate numbers of adults have been sampled. Males of *C. p. eremita* from western Oregon average more heavily marked above than those of *C. p. palla* to the east, with thicker black markings above and below. Additionally, males of *C. p. eremita* tend to be darker red above, and median wing markings are even less contrasting (less yellowish), than those of *C. p. palla*. To date, *C. p. eremita* has not been found north of the Hwy. 20 area in Linn County, but should be sought in low to mid-elevation canyons in Marion and Clackamas Counties.

Emmel et al. (1998e: 141) applied the name *Chlosyne palla palla* to populations in the foothills of the Sierra Nevada where pale or dusky females predominate, and dark females are uncommon. They suggested that *C. p. palla* and *C. p. eremita* blend at the north end of the Sacramento Valley in California. In southern Oregon, there is a noticeable difference in the percentage and darkness of dark females east and west of the southern tip of the Cascades. *Chlosyne palla palla* (TL: Hwy. 70 at Chambers Creek, ca. 6 rd. mi. SW of Belden, N Fork Feather River Canyon, 1850', Plumas Co., California; see Emmel et al. 1998i: 18), as applied herein, occurs from the Klamath Falls area, Klamath County, eastward to the east side of the Warner Mountains (Adel area, Lake Co.). Males are mostly bright red-orange above, with thin dark markings. Above, median wing markings on males of *C. p. palla* are usually less contrasting (less yellowish) than on males from northeastern Oregon (see below). Most females of *C. p. palla* from Oregon average slightly darker orange above than males, but dark females are rarely seen. As in Californian populations of *C. p. palla* discussed by Emmel et al. (1998e: 141), the average female phenotype in populations herein called *C. p. palla* is essentially intermediate between that displayed by *C. p. eremita* and the bright female forms of mid- to high-elevation Sierra Nevadan and Cascadian populations (see below). Dark female forms are rare in and around the Warner Mountains, Lake County, and become increasingly common to the west in Klamath County. In the vicinity of Bly Mountain, Klamath County, most females are pale or dusky above, but dark forms are seen fairly regularly. From the Keno and Klamath River Canyon areas, Klamath County, west to the CSNM, Jackson County, the percentage of dark females continues to increase, and at most sites in the CSNM, pale, dusky and dark forms are common. The species-level identity of populations south of Summer Lake, Lake County (see Hinchliff 1994: 124), is uncertain, and is discussed below under *C. acastus* (see p. 232).

Populations of *C. palla* in the east-central Cascades, from western Jefferson County (Camp Sherman area) south to about the northern end of Upper Klamath Lake (Klamath Co.), lack dark and dusky females. Males and females in this region are bright orange-red above, sometimes almost pinkish, and have reduced dark markings above and below. These populations have previously (e.g., Dornfeld 1980: 69, Hinchliff 1994: 124) been called *Chlosyne palla whitneyi* (Behr, 1863) (TL: S slope of Mt. Dana, at lower end of Glacier Canyon, 11,000', Mono Co., California; see Emmel et al. 1998h: 98). However, *Chlosyne whitneyi* now represents (see Emmel et al. 1998h: 98) the high-elevation Californian endemic that was formerly (e.g., Miller & Brown 1981: 158) called

Chlosyne damoetas malcomi (J. A. Comstock, 1926) (TL: nr. Mammoth, Mono Co., California). Emmel et al. (1998e: 140-141) proposed the name *Chlosyne palla altasierra* J. Emmel, T. Emmel & Mattoon, 1998 (TL: Fallen Leaf Lake, 6400', El Dorado Co., California) for the mid- to high-elevation populations of *C. palla* in the Sierra Nevada of California that were formerly (pre-1998) known as *C. p. whitneyi*. Like populations in the east-central Cascades of Oregon, mid- to high-elevation Sierra Nevadan populations lack dark females. However, adult phenotypes differ between Californian *C. p. altasierra* and populations in the east-central Cascades of Oregon. Males and females from Oregon average larger, with a pinker (versus orange) coloration above, and tend to have slightly more pointed forewings and suppressed dark markings above. This segregate shares the same geographic distribution as many taxa that occur in the volcanic ash fields of the Sand Creek area in the east-central Cascades of Oregon (see Shields 1963, Tilden 1963c). Further study of these populations could show that they might be aligned with *C. acastus* (as suggested by Pyle 2002: 294), but the presence of occasional individuals of this phenotype in *C. palla* populations at the east end of the Columbia River Gorge (see below), suggests that they are probably conspecific with *C. palla*.

Populations of *C. palla* in northeastern Oregon, from the Ochoco, Aldrich, Blue and Wallowa mountains, as well as from Steens Mountain (Harney Co.), have been called *C. p. palla* (e.g., Dornfeld 1980: 69, Hinchliff 1994: 124) or *Chlosyne palla calydon* (Holland, 1931) (e.g., Bauer 1975: 156, Guppy & Shepard 2001: 304). Males in these populations average more two-toned above than those of *C. p. palla* or *C. p. eremita*, due to paler yellow median wing markings. Development of dark markings above on males from northeastern Oregon is similar to that seen in *C. p. eremita*. Females, above, may be dark, dusky, or pale, and in some populations, dark forms predominate. Dark females have been examined from all populations of *C. palla* in northeastern Oregon that I have personally studied, as well as from central Idaho (Idaho Co., in OSAC) and Montana (e.g., Gallatin and Sweet Grass counties, see Ferris 1981b: 324; "Martina, Montana," in OSAC). While these populations with variably darkened females do not exactly match typical *C. p. palla* or *C. p. eremita*, the name *Chlosyne palla calydon* (Holland, 1931) (TL: Turkey Creek Junction, [Jefferson Co.], Colorado), used by Guppy & Shepard (2001: 304), does not apply either. Dark females do not occur in populations of typical *C. p. calydon*, and males of the two taxa show several subtle differences in wing markings (pers. obs.). With *C. p. calydon* herein restricted to the Front Range of eastern Colorado and southeastern Wyoming, no name is applicable to the populations with dark females between Montana and the Ochoco Mountains of central Oregon. Also see discussion below under *C. acastus sterope* (pp. 230-231) and Ferris & Fisher (1978).

An interesting group of *Chlosyne palla* populations occurs in the Simcoe Mountains of southern Washington (e.g., Newcomer 1962: 68, Hinchliff 1996: 107), and at the east end of the Columbia River Gorge in Washington and Oregon. The presence of this segregate in Oregon has previously been overlooked (e.g., Hinchliff 1994: 124), and museum specimens of this segregate have invariably been mixed in with *C. acastus sterope* (e.g., OSAC). To date, this segregate has been found in eastern Hood River (Neal Creek, ca. 1000') and northwestern Wasco (vic. Rowena, ca. 150'-350'; Chenoweth Creek, ca. 500'-600'; Mill Creek Rd., 1500'-2300') counties. It also occurs along the lower Klickitat River in Klickitat County, Washington, at least near Lyle (OSAC). It has not yet been found at sites along the east slope of the Cascades in Wasco County (e.g., White River State Game Management area; creeks along Rd. 48; Hwy. 26; Hwy. 216), where *C. a. sterope* is known to occur. Adults in these Columbia Gorge populations of *C. palla* are highly variable in phenotype. Males range from bright and pinkish above with reduced dark markings, similar to those from the east-central Cascades, to dark orange with swollen dark markings (some appear melanic), similar in appearance to *Chlosyne hoffmanni*. Pale median spots on the dorsal wing surfaces are highly variable in size and color. Most females are pale or dusky above, although dark females occur in small numbers. Despite the variability in dorsal phenotypes, adults of *C. palla* from the Columbia Gorge can consistently be separated from *C. acastus sterope*, with which they are parapatric and occasionally sympatric, by the intensity of orange coloration on the ventral forewing, and to some extent on the ventral hindwing. Adults of *C. palla* have a well-developed orange flush on the ventral forewing, which largely obscures details of the wing pattern. In *C. a. sterope*, this orange flush is normally reduced or absent, and details of ventral forewing pattern are well defined (also see Dornfeld 1980: 70). Additionally, adults of *C. palla* in this area average smaller, with more rounded wings, and with less contrasting markings above, compared to adults from nearby populations of *C. a. sterope* (also see biological notes below). The specimen of "*C. palla*" cited from Columbia County (see Hinchliff 1994: 124 and Pyle 2002: 295) is actually of *C. a. sterope* (see discussion herein on p. 231). Also see Higgins (1960).

Biological notes: In southern Oregon, from the Siskiyous to the Warners, and throughout the Aldrich, Blue and Wallowa mountains, *C. palla* is frequently encountered and may be locally common. Adults are less often seen in the Cascades, Ochocos, and at the east end of the Columbia River Gorge, where populations are more locally distributed. Males patrol along creeks, roads, hillside gullies and on serpentine outcroppings, and frequently visit mud and scat. Both sexes visit a wide variety of flowers. Most populations of *C. palla* in Oregon are situated in or very near forested habitats, even though adults are usually found in open areas. At some sites (see discussion under *C. acastus*, pp. 232-233), *C. palla* and *C. acastus* occur in sympatry, but populations of the two taxa usually occur in parapatry, and on average, adult flight times of the two species differ. Populations of *C. palla* in the Siskiyous and at the east end of the Columbia River Gorge (e.g., Wasco Co.) begin to fly in late April, weather permitting, and may fly through early June (Wasco Co.) or mid-July (Siskiyous). The Columbia Gorge populations occur in open forested habitats (*Pinus ponderosa – Quercus garryana* woodlands), from about 150' (near Rowena, Wasco Co.) to at least 2300' (Mill Creek Canyon, Wasco Co.), but extend to over 3500' in the Simcoe Mountains of Klickitat and Yakima counties, Washington (where adults fly in late June and July). In the Siskiyous, populations are known from about 900' (Rogue River drainage) to over 6000' (CSNM, Jackson Co.). Populations of *C. p. palla* from the Klamath Falls area, Klamath County, east through the Warner Mountains to Adel, Lake County, fly mostly in late May, June and July, at elevations from about 4200' (Klamath Falls) to over 6000' (Warner Mts.). Similarly, the east-central Cascadian and northeastern segregates fly primarily in June and July. Adults of the east-central Cascadian segregate fly from about 3000' (Camp Sherman area, Jefferson Co.) to at least 5000' (Klamath Co.), while populations in northeastern Oregon occur from about 4200' (many sites) to over 6500' (Wallowa Co.). One pair of adults has been examined from Steens Mountain, Harney County (Pike Creek Canyon, E side of Steens, 21 June 1974, OSAC). While these appear phenotypically similar to adults from the Blue and Wallowa mountains, evaluation of their phenotype is not possible from two specimens. These are tentatively associated with the segregate of *C. palla* in northeastern Oregon, although further study could indicate a closer relationship with populations of *C. p. palla* in Lake County.

No details on the immature stages or larval foodplants of *C. palla* from Oregon have been presented. In Washington, *Symphyotrichum campestre* var. *campestre* is the only documented larval foodplant (Jon Pelham pers. comm. 2004). Emmel et al. (1971: 238) reported *Solidago californica* as a larval foodplant of *C. palla* in Stanislaus County, California. Scott (1992: 41) reported *Erigeron speciosus* var. *macranthus* as a larval foodplant for *C. p. calydon* in eastern Colorado (also see Shields et al. 1970: 32). While populations of *C. palla* have been reported to use *Chrysothamnus* species as larval foodplants in California (e.g., Emmel & Emmel 1973: 35), records of *C. palla* using *Chrysothamnus* in the Pacific Northwest refer to *C. acastus* (see below). Guppy & Shepard (2001: 304) figured the eggs, first instar larvae, a prepupal larva, and a pupa of *C. palla* from British Columbia, which were reared on *Rhinanthus minor* ssp. *minor* (reported as *Rhinanthus crista-galli*). Also see Maeki & Remington (1961b: 184).

***Chlosyne acastus* (W. H. Edwards, 1874) (1870)**
_____(SE deserts) nr. *acastus* <u>Recorded</u>: Ha, Mal
_____(Snake River Basin, Burnt River Canyon) *dorothyi* Bauer, 1975 <u>Recorded</u>: **Ba**, Mal (along Snake R.), <u>Expected</u>: Wal (along Snake River)
_____(Columbia Basin) *sterope* (W. H. Edwards, 1870), **new combination** <u>Recorded</u>: Col (rare stray), Cr, Gi, Gr, **Je**, Mo, **Sh**, **Was**, Wh, <u>Expected</u>: De (NE), Um (NW), Wal (NE)
_____(Lake Co.?) <u>Recorded</u>: Lk?

<u>Taxonomic notes</u>: *Chlosyne acastus* and related taxa have been poorly studied until recently (e.g., Emmel et al. 1998e: 141-143, Austin 1998g: 576-577, Jon Pelham unpublished), and many questions about the species-level association of various populations remain. A detailed analysis of DNA sequence data from North American *Chlosyne* populations is being conducted (by N. Wahlberg, J. Llorente, J. Pelham and myself), in hopes of shedding light on the numerous unresolved taxonomic issues in the genus, particularly in the *C. palla* and *C. acastus* groups. Populations in the deserts of southeastern Oregon have previously been called *Chlosyne acastus acastus* (e.g., Dornfeld 1980: 69, Hinchliff 1994: 125). However, recent study of museum specimens from these populations (e.g., North Harney Lake, Harney Co.; W side Alvord Desert, Harney Co.; Trout Creek Mts., Malheur Co.; vic. Denio, Humboldt Co., Nevada) has shown that they are generally darker above than those of typical *Chlosyne acastus acastus* (TL: Provo Canyon, Utah Co., Utah; see Brown 1966b: 402-403), but not as dark as populations in Baker County (see below). Until these populations can be studied in more detail (along with those further north in Harney and Malheur counties, e.g., vic.

Juntura), and their relationship to populations of *C. a. acastus* (e.g., Utah, central Nevada) is better understood, they are herein called *Chlosyne acastus* nr. *acastus*.

At the south end of the Snake River Canyon, and in the Burnt River Canyon of Baker County, flies a segregate with darker adults, *Chlosyne acastus dorothyi* (TL: Durkee, [Baker Co.], Oregon). Males and females of *C. a. dorothyi* average considerably darker than those of *C. a.* nr. *acastus* from the southeastern deserts, but are highly variable on an individual basis. Some males have greatly increased dark markings above, resembling females, while others are much paler. Colored areas on males range from red-orange to pale yellow. The darkest females of *C. a. dorothyi* are similar to those of *C. a. sterope* (see below), although pale spots above tend to be larger and more colorful on *C. a. dorothyi* than on *C. a. sterope*. Males of *C. a. dorothyi* average darker tawny above than those of *C. a.* nr. *acastus*, but occasional males are similar to *C. a.* nr. *acastus*. Most adults of *C. a. dorothyi* have the broad wing shape of *C. a.* nr. *acastus*, but some individuals have shorter wings, and approach the phenotype seen at the north end of the Snake River Canyon of *Chlosyne acastus sterope*. The overall average adult phenotype of *C. a. dorothyi* is almost exactly intermediate between that of *C. a.* nr. *acastus* and *C. a. sterope* (see below), although wing shape is closer to that of *C. a.* nr. *acastus*, and average adult size of *C. a. dorothyi* averages larger than that of *C. a.* nr. *acastus* or *C. a. sterope*. The northern distributional extent of *C. a. dorothyi* is undetermined, since most of the Snake River Canyon (Hells Canyon) is largely inaccessible and has not been surveyed for the probable occurrence of *C. acastus*. However, populations of *C. acastus* at the north end of the Snake River Canyon (see below) are typical of *C. a. sterope*. The relationship of *C. a. dorothyi* to *C. a.* nr. *acastus* requires elaboration, and the southern extent of populations referable to *C. a dorothyi* in Malheur County is unclear (specimens from the Juntura area have not been personally examined). Likewise, specimens from Ada and Elmore counties, Idaho (Stanford & Opler 1993: 206), have not been personally examined, and it is unknown how these, or other population in the Snake River Basin of Idaho, may relate to *C. a. dorothyi*, *C. a.* nr. *acastus*, or *C. a. acastus*.

The original description of *Chlosyne acastus dorothyi* (see Bauer 1975: 157) was based on Howe's (1975: pl. 40) illustrations. However, the legend to plate 40 mislabeled *C. a. dorothyi* and *C. a sterope* (see Ferris 1989c: 43-44). Figures 9 and 12 are actually of *C. a. dorothyi* (not *C. a. sterope* as labeled), and figures 13 and 16 are actually of *C. a. sterope* (not *C. a. dorothyi* as labeled). The locality data for figures 9 and 16 are correct, but the locality data for figures 12 and 13 were reversed. The name *C. a. dorothyae* (see Hinchliff 1994: 125) apparently represents an incorrect subsequent spelling (see ICZN 1999: 39, art. 32.5.1, p. 42-43, art. 33.2.3, 33.3).

The taxonomic status of *Chlosyne sterope* (TL: Tygh Valley, Wasco Co., Oregon, see Brown 1966b: 407 and Bauer 1975: 157) has been unsettled (also see Leussler 1931). Dos Passos (1964: 84) treated *C. sterope* as a full species. Bauer (1975: 156) treated *C. sterope* as a segregate of *C. palla*, yet discussed several morphological and biological characters of *C. sterope* that are more typical of *C. acastus* than *C. palla*. Dornfeld (1980: 70) commented on the pale ventral phenotype of *C. a. sterope* and its similarity to *C. acastus*, but retained *sterope* as a segregate of *C. palla*. Perhaps, the consistent presence of dark females in populations of *C. a. sterope*, superficially similar to dark females of *C. palla*, has heavily influenced previous authors (e.g., Bauer 1975, Dornfeld 1980, Ferris 1981b, Tilden & Smith 1986: 101, Hinchliff 1994, Guppy & Shepard 2001, Pyle 2002) who have treated *C. a. sterope* as a segregate of *C. palla*. However, life history and most morphological characters indicate that *C. sterope* is conspecific with *C. acastus* (as first noted by Jon Pelham, pers. comm. 2001). Populations of *C. a. acastus*, *C. a.* nr. *acastus*, *C. a. dorothyi* and *C. a. sterope* all share the same habitat types, larval foodplants (see below), and adult flight times. Adults appear to show considerable overlap in phenotypes where segregates occur in close proximity to each other. Additionally, all of these *C. acastus* segregates are sympatric or parapatric (but mostly asynchronic) with nearby populations of *C. palla* at the upper elevational extent of their ranges (see below). Females of *C. a. sterope* consistently have small to medium-sized pale spots against a dark background above, although a few have limited tawny markings. Females of *C. a. sterope* and dark females of *C. palla* differ in several subtle ways, including ventral maculation and wing shape (see discussion on p. 228), and the name "*eremita*" should not be applied to females of *C. a. sterope* (*contra* Dornfeld 1980: 70). Males of *C. a. sterope* tend to be strongly two-toned above, with yellow median markings, and vary from bright to quite dark above, sometimes almost as dark as females.

Chlosyne acastus sterope is apparently endemic to the lower Columbia Basin, not extending south of the lower Snake River Canyon, and not extending north into British Columbia (e.g., Guppy & Shepard 2001: 304). Records of *C.* "*palla sterope*" plotted by Guppy & Shepard (2001: 304) from Idaho County, Idaho, apparently refer to dark females of *C. palla*, based on dark female specimens of *C. palla* deposited by Shepard in the OSAC collection. The eastern distributional limits of *C. a. sterope* are not entirely clear. Judging from its apparent habitat requirements in seasonally dry, xeric canyons and flats, it probably does not range into Idaho to any significant extent, other than possibly along the lower Clearwater River (e.g., Nez Perce Co.), or along the lower Salmon River, below about 3000'. Reports of *Chlosyne* "*palla* nr. *sterope*" (Ferris 1981b: 324, dorsal female at far right, p. 325) from Montana clearly refer to *C. palla* populations that contain dusky and dark female forms (see discussion of *C. palla*, p. 227). One male specimen of *C. a. sterope* (personally examined in 2004) is known from Columbia County, Oregon (2 mi. W of pavement on Bunker Hill Rd., ca. 1 mi. S of Hilard Rd. Guard Station, 15 May 1988, Vern Covlin; see Hinchliff 1994: 124 and Pyle 2002: 295). While a second individual was seen the day this adult was sampled (V. Covlin pers. comm. 2004), subsequent searches at that site have failed to locate additional adults of *C. a. sterope*. For now, it is assumed that these individuals were rare strays or temporary colonists from the east side of the Columbia River Gorge.

Confirmation of the apparent conspecific relationship of *C. acastus* and *C. sterope* will create some taxonomic issues, since *C. sterope* is the senior of the two names. For now, in the interest of nomenclatural stability (see ICZN 1999: xx, 28: art. 23.9.3), in anticipation of results from ongoing molecular studies and an application to the ICZN, *Chlosyne sterope* is treated as a segregate of *Chlosyne acastus* (W. H. Edwards, 1874) (1870). A more complete discussion of the taxonomic status of *C. a. sterope*, and its relationship to other *Chlosyne* populations, will be presented elsewhere once results of

DNA studies have been completed. Should results from those studies corroborate the morphological and biological characters that suggest the conspecificity of *C. acastus* and *C. sterope*, the synonymy of the group will be formally adjusted.

The taxonomic status of *Chlosyne* populations in Lake County, near Silver Lake (e.g., Hinchliff 1994: 125) and Summer Lake (e.g., Paisley Flat, 16 June 2000, D. Thackaberry), is unclear. I have not studied these populations in the field, and have not examined specimens from these sites. While these records may possibly refer to unusual populations of *Chlosyne palla*, they may relate to an entity that is known to occur at least on the Sheldon Antelope Range of Washoe County, Nevada (this was called *C. a. dorothyi* by Austin 1998c; adults sampled by George Austin were personally examined at the McGuire Center for Lepidoptera, Gainesville, Florida, in 2004). Adults of this entity average slightly smaller than those of *C. a.* nr. *acastus* and *C. a. dorothyi*, and have more rounded wings. Females are dusky to dark above, and males are dark and red-orange above. In overall phenotype, especially size and wing shape, they are similar to *C. a. sterope*, but females from Washoe County average slightly tawnier above. Further study in Washoe and Lake counties is needed before the species-level identity of *Chlosyne* populations there can be known. For now, records of *C. acastus* from Lake County are tentatively associated with the entity from Washoe County, Nevada, but this association is speculative, and requires confirmation.

<u>Biological notes</u>: *Chlosyne acastus* occurs primarily in basin habitats in Oregon, mostly below 5000' in the southeastern deserts, and generally below 3000' in the Columbia and Snake River basins. Adults are normally found in gullies, but also occur on hillsides where larval foodplants grow. Males of all segregates patrol in gullies, and visit mud. Both sexes visit a wide variety of flowers. In the Burnt River Canyon (Baker Co.), adults are strongly attracted to rare, spring-blooming *Chrysothamnus* flowers (pers. obs.). Flight times of all segregates of *C. acastus* in Oregon are similar. The single annual brood flies from mid-April to mid-June, and records extend from about 100' to 3000' in the Columbia Basin, from about 2500' to 3000' in Baker County, and from about 4200' to 6000' in southern Harney County.

The larval foodplant for all segregates of *C. acastus* in Oregon is *Chrysothamnus viscidiflorus* var. *viscidiflorus*, although other *Chrysothamnus* species may possibly be used as well. No details on immature stages have been presented for populations in Oregon. Various populations of *C. acastus* have been reared (e.g., Utah, California, see Emmel et al. 1998e: 141), but detailed descriptions of immature stages remain unpublished.

Throughout most of the range of *C. acastus,* it is often sympatric or parapatric with various populations of *C. palla* at its upper elevational limits (e.g., Ferris 1977: 140). Adults of *Chlosyne acastus* usually fly earlier than those of *C. palla*, but areas of regular overlap in flight times are known, and variation in seasonal conditions may place adults of the two species in sympatry on an irregular basis, in many areas. In southern Harney County, the population of *C. palla* on Steens Mountain appears to be sympatric or parapatric with local populations of *C. acastus* nr. *acastus* (see Hinchliff 1994: 124-125).

In Baker County, *C. palla* flies in sympatry with *C. acastus dorothyi* at Durkee (the TL of *C. a. dorothyi*), although *C. a. dorothyi* is more common at lower elevations in the Burnt River drainage, and Durkee appears to be at its upper elevational limit. In Baker County, as well as in southern Harney County, *C. acastus* flies mostly from early May to early June, in habitats populated by *Chrysothamnus viscidiflorus*, while *C. palla* flies from mid-June to mid-July, primarily in montane habitats above areas where *Chrysothamnus* grows. Throughout the northwestern drainages of the Blue and Ochoco mountains, *C. a. sterope* occurs in xeric, low-elevation habitats where *Chrysothamnus viscidiflorus* grows in abundance. While *C. a. sterope* has not yet been found in sympatry with *C. palla* in northeastern Oregon, they occur in parapatry at least in the John Day River, Crooked River and Deschutes River drainages, and areas of regular or occasional sympatry are likely to exist in these areas. At the east end of the Columbia River Gorge, *C. a. sterope* and *C. palla* are mostly parapatric, but are narrowly sympatric southwest of The Dalles (Wasco Co.). In this area, as an exception to areas where *C. palla* occurs at higher elevations, flight times of *C. palla* and *C. a. sterope* are largely synchronic, and in some years (e.g., 2004), fresh adults of *C. a. sterope* can be found long after the peak flight of parapatric *C. palla* populations.

Chlosyne hoffmanni **(Behr, 1863)**

_____(Siskiyous, Cascades) *segregata* (Barnes & McDunnough, 1918) Recorded: **Clk** (E), De (W), Do (E), **HR**, **Ja**, **Je** (W), Jo (S), Kl (W), **La** (E), **Lin** (E), Mar (E), **Was** (W), Expected: Mu (E)

Taxonomic notes: The taxonomy of *Chlosyne hoffmanni* is in need of review. Previous authors (e.g., Bauer 1975: 161, Dornfeld 1980: 70, Hinchliff 1994: 126) have considered all populations in Oregon to represent *Chlosyne hoffmanni segregata* (TL: Crater Lake, 6500', Klamath Co., Oregon). Specimens I have examined from the Cascades in Oregon are consistent with typical *C. h. segregata*, from the CSNM (and Mt. Ashland), Jackson County, north to Mt. Hood, Hood River and Wasco counties. Adults from the Siskiyous of Josephine County (e.g., vic. Bolan Mt.) average somewhat paler above than those from the Cascades, and in this respect phenotypically approach *Chlosyne hoffmanni hoffmanni* (TL: Gold Lake, Sierra Co., California, see Emmel et al. 1998h: 99). However, adults of *C. h. hoffmanni* from California tend to be paler below than those from Josephine County (which below are similar to other populations in Oregon), and are usually even paler on the dorsal surface. Since Shapiro et al. (1981: 97-98) considered all populations of *C. hoffmanni* in the Trinity Alps of northern California to represent *C. h. segregata*, all populations in Oregon are tentatively considered to represent *Chlosyne hoffmanni segregata*, until patterns of variation in the Siskiyous and nearby areas are better understood (also see Bauer 1975: 161).

The relationship of *C. h. segregata* in Oregon to populations called *Chlosyne hoffmanni manchada* Bauer, 1960 (TL: Tumwater Canyon, 1600', Chelan Co., Washington) in Washington requires further study (also see Pyle 2002: 291). Compared to *C. h. segregata*, on average, adults of *C. h. manchada* are slightly darker above (especially basal of the median spot bands), and the median spots tend to be very pale, giving the upper side a more contrasting, two-toned appearance. Currently, the Columbia River Gorge is considered to represent a boundary between *C. h. segregata* and *C. h. manchada* (e.g., Hinchliff 1994: 126, 1996: 108, Guppy & Shepard 2001: 306). Lower-elevation habitats in the Columbia Gorge, between the ranges of *C. h. manchada* and *C. h. segregata*, are occupied by *Chlosyne palla* (see discussion herein on pp. 227-228). The single record of *C. hoffmanni* from southeast of The Dalles (Mill Creek Canyon, 3 May 1970; see Hinchliff 1994: 126), Wasco County, refers to a specimen of the local population of *C. palla* (specimen personally examined in OSAC, 2004). Also see Comstock (1924c).

Biological notes: In Oregon, *C. hoffmanni* is found in moist and dry montane meadows where larval foodplants grow. Males patrol territories in sunny or partly shaded forest openings and in meadows, and visit mud. Both sexes frequently visit flowers. Adults fly in a single annual brood, from mid-June to late August, depending on elevation and seasonal conditions. Records of *C. hoffmanni* in Oregon extend from about 2500' (Rd. 48, Wasco Co.) to over 7000' (Crater Lake area, Klamath Co.; Mt. Ashland, Jackson Co.). *Chlosyne hoffmanni* is sympatric with *C. palla* in many areas (e.g., CSNM and Mt. Ashland, Jackson Co.; several sites in Lane and Linn counties; Camp Sherman area, Jefferson Co.; Crater Lake area, Klamath Co.), and is parapatric with *C. palla* throughout much of its distribution in Oregon. On average, *C. hoffmanni* flies at higher elevations and on later dates than does *C. palla*, but the two can be taken in exact sympatry and synchrony. Genitalically, *C. palla* and *C. hoffmanni* are easily distinguished, even when their identities based on adult wing phenotypes are questionable (see Bauer 1960). In southwestern Wasco (vic. Rd. 48) and northern Jefferson (lower Metolius River) counties, *C. hoffmanni* and *C. acastus sterope* occur in close parapatry, and probably in occasional sympatry.

Details on larval foodplants or early stages of *C. hoffmanni* from Oregon have not been reported. Newcomer (1967a) described the immature stages of *C. h. manchada* from Washington, and reported *Eurybia conspicua* (as *Aster conspicuus*) as a larval foodplant. Jon Pelham (pers. comm. 2004) has also recorded *Eucephalus ledophyllus* var. *ledophyllus* as a larval foodplant of *C. hoffmanni* in Washington. Shapiro et al. (1981: 98) reported *E. ledophyllus* (as *Aster ledophyllus*) as a larval foodplant of *C. h. segregata* in the Trinity Alps of northern California. Also see T. Emmel & J. Emmel (1963).

Phyciodes orseis **W. H. Edwards, 1871**

_____(Siskiyous, far S Cascades) *orseis* Recorded: **Ja**, Jo, **Kl** (far SW), Expected: Cu
_____(Warners) nr. *herlani* Bauer, 1975 Recorded: Lk (S)

Taxonomic notes: Two distinct groups of *Phyciodes orseis* populations exist in Oregon. Populations in Josephine, Jackson and extreme southwestern Klamath counties represent *Phyciodes orseis orseis* (TL: Mt. St. Helena, Napa Co., California; see Brown 1966b: 450). Adults in these populations are large and very dark, above and below. A poorly known group of *P. orseis* populations occurs in the Warner Mountains of Modoc

County, California (George Austin pers comm. 2004), and Lake County, Oregon (ca. 6000'). These adults are smaller than those of *P. o. orseis*, and are considerably paler above and below. Overall, they are phenotypically similar to the sympatric *P. mylitta* (which averages paler above) and *P. pulchella*, but differ from both in details of wing shape and markings. Adults of *P. orseis* from the Warner Mountains are somewhat similar to *Phyciodes orseis herlani* (TL: Glenbrook Creek, 7000', Douglas Co., Nevada), but average larger and darker above. However, only a few specimens from the Warners have been examined to date, and the range of phenotypic variation in populations there is unknown. More study of populations in the Warner Mountains is needed in order to determine their relationship to typical populations of *P. o. orseis* and *P. o. herlani*. For now, populations in the Warner Mountains are tentatively called *Phyciodes orseis* nr. *herlani*. Very few specimens of *P. o.* nr. *herlani* are known from the Warners, possibly because of confusion with the "common" and therefore infrequently sampled species, *P. mylitta* and *P. pulchella*. The ventral image of a female "*P. orseis*" in Pyle (2002: 297, middle right) is of a female *P. pulchella montana*. Likewise, the lower right image of "*P. orseis*" in Pyle (2002: 301) is apparently of a female *P. p. montana*. The best images available of *P. o. orseis* and *P. o. herlani* are in Howe (1975: pl. 43, #6, pl. 45, #9-10) and Dornfeld (1980: 165: #4a-d). Also see Wahlberg et al. (2003).

<u>Biological notes</u>: In Oregon, *Phyciodes orseis* is highly local in its distribution, but is sometimes abundant where it occurs. Adults fly along roadsides and on dry hillsides, but very little about their habitat requirements is known (also see Shapiro et al. 1981: 99). The single annual brood of *P. o. orseis* flies from mid-April to late June, depending on elevation and seasonal conditions, with most records in May. Populations of *P. o. orseis* occur from about 1300' (vic. town of Applegate, Jackson Co.) to about 4500' (CSNM, Jackson Co.). Records of *P. o.* nr. *herlani* from the Warners are from July, from around 6000' (vic. Camas Creek).

No details on the early stages of *P. orseis* from Oregon have been reported. Scott (1992: 42) described the full-grown larva and pupa of *P. o. orseis* from Siskiyou County, California, which he reared on *Cynara scolymus* (artichoke). Subsequently, Scott (1994: 22-23) described the immature stages of *P. o. orseis* from Siskiyou County in more detail, and reported *Cirsium cymosum* is the larval foodplant there (also see Shapiro et al. 1981: 100). Scott (1974a, 1992: 42, 1994: 24-25) described the early stages of *P. o. herlani* from Douglas County, Nevada, and El Dorado Co., California, which were reared in the lab on *Cirsium arvense*. Larval foodplants of *P. o. herlani* around Lake Tahoe, California, reportedly include *Cirsium andersonii* (see Scott 1994: 24).

***Phyciodes pallida* (W. H. Edwards, 1864)**

_____(Deschutes, John Day & Snake River drainages) *barnesi* Skinner, 1897 <u>Recorded</u>: Ba (E), Gi, Gr (W), Je (W), **Sh**, Wal (E), Was, Wh, <u>Expected</u>: Mal (NE), Mo, Um (NW)

<u>Taxonomic notes</u>: Pacific Northwestern populations of *Phyciodes pallida* are apparently referable to *Phyciodes pallida barnesi* (TL: Glenwood Springs, [Garfield Co.], Colorado). No geographic variation has been seen across populations of *P. pallida* in

Oregon, although adults are individually variable and sexually dimorphic. Putative differences between *P. p. barnesi* and *Phyciodes pallida pallida* (TL: Flagstaff Mt., Boulder Co., Colorado; see Brown 1966b: 448) need to be reevaluated (see Ferris 1981b: 322, but also see Scott 1994: 17-21, 1998a: 5-6), taking into consideration extremes of individual variation in adult and larval phenotypes across all known populations. Until then, the usefulness of trinomials to describe variation in this species will remain questionable. The "female" *P. pallida* in Pyle (2002: 297, lower left) is actually a male, and the "female" *P. pallida* in Pyle (2002: 302, lower left) is also a male. Also see Wahlberg et al. (2003).

Biological notes: In Oregon, *Phyciodes pallida* is infrequently encountered. Most records are from xeric habitats in the lower Deschutes River drainage, but scattered records also exist from the John Day River drainage and the Snake River drainage. Adults fly along dry roadsides and margins of creeks and rivers, and males visit mud. Females are usually found at flowers or near larval foodplants. The single annual brood flies from late April to late June, depending on elevation and seasonal conditions, with most records from May. Records of *P. pallida* in Oregon exist from about 100' (nr. mouth of Deschutes River, Sherman Co.) to over 4000' (Wallowa Co.).

No details on the immature stages or larval foodplants of *P. p. barnesi* in Oregon have been presented. Scott (1994: 20-21) described the late-instar larva and pupa of *P. p. barnesi* from western Colorado, which fed on *Cirsium neomexicanum*. Jon Pelham (in Scott 1998a: 5) described the late-instar larva of *P. p. barnesi* from Whitman County, Washington, and reported *Cirsium undulatum* as the larval foodplant there. Adults are apparently associated with *C. undulatum* in Oregon, in the lower Deschutes River drainage (e.g., N of Sherar's Bridge, pers. obs.). Guppy & Shepard (2001: 302) figured the eggs, full-grown larva and pupa of *P. p. barnesi* from British Columbia, which were reared on *C. undulatum*. Scott (1976a) briefly described the late-instar larva of *P. p. pallida* from eastern Colorado, which he reared on *Cirsium vulgare*. He later (1992: 42-43, 1994: 18-20) described all immatures of *P. p. pallida* from eastern Colorado in detail, and reported *Cirsium ochrocentrum* and *C. undulatum* as larval foodplants there.

***Phyciodes mylitta* (W. H. Edwards, 1861)**

_____(most of state) *mylitta* Recorded: all counties

Taxonomic notes: Populations of *Phyciodes mylitta* in Oregon are referable to *Phyciodes mylitta mylitta* (TL: Stanyan Hill, San Francisco, [San Francisco Co.], California; see Brown 1966b: 442). Various segregates of *P. mylitta* with darker adults occur in the southwestern United States and throughout montane Mexico (see Higgins 1981, Scott 1994: 13-17, 1998a: 4-5 and Wahlberg et al. 2003). Also see Fender (1930).

Biological notes: *Phyciodes mylitta* is widespread throughout Oregon, and occurs in essentially all habitat types, except subalpine meadows. Adults are frequently found along roadsides, where males guard perches. Both sexes visit a wide variety of flowers (see Pyle 2002: 303), and males visit mud and scat. Two or three annual generations of

P. mylitta fly in Oregon, from early March to late October, depending on elevation and seasonal conditions. Shapiro (1975g: 119) reported four annual broods of *P. mylitta* in the Sacramento Valley of California. Adults of the first brood are smaller and darker than those of later broods. In Oregon, records of *P. mylitta* extend from sea level to over 8000' (vic. Light Peak, Lake Co.; Steens Mt., Harney Co.).

No details on immature stages or larval foodplants of *P. mylitta* from Oregon have been presented. Mead (1875: 764-765) described the immatures of *P. mylitta* from California, based on information from Henry Edwards, and Dyar (1891c: 203-204) described the early stages from Yosemite. Hardy (1964) described the immature stages of *P. mylitta* from Vancouver Island, where they were reported to feed on *Cirsium arvense*. Dammers in Emmel & Emmel (1973: 40) illustrated the full-grown larva and pupa of *P. mylitta* from California. Scott (1976a) briefly described the full-grown larva of *P. mylitta* from California, and later (1992: 42, 1994: 14-15) described the last-instar larva and pupa in more detail. Guppy & Shepard (2001: 303) figured a full-grown larva and pupa of *P. mylitta* from British Columbia. Foodplants in Washington include various species of *Cirsium*, at least including *C. arvense*, *C. vulgare*, *C. undulatum*, *C. remotifolium*, *C. edule* and *C. hookerianum* (Jon Pelham pers. comm. 2004). Probably, *P. mylitta* larvae feed on additional *Cirsium* species (e.g., *C. douglasii* var. *breweri*, see Shapiro et al, 1981: 100), as well as species in other genera such as *Silybum marianum* (e.g., Shapiro 1975a: 196, 1975g: 119, Graves & Shapiro 2003: 425). As noted by Guppy & Shepard (2001: 303), the spread of *Cirsium arvense* (Canadian thistle) may have enabled *P. mylitta* to expand into habitats and regions that were formerly unoccupied. The image of a "male" *P. mylitta* figured by Pyle (2002: 303, upper right) is of a female.

***Phyciodes cocyta* (Cramer, 1777)**

_____(Columbia Basin, Blues, Wallowas) *pascoensis* W. G. Wright, 1905 <u>Recorded</u>: Ba, Gr, Mo (N), Um (NW), Wal, <u>Expected</u>: Cr?, Gi (N), Ha (N), Mal (N), Sh, Un, Wh?

<u>Taxonomic notes</u>: This species was formerly known as *Phyciodes tharos* (e.g., Dornfeld 1980: 67) or *P. selenis* (e.g., Hinchliff 1994: 127). Scott (1994: 35-36) argued that *P. selenis* (W. Kirby, 1837) (TL: Cumberland House, Saskatchewan; see Scott 1994: 35) is a junior synonym of *P. cocyta* (TL: Black Rock, Cape Breton, Nova Scotia; see Scott 1994: 36), and Wahlberg et al. (2003) demonstrated that *P. tharos* and *P. cocyta* are separate species. *Phyciodes cocyta* is poorly known in Oregon. I have not personally studied *P. cocyta* in the field in Oregon, and museum specimens from Oregon are scarce (only 1 female in OSAC: 3 mi. N Hermiston, Umatilla Co., 12 June 1963, D. Bauer). Populations along the Columbia River (vic. Boardman and Irrigon, Morrow Co.; vic. Hermiston, Umatilla Co.) refer to typical *Phyciodes cocyta pascoensis* (TL: Pasco, [Franklin Co.], Washington; see Tilden 1975: 23).

Adults of *P. cocyta* have not been personally examined from the Blue Mountains (e.g., Rock Creek, NW of Baker City, Baker Co., 7 July 1957; 2 mi. S Seneca, 26 July 1981, and Co. Rd. 20 at Bear Creek, 1 mi. NW Galena, 12 July, both Grant Co.), Wallowa Mountains (vic. Wallowa Lake, Wallowa Co.), or from the lower Grande Ronde or Imnaha rivers (Wallowa Co.). However, six specimens from along the Snake River (e.g., Snake River Rd., Baker Co., 20 June 1971, see Dornfeld 1980: 165; mouth of Wildhorse River, Adams Co., Idaho, 18 June to 15 July 1959, S. Jewett, OSAC) have been examined. The relationships between populations of *P. cocyta* in the Columbia Basin and elsewhere in Oregon are currently unknown. Until additional populations are located and more specimens become available, all populations in Oregon are tentatively called *Phyciodes cocyta pascoensis*. However, basin and montane populations in Washington have been considered to represent two distinct segregates (e.g., Hinchliff 1996: 109, but see Guppy & Shepard 2001: 299). It is quite possible that significant phenotypic or ecological differences do exist between basin and montane populations of *P. cocyta* in Oregon, but confirmation of this must await future studies. Elsewhere (e.g., W Colorado), basin and montane populations of *P. cocyta* have recently been considered to represent separate species by some authors (e.g., Scott 1998a: 11-13, 19-24). However, extensive studies on basin versus montane populations of *P. cocyta* throughout the American west have not been conducted, and preliminary DNA sequence analyses suggest that basin and montane *P. cocyta* populations in western Colorado that occur in parapatry are very closely related (see Wahlberg et al. 2003). Clearly, much further study of *P. cocyta* in Oregon and elsewhere is needed.

Biological notes: In Oregon, *P. cocyta* occurs in native and disturbed riparian habitats along the margins of the Columbia, lower Grande Ronde, lower Imnaha and Snake rivers. In these areas, it should be sought wherever its probable larval foodplant, *Symphyotrichum frondosum* (see below), grows in abundance. Along the Columbia River (ca. 200'-300'), *P. c. pascoensis* apparently flies in two annual broods, with records in Oregon from June, and from mid-August to early September. Available data from other populations in Oregon indicates at least one brood in June and July along the Snake River, although the possibility of a second brood in that area has not been investigated. Montane populations (e.g., Wallowa County, 6000') are probably univoltine, with records from July and August. Habitats of montane *P. cocyta* populations apparently include, at least, moist riparian areas (e.g., Wallowa Lake, Wallowa Co.).

No details on immature stages or larval foodplants from populations of *P. cocyta* in Oregon have been presented. Throughout its North American range, *P. cocyta* larvae feed on various species of *Symphyotrichum, Eurybia* and *Eucephalus*, among other composites, but different geographic segregates tend to specialize on certain foodplant species (e.g., Scott 1994: 39-40). In Washington, larvae of typical *P. c. pascoensis* feed on *Symphyotrichum frondosum*, which is the only confirmed foodplant for that segregate (Jon Pelham pers. comm. 2003). Populations of *P. c. pascoensis* in northern Morrow and Umatilla counties, Oregon, are probably associated with *S. frondosum*, but this requires confirmation. Montane populations of *P. cocyta* in Washington are associated with *Eucephalus ledophyllus* var. *ledophyllus* (Jon Pelham pers. comm. 2004). Scott (1994: 39-43) described the immature stages of *P. cocyta* from eastern Colorado, and reported *Symphyotrichum laeve* var. *geyeri* (as *Aster laevis* var. *geyeri*) as the larval foodplant there. Subsequently, Scott (1998a: 12-13) reported *Symphyotrichum foliaceum* (as *Aster foliaceus*) and (p. 22) *Eurybia glauca* (as *A. glaucoides*) as larval foodplants for two sets of *P. cocyta* populations in western Colorado, and described immatures of both segregates (pp. 13, 23-24).

Phyciodes pulchella **(Boisduval, 1852)**

_____(Willamette Valley) nr. *pulchella* Recorded: **Be**, La (central), Lin, Po, Ya, Expected: Clk (W)?, Col?, Li (E)?, Mar (W)?, Wan?

_____(Siskiyous, SW Cascades) Recorded: **Cu**, **Do**, **Ja**, **Jo**, Kl (far SW), **La**, Expected: Cos (S), Lin?

_____(Cascades, high elevations) nr. *montana* (Behr, 1863) Recorded: **De** (W), Do (far E), HR, **Je** (W), **Kl** (N), **La** (far E), **Lin** (far E), Mar (E), Expected: Clk (E), Ja (far NE)

_____(NE Cascades, Ochocos, Aldrichs, Blues, Wallowas) *owimba* Scott, 1998 Recorded: **Ba**, **Cr**, De (N-central), Gi, **Gr**, Ha (N), **Je**, **Mal** (N), **Mo**, Sh, **Um**, **Un**, **Wal**, **Was**, **Wh**

_____(far SE Cascades, Warners, SE Ranges) *inornatus* Austin, 1998 Recorded: Ha (S), Kl (SE), **Lk**, Mal (S)

Taxonomic notes: Populations of *Phyciodes pulchella* in Oregon were called *Phyciodes campestris* (Behr, 1863) by Dornfeld (1980: 67), and *Phyciodes pratensis* (Behr, 1863) by Hinchliff (1994: 128) and Guppy & Shepard (2001: 301). However, Scott (1994: 65-73, 1998a: 24) argued that *P. pulchella*, a name with priority over *P. campestris* and *P. pratensis*, was the correct name for this species (also see Emmel et al. 1998i: 18). The type locality for all three names is San Francisco, [San Francisco Co.], California (see Scott 1994: 72-73). Despite treatments by Dornfeld (1980), Hinchliff (1994) and Guppy & Shepard (2001), which made little mention of geographic variation in this species, *P. pulchella* displays a considerable amount of geographic variability in Oregon (also see Austin 1998k). Populations of *P. pulchella* in the Willamette Valley are composed of large adults that are quite dark above, and forewing shape is somewhat pointed below the apex. Due to their large size and overall dusky appearance, adults in these populations closely resemble topotypical *P. p. pulchella*. While adults from the Willamette Valley are nearly identical to those of *P. p. pulchella*, they are herein called *Phyciodes pulchella* nr. *pulchella*, since their distribution with respect to that of *P. p. pulchella* is highly disjunct, and ecological differences between populations in the two regions apparently exist (see below). The single known record of *P. pulchella* from Clackamas County (e.g., Hinchliff 1994: 128) is labeled from "Trout Creek near Sandy, 30 September 1968, E. L. Griepentrog" (from Hinchliff's data notebooks in OSAC). Since no other specimens of *P. pulchella* are known from this area, and since no populations of *P. pulchella* in Oregon are known to be double brooded (see below), mislabeling in this instance is suspected, and Clackamas County is not included in the distribution of *P. pulchella*. However, *P. pulchella* should occur in southeastern Clackamas County, at high elevations, and search should be conducted throughout western parts of the county for low-elevation populations.

To the south and east of the Willamette Valley, in the Siskiyous and lower elevations in the southwestern Cascades (S Lane to S Jackson counties and extreme SW Klamath Co.), adults of *P. pulchella* are smaller and somewhat brighter above than those from the Willamette Valley. However, they retain the rather pointed wing shape of *P. p.* nr. *pulchella*, and like adults from the Willamette Valley, due to the dark tawny coloration of the median spot band, they lack the distinctly two-toned dorsal aspect that adults from eastern Oregon normally display. For now, no trinomial is associated with populations of *P. pulchella* in the southwestern Cascades and Siskiyous.

At higher elevations in the Cascades, the range of individual variation within populations of *P. pulchella* becomes enormous. Some adults in this region closely resemble those from lower elevations (to the E and W) with dark adults, but others are bright tawny above, with extensively reduced dark wing pattern elements. Phenotypically, the brightest and palest of these adults resemble *Phyciodes pulchella montana* (TL: Tuolumne Meadows, Tuolumne Co., California; see Emmel et al. 1998h: 100). However, as noted by Dornfeld (1980: 67-68), nowhere in Oregon is this phenotype known to occur in a "pure" form, although the population at Diamond Lake, Douglas County, comes close. Most adults in these populations are phenotypically intermediate between those from dark populations at lower elevations, and the bright Californian *P. p. montana*. Herein, the name *Phyciodes pulchella* nr. *montana* is tentatively applied to populations in Oregon where at least some adults of the bright form occur. Populations representing *P. p.* nr. *montana* occur in eastern Douglas County (Diamond Lake area), northern Klamath County (many sites), extreme eastern Lane and Linn counties (various sites above 3000'), eastern Marion County (Elk Lake area), Deschutes County (western half) and far western Jefferson County. This phenotype may also occur in extreme northeastern Jackson County. The population of *P. pulchella* in the Camp Sherman area, Jefferson County, includes rare adults of or near the *P. p.* nr. *montana* phenotype, but most adults are dark. I have examined only a single specimen of *P. pulchella* from Hood River County (Hood River Meadows, 4500', 5 August 1953, S. Jewett, OSAC), which is intermediate between dark and pale forms. Also see Shapiro (1975c) and Austin (1998k: 740).

Along the northeastern slope of the Cascades, and in the northeastern ranges, adults of *P. pulchella* are more two-toned in appearance above than those from west of the Cascades, due to paler yellow median spot bands against a dark ground color. Additionally, the forewing shape of adults from east of the Cascadian crest is more rounded than that of adults from west of the Cascadian crest at lower elevations. While there is subtle variation in dorsal coloration among populations of *P. pulchella* in northeastern Oregon, until these populations can be studied in greater detail, they are herein called *Phyciodes pulchella owimba* (TL: Pattee Canyon, 3500', Missoula Co., Montana). These occur along the northeastern Cascades in Wasco County, south into Jefferson and northern Deschutes counties, where populations become "diluted" to a variable extent with phenotypes of *P. p.* nr. *montana*. To the east, *P. p. owimba* is known from all counties touching the Columbia River, and all counties in northeastern Oregon, south to northern Malheur, northern Harney, and Crook counties. A similar phenotype occurs in southeastern Klamath County (e.g., Bly Mt. area) and much of Lake County, including the Warner Mountains (see below).

Populations of *P. pulchella* in southern Harney County (Steens Mt. area) and southern Malheur County (Sage and Indian creeks, nr. McDermitt), are composed of adults that are paler and more contrastingly two-toned above than adults from elsewhere in Oregon. According to Austin (1998k), these are referable to *Phyciodes pulchella inornatus* (TL: Clear Creek, Clearwater Canyon, 2.9 rd. mi. E Grass Valley Rd., 1500 m, Sonoma Range, Pershing Co., Nevada). Adults from the Warner Mountains, east to the Bly Mountain area, Klamath County, average somewhat darker above than those from Steens Mountain, but populations in the Warners were also considered to represent *P. p. inornatus* by Austin (1998k: 747). Further study is needed in Klamath, Lake and Harney counties to determine the relationship of populations there to typical *P. p. inornatus*, and to populations of *P. pulchella* further west, in the Siskiyous. For now, I have followed Austin (1998k), and have included populations from southeastern Klamath and Lake counties with *P. p. inornatus*. Future study of variation in *P. pulchella* in eastern Oregon may show that *P. p. owimba* (publication date 20 February 1998) and *P. p. inornatus* ([18] December 1998) could be considered synonymous. They were not compared to each other in their original descriptions, and they seem to represent similar phenotypes, although *P. p. owimba* appears to average darker and less two-toned above. Also see Tilden (1970), Higgins (1981), Scott (1998a) and Davenport (2003: 37, 2004b: 41-42).

Biological notes: In the Willamette Valley, *P. pulchella* nr. *pulchella* is very local in its distribution, and known colonies occur primarily on or near native prairie habitats. To date, I know of only three extant populations, in Benton and Lane counties. The potential continued presence of this segregate in Yamhill County (Muddy Valley, ca. 4 mi. W McMinnville, 16 May 1928; Baker Creek Valley, 6 August 1930, both Jewett) and Polk County (nr. Monmouth, 30 May 1964, McCorkle) requires verification. Additionally, colonies should be sought in Marion, Clackamas, Lincoln, Washington and possibly Columbia counties. Throughout the rest of the state where *P. pulchella* occurs, populations are more widespread, and adults can be locally common in a wide variety of habitats. Males patrol in sunny meadows, gullies, or along roadsides, and visit mud and scat. Both sexes visit a wide variety of flowers. All populations of *P. pulchella* in Oregon appear to be univoltine, in contrast to populations further south in California (e.g., Shapiro 1975g: 118, Shapiro et al. 1981: 99) and Nevada (Austin 1998k), which may have two or three annual broods. Records of *P. p.* nr. *pulchella* in the Willamette Valley extend from mid-May to early July, and are from elevations below 1000'. Records of *P. pulchella* from the Siskiyous extend from late May to late July, depending on elevation and seasonal conditions, and from near sea level to at least 6500' (Mt. Ashland, Jackson Co.). Throughout eastern Oregon, *P. pulchella* flies primarily from late May through early September (mostly in June and July), and records extend from about 100' (mouth of Deschutes River, Sherman Co.) to at least 7400' (Steens Mt., Harney Co.). High-elevation populations of *P. p.* nr. *montana* in the Cascades occur from about 3000' (e.g., Camp Sherman, Jefferson Co., where it is a rare phenotype among otherwise typical *P. p. owimba*) to over 5200' (Diamond Lake area, Douglas Co.). Records extend from late June to late August.

No details on immature stages or larval foodplants for populations of *P. pulchella* in Oregon have been presented. In Washington, Jon Pelham (pers. comm. 2004) has recorded *Eucephalus ledophyllus* var. *ledophyllus* and *Eurybia conspicua* as larval foodplants of *P. p. owimba*. Guppy & Shepard (2001: 301) figured a full-grown larva of *P. pulchella* from Washington, and a late-instar larva of *P. pulchella* (origin unstated) was figured by Miller & Hammond (2003: 50). Emmel & Emmel (1974: 345) and Shapiro (1975c: 269) reported *Symphyotrichum spathulatum* (as *Aster occidentalis*), *S. foliaceum var. parryi* (as *Aster foliaceus* var. *parryi*) and *Eurybia integrifolia* (as *Aster integrifolius*) as larval foodplants of Californian *P. p. montana*, and Oliver (1978) provided notes on its full-grown larva and pupa. Shapiro (1975a: 196, 1975c: 268, 1975g: 119) reported *Symphyotrichum chilense* (as *Aster chilensis*) as a larval foodplant of *P. pulchella* in the Sacramento Valley of California. Shapiro et al. (1981: 99) suggested that *E. ledophyllus* (reported as *Aster ledophyllus*) and *Oreostemma alpigenum* var. *andersonii* (reported as *Aster alpigenus* var. *andersonii*) were likely to be larval foodplants of *P. pulchella* in the Trinities of northern California. Comstock (1930a: 53, 1931: 137) described and illustrated the immatures of *P. pulchella* from California (found on *Symphyotrichum lanceolatum* ssp. *hesperium*; reported as *Aster hesperius*), and Dammers in Emmel & Emmel (1973: 39) illustrated a full-grown larva and pupa from California. William H. Edwards (1885f) described the immatures of *Phyciodes pulchella camillus* W. H. Edwards, 1871 from eastern Colorado. Later, Scott (1992: 45-46, 1994: 79-83, 1998a: 27-28) described the immatures of *P. p. camillus*, also from Colorado, and recorded several species of "*Aster*" and *Machaeranthera* as larval foodplants there. Scott (1994: 73-78) described immatures and reported larval foodplants for other segregates of *P. pulchella*.

***Euphydryas gillettii* (Barnes, 1897)**
_____(NE of Wallowa Mts.) Recorded: **Wal** (E)

Taxonomic notes: No geographic variation among populations of *Euphydryas gillettii* (TL: Yellowstone [National] Park, Wyoming) has been formally described, from anywhere in its range (see Williams 1988). Also see Higgins (1978), Wahlberg & Zimmerman (2000) and Wahlberg (2001).

Biological notes: *Euphydryas gillettii* was first discovered in Oregon by Harold Rice, in the Summit Ridge area of Wallowa County, on 7 July 2003. Adults were found in this area again in late June and early July of 2004, in a variety of microhabitats, but were not found in great abundance anywhere (pers. obs.). Both sexes were observed to visit flowers (also see Williams 1988: 40). Search for additional populations of this species elsewhere in northeastern Oregon should be conducted. For now, *E. gillettii* is not projected from other counties in northeastern Oregon, but it should be sought in Baker, Union, Umatilla and Grant counties.

While larval foodplants have not yet been confirmed for the population in Oregon, *Euphydryas gillettii* has been well studied in other areas. Comstock (1940) reported *Lonicera involucrata* as a larval foodplant in Wyoming, but reared larvae in the lab on *Plantago lanceolata*, as well as *L. involucrata*. Williams (1990, also see Williams & Bowers 1987, Williams 1988) provided a summary of additional foodplants used by populations of *E. gillettii* throughout its range, which include *Lonicera caerulea* in Idaho, *Valeriana occidentalis* in Wyoming, *Pedicularis groenlandica* in Idaho, and apparently *Veronica wormskjoldii* (locality not stated). Comstock (1940) described the egg and all larval instars of *E. gillettii* from Teton County, Wyoming, and (p. 112) figured the full-grown larva. Williams et al. (1984) described and figured the life history of *E. gillettii* in detail, and discussed the ecology of several populations. As noted by Williams (1995), recently burned habitats containing larval foodplants appear to provide acceptable new areas for colonization by *E. gillettii*. Also, fires are apparently needed to buffer against the effects of habitat succession for the long-term survival of populations. Also see Coolidge (1909b), Holdren & Ehrlich (1981), Williams (1981), Debinski (1994) and Bowers & Williams (1995).

***Euphydryas anicia* (Doubleday, [1847])**

_____(Columbia Basin, most SE deserts and ranges) *veazieae* Fender & Jewett, 1953 <u>Recorded</u>: Ba (far SE), Cr, Gi, **Ha** (N & W), **Kl** (SE), **Lk**, **Mal** (N), Sh, Was, <u>Expected</u>: De (far E), Gr, Je (NE), Mo, Um, Wh

_____(vic. Alvord Desert) *macyi* Fender & Jewett, 1953 <u>Recorded</u>: **Ha** (SE), Mal (S)

_____(Burnt River Canyon and vicinity) *bakeri* D. Stallings & Turner, 1945 <u>Recorded</u>: **Ba**, <u>Expected</u>: Mal (far N), Wal (nr. Snake River)?

_____(Wallowa Mts., high elevations) nr. *howlandi* D. Stallings & Turner, 1947 <u>Recorded</u>: Wal (S), <u>Expected</u>: Ba (NE), Un (E)

<u>Taxonomic notes</u>: *Euphydryas anicia* is consistently separable from other taxa in the *E. chalcedona* complex in the Pacific Northwest (see Dornfeld 1980: 72-73, Ferris 1989c, Guppy & Shepard 2001: 307-310, Pyle 2002: 307), and apparently elsewhere (e.g., Austin et al. 2003). In Oregon, *E. anicia* is comprised of four sets of relatively distinctive populations. *Euphydryas anicia veazieae* (TL: Jackass Mts., Harney Co., Oregon) is the most widespread of these segregates. It is known from a few sites in the Columbia Basin (Beaver Creek, 3 mi. W Simnasho, Wasco Co.; vic. Sherar's Falls, Wasco and adjacent Sherman counties; Lonerock area, Gilliam Co.), but is probably more widespread there than known records suggest. It is widely distributed in southeastern Oregon, north of the Alvord Desert, south and southwest of the Snake River Basin, as far west as central Klamath County (Sprague River area, ca. 4400', pers. obs. 2004). Adults of *E. a. veazieae* average dark above with creamy or whitish spots, and with little or no red coloration. However, adults in most populations of *E. a. veazieae* are individually quite variable in phenotype. Occasional adults that are mostly red and white (or red and creamy) above occur in most populations of predominantly dark individuals, when large series are examined (see below). Populations of *E. a. veazieae* sometimes occur in sympatry or close parapatry with later-flying populations of *E. chalcedona wallacensis* and *E. c.* nr. *wallacensis* (e.g., Sprague River area, Klamath Co.; Picture Rock Pass, Lake Co.; hills N of Burns including Divine Canyon, also Little Rock Creek vic. Hwy. 20, Harney Co.; Big Summit Prairie, Ochoco Mts., Crook Co.; also see Austin et al. 2003). In these areas, adults are most reliably identified by details of the male genitalia (e.g., Gunder 1929, Higgins 1978, Tilden & Smith 1986: 109, Guppy & Shepard

2001: 307). As in *E. chalcedona* and *E. editha*, phenotypic aberrations are frequently seen in adults of *E. anicia*.

In the Alvord Basin and Pueblo Mountains of Harney County, and adjacent parts of Malheur County (e.g., Trout Creek Mts.; Succor Creek at Idaho border; also in Owyhee and Elmore counties, Idaho, see Bauer 1975: 187), *E. anicia* populations consist primarily of individuals that are mostly red and white (or creamy) above, with reduced dark markings. These are *Euphydryas anicia macyi* (TL: Wildhorse Creek, Alvord Basin, Harney Co., Oregon). Populations composed mostly of red and white *E. a. macyi* phenotypes occur in a relatively "pure" form only in this region, but individuals of the red phenotype occur in most populations of *E. a. veazieae* in southeastern Oregon, when large series are examined (e.g., vic. Sprague River, Klamath Co.; 9.5 mi. S Plush, Lake Co.; N of Burns, Harney Co.; N of Beulah Reservoir, and 2 mi. S of Jordan Valley, Malheur Co.). Adults sampled in 2002 at the north end of the Alvord Basin (ca. 4600') were largely intermediate in phenotype between *E. a. veazieae* and *E. a. macyi*. However, phenotypes resembling *E. a. macyi* remain unknown from populations of *E. a. veazieae* in the Columbia Basin. Following Hinchliff (1994: 132), populations in the Alvord Basin and nearby areas that have historically been called *E. a. macyi*, consisting primarily of red and white adults, are herein called *Euphydryas anicia macyi*. Clearly, further studies on populations containing both red and dark phenotypes in Oregon, Idaho and Nevada are needed. A unusual female individual of *E. a. macyi*, lacking whitish spots, was taken by John Hinchliff at the west edge of the Alvord Desert in Harney County (25 May 1996, in OSAC). It has a normal wing pattern, and is superficially similar to *Euphydryas anicia capella* (Barnes, 1897) from eastern Colorado. While much of the Stanley Jewett collection is in OSAC, the type specimens of *E. a. veazieae* and *E. a. macyi* are not in OSAC, and are apparently lost.

Populations of *E. anicia* in the Burnt River Canyon were named *Euphydryas anicia bakeri* (TL: Cave Creek, Durkee, [Baker Co.], Oregon). Adults in this area average smaller than those from further to the southeast, but are consistently of a pale, mostly red and white phenotype. Populations of *E. anicia* in adjacent parts of Idaho (e.g., Adams Co., nr. mouth of Wildhorse River, in OSAC; and possibly in Asotin and Garfield counties, Washington, see Guppy & Shepard 2001: 309) are phenotypically mostly like *E. a. bakeri*, but show some influence from *E. a.* nr. *howlandi* and/or *E. a. veazieae* (also see Bauer 1975: 187). Apparent intergradation between *E. a. bakeri* and *E. a. veazieae* occurs along the Snake River (e.g., Connor Creek Rd., nr. Snake River, and around Huntington, both Baker Co.; also see Bauer 1975: 187), as suggested by occasional dark adults that resemble *E. a. veazieae* (see Bauer 1975: 187), and apparent intermediates. Adults of *E. a. bakeri* differ from *E. a. macyi* in having shorter, rounder wings, and in being slightly duskier in overall appearance, above and below. In Oregon, *E. a. bakeri* is known only from Baker County, but populations may also exist in far northern Malheur County, and near the Snake River in Wallowa County. More study is needed to define the overall range of *E. a. bakeri*, and its relationship to other populations of *E. anicia* in Oregon, Idaho and Washington. As noted by Dornfeld (1980: 72), *E. a. bakeri* is sympatric but mostly asynchronic with *E. chalcedona wallacensis* in parts of Baker County.

Montane (e.g., Wallowa Lake, ca. 4700') and subalpine (e.g., Matterhorn Mt., 9832') populations of *E. anicia* in the Wallowa Mountains consist of adults that are superficially similar to *E. a. bakeri*, but average smaller in size, and are darker above and below. In addition, these populations have a later flight time than *E. a. bakeri* (see below). Dornfeld (1980: 73) and Hinchliff (1994: 132) called these populations *Euphydryas anicia howlandi* (TL: Polaris, Montana). However, populations of *E. anicia* in the high Wallowas are geographically disjunct from nominotypical *E. a. howlandi*. As currently applied (e.g., Hinchliff 1996: 113), the name *E. a. howlandi* represents a variety of high-elevation segregates of *E. anicia* that apparently do not comprise a monophyletic group. Until the relationship of *E. anicia* populations in the Wallowa Mountains to others called *E. a. howlandi* further north and northeast can be determined, they are herein called *Euphydryas anicia* nr. *howlandi*. Throughout the Wallowas (at least in Wallowa County), *E. a.* nr. *howlandi* flies in close parapatry and occasional sympatry (see Dornfeld 1980: 72) with *E. chalcedona wallacensis*, but the two taxa show no signs of intergradation.

<u>Biological notes</u>: *Euphydryas anicia* is widely distributed in Oregon east of the Cascades, in various xeric habitats including sagebrush-covered flats and hillsides, gullies, and rocky ridgelines and summits. While populations tend to be locally distributed, adults are usually common within populated areas. Males of some segregates are frequently found on hilltops, and both sexes visit a variety of flowers. All populations of *E. anicia* in Oregon are univoltine. Records for *E. a. veazieae* and *E. a. macyi* extend from mid-March to late June, depending on elevation and seasonal conditions, but most records are from May. These taxa occur from about 700' (Sherar's Falls, Wasco Co.) to over 6000' (Trout Creek Mts., Malheur Co.). Adults of *E. a. bakeri* fly from early April to mid-June, depending on elevation and seasonal conditions, and records extend from about 2000' (nr. Huntington) to over 3800' (7 mi. SW Durkee). Populations of *E. a.* nr. *howlandi* fly later and higher than do those of *E. a. bakeri*. Records for *E. a.* nr. *howlandi* in Wallowa County extend from about 4700' (Wallowa Lake) to over 9800' (see above), and from mid-June (Wallowa Lake) to early August at higher elevations.

Dornfeld (1980: 73) briefly described the larvae of *E. a. veazieae*, and reported *Penstemon* as the larval foodplant. No other details on the life history or foodplants of *E. anicia* from Oregon have been presented. Venables (1911) described early-instar larvae of *E. anicia* from British Columbia, and Guppy & Shepard (2001: 310) figured a full-grown larva and pupa from another British Columbian population. Late-instar larvae of *E. anicia* were figured by Wright (1993: 113) and Neill (2001: 117). A late-instar larva and pupae of *E. anicia* from Nebraska were figured by Spomer & Reiser (1985), who reported the local larval foodplant to be *Symphoricarpos occidentalis*. In Washington, *E. a. veazieae* uses *Penstemon speciosus*, *P. gairdneri* var. *gairdneri*, *Castilleja thompsonii* and *Collinsia sparsiflora* var. *bruciae* as larval foodplants. Other segregates of *E. anicia* in Washington feed mostly on *Penstemon* species (Jon Pelham pers. comm. 2004). Also see Fender & Jewett (1953), Maeki & Remington (1961b: 184), Phillipson (1967) and Cullenward et al. (1979).

***Euphydryas chalcedona* (Doubleday, [1847])**
_____(W Cascades, N Coast Range) *colon* (W. H. Edwards, 1881) Recorded: **Be**, **Clk**, **Do**, **HR**, Ja (N), **La**, **Lin**, **Mar**, Mu, **Po**, Wan, Ya, Expected: Col, Cos (N)
_____(Siskiyous) nr. *chalcedona* Recorded: Cos (S), **Cu**, Do (far SW), **Ja** (S), **Jo**
_____(far SE Cascades, Warners) nr. *wallacensis* Recorded: **Ja** (far SE), **Kl** (S), **Lk** (S)
_____(NE Cascades, Ochocos, Aldrichs, Blues, Wallowas) *wallacensis* Gunder, 1928 Recorded: Ba, Cr, Gi (far SE), **Gr**, Ha (N), **HR**, **Je**, **Mo** (S), **Um**, **Un**, **Wal**, **Was** (W), Wh, Expected: De (far N), Mal (far NW)
_____(E-central Cascades) Recorded: De (far SW), Do (far E), **Kl** (N), Expected: Lk (far NW)?

Taxonomic notes: Application of the name *Euphydryas chalcedona* to checkerspot populations in Oregon should be considered tentative. Some authors treat *E. colon* (including *E. c. wallacensis*) as a species-level taxon, separate from *E. chalcedona* (e.g., Bauer 1975: 176-181, Tilden & Smith 1986: 110-112, Austin et al. 2003). However, complete details on the separation of *E. chalcedona* and *E. colon* in northern California and southwestern Oregon have not been presented. Identification of the two taxa in this region apparently requires male genitalic dissections, as well as knowledge of local patterns of larval foodplant use and larval phenotypes (Bauer 1975: 179-180). As noted by Shields (1963: 114), adults with genitalia typical of *E. chalcedona*, but wing phenotypes of *E. colon*, are frequent in Josephine County (also see Dornfeld 1980: 72). Perhaps because of this apparent intergradation (or superficially similar morphologies if two taxa are involved), various authors have considered *E. colon* to be conspecific with *E. chalcedona* (e.g., Dornfeld 1980: 72, Ferris 1989: 93, Guppy & Shepard 2001: 307-308, Opler & Warren 2002: 34, Pyle 2002: 308-309). Considering adult morphology only, to date, I have been unable to assign *Euphydryas* populations from southwestern Oregon to either *E. c. chalcedona* or *E. c. colon*. However, I have thus far performed very few genitalic preparations on samples from this area. Until the relationship between *E. c. chalcedona* and *E. c. colon* can be studied in more detail, all populations in Oregon are called *Euphydryas chalcedona*, for now. It is however possible that further study may reveal that *E. c. chalcedona* and *E. colon* are indeed separable in southwestern Oregon, or that all or most populations in Oregon are referable to *E. colon*. As in *E. anicia* and *E. editha*, phenotypically aberrant adults are frequently found in Oregon, and some of these have been named (e.g., Gunder 1928: 163-164, 1932: 125, Fender 1945). Also see Dammers (1940), Scott (1981a) and Zimmerman et al. (2000).

Despite the complex patterns of geographic variation shown by segregates of *E. chalcedona* in California, Nevada (Brussard et al. 1989, Austin & Murphy 1998b, Austin et al. 2003) and Washington (Hinchliff 1996: 114, Pyle 2002: 308-309), geographic variation across populations of *E. chalcedona* in Oregon is subtle. *Euphydryas chalcedona colon* (TL: Kalama, Cowlitz Co., Washington; see Morrison 1883: 43, Tepper 1883: 81 and Brown 1966b: 361) occurs along the western slope of the Cascades and in the north Coast Range. Adults throughout this region are rather uniform in having dark dorsal hindwings, thick red markings on the ventral hindwing, and somewhat rounded wings. Above, adults are darker than those from other segregates in Oregon, although some individuals from Josephine and Curry counties are also quite dark above (see below). Adults from near Butte Falls, northern Jackson County, mostly resemble *E. c. colon*, but average slightly narrower red bands on the ventral hindwing, possibly representing introgression with paler populations to the south.

Bauer (1975: 177), Dornfeld (1980: 72), Hinchliff (1994: 133) and Pyle (2002: 308) called populations of *E. chalcedona* in southwestern Oregon *Euphydryas chalcedona chalcedona* (TL: San Francisco, [San Francisco Co.], California; see Barnes & McDunnough 1916: 85, Miller & Brown 1981: 165 and Emmel et al. 1998h: 101). Adults in this area are superficially like *E. c. colon*, but average increased pale markings below, narrower red bands on the ventral hindwing, and wing shape is somewhat more angular. As noted by Shields (1963: 114), many adults in this area are genitalically like *E. c. chalcedona*. Adults from most populations in this area are phenotypically variable, further complicating matters. Until the relationships between *E. c. chalcedona* and *E. c. colon* are better understood, populations of *E. chalcedona* in southern Coos, Curry, Josephine, southwestern Jackson and far southwestern Douglas counties are herein called *Euphydryas chalcedona* nr. *chalcedona*. However, as noted above, it is possible that two species-level entities are present in this region, including both *E. chalcedona* and *E. colon*.

Populations of *E. chalcedona* in far southeastern Jackson (CSNM area), southern Klamath and southern Lake counties (including the Warner Mts.) have previously been called *Euphydryas chalcedona macglashanii* (Rivers, 1888) (TL: Truckee, California) by Bauer (1975: 178), Dornfeld (1980: 72) and Hinchliff (1994: 133). Adults in this region average paler above and below than those of *E. c.* nr. *chalcedona*, and adult size averages somewhat larger. However, these adults do not resemble the red and pale phenotype of typical *E. c. macglashanii* (see Austin & Murphy 1998b: 421, 428). Austin & Murphy (1998b: 421) and Austin et al. (2003) called populations from the Warner Mountains and adjacent parts of Nevada *Euphydryas chalcedona wallacensis*. Nevertheless, adults in this region are considerably larger, and average paler above and below, than those of typical *E. c. wallacensis* (see below). Shapiro (1991a: 145) called populations in the Warner Mountains, and on Ball Mountain, Siskiyou County, California, *Euphydryas chalcedona* nr. *wallacensis*. Following Shapiro (1991a), until they can be studied in more detail, populations of *E. chalcedona* in southern Lake, Klamath and far southeastern Jackson counties are herein called *Euphydryas chalcedona* nr. *wallacensis*. Adults at the CSNM, Jackson County, and in the Bly Mountain area, Klamath County (Dornfeld 1980: 72), are highly variable in phenotype, and many apparent intermediate forms between *E. c.* nr. *chalcedona* and *E. c.* nr. *wallacensis* are seen. In addition, adults in the lower Klamath River Canyon, Klamath County, are equally variable (pers. obs. 2004).

East of the Cascadian crest, populations are referable to *Euphydryas chalcedona wallacensis* (TL: Wallace, [Shoshone Co.], Idaho). Compared to *E. c. colon*, adults of *E. c. wallacensis* average smaller in size, are paler above and below, with increased pale spots on the dorsal hindwing, and have considerably narrower red bands and increased black markings on the ventral hindwing. While adults in most known populations of *E. c. wallacensis* in Oregon are highly variable in phenotype, they are generally not as red below as those of *E. c. colon*. Apparent intergradation between *E. c. wallacensis* and *E.*

c. colon occurs in the Camp Sherman area of western Jefferson County, and in the Columbia River Gorge of Hood River County (e.g., vic. Dee; also see Bauer 1975: 180). Adults in the Camp Sherman area are mostly like *E. c. wallacensis*, but occasional individuals with wider red bands on the ventral hindwings are seen. Adults from Hood River County show phenotypic extremes resembling *E. c. colon* and *E. c. wallacensis*, and all types of intermediate forms. Records of *E. c. wallacensis* from Malheur County (Hwy. 20, ca. 4 mi. W Juntura; Succor Creek at Hwy. 95; see Hinchliff 1994: 133) apparently refer to *E. anicia veazieae*. While *E. c. wallacensis* is likely to be found in northwestern Malheur County, until it can be confirmed from there, Malheur County is not included in the distribution of *E. c. wallacensis*. Similarly, records of *E. c. wallacensis* from along the lower Deschutes River and its tributaries (e.g., vic. Sherar's Falls, ca. 700', Wasco and Sherman counties; Beaver Creek, 3 mi. W Simnasho, ca. 1600'-2400', Wasco Co.) mostly refer to *E. a. veazieae*, although both species apparently occur along Beaver Creek.

A population of somewhat dwarfed *E. chalcedona* adults occurs in the vicinity of Diamond Lake, Douglas County, and in northern Klamath (e.g., Gilchrist) and southern Deschutes (vic. La Pine) counties. Phenotypically, these adults are intermediate between *E. c. colon* and *E. c. wallacensis*, but average smaller in size than either of those taxa. These populations have previously been called *E. c. wallacensis* (e.g., Hinchliff 1994: 133), but herein, no name is associated with them. This segregate occupies a typical "Sand Creek" distribution (see Tilden 1963c).

Biological notes: *Euphydryas chalcedona* is widespread in Oregon, and occurs in a wide variety of forested and chaparral habitats. Adults are often common near riparian corridors, wherever larval foodplants are common. On average, adults of *E. chalcedona* fly later in the season than those of *E. anicia* and *E. editha*, but overlap in flight times with both species occurs at some sites on some years. All populations of *E. chalcedona* in Oregon are univoltine. Records of *E. chalcedona* in Oregon extend from late April (rarely) to early August, depending on elevation and seasonal conditions. Adults have been found from about 100' (Oneonta Creek, Multnomah Co.) to over 6000' (several sites, Warner Mts., Lake Co.). Males patrol along roadsides and in open meadows, and sometimes perch on hilltops (e.g., CSNM, Jackson Co.). Both sexes visit a wide variety of flowers, and males sometimes visit mud. Populations of *E. chalcedona* in the north Coast Range seem to be declining. Once common in Benton County (Dornfeld 1980: 72), I have seen only a single individual of *E. chalcedona* there since 1999 (Fitton Green area, 15 June 2000). Populations in Polk County have mostly been extirpated (Dave McCorkle pers. comm. 2003), but the species still occurs on Rickreall Ridge (ca. 2400'). Records of *E. chalcedona* from Yamhill County are from 1928 through 1930 (Hinchliff data notebooks, OSAC).

W. H. Edwards (1872: [95-96], pl. [34], 1884b) described the early stages of *E. chalcedona* from southern California, where they were reportedly associated with *Penstemon*, *Scrophularia* and *Castilleja*, among others. Comstock (1921: 45) described and illustrated the early instars of *Euphydryas chalcedona sierra* (W. G. Wright, 1905) from California. Dammers in Emmel & Emmel (1973: 32) illustrated a full-grown larva and pupa of *E. c. chalcedona* from California. Pyle (2002: 304) figured a pupa of *E. chalcedona* from Josephine County, Oregon. Newcomer (1964a: 223) reported *Symphoricarpos albus* as a larval foodplant of *E. c. colon* in Washington. Throughout western Oregon, larvae of *E. c. colon* feed on *Symphoricarpos albus* var. *laevigatus*. *Euphydryas c. wallacensis* use *Symphoricarpos oreophilus* var. *utahensis*, *S. hesperius* and *S. albus* var. *laevigatus* as primary larval foodplants in Washington, but post-diapause larvae have also been found feeding on *Penstemon fruticosus* var. *fruticosus* and *Verbascum thapsus* (Jon Pelham pers. comm. 2004). Post-diapause larvae of *E. c. chalcedona* from San Mateo County, California, were reported to feed on *Plantago erecta* by Emmel et al. (1971: 239). The "female" *Euphydryas chalcedona paradoxa* McDunnough, 1927 figured by Pyle (2002: 313) is a male. Also see Cunningham (1896), Hovanitz (1942), Masters (1979), Murphy et al. (1984) and Rutowski et al. (1988).

***Euphydryas editha* (Boisduval, 1852)**

_____(Willamette Valley) *taylori* (W. H. Edwards, 1888) Recorded: **Be**, La (central), Po, Expected: Do (N-central)?, Lin (central)?, Wan?, Ya?

_____(W Cascades) *colonia* (W. G. Wright, 1905) Recorded: Clk (E), Do, HR, Ja (N), **La** (E), **Lin** (E), Mar (E), Mu (E), Was (W), Expected: Je (far W)

_____(Mt. Thielsen, high elevations) *lawrencei* Gunder, 1931 Recorded: Do (far E)

_____(E-central Cascades) *remingtoni* Burdick, 1959 Recorded: De (W), Do (far E), Je (far W), **Kl** (N), Lk (far NW), Expected: La (far E)

_____(Siskiyous) nr. *rubicunda* (Hy. Edwards, 1881) Recorded: **Cu**, **Ja** (S), **Jo**, **Kl** (far SW), Expected: Cos

_____(SE Cascades) *edithana* (Strand, 1915) Recorded: **De** (E), [**Ja** (far SW)], **Kl** (S), **Lk** (W)

_____(E slope Warners) *mattooni* Austin & Murphy, 1998 Recorded: **Lk** (S), Expected: Ha (far SW)?

_____(SE ranges) *owyheensis* Austin & Murphy, 1998 Recorded: **Ha** (S), Expected: Mal

_____(Ochocos, Aldrichs, Blues, vic. Wallowas) nr. *edithana* Recorded: Ba (N), **Cr**, Gr (S), Ha (N), **Mal** (N), **Um**, **Un**, **Wal**, Expected: Gi (SE), Mo (S), Wh

Taxonomic notes: *Euphydryas editha* displays a great deal of geographic variation in Oregon and elsewhere. Geographic variants in Oregon fall into three groups, based on adult morphology. The first group includes just *E. e. taylori*. The second group includes *E. e.* nr. *rubicunda*, *E. e. colonia*, *E. e. remingtoni* and *E. e. lawrencei*. The third group includes *E. e. mattooni*, *E. e. owyheensis*, *E. e. edithana* and the various types of *E. e.* nr. *edithana* in the Ochoco, Blue and Wallowa mountains. Segregates within each of these three groups are phenotypically more similar to each other than they are to populations in other groups, and it is possible that more than one species is involved in the complex (Jon Pelham pers. comm. 2002). Subtle differences can be seen in series of adults from just about any two *E. editha* populations compared, which has resulted in a large number of trinomials that have been applied to geographic variants. For example, Emmel et al. (1998a: 828) recognized 18 named segregates of *E. editha* in California. Taken to an extreme, authors could apply trinomials to almost every geographically isolated population of *E. editha*. As in *E. anicia* and *E. chalcedona*, phenotypically aberrant adults are not uncommon in various populations, when adults are abundant. Also see Jewett (1960).

Populations of *E. editha* in the Willamette Valley have been called *Euphydryas editha taylori* (TL: Victoria, [Vancouver Island, British Columbia]) (e.g., Dornfeld 1980: 73, Hinchliff 1994: 134, Pyle 2002: 310). Compared to all other segregates of *E. editha* in Oregon, adults from the Willamette Valley are darker above and below, and have more rounded wings. Adults in extant populations of *E. e. taylori* in Oregon (Benton Co.) are highly variable. Some adults perfectly match those of topotypical *E. e. taylori*, although other phenotypes are also seen when long series are examined. To date, the only other extant similar populations are in the Puget Trough of northwestern Washington. Apparently (Jon Shepard pers. comm. 2002), *E. e. taylori* has now been completely extirpated from British Columbia, including Vancouver Island, its type locality (*contra* Guppy & Shepard 2001: 311). It is acknowledged that very subtle average morphological differences exist between adults of *E. editha* from Oregon and Vancouver Island. However, all populations historically called *E. e. taylori* (e.g., Dornfeld 1980: 73, Hinchliff 1994: 134, 1996: 115, Guppy & Shepard 2001: 310, Pyle 2002: 310) are phenotypically more similar to each other than they are to other named populations of *E. editha*, and the utility of additional trinomials to describe subtle geographic variation between Vancouver Island and the Willamette Valley is highly questionable. The "male" *E. e. taylori* figured by Pyle (2002: 312, upper right) is apparently a female.

Along the west slope of the Cascades in Oregon, adults of *E. editha* average somewhat larger than those of *E. e. taylori*, black coloration above is reduced, and red coloration above is greatly expanded. These populations are referable to *Euphydryas editha colonia* (TL: Mt. Hood, [Clackamas – Hood River counties], Oregon; see Tilden 1975: 21). Populations of *E. e. colonia*, as applied herein, extend from northern Jackson County to Hood River and western Wasco counties, mostly to the west of the Cascadian crest. Topotypical adults of *E. e. colonia* are somewhat paler above and below, compared to those from other western Cascadian populations. These, along with adults in western Wasco County, east of Mt. Hood (e.g., Flag Point Lookout, 5500'), apparently show some influence from populations of *E. e.* nr. *edithana* to the northeast (see p. 252). However, since these adults are topotypical, *Euphydryas editha colonia* is herein applied broadly, to all western Cascadian populations in Oregon.

Adults in the east-central Cascades, mostly east of the Cascadian crest, are similar to *E. e. colonia* in being predominantly red with reduced black markings, but average smaller in size. With increasing elevation along the crest of the Cascades, adults of *E. editha* become smaller and duskier. Adults at the very upper elevational limits of the species' range in the Cascades were named *Euphydryas editha lawrencei* (TL: 9000', Mt. Thielsen, Douglas Co., Oregon). These fly above timberline on Mt. Thielsen (ca. 7500'-9000'), and are consistently smaller and darker than adults from lower elevations (also see Bauer 1975: 194). Larger adults that fly at the base of Mt. Thielsen, around Diamond Lake, and around Crater Lake, were named *Euphydryas editha remingtoni* Burdick, 1959 (TL: Mt. Thielsen, Douglas Co., Oregon) (see Gunder 1931, Burdick 1959, Mattoni 1981). Populations of *E. e. remingtoni* occur throughout northern Klamath, far eastern

Douglas, and southwestern Deschutes counties, in a typical "Sand Creek" distribution (see Tilden 1963c). At times, *E. e. remingtoni* has been common in the Camp Sherman area of Jefferson County (Harold Rice pers. comm. 2002), although I did not observe it there between 2000 and 2004. The population of *E. editha* recorded from far northwestern Lake County (vic. Hole in the Ground) is of *E. e. remingtoni*. Hinchliff (1994: 134) mapped *E. e. remingtoni* as a synonym of *E. e. lawrencei*.

Many populations of *E. editha* in the Siskiyous are phenotypically similar to *E. e. colonia* and *E. e. remingtoni*, but adults average larger with more red. Bauer (1975: 193) included these populations within his concept of *E. e. colonia*. Dornfeld (1980: 73) called these populations *Euphydryas editha baroni* (W. H. Edwards, 1879) (TL: Mendocino, [Mendocino Co.], California), but Hinchliff (1994: 134) called them *Euphydryas editha rubicunda* (TL: Mariposa Co., California; see Gunder 1929: 6). The large, bright red adults from the Siskiyous average brighter than those of topotypical *E. e. baroni*, but average somewhat darker than those of typical *E. e. rubicunda*. Populations in the Siskiyous, however, seem closer to the phenotype of *E. e. rubicunda* than they do to *E. e. baroni*, and are herein called *Euphydryas editha* nr. *rubicunda*. Adults of *E. e.* nr. *rubicunda* are most common in Josephine (e.g., Chrome Ridge, ca. 4000') and Curry (e.g., Wimer Rd., ca. 3000') counties, where they may be locally abundant. They also occur in southwestern Jackson County, the CSNM area in southeastern Jackson County, and in the lower Klamath River Canyon of Klamath County, where adults are highly variable. However, throughout this area, there appear to be two local phenotypes of *E. editha*. One of these is *E. e.* nr. *rubicunda* as described above, and the other is somewhat smaller and darker, apparently approaching the phenotype of *E. e. edithana*. The smaller, darker adults tend to fly earlier than the larger adults with more red, although some large, red adults also fly early. It is unclear at this time how these phenotypes relate to each other or if they are even consistently separable. I have not observed discrete separation of flight times and habitats between these phenotypes (*contra* Hammond 1991: 67). It is possible that the smaller, darker adults are related to *E. e. edithana*, and that more than one species occurs in the region. However, with further study of adults and immatures, patterns of local phenotypic variation may become better known, and these variable phenotypes could be shown to represent extremes displayed by local populations of the same species.

East of the Cascades in Oregon, adults of *E. editha* are paler than those from the Cascades, and average more angular wings. These populations were called *Euphydryas editha edithana* (TL: Ash Valley, SE of Ash Creek, 14 mi. SE of Adin, 5000', Lassen Co., California; see Emmel et al. 1998l: 123) by Dornfeld (1980: 73) and Hinchliff (1994: 134). However, study of populations formerly called *E. e. edithana* from throughout northeastern California, northern Nevada and eastern Oregon has revealed subtle patterns of geographic variation (Austin & Murphy 1998a). In the strict sense, *Euphydryas editha edithana* in Oregon occurs in southern Klamath County (e.g., 6 mi. N of Chiloquin, ca. 4300'; Bly Mt., ca. 4800'; Sprague River, ca. 4400') and western Lake County (nr. Picture Rock Pass, ca. 5700'). Single males of *E. editha* from the summits of high peaks in Deschutes County (Pine Mt., ca. 6600'; E side of Broken Top Mt., ca. 8000') also appear to be of *E. e. edithana*.

Populations of *E. editha* east of the Warner Mountains in Lake County were recently named *Euphydryas editha mattooni* (TL: Fort Birdwell to Adel Road at Gravel Pit Road, 9.4 rd. mi. N of Fort Birdwell in Surprise Valley, 1707 m, Modoc Co., California; see Austin & Murphy 1998a: 411). These adults differ from those of typical *E. e. edithana* in being somewhat smaller and darker, on average. I took a single male of *E. editha* on top of Light Peak (8200') in the Warner Mountains, which is phenotypically like *E. e. mattooni* of lower elevations (ca. 6000'), and not like the red, high-elevation segregate of *E. editha* at the south end of the Warners in California, *Euphydryas editha bingi* Baughman & Murphy, 1998 (TL: Emerson Peak, 8200', Warner Mts., Modoc Co., California; see Baughman & Murphy 1998: 399-400, Austin & Murphy 1998a: 411-412).

I sampled a single female of *E. editha* at the north end of the Steens Mountain formation in Harney County (nr. the Malheur Co. line, ca. 4600', 12 May 2002) that appears to represent *Euphydryas editha owyheensis* (TL: Wildhorse Crossing Campground, 1950 m, Owyhee River Valley, Elko Co., Nevada; see Austin & Murphy 1998: 410). Adults of *E. e. owyheensis* average somewhat more ruddy than those of *E. e. mattooni* or *E. e.* nr. *edithana* (see below). However, until longer series of *E. editha* from this area can be assembled, the name *E. e. owyheensis* is only tentatively applied to populations in southeastern Harney County, and potentially, in parts of Malheur County.

Populations of *E. editha* in the Ochocos, Aldrichs, Blues and Wallowas are somewhat variable. Adults from the Ochocos (e.g., Big Summit Prairie, ca. 4600') tend to appear small and red, compared to those of *E. e. edithana* or *E. editha* from further northeast in Oregon. Throughout most of northeastern Oregon (e.g., N Harney Co., 5200'-5500'; S Grant Co., 5000'-5400'; N of Beulah Reservoir, N Malheur County, 4100'-4500'; southern Umatilla Co. and adjacent W Union Co., ca. 4000'-4600'; NE Baker Co. and Wallowa Co., up to 6400'), adults average about the same size as *E. e. edithana*, but tend to be darker than that taxon, above and below. However, each group of populations in this region appears to have somewhat different average character combinations, and future studies may show that some of these populations are phenotypically distinctive. Until these populations can be studied in more detail, they are all called *Euphydryas editha* nr. *edithana*. Adults of *E. editha* in southern Klickitat County, Washington (e.g., Satus Pass, ca. 4400'), and occasional individuals from western Wasco County (see p. 250), also resemble *E. e.* nr. *edithana* from northeastern Oregon, but average slightly larger, with more red coloration above and below, possibly as a result of occasional contact with *E. e. colonia*.

<u>Biological notes</u>: As noted by Pyle (2002: 310), the biology and ecology of *Euphydryas editha* has perhaps been studied more intensively than that of any other non-economic insect in North America. Dozens of studies on various populations of *E. editha* have been conducted (e.g., Ehrlich & Mason 1966, Labine 1966, 1968, Johnson et al. 1968, Singer 1971, 1982, 2003, Brussard et al. 1974, White 1974, White & Singer 1974, Singer & Ehrlich 1979, Ehrlich & White 1980, Rausher et al. 1981, Holdren & Ehrlich 1982, Rausher 1982, Murphy et al. 1983, Ehrlich & Wheye 1984, Murphy 1984, Mackay 1985, 1995, Mueller et al. 1985, Dobkin et al. 1987, Thomas et al. 1987, Weiss et al. 1987, 1988, Murphy & Weiss 1988, Orive & Baughman 1989, Britten et al. 1995,

Parmesan 1996, 2003, Singer & Thomas 1996, Ehrlich & Hanski 2004, and contributed chapters within).

In Oregon, *E. editha* is widely but locally distributed, and all populations are univoltine, usually flying in vernal conditions. Adults may be locally abundant, but populations often occupy very small areas. Dornfeld (1980: 73) noted that *E. e. taylori* "swarms" north of Corvallis (Benton Co.). By the time I arrived in Oregon (fall, 1998), *E. e. taylori* no longer flew at the sites Dornfeld frequented (e.g., McDonald Forest), and had not been reported at all from the state since the early 1990's. On 29 April 1999, I found a very large population of *E. e. taylori* in Benton County, near what is now called Fitton Green Open Space, about two miles southwest of McDonald Forest, under a powerline cut and in nearby grassy meadows (see Pyle 2002: 310). This population has remained robust since 1999, although adults are not currently as common under the powerline cut as they were in 1999 and 2000. In 2004, Dana Ross found an additional population of *E. e. taylori* about 5 miles north-northwest of the Fitton Green area. The only documented larval foodplant for these two extant populations of *E. e. taylori* is *Plantago lanceolata* (pers. obs.). Dornfeld (1980: 73) briefly described the larvae of *E. e. taylori*, which are easily found in February and March. Danby (1890) and Jones (1936) reported *Plantago lanceolata* as a larval foodplant of *E. e. taylori* on Vancouver Island, and Guppy & Shepard (2001: 310) figured the eggs of British Columbian *E. e. taylori*. In Washington, *E. e. taylori* uses *Castilleja levisecta*, *Plantago lanceolata*, *P. maritima juncoides*, *P. major* and *P. macrocarpa* as larval foodplants (Jon Pelham pers. comm. 2004). Adults of *E. e. taylori* in Benton County fly from early April to late May, although the peak flight is typically in late April and early May. Extant populations occur at about 800'-1500', although historical records exist from as low as about 425', near Coburg (Lane Co., *fide* Harold Rice).

Populations of *E. editha* elsewhere in the state are much more widespread. In the western Cascades, *E. e. colonia* flies from about 3000' (W of Dee, Hood River Co.) to over 6600' (Mt. Hood), and from late June to late July. The population of *E. e. lawrencei* on Mt. Thielsen (ca. 7500'-9000'), Douglas County, flies from mid-July to mid-August, depending on seasonal conditions. East-central Cascadian populations of *E. e. remingtoni* fly from about 3000' (Metolius River, Jefferson Co.) to about 7500' (Mt. Thielsen). In the Siskiyous, *E. e.* nr. *rubicunda* flies from early April to mid-July, depending on location and seasonal conditions, and from about 1300' (several sites in Josephine Co.) to 5800' (CSNM, Jackson Co.). Populations of *E. editha* east of the Cascades mostly occur above 3500', and males can be found on hilltops as high as 8200' (Light Peak, Lake Co.). Depending on locality and seasonal conditions, adults of *E. editha* east of the Cascades fly from mid-April to late July. Males from all *E. editha* segregates in the state, except *E. e. taylori*, frequently guard hilltop perches, when populations occur in mountainous terrain. However, males also patrol sagebrush flats (e.g., Big Summit Prairie, Crook Co.) and wet meadows (e.g., Lane Creek, Umatilla Co.), when populations are situated away from well-defined summits. Both sexes visit flowers. In Oregon, populations of *E. editha* frequently occur in sympatry with various segregates of *E. anicia* and *E. chalcedona*, although adults of *E. editha* often fly somewhat earlier than those of the other two species, especially *E. chalcedona*.

W. H. Edwards (1885b) described the late-instar larvae and pupa of *E. e. rubicunda* from California. W. H. Edwards (1879b: 129-131, 1897: [146-148], pl. [21]) described and illustrated the egg, early instars and pupa of *E. e. baroni* (W. H. Edwards, 1879) from Mendocino County, California. Larval foodplants of *E. e. colonia* in Washington include *Castilleja parviflora* var. *oreopola*, *C. miniata* var. *miniata* and *C. suksdorfii* (Jon Pelham pers. comm. 2004). East of the Cascadian crest, populations of *E. e.* nr. *edithana* feed on *Collinsia sparsiflora* var. *bruciae* and various species of *Castilleja* as pre-diapause larvae (including *C. thompsonii*) and on *Collinsia* as post diapause larvae (Jon Pelham pers. comm. 2004). Also see Masters (1979).

***Junonia coenia* Hübner, [1822]**

_____(breeding immigrant) *grisea* Austin & J. Emmel, 1998 <u>Recorded</u>: Ba, Be, Cr, Cu, De, Do, Gr, Ha, **Ja**, Je, Jo, Kl, La, Li, **Lk**, Mal, Was, <u>Expected</u>: Clk?, Cos, Gi, Mar, Mo, Po, Sh, Um, Wan?, Wh, Ya?

<u>Taxonomic notes</u>: Far western North American populations of *Junonia coenia* were recently named *Junonia coenia grisea* (TL: S Pasadena, 198 m, Los Angeles Co., California; see Austin & Emmel 1998b: 512-513). Adults of *J. c. grisea* from California and Oregon average grayer above than those of eastern North American *Junonia coenia coenia* (TL: [uncertain]), and other subtle differences exist between the two taxa. The taxonomic status of *J. coenia* populations in Arizona, Utah and New Mexico, where *J. c. grisea* and *J. c. coenia* may intergrade, requires further elaboration. While some authors have placed this species in the genus *Precis* Hübner, its placement in *Junonia* Hübner is correct (see de Lesse 1952, Tilden 1971, 1974b, Turner & Parnell 1985, Wahlberg et al. in press). As shown by Mather (1967), *J. coenia* is seasonally polyphenic. Also see Forbes (1929).

<u>Biological notes</u>: Throughout much of North America, *Junonia coenia* is well known as a migratory species (e.g., Macy & Shepard 1941: 126, Williams 1970, Scott 1975c, Walker 1978, Pyle 1981: 631, Smith et al. 1994: 84, Gochfeld & Burger 1997: 198). It occasionally establishes temporary populations during late summer far north of where they can survive winter conditions (e.g., Clark & Clark 1951: 46-47, Layberry et al. 1998: 207). Apparently, the same is true of western *J. c. grisea*, which can be found throughout much of southern Oregon during the summer in some years (rarely as far north as Wasco Co.), but is entirely absent in other years. *Junonia coenia* is probably not a permanent breeding resident in Oregon. Small populations may possibly persist through mild winters at low elevations in the Rogue River drainage, but apparently not often, and if so, not elsewhere in the state. Shapiro (1993b) has documented winter extirpation and recolonization of *J. coenia* in northern California.

Being migratory, records of *J. coenia* in Oregon are rather sporadic, and adults may be found in a wide variety of different habitats. Hinchliff reported (data notebooks, OSAC) three damaged adults of *J. coenia* from the CSNM area, Jackson County, from 30 May 1978. These apparently represent the earliest known records from Oregon. The latest report of *J. coenia* from Oregon is from 21 October (1978, Winchester, Douglas

Co.), and records extend from sea level (Pistol River, Curry Co.) to over 8000' (Steens Mt., Harney Co.). During years when *J. coenia* arrives in Oregon in May and June, it may produce two or three broods, until winter weather drives adults southward or forces them into inactivity. Generally speaking, *J. coenia* males perch in open, weedy areas, and are frequently found in gullies, washes, and roadside ditches. Both sexes visit a variety of flowers, especially *Apocynum* in Jackson County. Adults are very wary, and may be difficult to approach unless feeding at flowers.

Junonia coenia is easy to rear, and partly because of this, it is a popular study animal (e.g., Schrader 1913, 1926, Nijhout 1980a,b, 1985, 1991, Hafernik 1982, Dohrmann & Nijhout 1989, Paulsen & Nijhout 1993, Smith 1993, Koch 1994, 1995, Koch & Kaufmann 1995, Rountree & Nijhout 1995, Camara 1997). Larval foodplants of *J. coenia* east of the Rocky Mountains include, among other plants, *Nuttallanthus canadensis* (Smith & Abbot 1797: pl. 8), *Linaria vulgaris* (Scott 1992: 24), *Antirrhinum* (Heitzman & Heitzman 1987: 176), *Plantago* and others (Scudder 1889a: 500); see Bowers (1984) for more details. Shapiro (1978a) reported larvae of Californian *J. coenia* to feed on *Kickxia spuria*, *Penstemon azureus* and *Antirrhinum* among others (also see Graves & Shapiro 2003: 422), and they also feed on *Mimulus* species (Garth & Tilden 1986: 93). Early stages of *J. coenia* have been described and/or figured by many authors (e.g., Smith & Abbot 1797: pl. 8, Boisduval & Le Conte 1829-[1837]: pl. 49, Scudder 1889a: 497-498, pls. 64, 74, 78, 83, Dyar 1891b, Comstock 1927: 136, Klots 1951: pl. 6, Emmel & Emmel 1973: 46, Wright 1993: 107, Neck 1996: pl. 7, 14, Tveten & Tveten 1996: 160, Allen 1997: 323, 343). Also see Maeki & Remington (1961b: 186), Scott (1976b), Shapiro (1978a), Smith (1982), Ellis & Bowers (1998) and McDonald & Nijhout (2000).

***Polygonia faunus* (W. H. Edwards, 1862)**

_____(forested habitats statewide) *rusticus* (W. H. Edwards, 1874) Recorded: **Ba**, **Be**, Clk, Col, Cos, **Cr**, De, Do, **Gr**, **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, Li, **Lin**, **Lk**, Mar, Mo, **Mu**, **Po**, **Um**, **Un**, **Wal**, Wan, **Was**, Ya, Expected: Cls, Cu, Ha, Mal, Ti, Wh

Taxonomic notes: Across most of Oregon, *Polygonia faunus* shows little or no geographic variation, and most populations are apparently referable to *Polygonia faunus rusticus* (TL: Big Trees, [Calaveras Co.], California; see dos Passos in Brown 1967: 341). Populations of *P. faunus* in the coast ranges of central California, at least from Santa Cruz County in the south to Sonoma County in the north, were recently named *Polygonia faunus fulvescens* J. Emmel, T. Emmel & Mattoon (TL: Pescadero Creek, 400', nr. Portola State Park, San Mateo Co., California; see Emmel et al. 1998e: 139-140). Adults of *P. f. fulvescens* are reportedly yellower, and may average smaller dark spots above, compared to those of *P. f. rusticus*. In the north Coast Range, western Cascades and Siskiyous of Oregon, adults of *P. faunus* are phenotypically like those of *P. f. rusticus*, but average somewhat larger than those of *P. faunus* from further east in the state. Until the distribution of *P. f. fulvescens* is better understood, and geographic variation among populations in Oregon and California has been studied in more detail, all populations of *P. faunus* in Oregon are herein called *Polygonia faunus rusticus*. As shown by Wahlberg et al. (in press), *P. faunus* appears to be more closely related to Eurasian *Polygonia* species than it is to any other North American taxon.

Biological notes: *Polygonia faunus* is widespread but locally distributed in Oregon, and occurs in a variety of riparian and woodland habitats. Adults hibernate through the winter, and individuals may be seen as early as late February (27 February 2001, Benton Co., pers. obs.), or probably earlier, weather permitting. Records of *P. faunus* in Oregon extend into late September, and from near sea level (several sites along the Columbia River) to over 7500' (Wallowa Mts., Wallowa Co.). Apparently, a single annual brood is produced in Oregon. Male *P. faunus* perch on branches, sometimes over five meters above ground level, in a variety of sunny forested areas. Adults of both sexes feed at sap, dung, flowers, mud (mostly fresh males) and fermenting fruit (also see Pyle 2002: 317).

William H. Edwards (1872: [122], pl. [40], as *P. zephyrus*, 1884d: [194-195], pl. [34]) and Caulfield (1875) illustrated and described the full-grown larva and a pupa of *P. faunus*. Scudder (1889a: 351-353, 1889c: pls. 64, 67, 70, 74, 78, 83, 86) described and illustrated all immature stages of eastern North American *P. faunus*, and reported (p. 355) *Salix humilis* and *Betula lenta* as larva foodplants. Scott (1988a: 29, 49-56) described the life history of *Polygonia faunus hylas* (W. H. Edwards, 1872) from Colorado, where immatures were found on *Salix bebbiana* and, on one occasion, on *Ribes inerme*. More recently, Guppy & Shepard (2001: 251) figured a full-grown larva and pupa of *P. f. rusticus*, and a late-instar larva was figured by Miller & Hammond (2003: 51). Larval foodplants of *P. faunus* in Oregon and Washington include undetermined *Salix* species, *Rhododendron albiflorum*, and probably species of *Betula* (Jon Pelham pers. comm. 2004) and *Alnus* (Guppy & Shepard 2001: 252). Emmel et al. (1998e: 140) reported *Rhododendron occidentale* as a larval foodplant of *P. f. fulvescens* in San Mateo County, California.

***Polygonia satyrus* (W. H. Edwards, 1869)**

_____(most of state) *neomarsyas* dos Passos 1969 Recorded: all counties but two, Expected: Cos, HR

Taxonomic notes: The name *Polygonia satyrus neomarsyas* (TL: Salmon Meadows, Brewster, [Okanogan Co.], Washington) has been applied to Pacific Northwestern and Californian populations of *P. satyrus* (e.g., Garth & Tilden 1986: 87, Tilden & Smith 1986: 71), including those in Oregon (e.g., Dornfeld 1980: 65). Adults of *P. s. neomarsyas* average darker, above and below, than those from other populations of *P. satyrus* (e.g., dos Passos 1962: 219, 1969). However, Ferris (1981b: 339) noted that adults of *Polygonia satyrus satyrus* (TL: vic. Empire, Clear Creek Co., Colorado; see Brown 1967: 330-331) tend to be polymorphic at most or all localities, and considered the species to be monotypic. Since then, most authors have not applied any trinomial to describe phenotypic variation in *P. satyrus* (e.g., Hinchliff 1994: 135, Layberry et al. 1998: 198-199, Guppy & Shepard 2001: 250, Pyle 2002: 316). *Polygonia satyrus* does, however, display subtle geographic variation. Adults from the Pacific Northwest average smaller and darker than those of typical *P. s. satyrus*, above and below. While further study of phenotypic variation in *P. satyrus* is needed across Idaho, Montana and Wyoming, in series, all populations from Oregon are separable from those of *P. s. satyrus* from Colorado, and the name *Polygonia satyrus neomarsyas* is tentatively applied to populations in Oregon. The "female" *P. satyrus* figured by Pyle (2002: 316, also 314, lower) is apparently a male.

Biological notes: In Oregon, *Polygonia satyrus* is widely distributed, and will probably be found in all 36 counties. Adults occur in a variety of habitats, especially along riparian corridors and in woodlands. Winter is passed in the adult stage, and as a result, adults of *P. satyrus* may be seen as early as late January (21 January 2005, Benton Co., pers. obs.), weather permitting. Adults fly as late as mid-December (18 December 2004, Fred Ramsey), and range from near sea level (along Columbia River in Multnomah and Columbia counties) to at least 6800' (Mt. Ashland, Jackson Co.). At high-elevation sites, probably only one annual brood is produced, although *P. satyrus* apparently producees two broods at lower elevations (e.g., 900', Benton Co.). Males perch in sunny openings in or near forested habitats, and visit mud when fresh. Both sexes visit fermenting fruit, flowers and dung.

The life history of *P. satyrus* is well known. Larval foodplants in Oregon include *Urtica dioica* ssp. *gracilis* and possibly *Urtica urens*. Scott (1988a, 1992: 28) also reported *Urtica d. gracilis* as a larval foodplant in Colorado, in addition to *Humulus*. Remington (1952: 69) reported ovipositions of *P. satyrus* on *Salix drummondiana* in Colorado, but it is unclear if larvae actually feed on that plant. William H. Edwards (1872: [120], pl. [40]) described and illustrated the full-grown larva of *P. satyrus*. Scudder (1889a: 346, 1889c: pls. 74, 83; also see Klots 1951: pl. 6) did the same, and reported (p. 347) "nettle" as the larval foodplant. Comstock (1927: 121, pl. 63, #13) illustrated the egg, first-instar larva and pupa of *P. satyrus* from California, and Dammers in Emmel & Emmel (1973: 41) illustrated a full-grown larva and pupa. Scott (1988a: 49-56) described the immature stages of *P. satyrus* from Colorado, and Guppy & Shepard (2001: 250) figured eggs, a full-grown larva and pupa of *P. satyrus* from British Columbia. Pyle (2002: 314) figured a full-grown larva of *P. satyrus* from Washington.

***Polygonia gracilis* (Grote & Robinson, 1867)**

_____(Siskiyous, Cascades, eastward) *zephyrus* (W. H. Edwards, 1870) Recorded: **Ba**, **Be**, Clk, **Cr**, **De**, Do, Gi, **Gr**, **Ha**, **HR**, **Ja**, **Je**, **Jo**, **Kl**, **La**, **Lin**, **Lk**, **Mal**, Mar, Mo, Mu, Sh, Um, Un, **Wal**, **Was**, **Wh**, Expected: Cos, Cu

Taxonomic notes: Until recently, Pacific Northwestern authors have called this species *Polygonia zephyrus* (TL: Virginia City, Storey Co., Nevada; see Brown 1967: 350) (e.g., Dornfeld 1980: 66, Ferris 1981b: 340-341). However, Scott (1984) demonstrated that *P. zephyrus* and *Polygonia gracilis* (TL: Mt. Washington, New Hampshire) are most likely conspecific (also see Wahlberg et al. in press), and most subsequent authors have considered *P. zephyrus* to be conspecific with *P. gracilis* (e.g., Hinchliff 1994: 137, Layberry et al. 1998: 200, Pyle 2002: 318, but see Guppy & Shepard

2001: 252-253). Across Oregon, populations of *Polygonia gracilis zephyrus* show no geographic variation. The ventral "female" of *P. g. zephyrus* figured by Guppy & Shepard (2001: 252) is apparently a male.

Biological notes: *Polygonia gracilis* is widespread in Oregon from the Siskiyous and Cascades, eastward, and may be locally common. It is unrecorded in the north Coast Range, save a single somewhat worn female I found at 2400' on Mary's Peak, Benton County (12 July 2000), which was apparently a stray from further east. Adults are found in a wide variety of forested habitats and along riparian corridors. Records of *P. gracilis* in Oregon range from about 1000' (Tanner Creek Rd., Multnomah Co.) to over 8000' (Light Peak, Warner Mts., Lake Co.). Adults hibernate through the winter, and are active in Oregon at least from early February (e.g., 11 February 2005, Josephine Co.) to early September, depending on the weather and seasonal conditions. Apparently, *P. gracilis* produces a single annual brood in Oregon. Males perch in gullies, riverbeds, and in sunny gaps in forested habitats, and often perch near ground level. Males also visit mud, and sometimes defend perches on hilltops (e.g., Shields 1968: 82, pers. obs.). Both sexes of *P. gracilis* in Oregon feed at fermenting fruit, flowers and scat.

In Oregon and Washington (Jon Pelham pers. comm. 2004), *P. g. zephyrus* uses a variety of *Ribes* species as larval foodplants, including *R. aureum*, *R. cereum*, *R. viscosissimum* and *R. lacustre*, in addition to *Rhododendron albiflorum*. Bean (1893) reported *Ribes lacustre* and *Menziesia ferruginea* (as *M. glabella*) as larval foodplants of *P. g. zephyrus* in Alberta, and Scott (1988a: 47, 1992: 28) reported *R. cereum* and *R. inerme* as larval foodplants in Colorado. Shields et al. (1970: 32) and Emmel & Emmel (1974: 345) reported *R. cereum* as a larval foodplant of *P. g. zephyrus* in Nevada and California, respectively. William H. Edwards (1884d: [199-200], pl. [34]) described and illustrated a late-instar larva and pupa of *P. g. zephyrus*. Late-instar larvae were subsequently described and/or figured by Sugden (1970: 30), Emmel et al. (1992: 72), Guppy & Shepard (2001: 251, larva and pupa) and Miller & Hammond (2003: 52). Scott (1988a: 49-56) described the complete life history of *P. g. zephyrus* from Colorado. Also see Maeki & Remington (1961b: 186).

***Polygonia oreas* (W. H. Edwards, 1869)**

_____(Cascades, N Coast Range) *silenus* (W. H. Edwards, 1870) Recorded: **Be**, Clk, Cls, Col, Do, HR, Je (W), **Kl** (W), **La**, **Li**, Lin, Mar, Mu, **Po**, Ti, Ya, Expected: Cos (N), De (W), Ja (far N), Lk (NW), Wan, Was (W)

_____(Siskiyous, far S Cascades) *oreas* Recorded: Ja (S), **Kl** (S), Expected: Cos?, Cu, Jo

_____(Aldrichs, Blues, Wallowas) *threatfuli* C. Guppy & Shepard, 2001 Recorded: Ba, Gr, Um, Un, Wal, Expected: Cr, Ha (N), Mal (N), Mo (S), Wh

Taxonomic notes: Scott (1984) suggested that *Polygonia oreas* and *Polygonia progne* (Cramer, 1776) (TL: [New York]) should be considered conspecific, an arrangement followed by Hinchliff (1994: 138). However, most subsequent authors have retained *P. oreas* and *P. progne* as separate species (e.g., Bird et al. 1995: 223, Layberry et al. 1998: 200-202, Pyle 2002: 319), and the two taxa reportedly maintain their identities where their distributions approach each other in British Columbia (e.g., Guppy & Shepard 2001: 254-256). Recent molecular evidence (Wahlberg et al. in press) suggests that *P. oreas* and *P. progne* are not each other's closest relatives, and are clearly not conspecific. Populations of *P. oreas* across most of western Oregon represent *Polygonia oreas silenus* (TL: Portland, Multnomah Co., Oregon). Adults of *P. o. silenus* are the darkest of any segregate of *P. oreas*. Below, ground color is very dark when adults are fresh, and black spots above are enlarged, against a dark tawny ground color. The female "*P. oreas silenus*" figured by Dornfeld (1980: 163, fig. 4c) is a female of *P. faunus* (specimen examined in OSAC, 2002).

Overall, *P. o. silenus* is similar to *Polygonia oreas oreas* (TL: mountains of northern California; see dos Passos & Brown in Brown 1967: 354-355), although the latter is paler above and below, and adult size averages slightly smaller. Hinchliff (1994: 138) considered populations of *P. oreas* in southwestern Oregon (Jackson and SE Klamath counties) to represent *P. o. oreas*. Adults from these areas (e.g., Kinney Creek, Jackson County; lower Klamath River Canyon, Klamath Co.) do average smaller and paler, above and below, when compared to series of *P. o. silenus* from further north. Adults in this area, however, are not as pale as *P. o. oreas* examined from Monterey County, California. Until patterns of geographic variation in *P. oreas* in southwestern Oregon and northern California are better understood, populations in southern Jackson and Klamath counties are called *Polygonia oreas oreas*. The relationship of these populations to those of *P. o. silenus* requires further study in northern Jackson County.

Populations of *P. oreas* east of the Cascades were recently named *Polygonia oreas threatfuli* (TL: Vernon, Kalamalka Lake Provincial Park, British Columbia). Adults in these populations are considerably paler above and below than those of *P. o. silenus*, and are phenotypically intermediate between *P. o. silenus* and the southern Rocky Mountain segregate, *Polygonia oreas nigrozephyrus* Scott 1984 (TL: Lump Gulch, Gilpin Co., Colorado; see Scott 1984: 201-202). Adults of *P. o. threatfuli* are superficially similar to *P. o. oreas*, but average slightly larger and darker above.

<u>Biological notes</u>: *Polygonia oreas* is widespread but locally distributed in Oregon, and as noted by Dornfeld (1980: 66), adults tend to be scarce. Since adults hibernate through the winter, individuals of *P. oreas* may be seen in Oregon from late January (21 January 2005, Benton Co., pers. obs.), at least until mid-September. Records in Oregon extend from near sea level (Portland, Multnomah Co.) to about 5000' (Wallowa Mts., Wallowa Co.). In the north Coast Range (e.g., Benton Co.), and in the Siskiyous, two annual broods of *P. o. silenus* are apparently produced, although only a single annual brood may be generated in northeastern Oregon. Males guard sunny openings in woodland habitats, from perches near ground level or several meters above, on branch tips. On a few occasions I have watched males of *P. o. silenus* defend perches on mostly forested hilltops late in the afternoon (16:00 to 17:45 hrs.), and freshly eclosed males visit mud. Adults of both sexes sometimes visit flowers, and feed at scat and fermenting fruit.

Jones (1938: 20) reported *Ribes divaricatum* as a larval foodplant of *P. o. silenus* in British Columbia, and the same plant is widely used in western Washington (Jon

Pelham pers. comm. 2004), western Oregon (pers. obs.) and northwestern California (Emmel et al. 1971: 238). The full-grown larva of *P. o. silenus* was described by W. H. Edwards (1884d). Recently, Neill (2001: 126) figured a late-instar larva, and Guppy & Shepard (2001: 255) figured a full-grown larva and pupae of *P. o. silenus* from Polk County, Oregon. Scott (1988a) described the larvae of *P. o. oreas* from California, and described the immature stages of *P. o. nigrozephyrus* from Colorado. In Colorado, larval foodplants of *P. o. nigrozephyrus* include *Ribes inerme* and *R. leptanthum* (Scott 1988a: 47, 1992: 29).

***Aglais milberti* (Godart, 1819)**

_____(most of state) *subpallida* (Cockerell, 1889) Recorded: all counties but one, Expected: Cos

Taxonomic notes: Subtle patterns of geographic variation are displayed by *Aglais milberti* across North America, and various trinomials have been proposed to represent this. Far western populations of *A. milberti* have been called *Aglais milberti furcillata* (Say, 1825) (TL: [Ontario, Canada]) by some authors (e.g., Dornfeld 1980: 65, Garth & Tilden 1986: 91), and *Aglais milberti milberti* (TL: vic. Philadelphia, [Pennsylvania]; see dos Passos 1938: 72) by others (e.g., Ferris 1981b: 336-337, Hinchliff 1994: 142, Guppy & Shepard 2001: 263-264). Ferris (1981b: 337) and Austin (1998g: 578) noted that *A. m. furcillata* is best considered synonymous with *A. m. milberti*, and Austin (1998) used the next available name for western populations, *Aglais milberti subpallida* (TL: [Westcliffe, Custer Co., Colorado]). Until a thorough study of geographic variation in *A. milberti* across North America has been conducted, populations in Oregon are tentatively called *Aglais milberti subpallida*. Also see Wahlberg & Nylin (2003).

Biological notes: *Aglais milberti* is widespread in Oregon, and undoubtedly will be found in all 36 counties. Records of *A. milberti* adults in Oregon range from early February (2 February 1958, Dornfeld) to late October (22 October 1986, Hinchliff), and from sea level (e.g., Rock Creek, Lane Co.) to over 9300' (Steens Mt., Harney Co.). One or two annual broods are produced in Oregon (also see Guppy 1955, Scott 1992: 30). Adults occur in a wide variety of habitats, and are very often found on or just below hilltops (also see Shields 1968: 81, pers. obs.). Individuals feed at a wide variety of flowers (e.g., Pyle 2002: 326), as well as sap, fermenting fruit, scat and mud. Adults of *Aglais milberti* may be somewhat migratory in Oregon, as they apparently are in California (Shapiro 1974a, 1979b) and Colorado (Scott 1992: 30).

Saunders (1869b: 76), Gosse (1883: 49) and W. H. Edwards (1885g) described the early stages of *N. milberti* from northeastern North America. Subsequently, Scudder (1889a: 423-424, 1889c: pls. 64, 74, 78, 83, 86) described and figured the immature stages of eastern North American *N. milberti*, and (p. 426) reported *Urtica* as a larval foodplant. Remington (1952: 67) and Scott (1992: 29-30) reported *Urtica dioica* ssp. *gracilis* as a larval foodplant in Colorado (also pers. obs.). Larval foodplants of *A. milberti* in Oregon at least include *U. d. gracilis* (pers. obs.). Recently, eggs, larvae, and/or pupae of *A. milberti* were figured by Neill & Hepburn (1976: 42-43), T. Emmel et al. (1992: 73, pl. 7), Wright (1993: 109), Allen (1997: 323, 341), Nielsen (1999: 144), Guppy & Shepard (2001: 264) and Pyle (2002: 327). Also see Guppy (1951).

Nymphalis vaualbum **(Denis & Schiffermüller, 1775)**
_____(N Blues, Wallowas; rare stray elsewhere) *j-album* (Boisduval & Le Conte, [1835])
Recorded: Ba (N), Kl, Um, Un, Wal, Expected: Gr (NE)

Taxonomic notes: In the recent decades, many names have been applied to this species, due to issues over its genus- and species-level names. Some authors have placed this species in the genus *Roddia* Korshunov, 1995 (e.g., Guppy & Shepard 2001: 256-258, Nylin et al. 2001), instead of *Nymphalis* (e.g., Dornfeld 1980: 64, Pyle 2002: 321). More recent studies, however (e.g., Wahlberg & Nylin 2003, Wahlberg et al. in press), have indicated that *Roddia* is best considered a synonym of *Nymphalis*.

As originally proposed, *Nymphalis vaualbum* might be a *nomen nudum* (see IZCN 1999: 111, Gillham 1956: 28, Koçak, 1986: 24), in which case *Nymphalis l-album* (Esper, 1781) would be the proper species-level name (e.g., Guppy & Shepard 2001). Sattler & Tremewan (1984) argued that Denis & Schiffermüller's names should be retained, and as of this writing, the ICZN has been petitioned by Kudrna and Belicek to resolve the matter. Until a formal ruling by the ICZN has been made, prevailing usage is maintained, and this species is herein called *Nymphalis vaualbum*.

Nymphalis vaualbum shows very subtle patterns of geographic variation in North America, and two trinomials have been proposed to describe this. Western populations were named *Nymphalis vaualbum watsoni* (Hall, 1924) (TL: Sicamous, British Columbia). These adults are reportedly browner below than those of eastern North American *Nymphalis vaualbum j-album* (TL: [NE North America]), and some authors maintain use of *watsoni* as a trinomial (e.g., Guppy & Shepard 2001: 258-259). Further study of geographic variation in *N. vaualbum* across North America is needed to determine the degree to which eastern and western populations may differ. However, as noted by Layberry et al. (1998: 202) who treated *N. v. watsoni* as a synonym of *N. v. j-album*, differences between eastern and western North American populations of *N. vaualbum* are "minute." Until further study has been conducted, individuals from Oregon are called *Nymphalis vaualbum j-album*.

Biological notes: *Nymphalis vaualbum* is rarely seen in Oregon, and may or may not be a permanent breeding resident in the state. This species is widely distributed from northeastern Washington, north and northeastward. It is known to occasionally stray large distances from permanent breeding areas (e.g., Brown et al. 1957: 96, Covell 1999: 77), where it may establish temporary populations (e.g., Smyth 1938: 231). Most reports of *N. vaualbum* from Oregon are from the northern Blue Mountains and Wallowa Mountains (Umatilla, Union and Wallowa counties, ca. 2200'-5000'; especially along Hurricane and Lostine creeks in Wallowa Co.), where it is at least a sporadic breeding resident. A single record of a stray *N. vaualbum* exists from southern Klamath County (nr. Short Lake, 4.25 mi. NNW Bonanza, 4 September 1985, Mike Denny). Reports of

N. vaualbum in Oregon extend from 2 March (1968, E. McMackin) to 23 September (1949, W. Emery), representing what is apparently a single annual brood. Adults hibernate through the winter (see Bruggemann 1948, Proctor 1976). Layberry et al. (1998: 202) considered *N. vaualbum*, in its adult stage, to be the longest living Canadian butterfly. Adults feed at mud, sap, scat, carrion and fermenting fruit (e.g., Chermock 1952: 33), and occasionally visit flowers (e.g., Pyle 2002: 321). Elrod (1906: 93-94) and Macy & Shepard (1941: 119-120) provided detailed accounts of the adult habits of *N. vaualbum*.

Dawson (1889), Denton (1889), Scudder (1889a: 383, 1889c: pl. 83) and Fletcher (1900) described and illustrated the last instar larva and pupa of eastern North American *N. vaualbum*. Sugden (1970: 30) described the full-grown larva of *N. vaualbum*, and noted *Betula* as a larval foodplant. Wright (1993: 109) and Allen (1997: 321) figured late-instar larvae of *N. vaualbum*, and Guppy & Shepard (2001: 258) described and figured eggs, early and late-instar larvae, and a pupa of *N. vaualbum* from British Columbia. No details on early stages or larval foodplants are available from Oregon. In British Columbia, the only verified larval foodplants of *N. vaualbum* are species of *Betula* (Guppy & Shepard 2001: 258), although the use of *Populus* and *Salix* species has been reported elsewhere (e.g., Denton 1889, Ferris 1981b: 336, Bird et al. 1995: 218).

***Nymphalis californica* (Boisduval, 1852)**

_____(forested habitats; vagrant in basins) <u>Recorded</u>: all counties but one, <u>Expected</u>: Gi

<u>Taxonomic notes</u>: Pacific Northwestern populations of *Nymphalis californica* (TL: Queen Lily Campground, nr. Belden, N Fork Feather River Canyon, 2400’, Plumas Co., California; see Emmel et al. 1998i: 18) have sometimes been called *Nymphalis californica herri* Field, 1936 (TL: Buckhorn Mts., [Okanogan Co.], Washington) (e.g., Ferris 1981b: 335, Layberry et al. 1998: 202). However, when adults are compared in series from northern Washington, Oregon, and the Cascades and Sierra Nevada of California, no consistent morphological differences seem to exist between them. Therefore, following most recent authors (Dornfeld 1980: 64, Hinchliff 1994: 140, Guppy & Shepard 2001: 260, Pyle 2002: 322), no trinomials are applied to *N. californica*.

<u>Biological notes</u>: *Nymphalis californica* is widely distributed in Oregon, and is well known for its irregular population explosions, when adults and immatures may be extraordinarily abundant (e.g., Hopkins 1890, Fletcher 1902: 102, Elrod 1906: 94-95, Newcomer 1912a, Grinnell 1913, McDunnough 1913, Middleton 1913, Ross 1913, Webster 1913, Cockle 1920, Anderson 1923, Storer 1933, Smyth 1938: 232-234, Leech 1946, Fender & Baker 1953, Struble 1953, Tevis 1953, Whittaker 1953, Stoner 1954, Newcomer 1960, T. Emmel & J. Emmel 1962: 32, 1963: 32, Rogers 1962, Powell 1972a,b, Shapiro 1974e, 1976d, Dornfeld 1980: 64, Garth & Tilden 1986: 90, Knaus & Lambremont 1987, Shields 1988, Pyle 2002: 322-323). Individuals of *N. californica* are known to wander very large distances from breeding areas (e.g., Humphreys 1919, Knetzger 1919, Boram 1946, Clench 1954, Forbes 1960: 160, Phillips 1966, Heitzman & Heitzman 1987: 171, Layberry et al. 1998: 203). During outbreak years, adults can be

found virtually anywhere in Oregon, from along the coast, to over 9700’ (Steens Mt., Harney Co.). Migrational movements of *N. californica* have been seen along the Pacific coast in Oregon (Pyle 2002: 323), where larval foodplants are rare or absent. As many authors have noted (e.g., Dornfeld 1980: 64, Pyle 2002: 322), local or regional outbreaks of *N. californica* are frequently followed by years when the species is scarce. Apparently, one or two annual broods of *N. californica* are produced in Oregon, and adults hibernate through the winter (see Ross 1913, Cockle 1920, Hardy 1947, Downes 1948). Adults can be found on virtually any warm, sunny day during the winter, and records from Oregon extend from 21 January (2005, Benton Co., pers. obs.) to 18 December (2004, Tillamook Co., Bill Thackaberry). Males vigorously defend hilltop perches (also see Shields 1968: 81, pers. obs.), especially after 12:00 hrs., and sometimes congregate in large numbers at mud. Both sexes feed at scat, sap, fermenting fruit and flowers (especially post-diapause adults). Also see Danby (1891), Wright (1891), Dyar (1904), Coles (1948) and Hardy (1961, 1962a).

The life history of *N. californica* is very well known. Henry Edwards (1876) provided the first detailed descriptions of the early stages, which have subsequently been described and/or illustrated by several authors (e.g., Comstock 1932a: 17, Emmel & Emmel 1973: 42, Reinhard 1982, Scott 1992: 31). Recent figures of immatures can be found in Guppy & Shepard (2001: 260), Pyle (2002: 323) and Miller & Hammond (2003: 49); also see Reinhard (1982). Larval foodplants of *N. californica* in Oregon include *Ceanothus velutinus* var. *velutinus* (mostly) and *C. integerrimus*, possibly in addition to other *Ceanothus* species in the Siskiyous. In British Columbia, *N. californica* larvae have been reported to feed primarily on *C. sanguineus* (e.g., Dyar 1904, Harvey 1908, Cockle 1920). Also see T. Emmel & J. Emmel (1963).

Nymphalis antiopa **(Linnaeus, 1758)**
_____(most of state) Recorded: all counties

Taxonomic notes: *Nymphalis antiopa* in Oregon represents nominate *N. antiopa* (TL: Sweden). The validity of described geographic variants is questionable. Also see Shapiro (1981c) and Layberry et al. (1998: 203). The “female” *N. antiopa* figured by Dornfeld (1980: 161, figs. 4a-b) is apparently a male.

Biological notes: *Nymphalis antiopa* is widespread in Oregon, and has been recorded from all 36 counties. Adults occur in a wide variety of habitats, especially along riparian corridors, but also in towns and along roads and trails. Records of adult *N. antiopa* in Oregon range from at least 11 February (2005, Josephine Co., pers. obs.) to 11 October (1956, Harney Co., L. R. McGuire), and from the coast to over 7200’ (vic. Fish Lake, Steens Mt., Harney Co.). Adults hibernate through the winter (Siewers 1878), and one or possibly two annual broods are produced in Oregon. While *N. antiopa* is apparently migratory in parts of its range (e.g., Teale 1955, Gibo 1981, Opler & Krizek 1984), only a few reports of migratory movements exist from Oregon (e.g., Pyle 2002: 325). Males of *N. antiopa* guard perches (e.g., Bitzer & Shaw 1983), especially along rivers and creeks. Both sexes feed on fermenting fruit (e.g., Chermock 1952: 33), sap and scat, and males sometimes visit mud. Post-hibernation adults often feed at flowers (pers. obs.), but pre-hibernation adults seldom do (e.g., Tveten & Tveten 1996: 148, pers. obs.). As noted by Cockle (1915), Guppy & Shepard (2001: 262) and Pyle (2002: 325), some adults of *N. antiopa* may survive as long as a year.

The life history of *N. antiopa* is very well known, and many authors have described and/or figured immatures (e.g., Saunders 1869b: 75-76, Scudder 1889a: 400-402, 1889c: pls. 63, 64, 67, 70, 74, 78, 81, 83, 86, 87, Woodsworth 1889, Elrod 1906: 96, Weed 1923, Comstock 1927: pl. 63, #3, Comstock & Comstock 1929: pl. 2, 25, Klots 1951: pl. 5, 6, Krivda 1969, Rahn 1969, Emmel & Emmel 1973: 42, Wright 1993: 107, Bird et al. 1995: 216, Tveten & Tveten 1996: 149, Allen 1997: 321, 341, Guppy & Shepard 2001: 262, Pyle 2002: 325, Miller & Hammond 2003: 48). Larval foodplants of *N. antiopa* include various species of *Salix*, *Populus*, *Ulmus* and *Celtis* (Scudder 1889a: 403, Scott 1992: 31-32, Guppy & Shepard 2001: 262, Graves & Shapiro 2003: 423), among others (e.g., Byers & Richards 1986, Bird et al. 1995: 215), but seem especially fond of *Salix exigua* wherever that plant grows in abundance (pers. obs.). Also see Rácz (1967) and Young (1980).

***Vanessa atalanta* (Linnaeus, 1758)**
_____(breeding immigrant) *rubria* (Fruhstorfer, 1909) Recorded: all counties

Taxonomic notes: North American *Vanessa atalanta rubria* (TL: Mexico; see Field 1971: 16-17) does not display geographic variation.

Biological notes: *Vanessa atalanta* is widespread in Oregon, occurs in most habitat types, and is known from all 36 counties. This species is well known for irregular migratory movements (e.g., Davis 1912, Williams et al. 1942, Shapiro 1974a, Tveten & Tveten 1996: 152, Layberry et al. 1998: 207). For the most part, *V. atalanta* is an annual breeding immigrant in Oregon, where it may produce one or two broods. However, in western Oregon, adults of *V. atalanta* occasionally hibernate through the winter (also see West 1994). Two adults of *V. atalanta* were observed on 18 January 2005, 3 miles west of Brookings in Curry County, by Don and Karen Munson (pers. comm.). On 24 February 2001, I observed two separate individuals of *V. atalanta* in Benton County, both with wings in good condition (see Shepard 2002: 7). These were observed along with adults of other overwintered nymphalids (*Polygonia* and *Nymphalis*), about three weeks before other butterfly species began to fly. Despite this, early season adults such as this have not been seen at the same site on other years, so the ability of *V. atalanta* to successfully survive winters in western Oregon is apparently variable (also see Guppy & Shepard 2001: 269). The latest record of *V. atalanta* in Oregon is from 24 November (2004, Clatsop Co., *fide* Mike Patterson), and records range from the coast to over 7200' (Grant Co.). In Oregon, males defend hilltop perches (pers. obs.; also see Shields 1968: 82, Brown & Alcock 1991), especially from about 15:00 hrs. until dusk. Both sexes feed at a wide variety of flowers (e.g., Pyle 2002: 334), sap, scat and fermenting fruit (e.g., Chermock 1952: 33). Males sometimes visit mud. Adults of *V. atalanta* and other

Vanessa species (e.g., Hardesty 1987) may sometimes be active long after dusk, under certain conditions (e.g., Mather 1959).

Immature stages of *V. atalanta rubria* have been described and/or figured by various authors (e.g., W. H. Edwards 1882, 1883, 1885h, Scudder 1889a: 445-447, 1889c: pls. 64, 70, 74, 78, 83, 86, Comstock 1927: pl. 63, #5, Klots 1951: pl. 6, Emmel & Emmel 1973: 44, Wright 1993: 103, Tveten & Tveten 1996: 151, Allen 1997: 323, 343, Guppy & Shepard 2001: 269, Miller & Hammond 2003: 56). Scudder (1889a: 448) reported *Urtica*, *Humulus* and other genera as larval foodplants of *V. atalanta* in the northeastern United States. Remington (1952: 67-68) and Scott (1992: 24) reported *Urtica dioica* ssp. *gracilis* as a larval foodplant in Colorado. In Oregon, *V. atalanta* feeds on *U. d. gracilis* (pers. obs., Jon Pelham pers. comm. 2004), and possibly on *U. urens*. Other species of *Urtica* are used elsewhere (e.g., Shapiro 1975a: 201), in addition to species of *Parietaria*, *Pilea* and *Soleirolia* (e.g., Pyle 2002: 334, Shapiro 2002: 37, Graves & Shapiro 2003: 427). Natural hybrids between *V. atalanta* and *V. annabella* were reported by Dimock (1973).

***Vanessa cardui* (Linnaeus, 1758)**
_____(breeding immigrant) Recorded: all counties

Taxonomic notes: *Vanessa cardui* (TL: Sweden; see Field 1971: 43) does not display geographic variation. Also see Field (1940: 85-87), Shapiro & Geiger (1989) and Wahlberg et al. (in press). The "male" *V. cardui* figured by Dornfeld (1980: 159, figs. 4a,b) is apparently a female.

Biological notes: *Vanessa cardui* is well known for its irregular northward migrations in North America (e.g., Scudder 1876, Rivers 1903, Grinnell 1914, Dow 1924, 1926, Comstock 1927: 127-130, Schrader 1928, Cockrell 1935, Dawson 1937, Sugden 1937, Smyth 1938: 219-223, Williams 1938, 1949, 1970, Tanner 1941, Woodbury et al. 1942, Smith 1945, Sugden et al. 1947, Abbott 1950, 1951, 1959, 1963, Hardy, 1953, 1959, Knowlton 1954, Tilden 1962, Howe 1967, Hoying 1968, Arnaud 1969, Mather 1971, Brown 1974, Shields 1975b, Krivda 1976, Giuliani 1977, Garth & Tilden 1986: 92, Witham 1993, Giuliani & Shields 1995, 1997), Africa (e.g., Williams 1945, 1965, Larsen 1991: 353), Asia (e.g., Pendlebury 1921, Hammad & Raffat 1972, Larsen 1974: 117, 1983: 172-173, Tuzov et al. 2000: 25) and Europe (e.g., Morris 1919, Williams 1925, Valletta 1952, Brown & Heineman 1972: 202, Tolman 1997: 151, Asher et al. 2001: 197-199). As noted by Emmel & Wobus (1966), Shapiro (1980b), Myres (1985), Nelson (1985), Pyle (2002: 333) and others, *V. cardui* shows some southward movements in the fall, in years when it has successfully populated the Pacific Northwest and other northern regions.

Despite its success as a dispersalist, *V. cardui* apparently cannot survive winters in Oregon, or anywhere with regular frost or freezing temperatures (e.g., Pyle 2002: 332-333; *contra* Scott 1992: 27-28), except perhaps on very rare occasions (also see Clark & Clark 1951: 44). Depending on the year, *Vanessa cardui* can be widespread and common essentially everywhere in Oregon. Other years, the species is virtually absent. There is no evidence to suggest that adults of *V. cardui* hibernate through the winter anywhere in Oregon. Shapiro (1975a: 201) suggested that adults do not persist throughout the winter even in Solano County, California. In Oregon, records of *V. cardui* extend from early March to 29 October (1963, Polk Co., McCorkle), and from the coast to over 9700' (Steens Mt., Harney Co., R. Albright). At least two broods may be produced in Oregon, in years when *V. cardui* populates the state early in the season. Males frequently guard hilltop perches, especially in the afternoon (Shields 1968: 82, Brown & Alcock 1991, pers. obs.). Adults may be active long after dusk, under certain conditions (Hardesty 1987). Both sexes feed at a wide variety of flowers. As many authors have noted (e.g., Shields 1992), *V. cardui* is apparently the most widely distributed butterfly species on the planet.

The life history of *V. cardui* is very well known (e.g., Saunders 1869c: 93-94, Scudder 1889a: 475-477, 1889c: pls. 64, 67, 74, 78, 81, 83, 86, Dyar 1892: 6-7, Comstock 1927: pl. 63, #6, Klots 1951: pl. 6). Recent figures of immatures can be found in Emmel & Emmel (1973: 44), Wright (1993: 105), Neck (1996: pls. 7, 14), Tveten & Tveten (1996: 157), Allen (1997: 323, 341), Guppy & Shepard (2001: 266), Neill (2001: 135) and Miller & Hammond (2003: 57). Larval foodplants of *V. cardui* in the Pacific Northwest include most species of *Cirsium*, as well as *Lupinus sericeus* ssp. *sericeus* var. *sericeus*, *Arctium lappa*, *Onopordum acanthium* (Jon Pelham pers. comm. 2004), and undoubtedly many other plants (see Giuliani & Shields 1995: 161-162, Guppy & Shepard 2001: 266). Shapiro (1975a: 201) reported species of *Cirsium*, *Amsinckia*, *Malva*, *Centaurea* and *Silybum* as larval foodplants of *V. cardui* in Solano County, California, and other larval foodplants from California are known (e.g., Shapiro 2002: 37, Graves & Shapiro 2003: 427-428). Scott (1992: 25-28) reported *Carduus nutans* ssp. *macrolepis* and nine species of *Cirsium* as larval foodplants of *V. cardui* in Colorado, among others. As noted by Tveten & Tveten (1996: 157), over 100 different larval foodplants have been reported for *V. cardui*. Also see Knowlton (1953), Dimock (1968), Herman & Dallmann (1981), Byers et al. (1984) and Ellis & Bowers (1998).

***Vanessa annabella* (Field, 1971)**
_____(breeding immigrant) Recorded: all counties

Taxonomic notes: *Vanessa annabella* (TL: first valley W of Arroyo Verde Park, Ventura, Ventura Co., California) shows no geographic variation. The South American *Vanessa carye* Hübner, [1812] is phenotypically similar to *V. annabella*, but the two taxa were shown to be separate species by Herrera et al. (1958), Field (1971) and Shapiro & Geiger (1989). Also see Wahlberg et al. (in press).

Biological notes: In Oregon, *Vanessa annabella* is an irregular and sporadic breeding immigrant, and is usually encountered in small numbers. Some years, few or no adults are seen in Oregon, while other years they may be widespread and fairly common. As noted by Pyle (2002: 330), *V. annabella* is perhaps more tolerant of freezing temperatures than *V. cardui*, but apparently does not survive winters in most of the state.

It is unknown to what extent *V. annabella* adults or immatures may be able to persist in western Oregon during winter months, but winter survivorship most years is probably inconsiderable. Adults can be found in any habitat type, and their appearance is unpredictable. Records of *V. annabella* in Oregon extend from sea level to over 9300' (Steens Mt., Harney Co.), and from 19 March (1961, Klamath Co., Dornfeld) to 29 October (1958, Klamath Co., Dornfeld). Males defend hilltop perches (e.g., Shields 1968: 82, pers. obs.), especially during afternoon hours (Brown & Alcock 1991, pers. obs.). Both sexes of *V. annabella* visit flowers.

The life history of *V. annabella* is well known, and immatures have been described and/or figured by various authors (e.g., Dyar 1889, Huguenin 1921, Coolidge 1925a, Comstock 1927: pl. 63, #9, Emmel & Emmel 1973: 44, Dimock 1978, Guppy & Shepard 2001: 268). In Washington, *V. annabella* uses *Urtica dioica* ssp. *gracilis*, *Alcea rosea*, *Iliamna rivularis* var. *rivularis*, *Malva sylvestris*, *M. neglecta*, *M. parviflora* and *Malvella leprosa* as larval foodplants (Pyle 2002: 330, Jon Pelham pers. comm. 2004). Foodplants in California reportedly include species of *Malva*, *Alcea*, *Sida*, *Sidalcea* and *Parietaria* (Dyar 1889, Emmel & Emmel 1974: 345, Shapiro 1975a: 201, Graves & Shapiro 2003: 427). Larval foodplants of *V. annabella* in British Columbia include *U. dioica* and *A. rosea* (Dyar 1904, Harvey 1908, Jones 1936: 30). Also see Schrader (1929), Dimock (1973), Shapiro (1973b) and Bitzer & Shaw (1981).

Vanessa virginiensis **(Drury, 1773)**

_____(breeding immigrant) Recorded: Be, Clk, Cls, Cos, **Cr**, Cu, **De**, Do, Gi, Ha, **Ja**, Je, Jo, Kl, **La**, Li, **Lin**, **Lk**, Mal, Mar, Mo, Mu, Po, Sh, Ti, Um, Was, Wh, Ya, Expected: Ba, Col, Gr, HR, Un, Wal, Wan

Taxonomic notes: No geographic variation has been described for *Vanessa virginiensis* (TL: Virginia; see Field 1971: 49).

Biological notes: *Vanessa virginiensis* is usually uncommon in Oregon, but it can be found in essentially any type of habitat, and should eventually be found in all 36 counties. This species apparently is not a permanent resident anywhere in Oregon, but is an irregular and sporadic breeding immigrant (also see Tveten & Tveten 1996: 154, Pyle 2002: 329). Most records of *V. virginiensis* in Oregon are from the late summer (July to September), and very few records exist from April (one record) and May (I know of only three records). This suggests that *V. virginiensis* is unable to survive winters in Oregon with any regularity. Depending on when or if immigrants arrive, one or two summer broods may be produced in Oregon. Most often, only one or a few individuals are seen at any given locality, and some years, *V. virginiensis* is apparently absent in most or all of the state. In Oregon, records of *V. virginiensis* range from 16 April (1988, R. Pyle, Malheur Co.) to 30 October (1961, C. R. Crowe, Multnomah Co.), and from the coast to over 8000' (Lake Co., pers. obs. 2003; Deschutes Co., pers. obs. 2004). Males of *V. virginiensis* are often encountered on hilltops in Oregon and elsewhere (e.g., Shields 1968: 83, Brown & Alcock 1991; Deschutes Co., pers. obs.), and both sexes visit flowers (e.g., Pyle 2002: 329).

Immature stages of *V. virginiensis* have been described and/or figured by many authors (e.g., Smith & Abbot 1797: pl. 9, Boisduval & Le Conte 1829-[1837]: pl. 48, Saunders 1869d, Scudder 1889a: 461-463, 1889c: pls. 74, 78, 81, 83, Weed 1923, Klots 1951: pl. 5, Emmel & Emmel 1973: 44, Emmel et al. 1992: 74, Wright 1993: 105, Bird et al. 1995: 230, Tveten & Tveten 1996: 154, Allen 1997: 323, Nielsen 1999: 145, Neill 2001: 137 and Pyle 2002: 329). Scudder (1889a: 465) listed *Gnaphalium*, *Antennaria* and *Anaphalis* species as larval foodplants of *V. virginiensis*. Emmel & Emmel (1962: 32) and Shapiro (1975a: 201, as *G. bicolor*) reported *Gnaphalium palustre* as a larval foodplant of *V. virginiensis* in California. Scott (1992: 28) reported *Antennaria parvifolia* and *Anaphalis margaritacea* as larval foodplants of *V. virginiensis* in Colorado. Other genera of larval foodplants have been reported (e.g., Dornfeld 1980: 62, Scott 1992: 28, Guppy & Shepard 2001: 265), such as *Gazania* (Shapiro 2002: 37, Graves & Shapiro 2003: 428). Also see Maeki & Remington (1961b: 186).

Limenitidinae: (4 species)

***Limenitis archippus* (Cramer, 1776)**

_____(Columbia and Snake River basins) *idaho* Austin, 1998 Recorded: Ba, Gi, Gr, HR (E), Je, [La (see below)], Mal, Mo, Sh, Um (N), **Wal**, Was, Wh, Expected: Cr (W), De (NE), Ha, Un

Taxonomic notes: Until recently, populations of *Limenitis archippus* in Oregon either were not explicitly associated with any trinomial (e.g., Dornfeld 1980: 60), were considered "unnamed" (e.g., Herlan 1971), or were called *Limenitis archippus lahontani* Herlan, 1971 (TL: Fernley, Lyon Co., Nevada) (e.g., Perkins & Gage 1971, Perkins & Perkins 1975: 133, Hinchliff 1994: 148). However, Austin (1998d: 751-755) discussed western North American segregates of *L. archippus*, and restricted the distribution of *L. a. lahontani* to the Lake Lahontan drainage of Nevada. To represent populations of *L. archippus* in the Snake River drainage, the Columbia Basin, and the Bonneville Basin of Utah, Austin (1998d) proposed the name *Limenitis archippus idaho* (TL: Little Salmon River (= Salmon Falls Creek) Valley, US Rte. 93, 3.1 mi. S Jackpot, 1650 m, Elko Co., Nevada; see Austin 1998d: 754). Adults of *L. a. idaho* are paler above and below than those of *L. a. lahontani* or *Limenitis archippus archippus* (TL: New York; see Miller & Brown 1981: 178), but the development of dark markings above on *L. a. idaho* is essentially intermediate between that seen on *L. a. lahontani* and *L. a. archippus*. Also see Platt et al. (1970).

Biological notes: *Limenitis archippus* is locally distributed in Oregon, in the Columbia and Snake River drainages, and adults are usually seen in small numbers. It occurs in low-elevation riparian habitats with abundant *Salix*. In Oregon, records of *L. archippus* extend from about 50' (Hood River, Hood River Co., see Shepard 2002: 7) to 3000' (N of Halfway, Baker Co.), and from 15 May (1957, Morrow Co., R. Albright) to 6 September (1961, Gilliam Co., D. Bauer). Apparently, two annual broods of *L. archippus* fly in Oregon, peaking in June and August. Males guard perches along riparian corridors, and visit mud. Both sexes visit flowers and sap (e.g., Pyle 2002: 342). Various wild hybrids between *L. archippus* and *L. lorquini* are known from Oregon and Washington (e.g., Gage 1970, Perkins & Gage 1971, Platt et al. 1979, Dornfeld 1980: 60, 155, Pyle 2002: 343). Old records of *L. archippus* from Lane County (Sunshine Acres Dr., vic. Harlow Rd., 300'-400', 1957 to 16 July 1963, Dave McNeese et al.) possibly represent an introduced population that has long since been extirpated.

The only confirmed larval foodplant of *L. archippus* in Oregon and Washington (Jon Pelham pers. comm. 2004) is *Salix exigua*. Other species of *Salix* and *Populus* are used as larval foodplants elsewhere (e.g., Saunders 1869c, Bethune 1874, Scudder 1889a), reportedly in addition to *Prunus* (e.g., Ferris 1981b: 347). Guppy et al. (1994: 35, 38) reported *Pyrus* (apple) as a potential former foodplant of *L. archippus* in British Columbia, but the butterfly apparently no longer occurs there (also see Guppy & Shepard 2001: 316). The early stages of *L. a. idaho* have not been reported. The immatures of other segregates of *L. archippus* have been described and/or illustrated by many authors (e.g., Boisduval & Le Conte 1829-[1837], Saunders 1869c: 94-95, Bethune 1874, W. H. Edwards 1879c, 1880c: 248-251, 1884d: [222-225], pl. [36], Scudder 1889a: 269-271, 1889c: pls. 64, 67, 70, 74, 78, 81, 83, 86, Weed 1923, Comstock & Dammers 1933: 27-35, Klots 1951: pl. 5, 9, Emmel & Emmel 1973: 46, Tveten & Tveten 1996: 164, Allen 1997: 323, 343). Early-instar larvae of all of Oregon's *Limenitis* species mimic bird droppings, and partly grown larvae overwinter in hibernacula, which can be found at the tips of branches on larval foodplants. Also see Maeki & Remington (1961b: 190), Clark & Platt (1969), Ritland & Brower (1991, 2002) and Ritland (1995).

***Limenitis weidemeyerii* W. H. Edwards, 1861**
_____(far SE deserts and ranges) *latifascia* S. Perkins & E. Perkins, 1967 Recorded: Ha (S), Mal

Taxonomic notes: Populations of *Limenitis weidemeyerii* in Oregon represent *Limenitis weidemeyerii latifascia* (TL: Mink Creek, 10 mi. S Pocatello, Bannock Range, Bannock Co., Idaho). At most localities in Oregon where *L. weidemeyerii* flies, *L. lorquini* also occurs, as well as phenotypically intermediate adults. Because of this, and genetic similarity of the two taxa, some authors (e.g., Porter 1990) have argued that *L. weidemeyerii* and *L. lorquini* should be considered conspecific. However, zones of intergradation between *L. weidemeyerii* and *L. lorquini* in Nevada and California were studied in detail by Boyd et al. (1999), who maintained the taxa as separate species. Also see Perkins & Perkins (1967), Platt et al. (1970), Porter (1989) and Rosenberg (1989b).

Biological notes: *Limenitis weidemeyerii* is uncommon in Oregon, where it occurs along riparian corridors through the southeastern deserts, and in the Pueblo and Trout Creek mountains. Records of *L. weidemeyerii* in Oregon extend from about 3500' (vic. Owyhee River, Malheur Co.) to 6500' (Pueblo Mts., Harney Co.), and from 10 June (1973, Malheur Co., R. Albright) to 28 September (1978, Malheur Co., C. Bohn). One or two annual broods of *L. weidemeyerii* fly in Oregon. Males guard perches in canyons and along river courses, and visit mud. Both sexes feed at flowers.

Foodplant species used by larvae of *L. weidemeyerii* in Oregon have not been reported. Emmel et al. (1971: 237) reported *Salix exigua*, *Populus angustifolia*, *Amelanchier utahensis* and *Holodiscus* as a larval foodplants of *L. weidemeyerii* in Nevada and California (also see Fleischman et al. 1997: 18-19). Scott (1992: 23) reported *Amelanchier alnifolia*, *Populus angustifolia*, *P. deltoides*, *Salix exigua*, *S. amygdaloides*, *Prunus virginiana* var. *melanocarpa* and *Holodiscus dumosus* as larval foodplants of *L. weidemeyerii* in Colorado. The early stages of *L. weidemeyerii* from Colorado were described by W. H. Edwards (1892: 107-108, 1897: [418]), and a pupa from Colorado was figured by Emmel et al. (1992: 83). Also see Maeki & Remington (1961b: 188), Perkins & Perkins (1973), Rosenberg (1989a) and Rosenberg & Enquist (1991).

Limenitis lorquini **(Boisduval, 1852)**
Recorded: all counties
_____(Siskiyous, S Cascades, Warners) *lorquini*
_____(N Coast Range, Willamette Valley, Cascades) *ilgae* C. Guppy, 2001
_____(E of Cascades) *burrisoni* Maynard, 1891 (= *itelkae* C. Guppy, 2001, **new synonym**)

Taxonomic notes: Adults of *Limenitis lorquini* display a considerable amount of individual variation at most sites in western Oregon. In the Siskiyous, north Coast Range, Cascades (E and W slopes), Warners and Willamette Valley, individuals of *L. lorquini* phenotypically resembling two or three named segregates fly in sympatry. Throughout the Siskiyous, adults similar to the paler *Limenitis lorquini lorquini* (TL: Hwy. 70 at Soda Creek, E branch N Fork Feather River Canyon, 2500', Plumas Co., California; see Emmel et al. 1998i: 16) fly together with adults resembling the darker *Limenitis lorquini ilgae* (TL: Jones Creek Rd. to Oliphant Lake, Bamberton, British Columbia), and intermediates. Occasional adults similar to *L. l. lorquini* are found as far north as Benton County (pers. obs.), however most adults in the north Coast Range and Willamette Valley are phenotypically closest to *L. l. ilgae*. Throughout the Cascades of Oregon, *L. l. ilgae* and *Limenitis lorquini burrisoni* (TL: Landsdowne Creek nr. Fairmont Hot Springs, Vancouver Island, British Columbia; see Layberry et al. 1998: 210-211 and Guppy & Shepard 2001: 318) are indistinguishable. Individual variation in these populations (e.g., Mill Creek Canyon, Wasco Co.) is so great that no particular trinomial seems applicable.

East of the Cascades in Oregon, *L. l. burrisoni* occurs throughout the northeastern valleys and ranges. Adults in this region tend to be paler above and below, and have reduced orange areas on the forewing, compared to those from further west. Adults in these populations are individually variable, but are phenotypically more uniform than those from the Cascades or other sites in western Oregon. According to Layberry et al. (1998: 211) and Guppy & Shepard (2001: 318-319), the holotype specimen of *L. l. burrisoni* is likely to be a hybrid between *L. lorquini* and *Limenitis arthemis* (Drury, 1773). Because of this, Guppy & Shepard (2001) believed that the name was unavailable (see ICZN 1999: 21, art. 17; p. 27, art. 23.8), and proposed the name *Limenitis lorquini* *itelkae* (TL: 1 mi. N Hwy. 3A on Mt. Apex Rd., Keremeos, British Columbia) as a replacement. However, *burrisoni* is available for use as a species-level name (see ICZN 1999: 21, art. 17). Article 23.8 (ICZN 1999: 27) clearly states that *burrisoni* cannot be used as the name for either of its parental species, but the name is available for use as a trinomial. Therefore, *Limenitis lorquini itelkae* is herein treated as a synonym of *Limenitis lorquini burrisoni*. Also see discussion under *A. weidemeyerii* (p. 269), Perkins & Perkins (1966b), Platt et al. (1970) and Platt (1983).

Biological notes: In Oregon, *Limenitis lorquini* is widespread, and occurs in a wide variety of habitats. Adults are frequently found in riparian areas, where they are sometimes abundant, but also occur in other forested habitats, along roads, and occasionally in towns. Records of *L. lorquini* in Oregon extend from 9 May (1928, Yamhill Co., K. Fender) to 2 October (1958, Linn Co., R. Woodley), but most records are from June to early August. Adults occur from sea level to about 8000' (Light Peak, Warner Mts., Lake Co.). One or two annual broods are produced in Oregon. Males of *L. lorquini* guard perches in a variety of sunny areas, and visit mud and scat. Both sexes feed at sap (Guppy & Shepard 2001: 318), a wide variety of flowers and fermenting fruit. Various wild hybrids between *L. lorquini* and *L. archippus* from Oregon and Washington are known (e.g., Gage 1970, Perkins & Gage 1971, Platt et al. 1979, Dornfeld 1980: 60, 155, Pyle 2002: 343). Also, apparent hybrids between *L. lorquini* and *L. arthemis* have been reported from British Columbia and Alberta (e.g., Layberry et al. 1998: 211, Guppy & Shepard 2001: 313, 318-319).

William H. Edwards (1872: [124], 1897: [418-419]) and Dyar (1891a) described the immature stages of *L. lorquini*. Comstock (1927: 143) illustrated a pupa, Comstock (1932b: 87) described and illustrated the egg, and a full-grown larva and pupa of *L. lorquini* were illustrated by Dammers in Emmel & Emmel (1973: 46). Full-grown larvae of *L. lorquini* were subsequently figured by Pyle (2002: 337) and Miller & Hammond (2003: 47). Guppy & Shepard (2001: 318) figured an egg, full-grown larva, hibernaculum and pupa of *L. lorquini* from British Columbia. Dyar (1891a: 174) reported species of *Salix*, *Populus* and *Prunus* as larval foodplants of *L. lorquini* in California. Newcomer (1964a: 224) reported larvae to occasionally be common on *Pyrus* (apple) trees in Washington. Erik Runquist (Pers. comm. 2004) has found late-instar larvae of *L. lorquini* in Jackson County feeding on *Prunus virginiana*. Additional larval foodplants of *L. lorquini* in Washington include *Populus balsamifera* ssp. *trichocarpa*, *Salix lucida* ssp. *lasiandra*, *S. l.* ssp. *caudata*, *S. amygdaloides*, *S. melanopsis*, *S. exigua*, *S. lasiolepis*, *Ceanothus velutinus* var. *velutinus*, *Amelanchier alnifolia* var. *alnifolia*, *Holodiscus discolor* and *Spiraea douglasii* var. *douglasii* (Jon Pelham pers. comm. 2004). Sugden (1970: 31) described the full-grown larva of *L. lorquini*, and listed *Pyrus* (as *Malus*), *Populus tremuloides* and *P. balsamifera* ssp. *trichocarpa* (as *P. trichocarpa*) as larval foodplants in British Columbia. Other larval foodplants are undoubtedly used in Oregon and elsewhere (e.g., Emmel et al. 1971: 238, Guppy & Shepard 2001: 318, Pyle 2002: 340). As demonstrated by Prudic et al. (2002), a mimetic relationship apparently exists between *L. lorquini* (the mimic) and *Adelpha californica* (the model). Also see Pyle (1972) and Porter (1988).

***Adelpha californica* (Butler, 1865), revised status**

_____(Siskiyous, N Coast Range, Cascades, [Warners]) Recorded: **Be**, Cls, Cos, **Cu**, **Do**, **Ja**, Je (far SW), **Jo**, **Kl** (W), **La**, Li, Lin, Lk (S), Mar, Mu, **Po**, Ya, Expected: Clk, Col, De (W), HR?, Ti, Wan, Was (W)?

Taxonomic notes: This species was once known as *Adelpha* (*Heterochroa*) *californica*, or *A*. (*H*). *bredowii californica* (e.g., Skinner 1911, Holland 1931: 167, pl. XXII). Carpenter & Hobby (1944) treated *Adelpha bredowii* Geyer, 1837 (TL: Mexico), *Adelpha eulalia* (Doubleday, [1848]) (TL: Mexico) and *Adelpha californica* (TL: California) as geographic segregates of a single species, *A. bredowii*. Their arrangement has been followed by essentially all subsequent authors. However, *A. bredowii* and *A. eulalia* are sympatric and synchronic in many parts of western Mexico, from Durango in the north to Oaxaca in the south. In areas of sympatry, the two species maintain their morphological and genetic identities. Genetically, *A. bredowii* and *A. eulalia* are clearly separate species, and *A. californica* is as different from *A. eulalia* as *A. eulalia* is from *A. bredowii*. A detailed discussion of the molecular study upon which these conclusions are based will be presented elsewhere (Prudic and Warren, in preparation). The "female" *A. californica* figured by Dornfeld (1980: 157, figs. 3a,b) is a male. Also see Hovanitz (1945), Willmott (2003a,b) and Davenport (2004b: 47).

Biological notes: *Adelpha californica* is widespread in western Oregon, and occurs at most sites where larval foodplants grow in abundance. While it is apparently scarce in the Portland area (e.g., Newcomer 1964c: 48), *A. californica* can be abundant along the edges of the Willamette Valley. Records of *A. californica* in Oregon extend from near sea level (Depoe Bay, Lincoln Co.; see Macy 1959: 199) to over 6500' (Odell Butte, Klamath Co.), and from 22 May (Jackson Co.) to 29 October (Yamhill Co.). The single record of *A. californica* from the Warner Mountains (Lake Co.) apparently represents a stray individual, since it has not been replicated. Two or three annual broods of *A. californica* are produced in Oregon, depending on elevation and seasonal conditions. Recently eclosed adults can be found any time between late May and October, peaking in June and July. Most October records of *A. californica* are of fresh individuals. Males of *A. californica* perch along riparian corridors and roads in forested settings, and sometimes, perch high in the canopy of the forest. Recently eclosed males visit mud, and both sexes visit flowers, fermenting fruit, sap and scat.

Larval foodplants of *A. californica* in Oregon include *Quercus garryana*, the most widespread and preferred larval foodplant (*contra* Pyle 2002: 344), *Q. kelloggii* in Jackson County (Erik Runquist pers. comm. 2004, ovipositions witnessed), and *Chrysolepis chrysophylla* at higher elevations. Additional *Quercus* species are probably used as larval foodplants in southwestern Oregon and California, including *Q. chrysolepis*, *Q. agrifolia* and others (see Emmel & Emmel 1974: 346, Pyle 2002: 344). Dyar (1891d) described the immature stages of *A. californica* from Yosemite, California. Comstock (1927: 146) illustrated a pupa of *A. californica*, and Comstock & Dammers (1932c: 84) described and illustrated some of the other early stages. Dammers in Emmel & Emmel (1973: 46, also see Garth & Tilden 1986: pl. 1, i, j) illustrated a full-grown larva and pupa of *A. californica*, and a late-instar larva was figured by Miller &

Hammond (2003: 44). As shown by Prudic et al. (2002), a mimetic relationship apparently exists between *A. californica* (the model) and *L. lorquini* (the mimic). Also see Moeck (1958), Macy (1959) and Porter (1988).

Satyrinae: (7 species)

Coenonympha tullia **(Müller, 1764)**

_____(E Cascades, Warners, eastward) *ampelos* W. H. Edwards, 1871 Recorded: **Ba**, **Cr**, **De**, Gi, **Gr**, **Ha**, **HR** (E), **Je**, **Kl** (NE), **Lk**, **Mal**, **Mo**, **Sh**, **Um**, **Un**, **Wal**, **Was**, **Wh**
_____(Siskiyous) *eryngii* Hy. Edwards, 1877 Recorded: Cos (S), **Cu**, **Do** (S), **Ja**, **Jo**, **Kl** (SW)
_____(Willamette Valley and N Coast Range) *eunomia* Dornfeld, 1967 Recorded: **Be**, **Clk**, Col, **Do** (N), **La**, **Li**, Lin, Mar, Mu, **Po**, Wan, Ya, Expected: Cls (E), Cos (N), Ti (E)
_____(N coast) *insulanus* McDunnough, 1928 Recorded: Cls, Expected: Ti?
_____(S coast) *yontocket* Porter & Mattoon, 1989 Recorded: Cos, Cu

Taxonomic notes: Guppy & Shepard (2001: 320-323) grouped most North American *Coenonympha* populations as segregates of *Coenonympha california* Westwood, [1851], citing supposed differences in male genitalia between various North American populations and Eurasian *C. tullia* (TL: [Zeeland, Denmark]). However, this arrangement was proposed without supporting data, and it is unclear if genitalia of nominotypical *C. tullia* were examined. No discussion of variation in male genitalia across North American populations was provided by Guppy & Shepard (2001), and no specific description of supposed genitalic differences between *C. tullia* and *C. california* was offered. Until a detailed study is completed on all members of the *Coenonympha tullia* complex (including Eurasian ones, see Tuzov et al. 1997: 193, pl. 45), and relationships between North American taxa are better understood, the name *C. tullia* is herein retained for North American populations (see Davenport 1941, Klots 1951: 70-72, Brown 1955, Dornfeld 1967, 1980: 53, Porter & Geiger 1988, Porter & Mattoon 1989, and Austin & Gray 1998, Opler & Warren 2002: 40, but also see dos Passos 1958: 677, 1964: 101, Emmel 1975: 101-105, Pyle 1981: 678-683, Garth & Tilden 1986: 68, Tilden & Smith 1986: 41-43, Bird et al. 1995: 288-290 and Davenport 2003: 41, 2004b: 48).

Populations of *C. tullia* in Oregon display clear patterns of geographic variation, but wherever the distributions of various segregates meet, phenotypic intergradation occurs. In addition, adult phenotypes of all segregates of *C. tullia* in Oregon show subtle seasonal polyphenism. East of the Cascades, populations are referable to *Coenonympha tullia ampelos* (TL: probably nr. Goose Lake, Lake Co., Oregon; see Austin & Gray 1998: 590; also see Brown 1964a: 342-344). Adults of *C. t. ampelos* in most populations are phenotypically variable, but average pale ochre above, usually with small ocelli on the ventral hindwing margin, and near the ventral forewing apex. Austin & Gray (1998) summarized patterns of individual and seasonal variation in Great Basin populations of *C. tullia*, and considered all populations in eastern Oregon to represent *C. t. ampelos*. However, as noted by Austin & Gray (1998: 590) the type specimens of *C. t. ampelos* are from an area of apparent introgression between ochre Great Basin phenotypes, and the paler *C. t. eryngii*. While most individuals of *C. tullia* along the west slope of the Warner Mountains (e.g., Crane Creek; Kelley Creek; Warner Canyon) are of the ochre Great Basin phenotype, rare individuals in this area are pale above and lack ocelli below, and are identical to *C. t. eryngii*. In addition, various intermediate phenotypes are seen in this area, in small numbers. For now, following Austin & Gray (1998), the name *C. t. ampelos* is applied to predominantly ochre populations of *C. tullia* east of the Cascadian Crest, excluding much of Klamath County.

At several sites in central and southern Klamath County (e.g., N of Chiloquin, ca. 4500'; Sprague River, ca. 4400'; Bly Mt., ca. 4800'), and northern Siskiyou County, California (Shapiro 1991a: 144), phenotypic intermediates between *C. t. ampelos* and *Coenonympha tullia eryngii* (TL: Mt. Shasta, Siskiyou Co., California) are common. South and west of this area, populations are relatively "pure" *C. t. eryngii*, including those in far southwestern Klamath, Jackson, Josephine, Curry and southern Coos counties. Individuals in this area are pale above, sometimes with a faint ochre tint, and tend to lack ocelli below. Adults of *C. t. eryngii* are phenotypically similar to those of *Coenonympha tullia california* (TL: San Francisco, [San Francisco Co.], California; see Miller & Brown 1981: 194), but *C. t. california* is even paler than *C. t. eryngii*, and averages better developed ocelli on the ventral wing surfaces (Tilden & Smith 1986: 43).

In southern Douglas County (e.g., vic. S Umpqua River, ca. 1500'; Canyonville area, ca. 1200') and probably in central Coos County, *C. t. eryngii* intergrades with *Coenonympha tullia eunomia* (TL: Wilhoit, [Clackamas Co.], Oregon; also see Field 1937). Adults in these areas are phenotypically quite variable, and range from the pale *C. t. eryngii* to the ochre *C. t. eunomia*, and all kinds of intermediates. Populations to the north, in the Willamette Valley and lower west slope of the Cascades, represent *Coenonympha tullia eunomia*. These adults are darker and duller ochre above than those of *C. t. ampelos*, and average smaller in size than that taxon. Below, adults of *C. t. eunomia* lack ocelli. While *C. t. eunomia* and *C. t. ampelos* have not been reported to intergrade, such blending could occur in the Columbia River Gorge, and additional studies there should be conducted.

There are two sets of *C. tullia* populations in Oregon that occur along the immediate coast. Along the north coast in Clatsop County flies *Coenonympha tullia insulanus* (TL: Victoria, [Vancouver Island, British Columbia]). Adults of *C. t. insulanus* are phenotypically similar to those of *C. t. eunomia*, yet average somewhat grayer below, with better developed pale median hindwing markings. However, differences between the two taxa are subtle, and some authors consider them to be synonymous (e.g., Guppy & Shepard 2001: 322, but see Hinchliff 1996: 131). On the south coast, in Curry and southern Coos counties, flies *Coenonympha tullia yontocket* (TL: 4 km. W Fort Dick, Del Norte Co., California). Adults of *C. t. yontocket* are phenotypically similar to those of *C. t. insulanus*, and are ochre above, not pale as in *C. t. eryngii*. Populations of *C. t. yontocket* are separated from *C. t. insulanus* more by geography than by any striking morphological differences. Away from the immediate coast in Curry County (e.g., Winchuck River Rd., 10 mi. E Brookings, ca. 800'), *C. t. yontocket* and *C. t. eryngii* intergrade.

<u>Biological notes</u>: *Coenonympha tullia* is widespread in Oregon, and is found in most parts of the state. Areas not occupied by *C. tullia* in Oregon include the central coast and the high Cascades. Populations occur in a variety of open grassy habitats. Males patrol through grassy areas, and both sexes visit a variety of flowers (e.g., Pyle 2002: 346). East of the Cascadian crest, *C. t. ampelos* flies in two annual broods, from late April to mid-July, and from late July through September. Records extend from about 85' (vic. The Dalles, Wasco Co.) to over 8500' (Steens Mt., Harney Co.). Adults of *C. t. eunomia* and *C. t. eryngii* fly in two or three annual broods, from late April to early July, and from late July to early October. Records of *C. t. eunomia* extend from about 75' (Portland, Multnomah Co.) to 3500' (Mary's Peak, Benton Co.). Records of *C. t. eryngii* extend from about 700' (Reuben Creek, Josephine Co.) to over 6000' (CSNM, Jackson Co.). Adults of *C. t. insulanus* and *C. t. yontocket* fly in grassy coastal habitats, in two annual broods, from early May to late June, and from mid-July through September.

No details on larval foodplants used by populations of *C. tullia* in Oregon have been presented. Scott (1992: 21d-21e) reported various species of *Poa*, *Festuca*, *Bouteloua*, *Carex* and others as probable larval foodplants of *C. tullia* in Colorado. The early stages of *C. tullia insulanus* were described by W. H. Edwards (1887a, also see Brown 1964a) and Hardy (1960a). Henry Edwards (1887) described the immatures of *C. tullia* from western California, followed (with illustrations) by W. H. Edwards (1897: 220-222], pl. [29]) and Comstock (1927: 66; also see Emmel & Emmel 1973: 26). Guppy & Shepard (2001: 323) figured a full-grown larva and pupa of *C. tullia* from British Columbia.

***Cercyonis pegala* (Fabricius, 1775)**
_____(Siskiyous, N Coast Range, Willamette Valley, W Cascades) *ariane* (Boisduval, 1852) <u>Recorded</u>: **Be**, Clk, Cls (E), Col, Cos, Cu, **Do**, **Ja**, **Jo**, Kl (far W), **La**, Li (E), Lin, Mar, Mu, Po, Ti, Wan, **Ya**, <u>Expected</u>: HR
_____(NE Cascades, Ochocos, Aldrichs, Blues, Wallowas) nr. *ariane* <u>Recorded</u>: Ba, **Cr**, De (N), Gi, Gr, Ha (N), HR, **Je**, Mal (N), Mo, Sh, Um, Un, **Wal**, **Was**, Wh
_____(Little Deschutes River) <u>Recorded</u>: De (SW), **Kl** (N)
_____(Silver Lake area) <u>Recorded</u>: Lk (NW)
_____(Summer Lake area, Lake Albert area, etc.) *stephensi* (W. G. Wright, 1905) <u>Recorded</u>: Ha (SW), **Lk** (central)
_____(Crump Lake area, Lake Co.) <u>Recorded</u>: Lk (SE)
_____(Warners and Goose Lake area) *gabbii* (W. H. Edwards, 1870) <u>Recorded</u>: **Lk** (SW)
_____(Klamath Basin) nr. *gabbii* <u>Recorded</u>: Kl (S)
_____(S Alvord Desert) nr. *paucilineatus* Austin 1992 <u>Recorded</u>: Ha (SE), <u>Expected</u>: Mal (S)
_____(central Harney Co.) <u>Recorded</u>: Ha (central)

Taxonomic notes: Great Basin populations of *Cercyonis pegala* were reviewed by Austin (1992), who named several distinctive segregates. Since Austin's review, the taxonomic status of populations of *C. pegala* in southeastern Oregon is relatively clear, but populations in western and northeastern Oregon require much additional study. Populations in the Siskiyous, north Coast Range, Willamette Valley and western Cascades are somewhat variable, but no traits to further divide these populations into distinctive segregates have thus far been identified. Several names are potentially applicable to these populations, including *Cercyonis pegala ariane* (TL: 2 mi. S of Spanish Ranch, Plumas Co., California; see Emmel et al. 1998i: 19), *Cercyonis pegala boopis* (Behr, 1864) (TL: Point Richmond, Contra Costa Co., California; see Emmel et al. 1998h: 102), *Cercyonis pegala baroni* (W. H. Edwards, 1880) (TL: Mendocino Co., California; see Brown 1964a: 380) and *Cercyonis pegala incana* (W. H. Edwards, 1880) (TL: Olympia, [Thurston Co.], Washington; see Brown 1964a: 380-382). However, the taxonomic status of these names has not been elaborated upon in recent literature (e.g., Austin 1992, Sourakov 1995, Emmel et al. 1998h, i), and their application to populations in Oregon (e.g., Guppy & Shepard 2001: 324-325, Pyle 2002: 348-349) remains speculative (note that the same image was used for *C. p. ariane* and *C. p. incana* by Pyle 2002: 349, 352). Until this situation is studied in detail, and series from all over northern California and western Oregon are examined, populations in western Oregon are tentatively called *Cercyonis pegala ariane*, the oldest of the four names.

The name *C. p. ariane* has been misapplied in much of the recent literature (e.g., Sourakov 1995; see Austin 1992: 5 for a review). Topotypical males of *C. p. ariane* have a variable number of ventral hindwing ocelli, and females have greatly reduced ocelli, which may be absent. Both sexes, especially females, have some white "frosting" on the wings below (Austin 1992: 5, Emmel et al. 1998i: 19), and dark striations are usually well developed. Populations in the northeastern Cascades, Ochocos, Aldrichs, Blues, Wallowas and surrounding areas are similar to those from western Oregon, although adults tend to have less whitish frosting below, and ocelli usually are not as well developed. Some individuals from northeastern Oregon approach the phenotype of *Cercyonis pegala ino* G. Hall 1924 (TL: Calgary, Alberta). These are smaller, with very poorly-developed ocelli below, but other adults in the same populations are phenotypically closer to those from western Oregon. Additionally, some adults from lower elevations in the Columbia Basin are somewhat paler below than adjacent populations at higher elevations. Until populations throughout northeastern Oregon and adjacent states are studied in more detail, they are tentatively called *Cercyonis pegala* nr. *ariane*.

A distinctive population of *C. pegala* occurs along the Little Deschutes River in northern Klamath and southern Deschutes counties (e.g., Gilchrist, Klamath Co.; see Austin 1992: 25 and Dornfeld 1980: 149, #4a, 4b, 4c, labeled as "*C. sthenele silvestris*"). Adults in this area are unusually small and dark, similar in size to *C. sthenele*, but are phenotypically most like populations of *C. p.* nr. *ariane* to the north. A population of *C. pegala* occurring in the vicinity of Silver Lake, Lake County, was reported by Austin (1992: 25) to be phenotypically intermediate between the population along the Little Deschutes River, and *C. p. stephensi* (see below).

Cercyonis pegala stephensi (TL: between Lake City and Cedarville, Surprise Valley, Modoc Co., California; see Austin 1992: 9) occurs in the vicinity of Summer Lake and south of Albert Lake in Lake County, and in southwestern Harney County (Austin 1992: 25). These adults are large and pale, with large and well-developed ocelli and dark striations on the ventral hindwing. Females are especially pale. *Cercyonis pegala blanca* T. Emmel & Mattoon, 1972 (TL: Hwy. 140 at Dufurrena Ranch, Chas. Sheldon Antelope Range, Humboldt Co., Nevada) is a synonym of *Cercyonis pegala stephensi* (Austin 1992).

Adults in the vicinity of Goose Lake, Lake County, represent *Cercyonis pegala gabbii* (TL: Goose Lake region, Lake Co., Oregon; see Austin 1992: 8). These are somewhat smaller and darker than those of *C. p. stephensi*, and ocelli below are not as well developed. The ventral ground color is paler than that of *C. p. ariane*, but is slightly darker than that of *C. p. stephensi.* Austin (1992: 8) considered populations on the west slope of the Warner Mountains to be phenotypically intermediate between *C. p. ariane* and *C. p. gabbii*, but they were included within the concept of *C. p. gabbii*. I have found that populations up to 6000' in the Warners (e.g., Camas Creek) are mostly composed of individuals of the *C. p. gabbii* phenotype. Herein, the name *Cercyonis pegala gabbii* is applied to all populations in the Warner Mountains and Goose Lake area. The population centered at Crump Lake, Lake County, at the eastern base of the Warners, is phenotypically intermediate between *C. p.* nr. *ariane* and *C. p. stephensi* (see Newcomer 1965, Austin 1992: 20). Populations in the vicinity of Klamath Falls, Klamath County, are similar to *C. p. gabbii*, but according to Austin (1992: 7), represent a distinctive segregate. However, I have not yet examined adults from this area.

At the southern end of the Alvord Desert (e.g., Trout Creek and Tum Tum Lake), adults of *C. pegala* are phenotypically intermediate (see Austin 1992: 13, 20) between *C. p. stephensi* and *Cercyonis pegala paucilineatus* (TL: US Rte. 95, 3.8 mi. S Orovada, 1304 m, Quinn River Valley, Humboldt Co., Nevada), and are herein called *Cercyonis pegala* nr. *paucilineatus.* Typical adults of *C. p. paucilineatus* differ from those of *C. p. stephensi* by having smaller ocelli, and dark striations on the ventral hindwing are usually not as well defined. Additionally, adults of *C. p. paucilineatus* average darker above and below than those of *C. p. stephensi* (see Austin 1992: 12-13). Typical *C. p. paucilineatus* may eventually be found in southern Malheur County. Populations of *C. pegala* to the north of *C. p.* nr. *paucilineatus*, in central Harney County (e.g., Frenchglenn, northward to Burns), are composed of darker adults than those of *C. p.* nr. *paucilineatus* or *C. p. stephensi*, and appear phenotypically intermediate between those phenotypes and *C. p.* nr. *ariane* of the Blue Mountains (Austin 1992: 20). Also see W. H. Edwards (1880d) and Comstock (1924b).

<u>Biological notes</u>: *Cercyonis pegala* is widespread and common in the Siskiyous, north Coast Range, Willamette Valley, western Cascades, northeastern Cascades and through the northeastern mountain ranges. Populations in southeastern Oregon tend to be more locally distributed. Preferred habitats for *C. pegala* include open fields and roadsides in the west, montane meadows and riparian corridors in the Cascades and northeastern mountains, and riparian habitats (pastures, edges of lakes) in the southeast.

Some populations of *C. pegala* in the Columbia Basin (e.g., Tygh Valley, Wasco Co.) occur in dry gullies. Males patrol through preferred habitats, often in the shade of trees and shrubs up to four meters above the ground, and both sexes visit a wide variety of flowers (Pyle 2002: 348). I have also seen males of *C. pegala* at scat and sap. Records extend from about 25' (Elk River Rd., Curry Co.) to over 7000' (Crater Lake National Park, Klamath Co.). The single annual brood of *C. pegala* in Oregon flies from late May (but usually late June) to mid-September, depending on elevation and seasonal conditions.

Immature stages have been described and/or illustrated from various populations of *C. pegala* (e.g., Boisduval & Le Conte 1829-[1837]: pl. 59, W. H. Edwards 1877, 1884d: [263-265], pl. [40, 42], Scudder 1889a: 166-167, 173, 1889c: pls. 64, 67, 70, 74, 78, 83, 86, Elrod 1906: 107, Klots 1951: pl. 5, 6, Emmel 1969, Scott 1992: 21f, Wright 1993: 29, Sourakov 1995, Allen 1997: 325, 345, Guppy & Shepard 2001: 325, Miller & Hammond 2003: 62). Emmel & Mattoon (1972) provided detailed descriptions and figures of the early stages of *C. p. stephensi* from Humboldt County, Nevada. Larval foodplants of *C. pegala* in Oregon have not been reported, but Emmel & Mattoon (1972: 143) listed several possible foodplants of *C. p. stephensi* in Nevada. Scott (1992: 21e-21f) reported ovipositions of *C. pegala* on many grasses in Colorado, and listed *Poa pratensis* and a *Festuca* species as confirmed larval foodplants there. Allen (1997: 177) reported *Danthonia spicata*, an *Andropogon* species, *Poa* species and others as larval foodplants of *C. pegala* in West Virginia. Confirmation of larval foodplants is difficult since females of *C. pegala* are known to oviposit haphazardly, and often drop their eggs in flight (Scott 1992: 21f). Also see Maeki & Remington (1961a: 132), Perkins (1973) and Bowers & Wiernasz (1979).

***Cercyonis sthenele* (Boisduval, 1852)**

_____(E of Cascadian crest) *sineocellata* Austin & J. Emmel, 1998 <u>Recorded</u>: Ba, Cr, **De**, Gi, Gr, Ha, Je, Kl, **Lk**, Mal, Sh, **Wal**, Was, Wh, <u>Expected</u>: HR (E)?, Mo, Um, Un
_____(Siskiyous, far S Cascades) <u>Recorded</u>: Cu, **Ja** (S), **Jo**, <u>Expected</u>: Cos (S), Do (SW)
_____(W Cascades) <u>Recorded</u>: Do (E), Ja (N), **La** (E), Lin (E), <u>Expected</u>: Mar (E)?, Clk (E)?

<u>Taxonomic notes</u>: Populations of *Cercyonis sthenele* throughout eastern Oregon, east of the Cascadian crest, are referable to *Cercyonis sthenele sineocellata* (TL: W side of Crump Lake, 8.2 rd. mi. N of Adel, Lake Co., Oregon, see Austin & Emmel 1998b: 514-515). Dornfeld (1980: 54) and Hinchliff (1994: 154) called these populations *Cercyonis sthenele paulus* (W. H. Edwards, 1879) (TL: vic. Virginia City, Storey Co., Nevada; see Brown 1964a: 365). Ventral wing color on *C. s. sineocellata* is pale brown-gray, usually with prominent whitish "frosting." Ocelli on the ventral hindwing are poorly developed. There is usually a distinct contrast on the ventral hindwing between the darker basal area and the paler outer area. The figure of *C. s.* "*silvestris*" in Pyle (2002: 350) is of *C. s. sineocellata.*

Most other populations of *C. sthenele* in Oregon have previously been called *Cercyonis sthenele silvestris* (W. H. Edwards, 1861) (TL: 2 air mi. SW Pulga, N Fork Feather River Canyon, Butte Co., California; see T. Emmel & J. Emmel 1998: 121). The figures of "*C. sthenele silvestris*" in Dornfeld (1980: 149, #4a, 4b, 4c) are actually of the Little Deschutes River segregate of *Cercyonis pegala* (see discussion under *C. pegala*, p. 276). These *C. pegala* populations represent, in part, what Dornfeld (1980: 54) called *C. sthenele* populations that were "decidedly darker" than *C. s. silvestris*. Unusually dark populations of *C. sthenele* do, however, exist in western Oregon (see below), but were apparently unknown to Dornfeld (1980: 233).

Populations of *C. sthenele* in the Siskiyous are phenotypically rather similar to *C. s. sineocellata*, but are darker above and below, and there tends to be less of a contrast between basal and marginal hindwing coloration. These populations (e.g., CSNM area and Medford area, Jackson Co.; Eight Dollar Mt. area, and O'Brien area, Josephine Co.; Brookings, Curry Co.) retain extensive whitish frosting below, and ventral hindwing ocelli are poorly developed. Populations in the western Cascades (H. J. Andrews Forest, Linn-Lane Co.; extreme southern Lane Co.; Steamboat, Douglas Co.; N of Butte Falls, Jackson Co.) are very dark above and below. These lack any trace of whitish frosting below, and ventral hindwing ocelli are usually reduced to only a single ocellus, or none at all. Additionally, black striations on the ventral hindwing are very poorly developed. These adults can easily be confused with those of *C. oetus* (e.g., *C. o. phocus* of Guppy & Shepard 2001: 327, but individuals from Oregon are considerably darker and not as clearly marked below).

It is not clear if the name *Cercyonis sthenele silvestris* applies to either of these phenotypes of *C. sthenele* in western Oregon. Brown (1964a: 359-363) figured the lectotype of *C. s. silvestris*, and commented on its poor state of preservation. The lectotype appears to be dark and poorly ocellated below. However, according to Austin & Emmel (1998b: 515), *C. s. silvestris* "is a pale, almost yellow brown, insect with fewer ocelli and no whitish scaling on the ventral hindwing." This description does not match either phenotype in Oregon previously called *C. s. silvestris*. For now, no trinomial is associated with either segregate of *C. sthenele* west of the Cascadian crest, until further taxonomic studies are conducted, and the phenotype of typical Californian *C. s. silvestris* is better understood. Also see Shapiro et al. (1981: 93).

<u>Biological notes</u>: In eastern Oregon, *Cercyonis sthenele* is widespread and sometimes common, especially in Lake and Harney counties, where it occurs in small canyons, desert washes, and on sagebrush-covered hillsides. Populations in the Siskiyous are more locally distributed. *Cercyonis sthenele* is very locally distributed and uncommon in the western Cascades. Adults fly in a single annual brood from late June to mid-September, depending on elevation and local conditions. Records extend from near sea level (Brookings, Curry Co.) to over 5200' (Warner Mts., Lake Co.). Both sexes visit a variety of flowers, especially *Chrysothamnus* (e.g., Lake Co.).

Some life history details for *C. sthenele* are known (Emmel 1969, Ferris 1981b: 275), but its complete life history has not been reported. Emmel & Emmel (1973: 27) figured a full-grown larva and pupa of *C. s. silvestris* from California, and Sourakov (1995: 13) figured late-instar larvae of *C. sthenele* from several populations. Species of larval foodplants used by *C. sthenele* in Oregon have not been reported, but presumably include grasses, possibly *Poa* species (see Ferris 1981b: 275).

***Cercyonis oetus* (Boisduval, 1869)**

_____(Cascades, E Siskiyous, Warners, Ochocos, Aldrichs, Blues, Wallowas, Steens, SE deserts, Columbia Basin) *oetus* Recorded: Ba, Cr, **De**, Do (far E), Gi, Gr, Ha, **Ja** (E), **Je**, **Kl**, La (E), **Lin** (E), **Lk**, Mal, Mo, Sh, Um, **Un**, **Wal**, **Was**, Wh, Expected: Clk (far E)?, HR, Mar (far E)?

Taxonomic notes: Adults of *Cercyonis oetus* in Oregon display a great amount of individual variation. This variation includes the extent of whitish "frosting," and the development of wing markings and ocelli below. Most adults from Oregon are dark above and below, and are phenotypically consistent with *Cercyonis oetus oetus* (TL: W slope Mt. Judah, SSE of Donner Pass, Placer Co., California; see Brown 1966a: 142-143 and Emmel et al. 1998i: 35). Consistently paler populations of *C. oetus* are known from parts of central Nevada (e.g., Emmel & Emmel 1971, Austin 1998g: 578-579). On average, adults from montane, forested habitats in Oregon (e.g., CSNM, Jackson Co.; Gilchrist, Klamath Co.; Camp Sherman area, Jefferson Co.) are darker above and below than those from low-elevation basin habitats (e.g., vic. Tygh Valley, Wasco Co.), but no distinct boundaries between darker and lighter populations are obvious. Until further study in Oregon is conducted, variation in adult coloration is considered to parallel variation in elevation and local environmental conditions, and no distinctive segregates are recognized. The figure of a male "*Cercyonis oetus phocus*" (W. H. Edwards, 1874) in Guppy & Shepard (2001: 327) is actually of a dark male *C. sthenele* (see above). Also see Emmel (1969).

Biological notes: *Cercyonis oetus* is widespread and sometimes common east of the Cascades in Oregon. It is less common in the eastern Siskiyous, absent from south-central Jackson County, westward, and is uncommon on the west slope of the Cascades, where records probably represent stray individuals from further east. This species flies in a single annual brood, from late May to mid-September, and from about 800' (nr. Sherar's Bridge, Wasco Co.) to over 7500' (Steens Mt., Harney Co.). Males of *C. oetus* patrol through sagebrush flats and over dry hillsides, and occasionally visit mud. Both sexes visit a wide variety of flowers (Pyle 2002: 351).

Immature stages of *C. oetus* from outside of Oregon were described and illustrated by W. H. Edwards (1886, 1897: [238-240], pl. [32], also see Comstock 1927: 75-76), with additional life history details provided by Emmel (1969) and Scott (1992: 21g). Sourakov (1995: 10-11) figured an egg and a head capsule of a first instar larva of *C. oetus* from Colorado. Larval foodplants of *C. oetus* in Oregon are unknown, but Scott (1992: 21g) reported *Poa pratensis* (as *P. agassizensis*) and *Festuca idahoensis* as larval foodplants in Colorado. Also see Maeki & Remington (1961a: 132).

***Erebia epipsodea* Butler, 1868**
_____(Ochocos, Aldrichs, Blues, Wallowas) *epipsodea* Recorded: **Ba**, **Cr**, **Gr**, **Mal** (far NW), **Mo**, **Um**, **Un**, **Wal**, **Wh**, Expected: Gi (far SE)?, Ha (N), Je (SE)

Taxonomic notes: In Oregon, *Erebia epipsodea* does not display geographic variation. Adults from all known populations are individually variable in size, darkness of ground color, and in the development of orangish markings above. Most previous authors have used the name *Erebia epipsodea hopfingeri* P. Ehrlich, 1954 (TL: Black Canyon, 1000', S of Methow, Okanogan Co., Washington) for populations in Oregon, including Dornfeld (1980: 56), Hinchliff (1994: 156) and Pyle (2002: 354). However, Guppy & Shepard (2001: 339) treated *E. e. hopfingeri* as a synonym of *Erebia epipsodea epipsodea* (TL: Rock Lake, nr. Jasper, Alberta; see Kondla 1996: 40), attributing supposed differences in size and pattern between these taxa to elevational variation. Considering the great deal of individual variation seen within populations of *E. epipsodea* in Oregon, where adults in single populations sometimes resemble several named segregates (also see Bird et al. 1995: 294), all populations in Oregon are herein called *Erebia epipsodea epipsodea*, following Guppy & Shepard (2001). Also see Warren (1936), Ehrlich (1954, 1955) and Belik (2000).

Biological notes: In Oregon, *Erebia epipsodea* is widespread and sometimes common in moist montane meadows and on grassy hillsides in open forested habitats, from about 2000' (Brownlee Reservoir, Baker Co.), to over 8000' (Mt. Howard, Wallowa Co.). Adults fly in a single annual brood from mid-May to late July, depending mostly on elevation. Males patrol along riparian corridors and in open meadows. Both sexes visit flowers, and males are frequently found at dung (e.g., Pyle 2002: 353), and sometimes at mud. The single record for *E. epipsodea* from Wasco County has not been replicated despite recent search, and the labeled date of capture seems very unlikely ("Jct. Hwys. 97 & 197, S of Maupin, 17 March 1964, E. Griepentrog;" see Hinchliff 1994: 156). Since mislabeling is strongly suspected, Wasco County has been excluded from the distribution of *E. epipsodea* in Oregon, and the species is not expected to occur there.

Lyman (1896) and W. H. Edwards (1897: [258-261], pl. [36]) described and illustrated the early stages of *E. epipsodea* from Alberta and Colorado, respectively. Scott (1992: 21h-21i) provided life history notes on *E. epipsodea* from Colorado, where he reared immatures on *Poa pratensis*. He also noted *Poa pratensis* to be a likely larval foodplant in Colorado, and witnessed ovipositions on *P. pratensis* and other grass species. Wright (1993: 29) illustrated a full-grown larva, and Guppy & Shepard (2001: 337) figured the egg and first instar larva of *E. epipsodea* from British Columbia. Also see W. H. Edwards (1890), Brussard & Ehrlich (1970a, b), Brussard (1971) and Ehrlich (1956).

***Neominois ridingsii* (W. H. Edwards, 1865)**
_____(SE ranges) *stretchii* (W. H. Edwards, 1870) Recorded: **De** (E), Ha (S), **Lk**, Mal (S), Expected: Ba (S)?, Cr (S)

Taxonomic notes: *Neominois ridingsii* was reviewed by Austin (1986a), who called populations in Oregon *Neominois ridingsii stretchii* (TL: Mt. Jefferson, Nye Co., Nevada; see Burdick 1942b: 205 and Brown 1964a: 357-359), a name used earlier by Dornfeld (1980: 53). No significant geographic variation has been seen across the few known populations of *N. r. stretchii* in Oregon. Also see Avinoff & Sweadner (1951).

Biological notes: *Neominois ridingsii* is univoltine in Oregon. Records extend from late June to mid-August, and from 6000' (vic. Arizona Creek, Pueblo Mts., Harney Co.) to over 8200' (top of Light Peak, Warner Mts., Lake Co., see Newcomer 1964c: 47-48). Populations of *N. ridingsii* in Oregon have been found on grassy, windswept hillsides and hilltops. Males of *N. ridingsii* perch in bare areas between plants of *Atremisia tridentata*, or between clumps of bunchgrass. During calm moments with little or no wind, males patrol hillside swales, at least from 11:00 hrs. to 14:30 hrs. (e.g., Pine Mt., Deschutes Co.; Light Peak, Lake Co.). Males in Oregon occasionally perch on hilltops, but do not seem strongly oriented towards them. In Oregon, adults of *N. ridingsii* have not been observed to feed, and except when disturbed, are not especially active fliers in windy conditions (which is most of the time in their habitats).

Early stages of *N. ridingsii* from Colorado were described and illustrated by W. H. Edwards (1897: [268-271], pl. [37]), and later summarized by Elrod (1906: 122), Comstock (1927: 69) and Scott (1973a). The primary larval foodplant in eastern Colorado is *Bouteloua gracilis* (Scott 1992: 21j), although populations are associated with *Hesperostipa comata* (reported as *Stipa comata*) in Nevada (Austin 1986a), and possibly also in Oregon. While *N. ridingsii* is currently known only from a few widely separated populations in Oregon (e.g., Light Peak, Warner Mts., Lake Co.; Pine Mt., Deschutes Co. [see Shepard 2003: 9]; Pueblo Mts., Harney Co.; Blue Mt., Malheur Co. [see Shepard 1997: 8]) additional populations undoubtedly exist. Many possible habitats for *N. ridingsii* in southeastern Oregon have not been extensively surveyed for butterflies (e.g., Hart Mt., Lake Co.; Glass Buttes, Lake Co.; Juniper Mt., Lake and Harney counties; Wagontire Mt., Lake and Harney counties; Beatys Butte, Harney Co.; Trout Creek Mts., Harney Co.; Mahogany Mt., Malheur Co.; Bear Creek Buttes, Crook Co., etc.). Also see Scott (1973a).

***Oeneis nevadensis* (C. Felder & R. Felder, 1867)**

_____(Cascades, Siskiyous, Warners, [Blues]) *nevadensis* Recorded: Clk (E), Cu, **De**, **Do**, **HR**, **Ja**, **Je** (W), Jo, **Kl**, **La**, **Lin**, **Lk**, **Mar** (E), [Um], **Was**, Expected: Cos, Mu (E)
_____(N Coast Range) nr. *gigas* Butler, 1868 Recorded: **Cls**, **Po**, Ti, Expected: Wan?, Ya

Taxonomic notes: Adults from most populations of *Oeneis nevadensis* in Oregon are large, and generally resemble *Oeneis nevadensis nevadensis* (TL: Little Volcano Mt., ca. 7 air mi. SE of Quincy, Plumas Co., California; see Emmel et al. 1998g: 88). Occasional individuals are paler above, approaching the phenotype of *Oeneis nevadensis iduna* (W. H. Edwards, 1874) (TL: Mendocino Co., [California]; see Brown 1964a: 392). However, these represent variable individuals within populations of otherwise darker adults, and no populations in Oregon are known where this phenotype is dominant.

Populations of *O. nevadensis* in the north Coast Range (Rickreall Ridge, Polk Co.; Kings Mt., Tillamook Co.; Saddle Mt. area, Clatsop Co.) differ from Cascadian *O. n. nevadensis* in several ways. Adults of both sexes have shorter, rounder forewings, and males have reduced forewing androconial scales, along with reduced darkened areas around these scales. Below, coloration is variable, but not consistently different from adults in the Cascades. Behaviorally (see below), these populations resemble *Oeneis nevadensis gigas* (TL: Vancouver Island, [British Columbia]). These adults closely match the dorsal illustrations of *O. n. gigas* presented by W. H. Edwards (1884d: pl. [43-44]). However, unlike *O. n. gigas*, these adults are apparently smaller, and are not considerably darker below, compared to Cascadian individuals. Until a detailed study of these populations is conducted, they are herein called *Oeneis nevadensis* nr. *gigas*. The Onion Peak area of southwestern Clatsop County, along with other high peaks in the north Coast Range, should also be surveyed for the possible presence of *O. n.* nr. *gigas*.

<u>Biological notes</u>: Throughout the Cascades, eastern Siskiyous and Warners, *Oeneis nevadensis* is widespread and sometimes common along sunny forested roads, and in small sunlit meadows surrounded by forest. Adults in these populations fly primarily in even-numbered years. Smaller flights on odd-numbered years occur at some of the same localities where even-year adults are common (e.g., Mill Creek Canyon, Wasco Co., also see Newcomer 1964a). Records extend from late April to late August, and from about 500' (Rowena, Wasco Co.) to over 8000' (Light Peak, Warner Mts., Lake Co.). The single adult of *O. nevadensis* from the Blue Mountains in Umatilla County (Pearson Creek, sampled by Vern Covlin, presumably of *O. n. nevadensis*) suggests that further search for this species in the Ochoco, Aldrich and Blue mountains should be conducted. For now, counties in eastern Oregon are not listed as "expected," above, until more information on the status of *O. nevadensis* east of the Cascades and Warners is available. Populations of *O. n.* nr. *gigas* in the north Coast Range fly primarily (or entirely?) in odd-numbered years, from mid-June through July. Males at Saddle Mountain aggressively guard hilltop perches, and in this respect are more like *O. n. gigas* (see Guppy 1962, 1970) than Cascadian *O. n. nevadensis*, where males do not guard perches on hilltops (pers. obs.). Adults at Saddle Mountain fly primarily over subalpine tundra, and in large, grassy meadows, near and above treeline. Adults on Rickreall Ridge, Polk County, are found in small forest clearings and on grassy hillsides (Dave McCorkle pers. comm. 2002), at about 2400'.

Life history details of *O. nevadensis* from Oregon remain unreported. William H. Edwards (1897: [369-370], pl. [48]) described and illustrated the early stages of *O. n. gigas* from Vancouver Island, of *O. n. iduna* from Mendocino County, California (pp. [381-383], pl. [49]), and of *O. n. nevadensis* (pp. [385-387], pl. [49]) from Washington (also see Comstock 1927: 77). Larval foodplants presumably include grasses, but foodplant species remain unreported. Much further study on the biology of this species is needed. Larvae are presumed to require two years to mature, in all populations, but biological details on populations in Oregon where adults fly annually are lacking (see Dornfeld 1980: 55). Also see Cunningham (1895a), Venables (1910), Masters & Sorensen (1969) and Guppy & Shepard 2001: 340).

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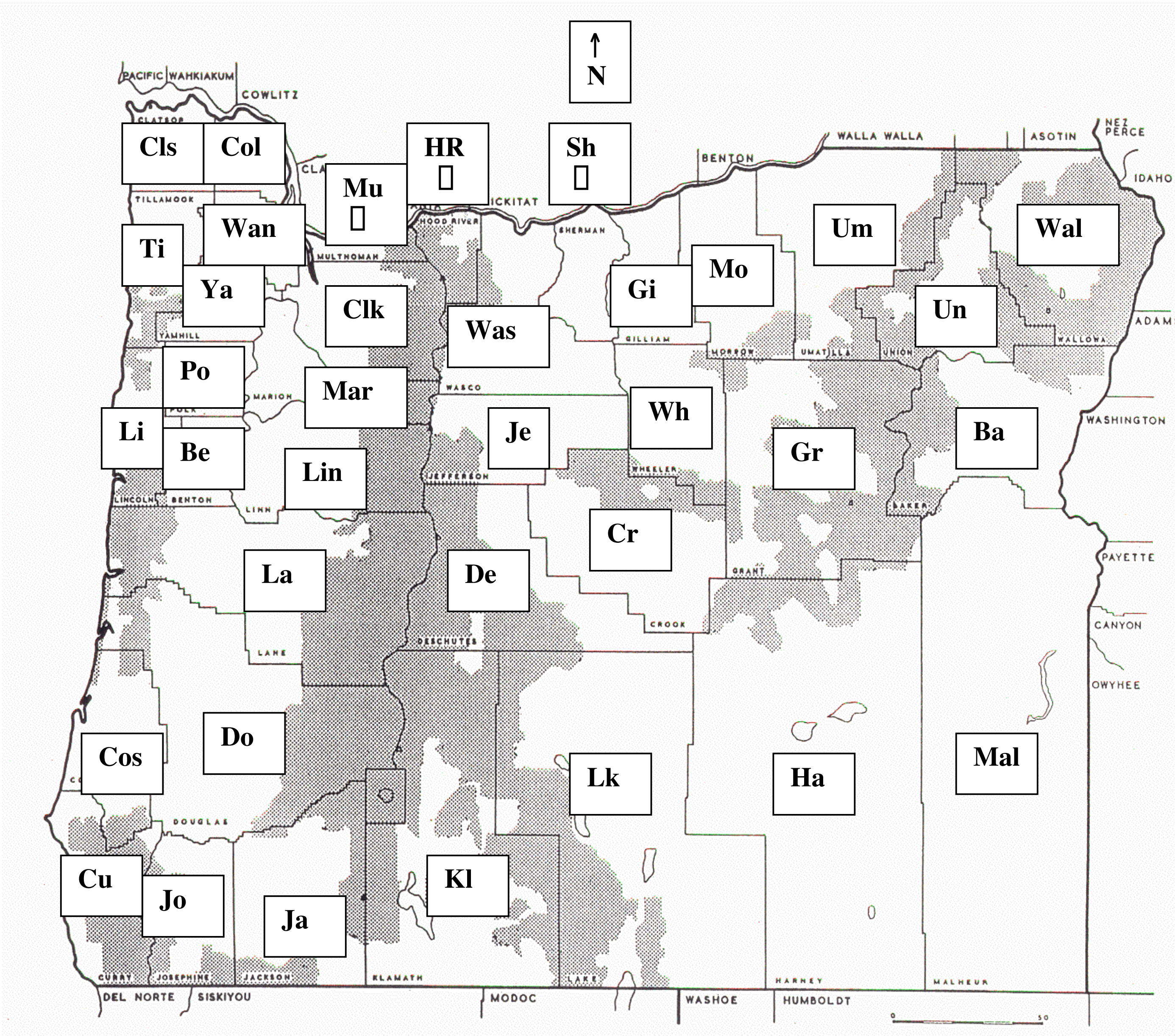
INDEX OF PLANT NAMES

This index includes the names of all plants mentioned in the text, except for some synonyms. Names, authorship, and family placement follow Kartesz (1999) and Olmstead et al. (2001).

INDEX OF BUTTERFLY NAMES

This index includes all family-, genus- and species-level names of butterflies mentioned in the text, including all trinomials. Names listed in the Table of Contents and References are not included in the index.

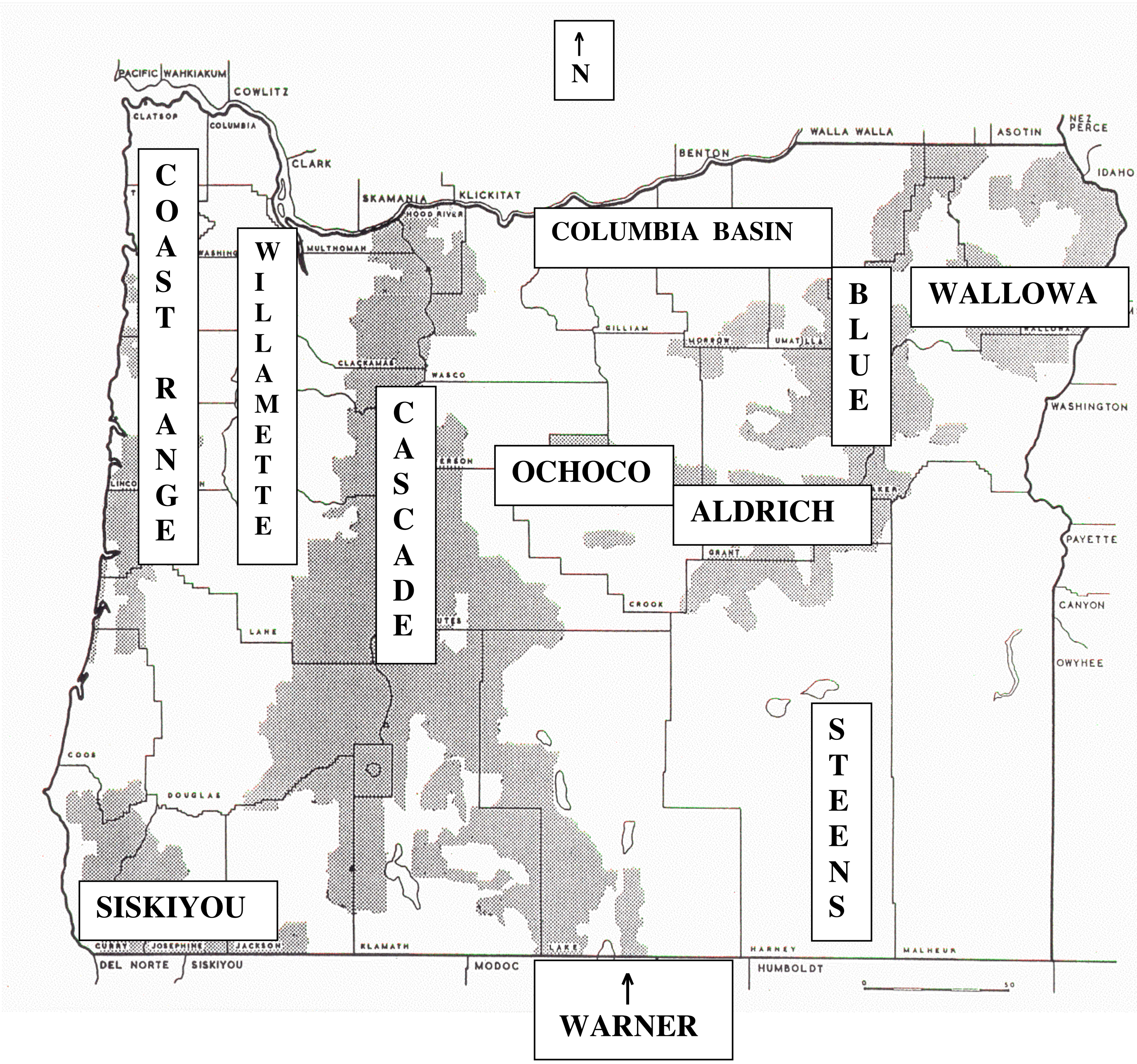
MAP 1. OREGON'S COUNTIES



Abbreviations used for Oregon's 36 counties. **Ba** = Baker, **Be** = Benton, **Clk** = Clackamas, **Cls** = Clatsop, **Col** = Columbia, **Cos** = Coos, **Cr** = Crook, **Cu** = Curry, **De** = Deschutes, **Do** = Douglas, **Gi** = Gilliam, **Gr** = Grant, **Ha** = Harney, **HR** = Hood River, **Ja** = Jackson, **Je** = Jefferson, **Jo** = Josephine, **Kl** = Klamath, **La** = Lane, **Li** = Lincoln, **Lin** = Linn, **Lk** = Lake, **Mal** = Malheur, **Mar** = Marion, **Mo** = Morrow, **Mu** = Multnomah, **Po** = Polk, **Sh** = Sherman, **Ti** = Tillamook, **Um** = Umatilla, **Un** = Union, **Wal** = Wallowa, **Wan** = Washington, **Was** = Wasco, **Wh** = Wheeler, **Ya** = Yamhill

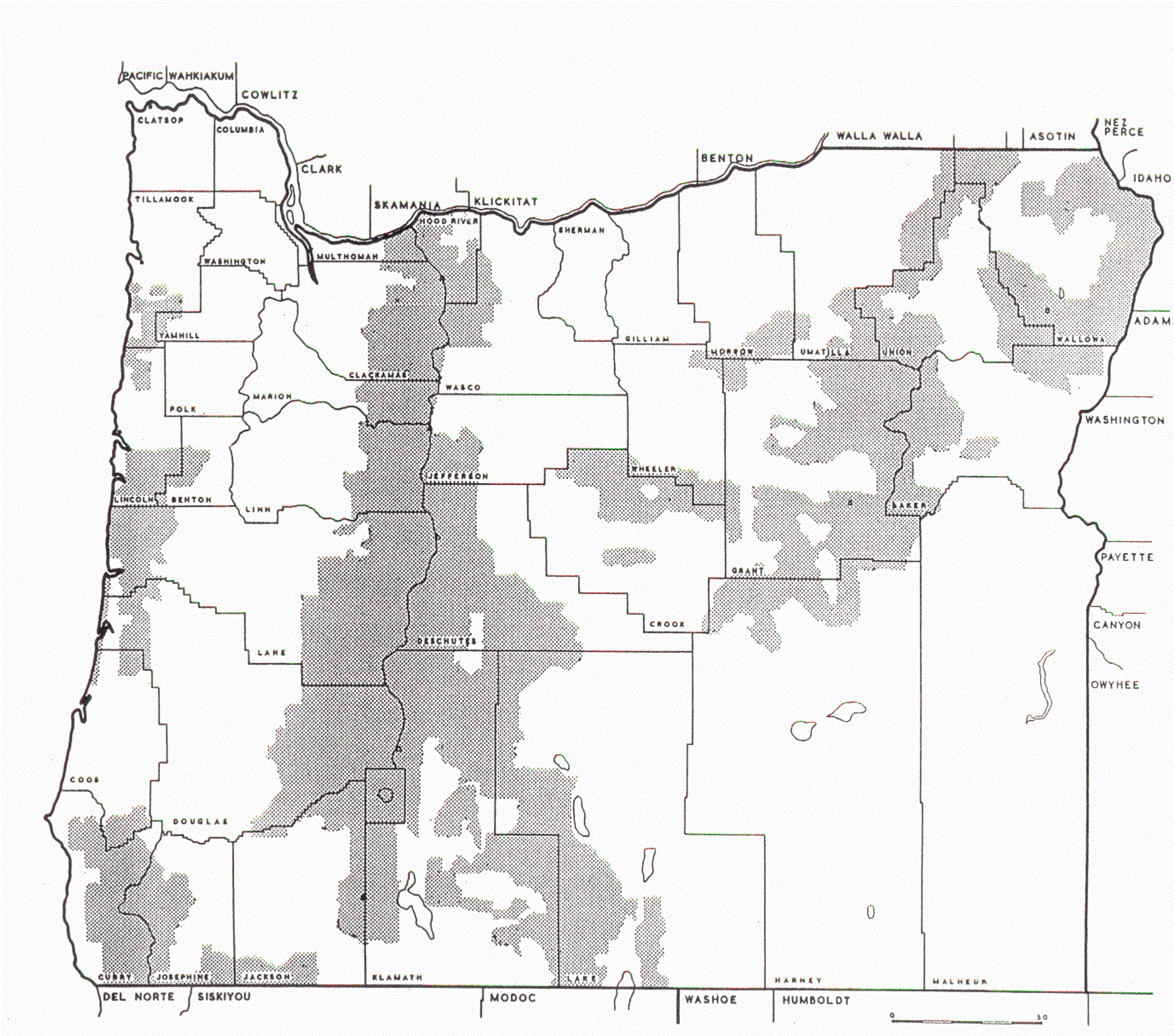
Shaded areas on map indicate National Forest
Map modified from Hinchliff (1994)

MAP 2. OREGON'S MAJOR MOUNTAIN RANGES AND VALLEYS



Shaded areas on map indicate National Forest
Map modified from Hinchliff (1994)

MAP 3. BLANK MAP OF OREGON'S COUNTIES



Shaded areas on map indicate National Forest
Map modified from Hinchliff (1994)