Galbreath Special Status Species Assessment – Invertebrates

Before I worked on this project, I had no idea how to apply GIS to basic ecological concepts. – Christoph Schopfer, Geography Major

Project Summary

A team of students and Center staff mapped potential habitat for 110 special status plants and animals on the Galbreath Wildlands Preserve. We identified special status species with potential to occur in the Galbreath Preserve using existing agency databases and publications. These included fungi, bryophytes, plants, invertebrates, amphibians, reptiles, birds and mammals. For each species, we collected biological information, undertook GIS-based habitat suitability analysis, and assessed the likelihood of occurrence within preserve boundaries. The project created professional experience for Biology and Geography undergraduates and graduate students who worked on an interdisciplinary team to develop assessment techniques and methods. See Methods (PDF) and Species List (PDF) for additional information.

Project Lead: Claudia Luke

Dates: 2010-2011

Funding: Robert and Sue Johnson Family

Students: Neal Ramus (Business), Emily Harvey (Biology), Kandis Gilmore (Biology), Linden Schneider (Biology), Christoph Schopfer (Geography), James Sherwood (Geography)

Invertebrates

These results are part of a larger assessment of all special status species with potential to occur at the Galbreath Wildlands Preserve. Assessments were conducted as planning exercise and do not constitute evidence of occurrence.

Mollusca (Snails, Slugs, and Bivalves)

Helminthoglypta arrosa pomoensis, Pomo Bronze Shoulderband: HEAR Text, HEAR Map

Noyo interessa, Ten Mile Shoulderband: NOIN Text, NOIN Map (none)

Anodonta californiensis, California Floater (Pelecypoda): ANCA Text, ANCA Map

Crustacea (Shrimps, Crabs, and Barnacles)

Linderiella occidentalis, California Fairy Shrimp: LIOC Text, LIOC Map

Insecta (Insects)

Dubiraphia giulianii, Giuliani's Dubiraphian Riffle Beetle: DUGI Text, DUGI Map

Lepidoptera

Carterocephalus palaemon magnus, Sonoma Arctic Skipper: CAPA Text, CAPA Map

Danaus plexippus, Monarch Butterfly: DAPL Text, DAPL Map

Status:

Federal: None

State: None

Other: CNDDB: G2T1S1, IUCN: Data Deficient

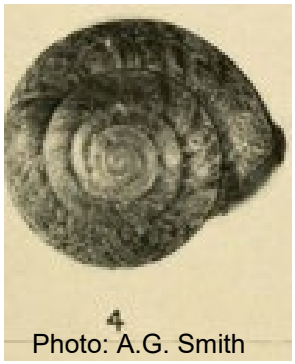


Photo: A.G. Smith

Species Description: Land snail with large and heavy low-spired shell that is dark cinnamon-brown. The shell has heavy malleations and is covered with a network of maize-yellow markings that follow the raised edges of the malleations. Color within the aperture is a reddish-violet. (Smith 1937). Shell diameter 39 mm (Pilsbry 1948).

Distribution: Endemic to Mendocino County, known from type specimens from Big River, Navarro River, and Russian Gulch watersheds (Smith, 1937). Listed in CNDDB (2010) in North Coast Region.

Life History & Threats: Very little is known about this species. Snails in the genus *Helminthoglypta* use a “love dart” in their mating rituals (Weasma 1998).

Habitat & Habitat Associations: Heavily redwood-timbered canyons of Mendocino County, generally well inland (Pilsbry 1948).

Conceptual Basis for GIS Model Development: Suitable habitat for this species in the Study Area is mapped as all locations with redwood trees.

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Based on this species association with redwood trees, the quality of habitat in the Study Area may be moderate to good. Redwood stands are most extensive northwest of the Preserve, but redwoods do occur within steep-side drainages to Rancheria Creek.

Nearest Occurrence:

Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been documented on the Preserve. To our knowledge no surveys have been conducted.

Nearest Occurrence to the Galbreath Wildlands Preserve: Type specimens of this species occur in the Navarro watershed, but the exact location is not available at the time of this writing.

Summary: We anticipate that this rare endemic species is “Unlikely to Occur.” While habitat may occur in sufficient quality and quantity and specimens have been collected in the Navarro Watershed relatively nearby, Pomo Bronze Shoulderband was last documented in 1937 and dramatic land use changes have occurred in much of the land in the watershed

since that time. Also, very little is known about habitat requirements, and the accuracy of mapping redwoods alone as a habitat requirement is suspect.

References

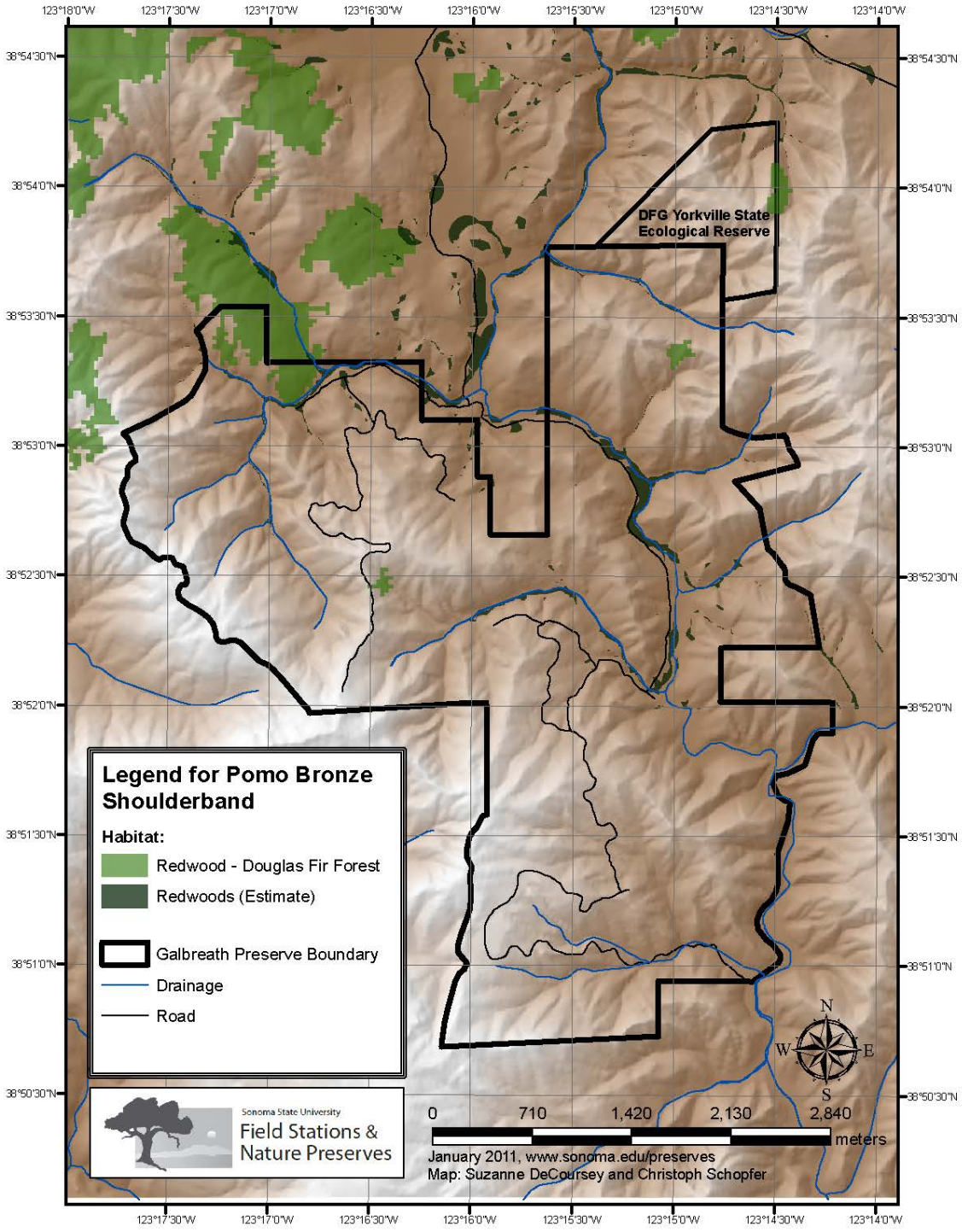
Smith, AG. 1937-1938. Three new subspecies of *Helminthoglypta arrosa* (Gould). The Nautilus 51(3): 81

Pilsbry, HA. 1948 Land mollusca of North America: (north of Mexico). Volume 3 of Monographs of Academy of Natural Sciences of Philadelphia 3(3): 117-118.

Weasma, TR. 1998. Conservation Assessment for Helminthoglypta hertlieni, Oregon Shoulderband. <http://www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/20050713-moll-oregon-shoulderband.doc> Accessed 2010 Jun 18.

Species Account Description: Kandis Gilmore & Emily Harvey

Figure 53: Potential habitat for Pomo Bronze Shoulderband *(Helminthoglypta arrosa pomoensis)*



Status:

Federal: None

State: None

Other: G2 S2

Photo: © Bill Stagnaro 2010

Species Description: A land snail in the family Helminthoglyptidae.

Distribution: Known to occur in Humboldt and Mendocino counties, and thought to be extirpated or possibly extirpated. Natural heritage records exist for the Big-Navarro-Garcia watershed (NatureServe 2002).

Life History & Threats: unavailable

Habitat & Habitat Associations: unavailable

Conceptual Basis for GIS Model Development: Available information is insufficient to map this species.

Potential Occurrence in the Study Area:

Habitat: Habitat for Ten-mile Shoulderband is undescribed.

Nearest Occurrence:

Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been documented on the Preserve. To our knowledge no surveys have been conducted.

Nearest Occurrence to the Galbreath Wildlands Preserve: Natural heritage records exist for the Big-Navarro-Garcia watershed (NatureServe 2002). There are 6 specimens on record from Mendocino County, but the location information is not specific enough to estimate nearest distance to the Preserve (NatureServe 2002; Global Biodiversity Information Portal 2009).

Summary: This species is “Unlikely to Occur” in the Preserve because this species is rare. However, surveys are justified because this species is known from the Navarro watershed and could occur in the Preserve.

References:

Global Biodiversity Information Facility. 2009 Feb 29. Occurrence Detail: Noyo intersessa. <http://data.gbif.org/occurrences> Accessed 2010 Aug 18.

NatureServe. 2002. Comprehensive Report Species- *Noyo intersessa*. NatureServe Explorer. Unknown author. NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. <http://www.natureserve.org/explorer>. Accessed 2010 Jul 01.

Turgeon, D.D., J.F. Quinn, Jr., A.E. Bogan, E.V. Coan, F.G. Hochberg, W.G. Lyons, P.M. Mikkelsen, R.J. Neves, C.F.E. Roper, G. Rosenberg, B. Roth, A. Scheltema, F.G. Thompson, M. Vecchione, and J.D. Williams. 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks. 2nd Edition. American Fisheries Society Special Publication 26, Bethesda, Maryland: 526 pp.

Species Account Description: Kandis Gilmore & Emily Harvey

Status:

Federal: None

State: None

Other: USFS:S, G3Q S2?


Photo: Xerces Society

Species Description: The California Floater is a freshwater mussel that is usually rounded, has a light colored interior, and lacks a prominent ridge on their shell (Schonberg 2010).

Nomenclature:

The taxonomic status of *Anodonta californiensis* (Lea, 1852) is currently under review. Chong et al. (2008) found that *A. californiensis* and *A. nuttalliana* belong to a single clade, which is highly divergent from the clade that *A. oregonensis* and *A. kennerlyi* belong to. The genetic work also suggests that the *A. californiensis/A. nuttalliana* clade is highly divergent from the clade that *A. beringiana* belongs to. (From Schonberg 2010)

Distribution:

The California floater's historic range encompassed the west coast from Baja California to southern British Columbia, and east beyond the Continental Divide. United States included in the historic distribution of this species include: Arizona, California, Idaho, Nevada, Oregon, Utah, Washington and Wyoming; it also occurs in Mexico and British Columbia. This species has been found historically in shell middens in western New Mexico. It has been extirpated from much of its historic range in California and Arizona. (From Schonberg 2010)

Life History & Threats: California floaters require species-specific host fish (usually minnow species) during the parasitic larval stage of their life cycle (Nedeau, et. al. 2005).

Freshwater mussels are vulnerable to water level fluctuation and are thus threatened by the diversion of water for irrigation, water supply and power generation. Freshwater mussels rely on native fish as hosts during their immature, or glochidial, life stage. The replacement of native fish by introduced fish species may be the greatest threat to the reproduction of mussel populations. Because freshwater mussels are filter-feeders, they can be adversely impacted by sedimentation and the accumulation of pollutants in sediments. (From Schonberg 2010)

Habitat & Habitat Associations:

Aquatic Habitat Types: Habitat for this species is fresh water shallow muddy or sandy habitat in large rivers, reservoirs and lakes (Schonberg 2010). Also in low-gradient creeks and streams with steady water levels (Nedeau, et. al. 2005).

Elevation: Low elevations (Frest and Johannes 1995). However, the California Academy of Sciences has a specimen from Tulloch Lake, Tuolomne County which is at 1405 feet.

Geology and Soils: Benthic zone consisting of sandy or muddy sediment composition (Cordeiro 2006).

Conceptual Basis for GIS Model Development: Potential habitat for this species is mapped as perennial creeks and streams.

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: California Floaters occur in shallow areas of large rivers, lakes, or low-gradient streams with steady water levels. Habitat for this species in the Preserve is poor. Perennial water in the Preserve (Figure 54) occurs in narrow steep canyons with seasonally variable water levels. The mainstem of the Rancheria Creek like other areas of the Navarro Watershed has also been listed for high levels of sedimentation.

Nearest Occurrence:

> Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: The California Floater has not been reported to occur in USGS quads adjacent to the Study Area.

Summary: We anticipate that the California Floater is "Unlikely to Occur" in the Preserve because water levels are highly variable making the habitat poor in quality.

References

Cordeiro, J. 2006 Sep 26. *Anodonta californiensis.*<http://www.natureserve.org/explorer/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&elKey=108832&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=108832&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=108832>. Accessed 6/16/10.

Author Unknown. California Floater (*Anodonta californiensis*). <http://gf.state.wy.us/wildlife/CompConvStrategy/Species/MollusksCrustaceans/PDFS/California%20Floater.pdf>. Accessed 6/16/10.

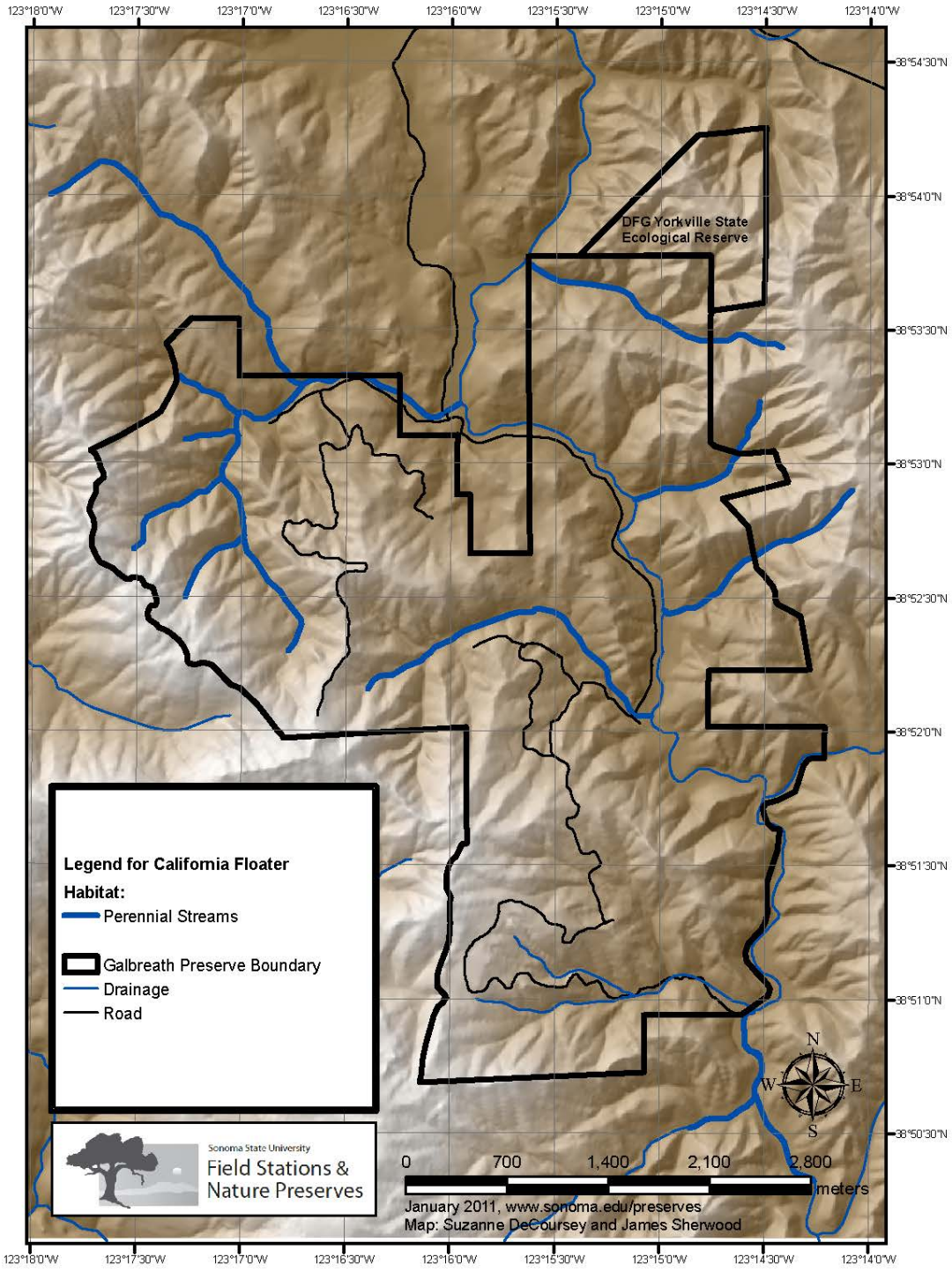
Frest, T. J. and E. J. Johannes. 1995. Interior Columbia Basin mollusk species of special concern. Final report to the Interior Columbia Basin Ecosystem Management Project, Walla Walla, WA. Contract #43-0E00-4-9112. 274 pp. plus appendices

Nedeau, E., A.K. Smith, and J. Stone. 2005. Freshwater Mussels of the Pacific Northwest. Pacific Northwest Native Freshwater Mussel Workgroup, Vancouver, Washington. 45 pp.

Schonberg, L. Freshwater mussels: California floater (*Anodonta californiensis*). <http://www.xerces.org/california-floater/>. Accessed 6/16/10.

Species Account Description: Kandis Gilmore, Andrew Cornelius & Emily Harvey

Figure 54. Potential habitat for California Floater, *Anodonta californiensis*



Status:

Federal: none

State: none

Other: G3 S2S3, IUCN:NT

Photo: © Ken W. Davis

Species Description: California Linderiella is a small species of fairy shrimp that ranges in size from 3 to 38 mm (Rogers 2002). They are translucent grey to off-white in color and red eyes distinguish them from other species of fairy shrimp (USFWS 2007).

Synonyms: California Fairy Shrimp or the California Linderiella (Hardwicke and HT Harvey & Associates 2009).

Distribution:

> California linderiella fairy shrimp are the most common fairy shrimp in California, and are found in almost any grassland supporting vernal pools. Their range is reported as occurring from Shasta County south to Fresno County, across the Central Valley, and the Coast and Transverse Ranges from Willits in Mendocino County south to near Sulfur Mountain in Ventura County (USFWS 1994). They have been collected at elevations as California Linderiella Fairy Shrimp high as 3,800 ft. In Yolo County the California linderiella fairy shrimp has been reported from seasonally inundated pools formed from borrow pits along the Union Pacific Railroad just east of the Yolo Bypass levee and along the Sacramento Northern Electric Railroad grade southwest of Saxon in the Yolo Bypass (CNDDB 2008). The species also likely occurs or has potential to occur in vernal pool and other seasonal wetland habitats in Yolo County including Grasslands Regional Park, and in grasslands along the western edge of the Central Valley north of Winters. (From Hardwicke and HT Harvey & Associates 2009)

Life History & Threats: Generally one generation per year. Fairy shrimp eggs dry out during the summer and hatch after being soaked by winter rains. The larval stage lasts an average of 33 days, and adults reproduce after an average of 43 days (Cordeiro 2008). This species is faced with threats of habitat loss to agriculture and development since roughly 80% of Calfornia's vernal pools have been already been destroyed (Holland 1998).

Habitat & Habitat Associations: Ephemeral freshwater wetlands including vernal pools, seasonal ponds, roadside ditches (USFWS 2007).

> The California linderiella fairy shrimp needs the cold winter waters to hatch and grow— typically appearing after the first frosts-- and the dry summers to desiccate the resting cysts and prevent fungal infection. Habitats supporting the California linderiella fairy shrimp are typical in Central Valley floristic provinces below 300-m (984-ft) elevation. Typical habitat for California linderiella fairy shrimp in California includes large, clear vernal pools (Eng et al. 1990, USFWS 2007), although this species have been found in turbid, tea-colored, or small pools. Linderiella fairy shrimp are the most heat-tolerant fairy shrimp species in California, and are able to tolerate water temperatures from 41 to 85 degrees F (USFWS 2007). (From Hardwicke and HT Harvey & Associates 2009)

> Common wetland plant species that co-occur with California linderiella fairy shrimp generally need the same hydrological conditions. Therefore, the presence of these plant species within a potential habitat implies a greater potential for a population of these shrimp to be present. These plants may include toad rush (Juncus bufonius), coyote thistle (Eryringium spp.), downingia (Downingia ornatissma or bicornuta), goldfields (Lasthenia spp.), woolly marbles (Psilocarphus spp.), and hair grass (Deschampsia spp.). (From Hardwicke and HT Harvey & Associates 2009)
>
> Similarly, the hydrology of pools dominated by vernal pool plant species that require short inundation periods may not support shrimp species. Plants within these short duration pools may include Mediterranean barley (*Hordeum murinum*), toad rush, false dandelion (*Hypochoeris radicata*), and Italian rye grass (*Lolium multiflorum*). (From Hardwicke and HT Harvey & Associates 2009)
>
> Conversely, wetland habitats that support plant species that need perennial or very long- term periods of soil saturation cannot support special-status shrimp species because the shrimp's cysts must dry out before they can hatch (Eriksen and Belk 1999). If they remain wet or moist through the warmer summer months, the cysts will contract fungal infections. These plants include cattails (*Typha* spp.), willow (*Salix* spp.), cottonwood (*Populus* spp.), duckweed (*Lemna* spp.), sedges (*Cyperus* spp.), Baltic rush (*Juncus balticus*), and bulrush (*Schenoplectus* and *Scirpus* spp.). (From Hardwicke and HT Harvey & Associates 2009)

Conceptual Basis for GIS Model Development: We mapped suitable habitat as areas with seasonal standing water (i.e., ephemeral ponds).

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: The California Linderiella is found in large, clear ephemeral freshwater wetlands including vernal pools, seasonal ponds, and roadside ditches. There is one seasonal pond on the southeastern border of the Preserve which lies in a heavily shaded site. There may be a few areas where seasonal water collects, such as pig wallows and roadside ditches, that are not mapped and could provide habitat for this species.

Habitat quality of ephemeral water sites is moderate. Most of the areas where water collects tend to have poor water quality, non-native grasses, and are heavily shaded.

Nearest Occurrence:

> Documented Occurrences in Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.
>
> Nearest Occurrence to Preserve: California Linderiella generally occurs in numerous counties east and south of the Preserve and has not been documented in Mendocino County or counties north of the Preserve along the California coast (Cordeiro 2008). The nearest location to the Preserve is a site in the Russian River watershed in Sonoma County (Cordeiro 2008)

Summary: We anticipate that the California Linderiella is "Unlikely to Occur" in the Galbreath Wildlands Preserve because potential habitat is rare, habitat quality is moderate, and the species is not known to occur in coastal counties of California from Mendocino northward.

References:

Cordeiro, J. 2008 Oct 03. Comprehensive Species Report- *Linderiella occidentalis*. NatureServe Explorer. http://www.natureserve.org/explorer/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&elKey=116661&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=116661&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=116661. 2010 June 29.

Holland, RF. 1998. Current distribution and historical extent of vernal pools in southern California and northern Baja California, Mexico. In: Witham, C. W., E.T. Bauder, D. Belk, W.R. Ferrin Jr., and R. Ornduff (eds.). Ecology, conservation, and management of vernal pool ecosystems − proceedings from a 1996 conference. Sacramento: California Native Plant Society p. 71-75.

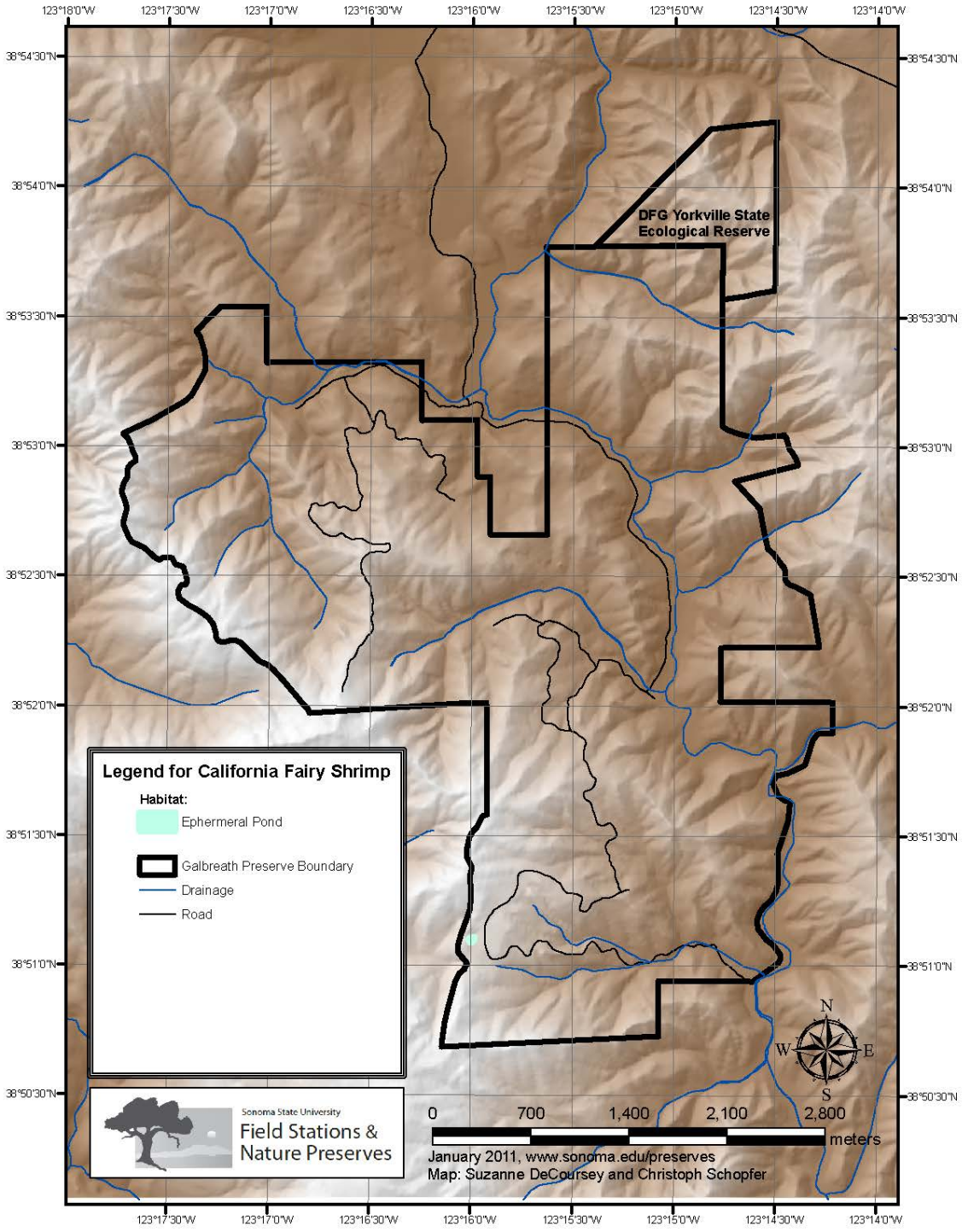
Harwicke, K and HT Harvey & Associates. 2009. California Linderiella fairy shrimp. Draft species accounts. http://www.yoloconservationplan.org/yolo_pdfs/speciesaccounts/invertebrates/cal-linderiella-fairy-shrimp.pdf. 2010 June 30.

Rogers, DC. 2002. Amplexial morphology of selected Anostraca. Hydrobiologia 486:1-18.

U.S. Fish and Wildlife Service (USFWS). 2007. Species account for *Linderiella occidentalis*. Sacramento Office of the U.S. Fish and Wildlife Service. http://www.fws.gov/sacramento/es/animal_spp_acct/linderiella.htm. 2010 June 30.

Species Account Description: Kandis Gilmore and Emily Harvey

Figure 55: Potential habitat for California Fairy Shrimp



Status:

Federal: None

State: None

Other: G1G3 S1S3

Photo: Joyce Gross of related species, *Dubiraphia vittata*

Species Description: Giuliani's Dubiraphian Riffle Beetle belongs to a group of small, aquatic beetles in the family Elmidae. This group has long tarsal claws which allow for walking on submerged vegetation (Cedar Creek 2000).

Distribution: Little is known about the distribution or occurrence of this species. Natural history heritage records exist for this species in Sonoma County in the Russian River watershed (Schwietzer 1991).

Life History & Threats: Adults can fly, and both larvae and adults are aquatic. This species has been proposed for federal listing, but was dropped from consideration due to insufficient data (FWS 1994). Related species are noted as being sensitive to chlorides (Schweitzer 1991).

Habitat & Habitat Associations: Submerged vegetation in streams with moderate to strong flowing current (Cedar Creek 2000). Rivers with slow flows and possibly creeks, since several of its relatives inhabit creeks (Schweitzer 1991).

Conceptual Basis for GIS Model Development: We mapped potential habitat as all perennial sections of river, streams and creeks in the Study Area.

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Giuliani's Dubiraphian Riffle Beetle occurs on submerged vegetation in areas with moderate to strong current. In the absence of more specific information about the habitat requirements for this species, we assume that habitat quality is poor moderate. Perennial water required by this species occurs on tributaries to Rancheria Creek (Figure 56), however flow rates during the summer can be very slow, with only pools available in these areas.

Nearest Occurrence:

Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.

Nearest Occurrence to the Galbreath Wildlands Preserve: Russian River watershed (Schweitzer 1991, Cal Academy 2010). Online databases of catalogued specimens

do not report precise location data (Cal Academy 2010), and an estimation of distance to the Study Area is not possible.

Summary: We anticipate that the Giuliani's Dubiraphian Riffle Beetle is "Unlikely to Occur" in the Preserve because habitat quality is poor to moderate, the species is rare, and is known only from the Russian River watershed.

References:

California Academy of Sciences. 2010. CAS Entomology General Collection Database. http://research.calacademy.org/ent/collections. Accessed 2010 Aug 18.

Cedar Creek Ecosystem Science Reserve. 2000 May. Insects of Cedar Creek <http://www.cedarcreek.umn.edu/insects/024045n.html> Accessed 2010 Jun 25

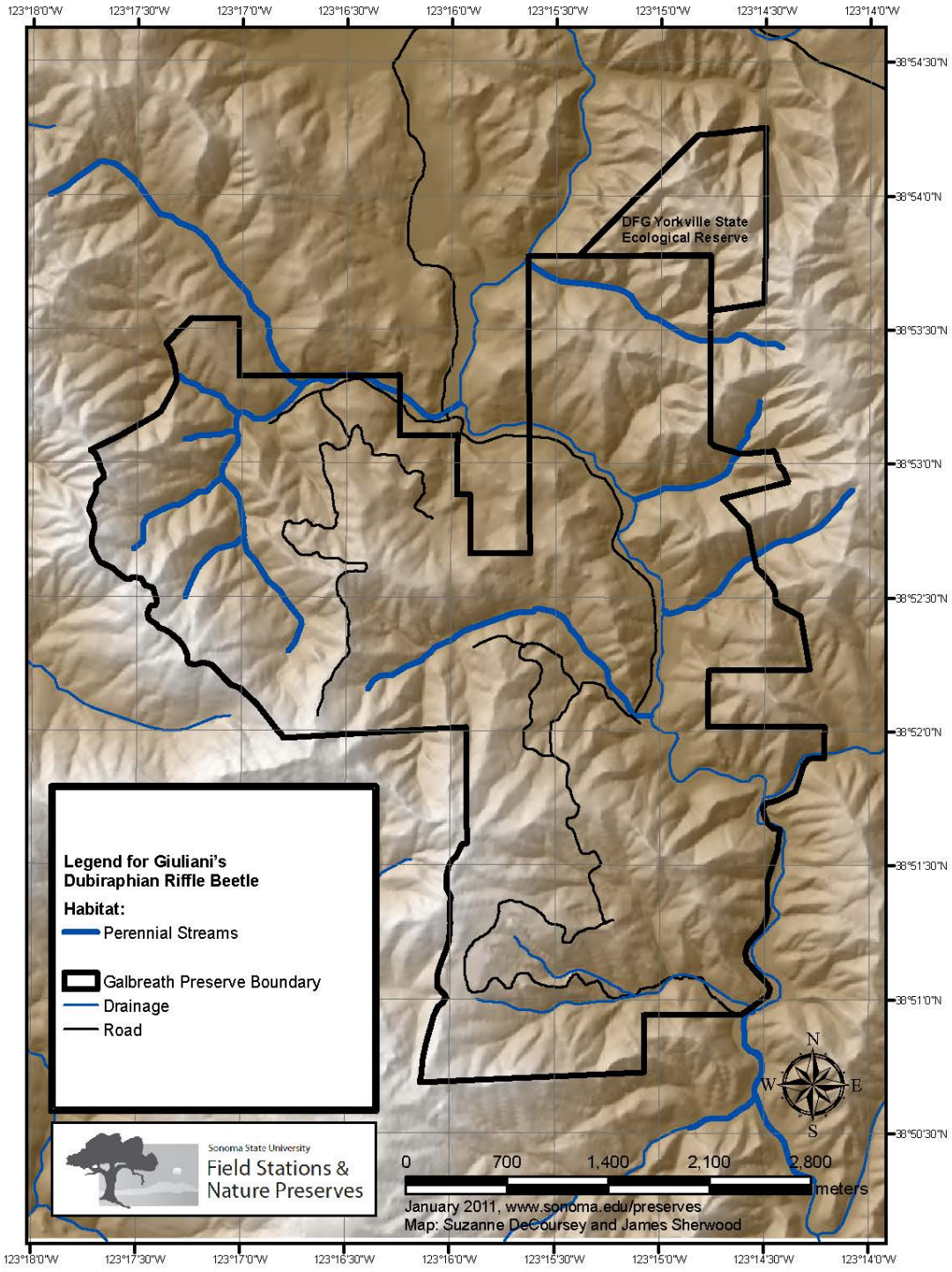
Fish and Wildlife Service. 1994 Nov 15. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species. Federal Register 59(219): 33

Schweitzer, DF. 1991 Mar 29. Comprehensive Report: Species Dubiraphia giulianii. NatureServe Explorer. NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. Accessed 2010, Jun 25).

Photo Source: Photo is not of species listed. It is of a related species, *Dubiraphia vittata*, found in Ithaca, NY. From <http://bugguide.net/node/view/129516> Accessed 2010 Jun 28. Image copyright by Joyce Gross, contact joyceg@berkeley.edu

Species Account Description: Kandis Gilmore & Emily Harvey

Figure 56. Potential habitat for Giuliani's Dubiraphian Riffle Beetle , *Dubiraphia giulianii*



Status:

Federal: none

State: none

Other: G5T1 S1


Photo: Sander van der Molen

Species Description: The Arctic Skipper has a wingspan of 2.5-3.2 cm and is black with square orange spots. The underside of the forewing is orange with black spots, while the underside of the hindwing is orange-red with cream spots outlined in black (Opler 2010). The Sonoma Arctic skipper is the largest of the subspecies (Guppy et al. 2001).

> The eggs were pale green and round. The mature larvae were 1.12 inches (2.8 cm) in length. The colour was pale green, with white lateral stripes on the abdomen. The prothorax is not heavily sclerotizied as in some other skipper larvae. (From Guppy et al. 2001)

Distribution:

> The Arctic Skipper is Holarctic and is found across boreal North America from central AK to NF and south to northern CA, northwestern WY, and New England. (From Guppy and Shepard 2001)

The Arctic Skipper is widely distributed in Alaska, Canada, and the northern United States; northern California is the southern end of its range (Shapiro 2006; Opler 2010).

> The newly described subspecies, *C. p. magnus* Mattoon & Tilden, 1998 is the correct name for the subspecies from northern California north to central BC, and the subspecies is not restricted to northern California as the authors thought (Mattoon and Tilden 1998). (From Guppy and Shepard 2001)

The subspecies, Sonoma arctic skipper, is known from two populations in Sonoma County: one in Guerneville that is thought to be extinct and another near Salt Point (Shapiro 2010).

Life History & Threats:

> Adults are found flying from early May to early August, depending on elevation and latitude. There is no evidence of a second brood. The eggs hatch within two weeks of being laid and develop to mature larvae by fall. Presumably the mature larva is the overwintering stage….Garth and Tilden (1986) report purple reed grass (*Calamagrostis purpurascens*) as the foodplant. In Europe it has been reared on Bromus sp. (Higgins and Riley 1970). (From Guppy and Shepard 2001)

> Adults rest with their wings closed, but bask with hindwings open wide and forewings open to about 45 degrees. To find receptive females, males perch on low vegetation and sometimes patrol in openings. Females lay eggs singly on leaves of the host plant. Caterpillars live and

> feed within nests of silked-together leaves; fully-grown caterpillars overwinter in their nests and then pupate within them in the spring. (From Opler 2010)
>
> Adults sit in sunflecks and visit flowers, particularly native vetches which they pitch up onto from below. The larval hosts are presumed to be native grasses. There is one brood in early summer (May-July). (From Shapiro 2006)

One brood per year from May through July. Caterpillar host plants for this species include purple reedgrass (*Calamagrostis purpurascens*) and other native grasses in California (Shapiro 2006; Opler 2010). Adults feed on flowers including iris (*Iris* sp.) in California. The Arctic Skipper is secure throughout much of its range in Canada and the northern United States, but being a cold-adapted species it is rarer in California (Opler 2010).

Habitat & Habitat Associations:

Habitat for the Arctic Skipper (i.e., for all subspecies) includes:

- Glades and openings in heavily forested woods, moist meadows, and streamsides (Opler 2010)
- Openings in redwood and evergreen forest (PRMD 2010)
- Usually it is found in moist open meadows along streams in the south (Guppy and Shepard 2001)
- Cool, wooded, usually streamside habitats (Shapiro 2006)
- Glades, along roadsides, streamside grassy openings in cool forests (NatureServe 2001)

Caterpillar host plants are presumed to be native grasses (Shapiro 2006). Purple reed grass has been documented as a host plant (Opler 2010).

> Adults visit flowers including native vetches (Shapiro 2006) and iris (Iris sp). Often found in association with the Western meadow fritillary butterfly often in association with *Clossiana epithore* or Small Pearl-bordered Fritillary (*C. selene*). (From Guppy and Shepard 2001)

Conceptual Basis for GIS Model Development: We mapped potential habitat in the Study Area as:

- Broadleaf upland forest (i.e., mixed, montane mixed, and single dominant hardwood types with a canopy cover $\geq$ 40%)
- Dense (canopy cover $\geq$ 40%) coniferous forest (i.e., redwood-douglas fir mix and pacific Douglas Fir types).
- Grasslands

Best habitat was indicated within the above areas as:

- Roadsides

- Streamsides

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat:

> General habitat for the Sonoma Arctic Skipper is abundant in the Preserve, and of good quality. The best habitat for this species, roadsides and streamsides, are also abundant throughout the Preserve. Perennial water is in most tributaries to Rancheria Creek which flow through heavily wooded areas, and in a few small ponds. Springs and seeps are also common throughout the Preserve, but are not available for mapping in the GIS database.

Nearest Occurrence:

> Documented Occurrences in Preserve: This species has not been documented in the Study Area. To our knowledge, no surveys have been conducted.
>
> Nearest Occurrence to Preserve: This species has not been recorded in Mendocino County and is known only from two sites in coastal Sonoma County to the south of the Preserve: a site near Guerneville where the population is thought to be extinct and a site near Salt Point in the Gualala-Salmon watershed (Shapiro 2010, NatureServe 2001), approximately 20 miles southwest of the Preserve.

Summary: The Sonoma Arctic Skipper is "Unlikely to Occur" at the Galbreath Preserve because it is exceedingly rare and has never been documented as far north as the Preserve. However, there is good quality, abundant habitat at the Preserve and surveys are warranted.

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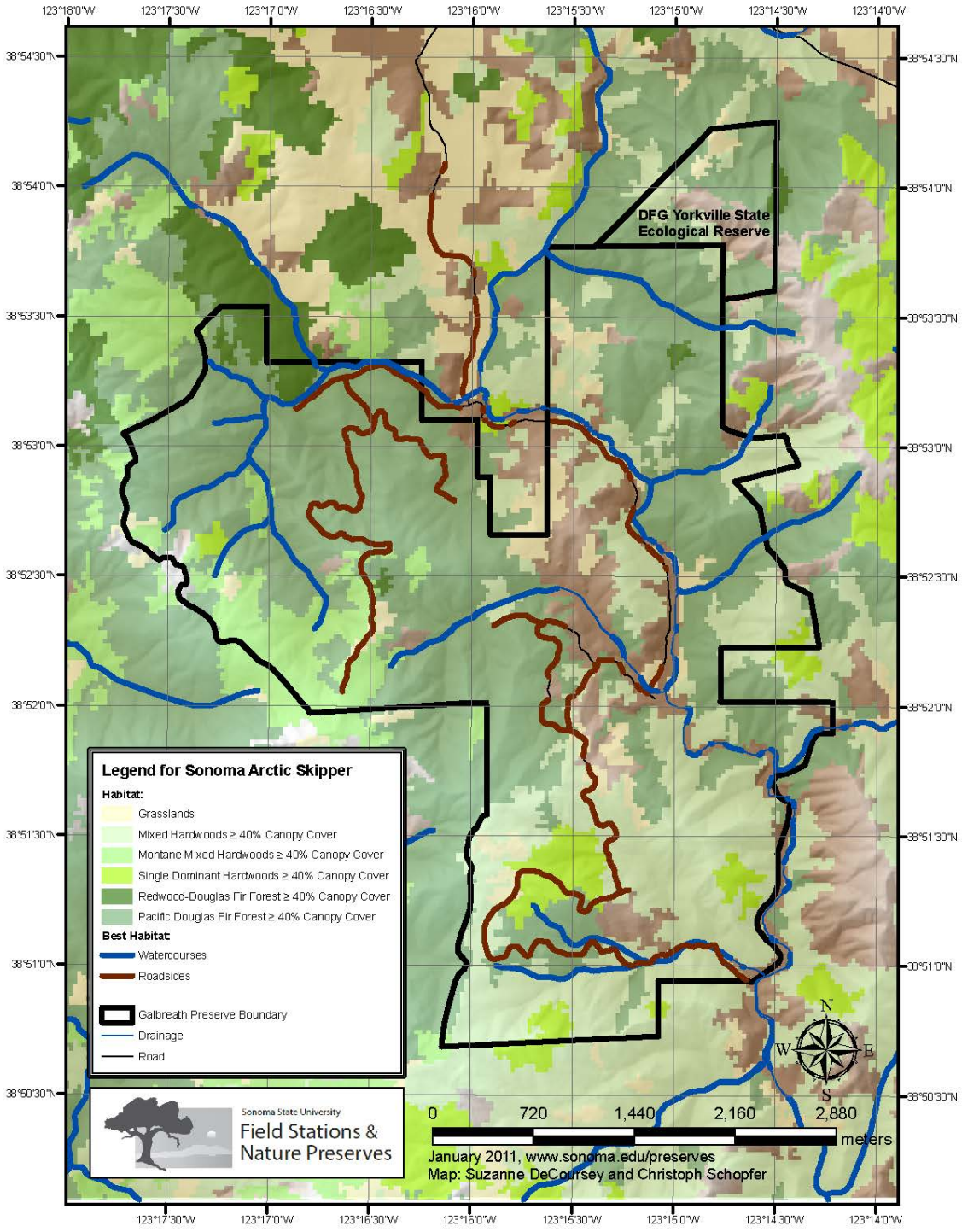
Species Account Description: Kandis Gilmore & Emily Harvey

Figure 57: Potential habitat for Sonoma Arctic Skipper *(Caterocephalus palaemon magnus)*



Status: (Overwintering Habitat)

Federal: None

State: None

Other: G5 S3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Species Description: Adults have rust-orange wings with black veins and white dots along the margins. Wingspan 8-10 cm. Ingest cardiac glycosides from milkweed host plant which makes them poisonous to predators. Larvae are pale green and yellow with a thin black stripe along each segment (Powell & Hogue 1979).

Distribution:

The butterfly is attaining near worldwide distribution, but is primarily American. Autumnal migrants occasionally go to England; has spread throughout Pacific Ocean area and is well-established in Australia. However, essential overwintering areas for North American populations are limited to about 100 places in coastal California and the mountains of Mexico. (From NatureServe 2010)

The critical conservation feature for North American populations is the overwintering habitats, which are certain high altitude Mexican conifer forests or coastal California conifer or Eucalyptus groves as identified in literature. It appears virtually all North American monarchs overwinter in one of these two areas. (From Schweitzer 2010)

Life History & Threats:

Probably the world's best known butterfly, the Monarch often used to symbolize natural beauty and butterflies in general…it is the insect most known to regularly migrate on a seasonal cycle; moving northward through spring and summer, while passing through 2-3 generations. The descendents migrate southward in the fall to establish overwintering aggregations along the coasts and in Mexico. (From Powell & Hogue 1979)

Females appear to avoid ovipositing on milkweeds already attacked by the oleander aphid (*Aphis nerii*) or the bright blue-green beetle *Chrysochus cobaltinus*. The Monarch acquires protective chemicals (cardenolides, "cardiac glycosides") from its host plants. Because different milkweeds differ greatly in their cardenolide content, Monarchs do also. Our commonest milkweeds (*Asclepias fascicularis* and *A. speciosa*) are low in cardenolides and produce innocuous butterflies; some relatively rare species, like the serpentine-endemic A. solanoana, are very nasty. The chemical defense is the basis for the famous mimicry by the Viceroy (*Limenitis archippus*) and other insects, but the Monarch has no mimics here. Population numbers vary greatly, probably reflecting disease; the locations where summer breeding occurs also vary greatly, and some years are mostly east of the Sierran crest. The westward migration begins as early as late July or August, but some breeding occurs well into autumn and adults continue to emerge at Sierra Valley into October. They then have a very short time to get over the mountains before the weather turns hostile. Altogether, there are

> three to four generations in an average year, but the mobility of the butterflies makes it difficult to pin this down. (From Shapiro 2010)

The monarch's NatureServe Global status is G5, meaning that is considered secure globally. The threats faced by the monarch are most pressing in its overwintering grounds, where development and deforestation can interfere with populations' survival (Schweitzer 2010).

Habitat & Habitat Associations:

Overwintering Habitat:

> The critical conservation feature for North American populations is the overwintering habitats, which are certain high altitude Mexican conifer forests or coastal California conifer or Eucalyptus groves as identified in literature. It appears virtually all North American monarchs overwinter in one of these two areas. (From Schweitzer 2010)

Breeding Habitat: Individuals may be found all over the state, but breeding takes place at mid to low elevations. (Schweitzer 2010)

> In general breeding areas are virtually all patches of milkweed in North America and some other regions. (From Schweitzer 2010)

Species of milkweed that are known to occur in Mendocino County that could be larval host plants to the Monarch are *Asclepias californica* ssp*. greenei, A. cordifolia, A. eriocarpa, A. fascicularis, and A. speciosa* (CalFlora 2010; Smith 1992). A milkweed species that is widely used by Monarchs in foothills and mountains is the purple milkweed, *A.cordifolia* (Shapiro 2010).

Feeding Habitat:

> Adult monarchs are not limited to feeding on milkweed and, due to their long proboscis, will feed from many types of flowers which have a long corolla. (From Shapiro 2010)

Conceptual Basis for GIS Model Development: Potential overwintering habitat was mapped as coniferous forest vegetation types.

Potential Occurrence in the Galbreath Wildlands Preserve: Protection status for this species applies to overwintering habitat.

Habitat: Conifers needed by Monarchs as overwintering habitat are abundant in the Preserve.

Nearest Occurrence:

> Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been documented on the Preserve. To our knowledge no surveys have been conducted.
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: Overwintering sites in California are limited to about 100 locations (NatureServe 2010). This species has been reported to occur in the Stewarts Point USGS quad southwest of the Preserve.

Summary: Overwintering colonies of Monarch butterflies are “Unlikely to Occur” in the Preserve because colonies are rare along the California coast, and coniferous habitat is abundant in areas surrounding the Preserve.

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Species Account Description: Kandis Gilmore & Emily Harvey

Figure 58. Potential habitat for Monarch Butterfly, *Danaus plexippus*