

## APPENDIX 1-1—LIST OF TERRESTRIAL VERTEBRATE SPECIES WITHIN THE SALMON SUBBASIN AND DESCRIPTIONS OF GLOBAL AND STATE CONSERVATION RANKINGS

**Table 1. Conservation status, occurrence information, and breeding status of terrestrial vertebrate species within the Salmon subbasin, Idaho (source: IBIS 2003; Conservation Status-Idaho Department of Fish and Game, Idaho Conservation Data Center).**

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
<b>Amphibians (Total Number: 10)</b>				
Tiger salamander	<i>Ambystoma tigrinum</i>	G5/S5	resident	breeder
Long-toed salamander	<i>Ambystoma macrodactylum</i>	G5/S5	resident	breeder
Idaho giant salamander	<i>Dicamptodon aterrimus</i>	G3/S?	resident	breeder
Inland tailed frog	<i>Ascaphus truei</i>	G4/S3	resident	breeder
Great basin spadefoot	<i>Scaphiopus intermontanus</i>	G5/S4	resident	breeder
Western toad	<i>Bufo boreas</i>	G4/S4	resident	breeder
Pacific chorus (tree) frog	<i>Pseudacris regilla</i>	G5/S5	resident	breeder
Columbia spotted frog	<i>Rana luteiventris</i>	G4/S3S4	resident	breeder
Northern leopard frog	<i>Rana pipiens</i>	G5/S3	resident	breeder
Bullfrog	<i>Rana catesbeiana</i>	G5/SNA	nonnative	breeder
<b>Birds (Total Number: 272)</b>				
Common loon	<i>Gavia immer</i>	G5/S1B,S2N	resident	breeder
Pied-billed grebe	<i>Podilymbus podiceps</i>	G5/S4B,S3N	resident	breeder
Horned grebe	<i>Podiceps auritus</i>	G5/S1?	resident	breeder
Red-necked grebe	<i>Podiceps grisegena</i>	G5/S3B	resident	breeder
Eared grebe	<i>Podiceps nigricollis</i>	G5/S4B	resident	breeder
Western grebe	<i>Aechmophorus occidentalis</i>	G5/S4B	resident	breeder
Clark's grebe	<i>Aechmophorus clarkii</i>	G5/S2B	resident	breeder
American white pelican	<i>Pelecanus erythrorhynchos</i>	G3/S1B	resident	breeder
Double-crested cormorant	<i>Phalacrocorax auritus</i>	G5/S2B	resident	breeder
American bittern	<i>Botaurus lentiginosus</i>	G4/S4B	resident	breeder
Great blue heron	<i>Ardea herodias</i>	G5/S2B	resident	breeder
Great egret	<i>Ardea alba</i>	G5/S1B	resident	breeder
Snowy egret	<i>Egretta thula</i>	G5/S2B	resident	breeder
Cattle egret	<i>Bubulcus ibis</i>	G5/S2B	resident	breeder
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	G5/S3B	resident	breeder
White-faced ibis	<i>Plegadis chihi</i>	G5/S2B	resident	breeder
Turkey vulture	<i>Cathartes aura</i>	G5/S4B	resident	breeder
Greater white-fronted goose	<i>Anser albifrons</i>	G5/SNA	resident	nonbreeder
Snow goose	<i>Chen Caerulescens</i>	G5/SN2	resident	nonbreeder

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
Ross's goose	<i>Chen rossii</i>	G4/SNA	resident	nonbreeder
Canada goose	<i>Branta canadensis</i>	G5/S5B,S5N	resident	breeder
Trumpeter swan	<i>Cygnus buccinator</i>	G4/S1B,S2N	resident	breeder
Tundra swan	<i>Cygnus columbianus</i>	G5/S2N	resident	nonbreeder
Wood duck	<i>Aix sponsa</i>	G5/S4B,S1N	resident	breeder
Gadwall	<i>Anas strepera</i>	G5/S5B,S3N	resident	breeder
American wigeon	<i>Anas americana</i>	G5/S5B,S5N	resident	breeder
American black duck	<i>Anas rubripes</i>	G5/SNA	accidental	nonbreeder
Mallard	<i>Anas platyrhynchos</i>	G5/S5B,S5N	resident	breeder
Blue-winged teal	<i>Anas discors</i>	G5/S5B	resident	breeder
Cinnamon teal	<i>Anas cyanoptera</i>	G5/S5B	resident	breeder
Northern shoveler	<i>Anas clypeata</i>	G5/S5B,S1N	resident	breeder
Northern pintail	<i>Anas acuta</i>	G5/S5B,S3N	resident	breeder
Green-winged teal	<i>Anas crecca</i>	G5/S4B,S4N	resident	breeder
Canvasback	<i>Aythya valisineria</i>	G5/S4B,S2N	resident	breeder
Redhead	<i>Aythya americana</i>	G5/S5B	resident	breeder
Ring-necked duck	<i>Aythya collaris</i>	G5/S3B	resident	breeder
Greater scaup	<i>Aythya marila</i>	G5/SNA	accidental	nonbreeder
Lesser scaup	<i>Aythya affinis</i>	G5/S4	resident	breeder
Harlequin duck	<i>Histrionicus histrionicus</i>	G4/S1B	resident	breeder
Surf scoter	<i>Melanitta perspicillata</i>	G5/SNA	accidental	nonbreeder
Bufflehead	<i>Bucephala albeola</i>	G5/S3B,S3N	resident	breeder
Common goldeneye	<i>Bucephala clangula</i>	G5/S3B,S3N	resident	breeder
Barrow's goldeneye	<i>Bucephala islandica</i>	G5/S3B,S3N	resident	breeder
Hooded merganser	<i>Lophodytes cucullatus</i>	G5,S2B,S3N	resident	breeder
Common merganser	<i>Mergus merganser</i>	G5/S5B,S5N	resident	breeder
Red-breasted merganser	<i>Mergus serrator</i>	G5/SNA	resident	nonbreeder
Ruddy duck	<i>Oxyura jamaicensis</i>	G5/S5B	resident	breeder
Osprey	<i>Pandion haliaetus</i>	G5/S5B	resident	breeder
Bald eagle	<i>Haliaeetus leucocephalus</i>	G4/S3B,S4N	resident	breeder
Northern harrier	<i>Circus cyaneus</i>	G5/S5B,S5N	resident	breeder
Sharp-shinned hawk	<i>Accipiter striatus</i>	G5/S5	resident	breeder
Cooper's hawk	<i>Accipiter cooperii</i>	G5/S4	resident	breeder
Northern goshawk	<i>Accipiter gentilis</i>	G5/S4	resident	breeder
Swainson's hawk	<i>Buteo swainsoni</i>	G5/S4B	resident	breeder
Red-tailed hawk	<i>Buteo jamaicensis</i>	G5/S5B,S5N	resident	breeder
Ferruginous hawk	<i>Buteo regalis</i>	G4/S3B	resident	breeder
Rough-legged hawk	<i>Buteo lagopus</i>	G5/S4N	resident	nonbreeder
Golden eagle	<i>Aquila chrysaetos</i>	G5/S4B,S4N	resident	breeder

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
American kestrel	<i>Falco sparverius</i>	G5/S5B,S5N	resident	breeder
Merlin	<i>Falco columbarius</i>	G5/S1B,S2N	resident	breeder
Gyr Falcon	<i>Falco rusticolus</i>	G5/SNA	accidental	nonbreeder
Peregrine falcon	<i>Falco peregrinus</i>	G4T3/S1B	resident	breeder
Prairie falcon	<i>Falco mexicanus</i>	G5/S5B,S3N	resident	breeder
Chukar	<i>Alectoris chukar</i>	G5/SNA	nonnative	breeder
Gray partridge	<i>Perdix perdix</i>	G5/SNA	nonnative	breeder
Ring-necked pheasant	<i>Phasianus colchicus</i>	G5/SNA	nonnative	breeder
Ruffed grouse	<i>Bonasa umbellus</i>	G5/S5	resident	breeder
Greater sage grouse	<i>Centrocercus urophasianus</i>	G4/S4	resident	breeder
Spruce grouse	<i>Falcapennis canadensis</i>	G5/S4	resident	breeder
Blue grouse	<i>Dendragapus obscurus</i>	G5/S5	resident	breeder
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	G4/S3	resident	breeder
Wild turkey	<i>Meleagris gallopavo</i>	G5/SNA	nonnative	breeder
Mountain quail	<i>Oreortyx pictus</i>	G5/S2	resident	breeder
California quail	<i>Callipepla californica</i>	G5/SNA	nonnative	breeder
Northern bobwhite	<i>Colinus virginianus</i>	G5/SNA	nonnative	breeder
Virginia rail	<i>Rallus limicola</i>	G5/S5B	resident	breeder
Sora	<i>Porzana carolina</i>	G5/S5B	resident	breeder
American coot	<i>Fulica americana</i>	G5/S5B	resident	breeder
Sandhill crane	<i>Grus canadensis</i>	G5/S5B	resident	breeder
Black-bellied plover	<i>Pluvialis squatarola</i>	G5/S2N	resident	nonbreeder
American golden-plover	<i>Pluvialis dominica</i>	G5/SNA	resident	nonbreeder
Semipalmated plover	<i>Charadrius semipalmatus</i>	G5/S2N	resident	nonbreeder
Killdeer	<i>Charadrius vociferus</i>	G5/S5B,S3N	resident	breeder
Black-necked stilt	<i>Himantopus mexicanus</i>	G5/S4B	resident	breeder
American avocet	<i>Recurvirostra americana</i>	G5/S5B	resident	breeder
Greater yellowlegs	<i>Tringa melanoleuca</i>	G5/S2N	resident	nonbreeder
Lesser yellowlegs	<i>Tringa flavipes</i>	G5/S2N	resident	nonbreeder
Solitary sandpiper	<i>Tringa solitaria</i>	G5/SNA	resident	nonbreeder
Willet	<i>Catoptrophorus semipalmatus</i>	G5/S4B	resident	breeder
Spotted sandpiper	<i>Actitis macularia</i>	G5/S5B	resident	breeder
Upland sandpiper	<i>Bartramia longicauda</i>	G5/S1B	resident	breeder
Whimbrel	<i>Numenius phaeopus</i>	G5/SNA	accidental	nonbreeder
Long-billed curlew	<i>Numenius americanus</i>	G5/S3B	resident	breeder
Marbled godwit	<i>Limosa fedoa</i>	G5/S2N	resident	nonbreeder
Sanderling	<i>Calidris alba</i>	G5/SNA	resident	nonbreeder
Semipalmated sandpiper	<i>Calidris pusilla</i>	G5/S2N	resident	nonbreeder

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
Western sandpiper	<i>Calidris mauri</i>	G5/S2N	resident	nonbreeder
Least sandpiper	<i>Calidris minutilla</i>	G5/S2N	resident	nonbreeder
Baird's sandpiper	<i>Calidris bairdii</i>	G5/S2N	resident	nonbreeder
Pectoral sandpiper	<i>Calidris melanotos</i>	G5/SNA	resident	nonbreeder
Dunlin	<i>Calidris alpina</i>	G5/SNA	resident	nonbreeder
Stilt sandpiper	<i>Calidris himantopus</i>	G5/SNA	accidental	nonbreeder
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	G5/S2N	resident	nonbreeder
Wilson's snipe	<i>Gallinago delicata</i>	G?/S?	resident	breeder
Wilson's phalarope	<i>Phalaropus tricolor</i>	G5/S4B	resident	breeder
Red-necked phalarope	<i>Phalaropus lobatus</i>	G4G5/S2N	resident	nonbreeder
Franklin's gull	<i>Larus pipixcan</i>	G4G5/S2B	resident	breeder
Bonaparte's gull	<i>Larus philadelphia</i>	G5/SNA	resident	nonbreeder
Ring-billed gull	<i>Larus delawarensis</i>	G5/S2SB,S3	resident	breeder
California gull	<i>Larus californicus</i>	G5/S2SB,S3	resident	breeder
Herring gull	<i>Larus argentatus</i>	G5/S2N	resident	nonbreeder
Caspian tern	<i>Sterna caspia</i>	G5/S1B	resident	breeder
Common tern	<i>Sterna hirundo</i>	G5/S1B	resident	breeder
Forster's tern	<i>Sterna forsteri</i>	G5/S2S3B	resident	breeder
Black tern	<i>Chlidonias niger</i>	G4/S2B	resident	breeder
Rock dove	<i>Columba livia</i>	G5/SNA	nonnative	breeder
Band-tailed pigeon	<i>Columba fasciata</i>	G4/SNA	accidental	nonbreeder
Mourning dove	<i>Zenaida macroura</i>	G5/S5B	resident	breeder
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	G5/S1B	resident	historical breeder
Barn owl	<i>Tyto alba</i>	G5/S3?	resident	breeder
Flammulated owl	<i>Otus flammeolus</i>	G4/S3B	resident	breeder
Western screech-owl	<i>Otus kennicottii</i>	G5/S4	resident	breeder
Great horned owl	<i>Bubo virginianus</i>	G5/S5	resident	breeder
Snowy owl	<i>Nyctea scandiaca</i>	G5/SNA	accidental	nonbreeder
Northern pygmy-owl	<i>Glaucidium gnoma</i>	G5/S4	resident	breeder
Burrowing owl	<i>Athene cunicularia</i>	S4/S3S4	resident	breeder
Barred owl	<i>Strix varia</i>	G5/S4	resident	breeder
Great gray owl	<i>Strix nebulosa</i>	G5/S3	resident	breeder
Long-eared owl	<i>Asio otus</i>	G5/S5	resident	breeder
Short-eared owl	<i>Asio flammeus</i>	G5/S5	resident	breeder
Boreal owl	<i>Aegolius funereus</i>	G5/S2	resident	breeder
Northern saw-whet owl	<i>Aegolius acadicus</i>	G5/S4	resident	breeder
Common nighthawk	<i>Chordeiles minor</i>	G5/S5B	resident	breeder
Common poorwill	<i>Phalaenoptilus nuttallii</i>	G5/S4B	resident	breeder

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Black swift	<i>Cypseloides niger</i>	G4/S1B	resident	breeder
Vaux's swift	<i>Chaetura vauxi</i>	G5/S4B	resident	breeder
White-throated swift	<i>Aeronautes saxatalis</i>	G5/S4B	resident	breeder
Black-chinned hummingbird	<i>Archilochus alexandri</i>	G5/S5B	resident	breeder
Calliope hummingbird	<i>Stellula calliope</i>	G5/S5B	resident	breeder
Broad-tailed hummingbird	<i>Selasphorus platycercus</i>	G5/S5B	resident	breeder
Rufous hummingbird	<i>Selasphorus rufus</i>	G5/S5B	resident	breeder
Belted kingfisher	<i>Ceryle alcyon</i>	G5/S5	resident	breeder
Lewis's woodpecker	<i>Melanerpes lewis</i>	G4/S4B	resident	breeder
Williamson's sapsucker	<i>Sphyrapicus thyroideus</i>	G5/S5B	resident	breeder
Red-naped sapsucker	<i>Sphyrapicus nuchalis</i>	G5/S5B	resident	breeder
Downy woodpecker	<i>Picoides pubescens</i>	G5/S5	resident	breeder
Hairy woodpecker	<i>Picoides villosus</i>	G5/S5	resident	breeder
White-headed woodpecker	<i>Picoides albolarvatus</i>	G4/S2B	resident	breeder
Three-toed woodpecker	<i>Picoides tridactylus</i>	G5/S3?	resident	breeder
Black-backed woodpecker	<i>Picoides arcticus</i>	G5/S3	resident	breeder
Northern flicker	<i>Colaptes auratus</i>	G5/S5	resident	breeder
Pileated woodpecker	<i>Dryocopus pileatus</i>	G5/S4	resident	breeder
Olive-sided flycatcher	<i>Contopus cooperi</i>	G4/S4B	resident	breeder
Western wood-pewee	<i>Contopus sordidulus</i>	G5/S5B	resident	breeder
Willow flycatcher	<i>Empidonax traillii adastus</i>	G5/S5B	resident	breeder
Least flycatcher	<i>Empidonax minimus</i>	G5/SNA	resident	breeder
Hammond's flycatcher	<i>Empidonax hammondi</i>	G5/S5B	resident	breeder
Gray flycatcher	<i>Empidonax wrightii</i>	G5/S2B,S2N	resident	breeder
Dusky flycatcher	<i>Empidonax oberholseri</i>	G5/S5B	resident	breeder
Cordilleran flycatcher	<i>Empidonax occidentalis</i>	G5/S4B	resident	breeder
Say's phoebe	<i>Sayornis saya</i>	G5/S5B	resident	breeder
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	G5/S3S4B	resident	breeder
Western kingbird	<i>Tyrannus verticalis</i>	G5/S5B	resident	breeder
Eastern kingbird	<i>Tyrannus tyrannus</i>	G5/S4B	resident	breeder
Loggerhead shrike	<i>Lanius ludovicianus</i>	G4/S3	resident	breeder
Northern shrike	<i>Lanius excubitor</i>	G5/S3N	resident	nonbreeder
Warbling vireo	<i>Vireo gilvus</i>	G5/S5B	resident	breeder
Red-eyed vireo	<i>Vireo olivaceus</i>	G5/S5B	resident	breeder
Gray jay	<i>Perisoreus canadensis</i>	G5/S5	resident	breeder
Steller's jay	<i>Cyanocitta stelleri</i>	G5/S5	resident	breeder
Western scrub-jay	<i>Aphelocoma californica</i>	G5/S2?	resident	breeder
Pinyon jay	<i>Gymnorhinus cyanocephalus</i>	G5/S2?	resident	breeder
Clark's nutcracker	<i>Nucifraga columbiana</i>	G5/S5	resident	breeder

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Black-billed magpie	<i>Pica pica</i>	G5/S5	resident	breeder
American crow	<i>Corvus brachyrhynchos</i>	G5/S5	resident	breeder
Common raven	<i>Corvus corax</i>	G5/S5	resident	breeder
Horned lark	<i>Eremophila alpestris</i>	G5/S5	resident	breeder
Tree swallow	<i>Tachycineta bicolor</i>	G5/S5B	resident	breeder
Violet-green swallow	<i>Tachycineta thalassina</i>	G5/S5B	resident	breeder
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	G5/S5B	resident	breeder
Bank swallow	<i>Riparia riparia</i>	G5/S5B	resident	breeder
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	G5/S5B	resident	breeder
Barn swallow	<i>Hirundo rustica</i>	G5/S5B	resident	breeder
Black-capped chickadee	<i>Poecile atricapillus</i>	G5/S5	resident	breeder
Mountain chickadee	<i>Poecile gambeli</i>	G5/S5	resident	breeder
Chestnut-backed chickadee	<i>Poecile rufescens</i>	G5/S4	resident	breeder
Bushtit	<i>Psaltriparus minimus</i>	G5/S4	resident	breeder
Red-breasted nuthatch	<i>Sitta canadensis</i>	G5/S5	resident	breeder
White-breasted nuthatch	<i>Sitta carolinensis</i>	G5/S4	resident	breeder
Pygmy nuthatch	<i>Sitta pygmaea</i>	G5/S2S3	resident	breeder
Brown creeper	<i>Certhia americana</i>	G5/S5	resident	breeder
Rock wren	<i>Salpinctes obsoletus</i>	G5/S5B	resident	breeder
Canyon wren	<i>Catherpes mexicanus</i>	G5/S5B	resident	breeder
House wren	<i>Troglodytes aedon</i>	G5/S5B	resident	breeder
Winter wren	<i>Troglodytes troglodytes</i>	G5/S5	resident	breeder
Marsh wren	<i>Cistothorus palustris</i>	G5/S5B	resident	breeder
American dipper	<i>Cinclus mexicanus</i>	G5/S5	resident	breeder
Golden-crowned kinglet	<i>Regulus satrapa</i>	G5/S5	resident	breeder
Ruby-crowned kinglet	<i>Regulus calendula</i>	G5/S5B	resident	breeder
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	G5/S3?	resident	breeder
Western bluebird	<i>Sialia mexicana</i>	G5/S4B	resident	breeder
Mountain bluebird	<i>Sialia currucoides</i>	G5/S4B	resident	breeder
Townsend's solitaire	<i>Myadestes townsendi</i>	G5/S5	resident	breeder
Veery	<i>Catharus fuscescens</i>	G5/S5B	resident	breeder
Swainson's thrush	<i>Catharus ustulatus</i>	G5/S5B	resident	breeder
Hermit thrush	<i>Catharus guttatus</i>	G5/S5B	resident	breeder
American robin	<i>Turdus migratorius</i>	G5/S5B,S3N	resident	breeder
Varied thrush	<i>Ixoreus naevius</i>	G5/S5B	resident	breeder
Gray catbird	<i>Dumetella carolinensis</i>	G5/S5B	resident	breeder
Northern mockingbird	<i>Mimus polyglottos</i>	G5/S1B	resident	breeder
Sage thrasher	<i>Oreoscoptes montanus</i>	G5/S5B	resident	breeder

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
European starling	<i>Sturnus vulgaris</i>	G5/SNA	nonnative	breeder
American pipit	<i>Anthus rubescens</i>	G5/S4B	resident	breeder
Bohemian waxwing	<i>Bombycilla garrulus</i>	G5/S1B,S3N	resident	nonbreeder
Cedar waxwing	<i>Bombycilla cedrorum</i>	G5/S5B,S3N	resident	breeder
Orange-crowned warbler	<i>Vermivora celata</i>	G5/S5B	resident	breeder
Nashville warbler	<i>Vermivora ruficapilla</i>	G5/S5B	resident	breeder
Yellow warbler	<i>Dendroica petechia</i>	G5/S5B	resident	breeder
Yellow-rumped warbler	<i>Dendroica coronata</i>	G5/S5B	resident	breeder
Black-throated gray warbler	<i>Dendroica nigrescens</i>	G5.S3?B	resident	breeder
Townsend's warbler	<i>Dendroica townsendi</i>	G5/S4B	resident	breeder
Palm warbler	<i>Dendroica palmarum</i>	G5/SNA	accidental	nonbreeder
American redstart	<i>Setophaga ruticilla</i>	G5/S4B	resident	breeder
Northern waterthrush	<i>Seiurus noveboracensis</i>	G5/S3?	resident	breeder
MacGillivray's warbler	<i>Oporornis tolmiei</i>	G5/S5B	resident	breeder
Common yellowthroat	<i>Geothlypis trichas</i>	G5/S5B	resident	breeder
Wilson's warbler	<i>Wilsonia pusilla</i>	G5/S5B	resident	breeder
Yellow-breasted chat	<i>Icteria virens</i>	G5/S5B	resident	breeder
Western tanager	<i>Piranga ludoviciana</i>	G5/S5B	resident	breeder
Green-tailed towhee	<i>Pipilo chlorurus</i>	G5/S5B	resident	breeder
Spotted towhee	<i>Pipilo maculatus</i>	G5/S5B	resident	breeder
American tree sparrow	<i>Spizella arborea</i>	G5/S3N	resident	nonbreeder
Chipping sparrow	<i>Spizella passerina</i>	G5/S5B	resident	breeder
Clay-colored sparrow	<i>Spizella pallida</i>	G5/SNA	accidental	nonbreeder
Brewer's sparrow	<i>Spizella breweri</i>	G5/S4B	resident	breeder
Vesper sparrow	<i>Pooecetes gramineus</i>	G5/S4B	resident	breeder
Lark sparrow	<i>Chondestes grammacus</i>	G5/S5B	resident	breeder
Black-throated sparrow	<i>Amphispiza bilineata</i>	G5/S2B	resident	breeder
Sage sparrow	<i>Amphispiza belli</i>	G5/S4B	resident	breeder
Savannah sparrow	<i>Passerculus sandwichensis</i>	G5/S5B	resident	breeder
Grasshopper sparrow	<i>Ammodramus savannarum</i>	G5/S3B	resident	breeder
Fox sparrow	<i>Passerella iliaca</i>	G5/S5B	resident	breeder
Song sparrow	<i>Melospiza melodia</i>	G5/S5B,S5N	resident	breeder
Lincoln's sparrow	<i>Melospiza lincolni</i>	G5/S5B	resident	breeder
White-throated sparrow	<i>Zonotrichia albicollis</i>	G5/SNA	resident	nonbreeder
Harris's sparrow	<i>Zonotrichia querula</i>	G5/SNA	resident	nonbreeder
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	G5/S5B,S4N	resident	breeder
Dark-eyed junco	<i>Junco hyemalis</i>	G5/S5	resident	breeder
Lapland longspur	<i>Calcarius lapponicus</i>	G5/SNA	resident	nonbreeder
Snow bunting	<i>Plectrophenax nivalis</i>	G5/S3N	resident	nonbreeder

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	G5/S5B	resident	breeder
Lazuli bunting	<i>Passerina amoena</i>	G5/S5B	resident	breeder
Bobolink	<i>Dolichonyx oryzivorus</i>	G5/S4B	resident	breeder
Red-winged blackbird	<i>Agelaius phoeniceus</i>	G5/S5B,S3N	resident	breeder
Western meadowlark	<i>Sturnella neglecta</i>	G5/S5B,S3N	resident	breeder
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	G5/S5B	resident	breeder
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	G5/S5B,S5N	resident	breeder
Brown-headed cowbird	<i>Molothrus ater</i>	G5/S5B	resident	breeder
Bullock's oriole	<i>Icterus bullockii</i>	G5/S5B	resident	breeder
Black rosy-finch	<i>Leucosticte atrata</i>	G4/S4B,S3N	resident	breeder
Pine grosbeak	<i>Pinicola enucleator</i>	G5/S4	resident	breeder
Purple finch	<i>Carpodacus purpureus</i>	G5/SNA	accidental	nonbreeder
Cassin's finch	<i>Carpodacus cassinii</i>	G5/S5	resident	breeder
House finch	<i>Carpodacus mexicanus</i>	G5/S5	resident	breeder
Red crossbill	<i>Loxia curvirostra</i>	G5/S5	resident	breeder
White-winged crossbill	<i>Loxia leucoptera</i>	G5/S1?	resident	breeder
Common redpoll	<i>Carduelis flammea</i>	G5/S2N	resident	nonbreeder
Pine siskin	<i>Carduelis pinus</i>	G5/S5	resident	breeder
Lesser goldfinch	<i>Carduelis psaltria</i>	G5/S1B	resident	breeder
American goldfinch	<i>Carduelis tristis</i>	G5/S5	resident	breeder
Evening grosbeak	<i>Coccothraustes vespertinus</i>	G5/S5	resident	breeder
House sparrow	<i>Passer domesticus</i>	G5/SNA	nonnative	breeder
<b>Mammals (Total Number: 91)</b>				
Masked shrew	<i>Sorex cinereus</i>	G5/S5	resident	breeder
Vagrant shrew	<i>Sorex vagrans</i>	G5/S5	resident	breeder
Montane shrew	<i>Sorex monticolus</i>	G5/S4?	resident	breeder
Water shrew	<i>Sorex palustris</i>	G5/S4?	resident	breeder
Merriam's shrew	<i>Sorex merriami</i>	G5/S2?	resident	breeder
Coast mole	<i>Scapanus orarius</i>	G5/S1?	resident	breeder
California myotis	<i>Myotis californicus</i>	G5/S1?	resident	breeder
Western small-footed myotis	<i>Myotis ciliolabrum</i>	G5/S4?	resident	breeder
Yuma myotis	<i>Myotis yumanensis</i>	G5/S3?	resident	breeder
Little brown myotis	<i>Myotis lucifugus</i>	G5/S5	resident	breeder
Long-legged myotis	<i>Myotis volans</i>	G5/S3?	resident	breeder
Fringed myotis	<i>Myotis thysanodes</i>	G4G5/S1?	resident	breeder
Long-eared myotis	<i>Myotis evotis</i>	G5/S3?	resident	breeder
Silver-haired bat	<i>Lasionycteris noctivagans</i>	G5/S4?	resident	breeder
Western pipistrelle	<i>Pipistrellus hesperus</i>	G5/S1?	resident	breeder



Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
Big brown bat	<i>Eptesicus fuscus</i>	G5/S4?	resident	breeder
Hoary bat	<i>Lasiurus cinereus</i>	G5/S4?	resident	breeder
Spotted bat	<i>Euderma maculatum</i>	G4/S2	resident	breeder
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	G4/S2?	resident	breeder
Pallid bat	<i>Antrozous pallidus</i>	G5/S1?	resident	breeder
American pika	<i>Ochotona princeps</i>	G5/S5	resident	breeder
Nuttall's (mountain) cottontail	<i>Sylvilagus nuttallii</i>	G5/S5	resident	breeder
Snowshoe hare	<i>Lepus americanus</i>	G5/S5	resident	breeder
Pygmy rabbit	<i>Brachylagus idahoensis</i>	G5/S3	resident	breeder
White-tailed jackrabbit	<i>Lepus townsendii</i>	G5/S5	resident	breeder
Black-tailed jackrabbit	<i>Lepus californicus</i>	G5/S5	resident	breeder
Least chipmunk	<i>Tamias minimus</i>	G5/S5	resident	breeder
Yellow-pine chipmunk	<i>Tamias amoenus</i>	G5/S5	resident	breeder
Red-tailed chipmunk	<i>Tamias ruficaudus</i>	G5/S4	resident	breeder
Yellow-bellied marmot	<i>Marmota flaviventris</i>	G5/S5	resident	breeder
Hoary marmot	<i>Marmota caligata</i>	G5/S5	resident	breeder
White-tailed antelope squirrel	<i>Ammospermophilus leucurus</i>	S5/S4	resident	breeder
Belding's ground squirrel	<i>Spermophilus beldingi</i>	G5/S4?	resident	breeder
Columbian ground squirrel	<i>Spermophilus columbianus</i>	G5/S5	resident	breeder
Golden-mantled ground squirrel	<i>Spermophilus lateralis</i>	G5/S5	resident	breeder
Eastern fox squirrel	<i>Sciurus niger</i>	G5/SNA	nonnative	breeder
Red squirrel	<i>Tamiasciurus hudsonicus</i>	G5/S5	resident	breeder
Northern flying squirrel	<i>Glaucomys sabrinus</i>	G5/S4	resident	breeder
Northern pocket gopher	<i>Thomomys talpoides</i>	G5/S5	resident	breeder
Idaho pocket gopher	<i>Thomomys idahoensis</i>	G4/S4?	resident	breeder
Townsend's pocket gopher	<i>Thomomys townsendii</i>	G4G5/S4?	resident	breeder
Great basin pocket mouse	<i>Perognathus parvus</i>	G5/S5	resident	breeder
Little pocket mouse	<i>Perognathus longimembris</i>	G5/S1?	resident	breeder
Ord's kangaroo rat	<i>Dipodomys ordii</i>	G5/S5	resident	breeder
Chisel-toothed kangaroo rat	<i>Dipodomys microps</i>	G5/S3?	resident	breeder
American beaver	<i>Castor canadensis</i>	G5/S5	resident	breeder
Western harvest mouse	<i>Reithrodontomys megalotis</i>	G5/S5	resident	breeder
Deer mouse	<i>Peromyscus maniculatus</i>	G5/S5	resident	breeder
Canyon mouse	<i>Peromyscus crinitus</i>	G5/S3S4	resident	breeder
Piñon mouse	<i>Peromyscus truei</i>	G5/S2	resident	breeder
Northern grasshopper mouse	<i>Onychomys leucogaster</i>	G5/S4	resident	breeder
Desert woodrat	<i>Neotoma lepida</i>	G5/S4	resident	breeder

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
Bushy-tailed woodrat	<i>Neotoma cinerea</i>	G5/S5	resident	breeder
Southern red-backed vole	<i>Clethrionomys gapperi</i>	G5/S5	resident	breeder
Heather vole	<i>Phenacomys intermedius</i>	G5/S4	resident	breeder
Meadow vole	<i>Microtus pennsylvanicus</i>	G5/S5	resident	breeder
Montane vole	<i>Microtus montanus</i>	G5/S5	resident	breeder
Long-tailed vole	<i>Microtus longicaudus</i>	G5/S5	resident	breeder
Water vole	<i>Microtus richardsoni</i>	G5/S4	resident	breeder
Sagebrush vole	<i>Lemmyscus curtatus</i>	G5/S4	resident	breeder
Muskrat	<i>Ondatra zibethicus</i>	G5/S5	resident	breeder
Norway rat	<i>Rattus norvegicus</i>	G5/SNA	nonnative	breeder
House mouse	<i>Mus musculus</i>	G5/SNA	nonnative	breeder
Western jumping mouse	<i>Zapus princeps</i>	S5/S5	resident	breeder
Common porcupine	<i>Erethizon dorsatum</i>	G5/S5	resident	breeder
Coyote	<i>Canis latrans</i>	S5/S5	resident	breeder
Gray wolf	<i>Canis lupus</i>	G4/S1	resident	breeder
Red fox	<i>Vulpes vulpes</i>	G5/S5	resident	breeder
Black bear	<i>Ursus americanus</i>	G5/S5	resident	breeder
Grizzly bear	<i>Ursus arctos horribilis</i>	G4T3T4/S1	resident	breeder
Raccoon	<i>Procyon lotor</i>	G5/S4	resident	breeder
American marten	<i>Martes americana</i>	G5/S5	resident	breeder
Fisher	<i>Martes pennanti</i>	G5/S1	resident	breeder
Ermine	<i>Mustela erminea</i>	G5/S5	resident	breeder
Long-tailed weasel	<i>Mustela frenata</i>	G5/S5	resident	breeder
Mink	<i>Mustela vison</i>	G5/S5	resident	breeder
Wolverine	<i>Gulo gulo</i>	G5/S2	resident	breeder
American badger	<i>Taxidea taxus</i>	G5/S5	resident	breeder
Western spotted skunk	<i>Spilogale gracilis</i>	G5/S5	resident	breeder
Striped skunk	<i>Mephitis mephitis</i>	S5/S5	resident	breeder
Northern river otter	<i>Lutra canadensis</i>	S5/S4	resident	breeder
Mountain lion	<i>Puma concolor</i>	G5/S5	resident	breeder
Canada Lynx	<i>Lynx canadensis</i>	G5/S1	resident	breeder
Bobcat	<i>Lynx rufus</i>	G5/S5	resident	breeder
Rocky mountain elk	<i>Cervus elaphus nelsoni</i>	G5/S5	resident	breeder
Mule deer	<i>Odocoileus hemionus</i>	G5/S5	resident	breeder
White-tailed deer (eastside)	<i>Odocoileus virginianus ochrourus</i>	G5/S5	resident	breeder
Moose	<i>Alces alces</i>	G5/S5	resident	breeder
Pronghorn	<i>Antilocapra americana</i>	G5/S5	resident	breeder
Mountain goat	<i>Oreamnos americanus</i>	G5/S3	resident	breeder

Common Name	Scientific Name	Conservation Status	Occurrence	Breeding Status
Bighorn sheep	<i>Ovis canadensis</i>	G4T1/S1	resident	breeder
<b>Reptiles (Total Number: 14)</b>				
Painted turtle	<i>Chrysemys picta</i>	G4/S4	resident	breeder
Long-nosed leopard lizard	<i>Gambelia wislizenii</i>	G5/S5	resident	breeder
Short-horned lizard	<i>Phrynosoma douglassii</i>	G5/S5	resident	breeder
Sagebrush lizard	<i>Sceloporus graciosus</i>	S5/S5	resident	breeder
Western fence lizard	<i>Sceloporus occidentalis</i>	G5/S4	resident	breeder
Western skink	<i>Eumeces skiltonianus</i>	S5/S5	resident	breeder
Rubber boa	<i>Charina bottae</i>	G5/S5	resident	breeder
Racer	<i>Coluber constrictor</i>	G5/S5	resident	breeder
Ringneck snake	<i>Diadophis punctatus</i>	G5/S1?	resident	breeder
Night snake	<i>Hypsiglena torquata</i>	G5/S3	resident	breeder
Gopher snake	<i>Pituophis catenifer</i>	G5/S5	resident	breeder
Western terrestrial garter snake	<i>Thamnophis elegans</i>	G5/S5	resident	breeder
Common garter snake	<i>Thamnophis sirtalis</i>	G5/S5	resident	breeder
Western rattlesnake	<i>Crotalus viridis</i>	G5/S5	resident	breeder
<b>(Total Number of Species: 389)</b>				
<sup>a</sup> Resident to mean year-round, winter, or summer resident or migratory visitor.				

## Global and State Conservation Ranking Descriptions

(Idaho Department of Fish and Game, Idaho Conservation Data Center)

The network of Natural Heritage Programs and Conservation Data Centers—which currently consists of installations in all 50 states, several Canadian provinces, and several Latin American and Caribbean countries—ranks the status of plants, animals, and plant communities at the rangewide or global (G-rank) and state (S-rank) levels on a scale of 1 to 5. The rank is based primarily on the number of known occurrences, but other factors—such as habitat quality, estimated number of individuals, narrowness of range of habitat, trends in populations and habitat, and threats to the species—are also considered. The ranking system is meant to exist alongside national and state rare species lists because these lists often include additional criteria (e.g., recovery potential and depth of knowledge) that go beyond assessing threats to extinction.

### Components of Ranks:

- G** Global rank indicator: rank is based on rangewide status
- T** Trinomial rank indicator: global status is for intraspecific taxa
- S** State rank indicator: rank is based on status within Idaho
- 1** Critically imperiled because of extreme rarity or because some factor of its biology makes it especially vulnerable to extinction (typically 5 or fewer occurrences)
- 2** Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (typically 6 to 20 occurrences)
- 3** Rare or uncommon but not imperiled (typically 21 to 100 occurrences)
- 4** Not rare and apparently secure but with cause for long-term concern (usually more than 100 occurrences)
- 5** Demonstrably widespread, abundant, and secure
- U** Unrankable
- H** Historical occurrence (i.e., formerly part of the native biota; implied expectation is that it might be rediscovered or possibly be extinct)
- X** Presumed extinct or extirpated
- Q** Uncertainty exists about taxonomic status
- ?** Uncertainty exists about the stated rank
- NR** Not ranked
- NA** Conservation status rank is not applicable

### Examples of Use:

**G4T2** = Species is apparently secure rangewide, but this particular subspecies or variety is imperiled.

**S2S3** = Uncertainty exists about whether the species or subspecies should be ranked S2 or S3.

### Components of State Ranks Specific to Long-Distance Migrants (Bats and Birds):

- A** Accidental (occurring only once or a few times) or casual (occurring more regularly although not every year) in Idaho; a few of these species might have bred during one or more of the periods in which they were recorded

- B** Breeding population
- M** Migrant that resident only in an irregular, transitory, and dispersed manner; occurrences cannot be predicted from year to year
- N** Nonbreeding population

**Examples of Use:**

**S4N** = Fairly common winter resident

**S1B,S5N** = Rare breeder but a common winter resident

**S2B,SMN** = Rare breeder and an uncommon spring and fall transient among which a few remain as local and irregular (in location) winter residents

## **APPENDIX 1-2—RARE AND SENSITIVE VEGETATION**

Rare and endemic vegetation is a good indicator of the stability of a natural system. This assessment makes the assumption that rare and threatened vegetation at a point prior to the introduction of anthropogenic effects was sustainable in a natural state. Thus, if a vegetative species is now threatened, it is likely to be highly correlated to changes in its habitat due to human activities. The authors of the assessment did not write the content of this appendix. Rather, this appendix was generated directly from texts of existing literature, including the Idaho Conservation Data Center website (accessed in April 2003) and Atwood *et al.* (2000).

In the Salmon subbasin, there are 81 documented species of rare vegetation (Table 1). Of these, 21 have detailed records developed by the sources listed above and are included in this appendix.

**Table 1. Global (G1–G3) or state (S1–S2) rare or sensitive species in the Salmon subbasin (IDCDC 2003).**

Common Name	Scientific Name	LEM	LOS	LSA	MFL	MFU	MSC	MSP	PAH	SFS	UPS	A*
Pink agoseris	<i>Agoseris lackschewitzii</i>	X										
Swamp onion	<i>Allium madidum</i>			X								
Northern sagewort	<i>Artemisia campestris</i> ssp. <i>borealis</i> var. <i>purshii</i>										X	
Challis milkvetch	<i>Astragalus amblytropis</i>							X			X	
Lemhi milkvetch	<i>Astragalus aquilonius</i>	X							X		X	Y
Two-groove milkvetch	<i>Astragalus bisulcatus</i> var. <i>bisulcatus</i>	X										Y
Meadow milkvetch	<i>Astragalus diversifolius</i>	X							X			Y
Plains milkvetch	<i>Astragalus gilviflorus</i>	X										Y
Payson's milkvetch	<i>Astragalus paysonii</i>						X				X	
White clouds milkvetch	<i>Astragalus vexilliflexus</i> var. <i>nubilus</i>										X	
Bent-flowered milkvetch	<i>Astragalus vexilliflexus</i> var. <i>vexilliflexus</i>									X		
Prairie moonwort	<i>Botrychium campestre</i>										X	
Least moonwort	<i>Botrychium simplex</i>		X				X			X	X	Y
Blue gramma	<i>Bouteloua gracilis</i>	X						X	X			
Leafless bug-on-a-stick	<i>Buxbaumia aphylla</i>		X									
Cascade reedgrass	<i>Calamagrostis tweedyi</i>		X				X			X		
Green-band mariposa lily	<i>Calochortus macrocarpus</i> var. <i>maculosus</i>		X	X								
Broad-fruit mariposa	<i>Calochortus nitidus</i>		X	X								
Brewer's sedge	<i>Carex breweri</i> var. <i>paddoensis</i>										X	
Pale sedge	<i>Carex livida</i>	X				X				X	X	Y
Mt. Shasta sedge	<i>Carex stramineiformis</i>					X				X	X	
Beautiful indian paintbrush	<i>Castilleja pulchella</i>	X										
Northern golden-carpet	<i>Chrysosplenium tetrandrum</i>							X				
Bulb-bearing waterhemlock	<i>Cicuta bulbifera</i>									X		
Palouse thistle	<i>Cirsium brevifolium</i>		X	X								
Reindeer lichen	<i>Cladonia luteoalba</i>				X							
Flexible alpine collomia	<i>Collomia debilis</i> var. <i>camporum</i>							X				
Cushion cactus	<i>Coryphantha vivipara</i>							X				Y
Douglass' wavewing	<i>Cymopterus douglassii</i>								X			
Idaho douglasia	<i>Douglasia idahoensis</i>						X			X		Y

Common Name	Scientific Name	LEM	LOS	LSA	MFL	MFU	MSC	MSP	PAH	SFS	UPS	A*
Pointed draba	<i>Draba globosa</i>										X	
Yellowstone draba	<i>Draba incerta</i>	X							X	X	X	
Stanley whitlow-grass	<i>Draba trichocarpa</i>										X	
Spoon-leaved sundew	<i>Drosera intermedia</i>										X	Y
Giant helleborine	<i>Epipactis gigantea</i>		X		X	X	X	X		X		Y
Low fleabane	<i>Erigeron humilis</i>								X			
Salmon River fleabane	<i>Erigeron salmonensis</i>				X			X				
Welsh's buckwheat	<i>Eriogonum capistratum</i> var. <i>welshii</i>								X		X	
Guardian buckwheat	<i>Eriogonum meledonum</i>										X	
Slender gentian	<i>Gentianella tenella</i>								X			
Davis' stickseed	<i>Hackelia davisii</i>				X	X	X	X				
Sticky goldenweed	<i>Haplopappus hirtus</i> var. <i>sonchifolius</i>		X									
Bugleg goldenweed	<i>Haplopappus insecticruris</i>										X	
Palouse goldenweed	<i>Haplopappus liatrifolius</i>		X									Y
Blandow's helodinium	<i>Helodium blandowii</i>	X	X	X		X	X			X	X	
Simple kobresia	<i>Kobresia simpliciuscula</i>	X							X			
Hazel's prickly phlox	<i>Leptodactylon pungens</i> ssp. <i>hazeliae</i>		X	X								
Idaho bitterroot	<i>Lewisia kelloggii</i>					X		X		X	X	
Pored lungwort	<i>Lobaria scrobiculata</i>						X					
Marsh felwort	<i>Lomatogonium rotatum</i>	X										Y
Meesia	<i>Meesia longiseta</i>							X				
Spacious monkeyflower	<i>Mimulus ampliatus</i>		X				X					
Macfarlane's four-o'clock	<i>Mirabilis macfarlanei</i>		X									Y
Kotzebue's grass-of-parnassus	<i>Parnassia kotzebuei</i> var. <i>kotzebuei</i>								X			
Lemhi penstemon	<i>Penstemon lemhiensis</i>	X			X		X	X				
Lyall's phacelia	<i>Phacelia lyallii</i>	X		X				X				
Salmon twin bladderpod	<i>Physaria didymocarpa</i> var. <i>lyrata</i>	X						X				Y
Nail lichen	<i>Pilophorus acicularis</i>						X					
Kruckeberg's sword-fern	<i>Polystichum kruckebergii</i>										X	
Alkali primrose	<i>Primula alcalina</i>	X							X			Y
Jones' primrose	<i>Primula incana</i>										X	
White beakrush	<i>Rhynchospora alba</i>									X		Y



Common Name	Scientific Name	LEM	LOS	LSA	MFL	MFU	MSC	MSP	PAH	SFS	UPS	A*
Wolf's currant	<i>Ribes wolfii</i>		X							X		
Hoary willow	<i>Salix candida</i>	X							X			
Farr's willow	<i>Salix farriae</i>								X		X	
False mountain willow	<i>Salix pseudomonticola</i>	X							X			
Wedge-leaf saxifrage	<i>Saxifraga adscendens</i> var. <i>oregonensis</i>								X		X	
Tobias' saxifrage	<i>Saxifraga bryophora</i> var. <i>tobiasiae</i>			X								Y
Nodding saxifrage	<i>Saxifraga cernua</i>								X			
Pod grass	<i>Scheuchzeria palustris</i>									X		Y
Borsch's stonecrop	<i>Sedum borschii</i>			X	X	X		X				
Spalding's silene	<i>Silene spaldingii</i>		X									Y
Hapeman's sullivantia	<i>Sullivantia hapemanii</i> var. <i>hapemanii</i>				X							
Whiteworm lichen	<i>Thamnolia subuliformis</i>				X							
Purple thick-leaved thelypody	<i>Thelypodium laciniatum</i> var. <i>streptanthoides</i>		X									
Wavy-leaf thelypody	<i>Thelypodium repandum</i>							X			X	Y
Stanley thlaspi	<i>Thlaspi idahoense</i> var. <i>aileeniae</i>					X					X	
Short-style tofieldia	<i>Triantha occidentalis</i> ssp. <i>brevistyla</i>		X							X		Y
Douglas' clover	<i>Trifolium douglasii</i>		X	X								
Plumed clover	<i>Trifolium plumosum</i> var. <i>amplifolium</i>		X									
Idaho range lichen	<i>Xanthoparmelia idahoensis</i>	X						X				

A\* Included in this appendix.

## ***Astragalus aquilonius* (Barneby) Barneby— Lemhi milkvetch**

**Fabaceae (Pea, Legume family)**

**General Description**—A taprooted, herbaceous, short-lived perennial with numerous, decumbent or trailing stems up to about 35 cm long and often purplish-tinged. The herbage is greenish-ashy in color due to short, fine hairs. The compound leaves consist of 9–23 oval, oblong, or oblanceolate, rounded to apically notched leaflets 5–16 mm long. The inflorescence is a loose raceme of 4–15 greenish-white flowers, each about 1 cm long. The keel petal is often purplish tipped, while the calyx has white and gray-brown, more or less straight, appressed hairs. The one-celled fruit pods are 2.5–4 cm long by 1.3–1.7 cm in diameter, sessile, inflated, ellipsoid, membranous, green and not mottled, and glabrous to minutely hairy.

**Field Identification Tips**—Lemhi milkvetch is the only *Astragalus* species in east-central Idaho with a large, bladderly, unilocular fruit pod. Robust plants with numerous stems can have a low, rounded shape. The purplish-tinged stems and greenish-gray color of the herbage also help distinguish this species.

**Phenology**—Plants in flower from mid- to late May into July. Fruits may still be present into September.

**Similar Species**—The range of Lemhi milkvetch partly overlaps and is most likely to be confused with *A. amblytropis* (Challis milkvetch) because of its similar habit and greatly swollen fruit pod. Challis milkvetch differs, however, by having a two-chambered fruit.

**Habitat**—On dry, gentle to often steep and unstable slopes, talus, washes, alluvial debris,

and flats. It occurs on various, but often southerly aspects having gravelly and sandy, to ashy and occasionally clayey soils. The surrounding shrub-steppe vegetation is dominated by *Artemisia tridentata* ssp. *wyomingensis*, *Atriplex confertiflora*, *Pseudoroegneria spicata*, *Elymus elymoides*, *Poa secunda*, and *Leymus salinus* ssp. *salmonis*. Along the Salmon River it is often associated with two other Challis region endemics, *Astragalus amblytropis* and *Oxytropis besseyi* var. *salmonensis*.

**Global Distribution**—Endemic to east-central Idaho, in Custer, Butte, and Lemhi counties.

**Idaho Distribution**—The main center of distribution for Lemhi milkvetch includes the lower slopes of the Salmon River valley from near Ellis to Clayton, and the East Fork Salmon River upstream to the vicinity of Herd Creek. Populations are also known from the southern end of the Lemhi Range, the Lemhi River valley around Lemhi, and scattered locations in the Pahsimeroi and Lost River valleys. (See also:

[http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/astagu\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/astagu_dis.cfm).)

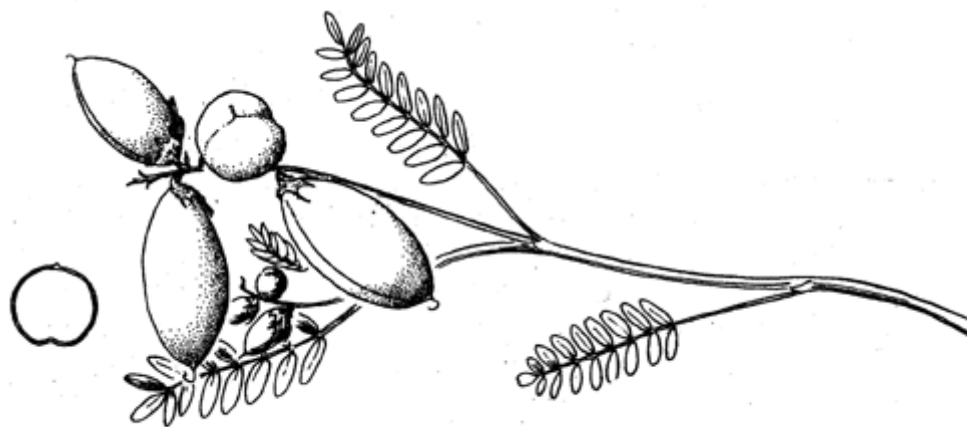
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Barneby, R. C. 1964. Atlas of North American *Astragalus*. Memoirs of the New York Botanical Garden Vol. 13. New York Botanical Garden, Bronx, NY. 1188 pp.



Photo © Robert K. Moseley  
*Astragalus aquilonius*  
Lemhi milkvetch



JRJ

*Astragalus aquilonius*  
Lemhi milkvetch

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. 1961. Vascular plants of the Pacific Northwest. Part 3. University of Washington Press, Seattle. 614 pp. Illustration by Jeanne Janish. Reprinted with permission of the University of Washington Press.

***Astragalus bisulcatus*  
(Hook.) A. Gray var.  
*bisulcatus*—two-grooved  
milkvetch**

**Fabaceae (Pea, Legume family)**

**General Description**—A stout, erect, clump-forming, leafy, and thinly pubescent perennial herb 15–70 cm tall. The compound leaves have 15–35, more or less oblong leaflets, each between 5 and 30 mm long. The inflorescence is a dense raceme of whitish or purplish flowers. The banner is 11–17 mm long, and longer than the wings or keel petal. The calyx is 5–10 mm long, often red-purple, with thin white or black hairs, and the base swollen on one side. The pendulous, linear or narrowly oblong fruit pods have a short stipe, a thick papery texture, and are 10–20 mm long. The front face of the pod is openly grooved lengthwise along either side of the raised suture.

**Field Identification Tips**—Two-grooved milkvetch is recognized by its very leafy, clumpy habit, dense inflorescence of relatively large whitish to purplish flowers, basally pouched calyx, and pendulous, two-grooved fruit pod. Bagged plants and those drying in a plant press often give off a strong, disagreeable smell of selenium.

**Phenology**—Flowers May to August.

**Similar Species**—Two-grooved milkvetch is most likely to be confused with other robust, leafy milkvetches having many leaflets and many, relatively large flowers. *Astragalus canadensis* (Canada milkvetch) is most readily distinguished by its erect, sessile, more or less leathery-textured fruit pods. Additional distinguishing characteristics include its rhizomatous root system, pick-shaped pubescence, and greenish-white or yellowish-white-colored flowers. While the

pods of *A. drummondii* (Drummond's milkvetch) are pendulous like two-grooved milkvetch, they differ in being bluntly three-angled in shape and having a longer stipe (5–11 mm long). In addition, the flowers tend to be larger (17–25 mm) and the foliage more hairy.

**Habitat**—Open grasslands, badlands, gullies, roadsides, and valley bottoms. In Idaho, populations occur in relatively moist sagebrush/grassland or creek bottom habitats, sometimes in degraded condition. Associated species include *Artemisia tridentata* ssp. *tridentata*, *A. tridentata* ssp. *wyomingensis*, *Rosa woodsii*, *Salix* spp., *Leymus cinereus*, *Pascopyrum smithii*, and *Poa pratensis*.

**Global Distribution**—Central Alberta to southwestern Manitoba, south to Kansas and New Mexico, and west to north-central Arizona, Utah, east-central Idaho, and southwestern Montana.

**Idaho Distribution**—Foothills of the southern Beaverhead and Centennial Mountain Ranges in Clark County, the Henrys Lake area in Fremont County, and the Lemhi River drainage in Lemhi County. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/astbis\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/astbis_dis.cfm).)

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Photo © Robert K. Moseley  
*Astragalus bisulcatus* var. *bisulcatus*  
two-grooved milkvetch



*Astragalus bisulcatus* var. *bisulcatus*  
two-grooved milkvetch

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. 1961. Vascular plants of the Pacific Northwest. Part 3. University of Washington Press, Seattle. 614 pp. Illustration by Jeanne Janish. Reprinted with permission of the University of Washington Press.

***Astragalus diversifolius***  
**Barneby—meadow**  
**milkvetch**

**Fabaceae (Pea, Legume family)**

**General Description**—A diffuse or prostrate perennial forb with weak, slender, sparsely leafy, simple or branched stems radiating from the root crown. Leaves are 2–5.5 cm long, with 1–5 linear, grasslike, or ovate leaflets 2–5 mm broad. The terminal leaflet is

always the longest and continuous with the leaf stalk. The inflorescence is a loose raceme of 2–8 white, cream, or yellowish-white flowers. The flowers are often faintly purplish-tinged/tipped, with the banner petal being 7–13 mm long. The calyx is 3.5–6.5 mm long and has short, appressed, black or white hairs. Fruit pods are oblong, straight or slightly curved, 10–7 mm long by 3–4 mm broad, with the thin green pod becoming papery and straw or gray-brown colored.

**Field Identification Tips**—The slender, often prostrate, sparsely leafy habit of meadow milkvetch, combined with a terminal leaflet larger than the lateral leaflets, makes this species relatively easy to identify. However, these same features can make it difficult to see in the field, especially if done flowering. The narrow leaflets mimic blades of grass and the whole plant becomes seemingly hidden in the vegetation.

**Phenology**—Plants begin to flower in June and peak during July. More fruits than flowers are observed by August.

**Similar Species**—Meadow milkvetch is most likely to be confused with other diffuse-looking, sparsely leafy *Astragalus* species occurring within its range. *Astragalus convallarius* (lesser rushy milkvetch) has narrow fruits over 20 mm long, very narrow leaflets, and occurs in drier habitats. *Astragalus ceramicus* (painted milkvetch) has inflated, reddish- to purplish-mottled pods and occurs in dry, sandy habitats. *Astragalus leptaleus* (Park milkvetch) occurs in several of the same east-central Idaho wetland systems as meadow milkvetch. It is readily distinguished by having leaves with 15–25 leaflets, smaller flowers, and an inflorescence that does not extend much above the middle of the plant.

**Habitat**—Moist soils in alkaline meadows with flat or hummocky topography supporting graminoid or medium height shrub vegetation. Associated species may include *Juncus balticus*, *Poa secunda*, *Leymus cinereus*, *Spartina gracilis*, *Senecio debilis*,

*Phlox kelsyi*, *Glaux maritima*, *Sarcobatus vermiculatus*, and *Potentilla fruticosa*.

**Global Distribution**—Widely separated populations are known from east-central Idaho, the southwestern edge of the Salt Lake Desert in western Juab and Tooele counties, Utah, and the Spring Valley area in southern White Pine County, Nevada. There is also a historical record for this species from the Green River Basin in western Wyoming.

**Idaho Distribution**—Most Idaho populations are located in Custer and Lemhi counties, in the intermountain valleys of the Big Lost, Little Lost, Pahsimeroi, and Lemhi rivers, and Birch Creek. The meadow milkvetch population reported from the upper Snake River Plain, near Springfield, in Bingham County, has probably been extirpated. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/astdiv\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/astdiv_dis.cfm).)

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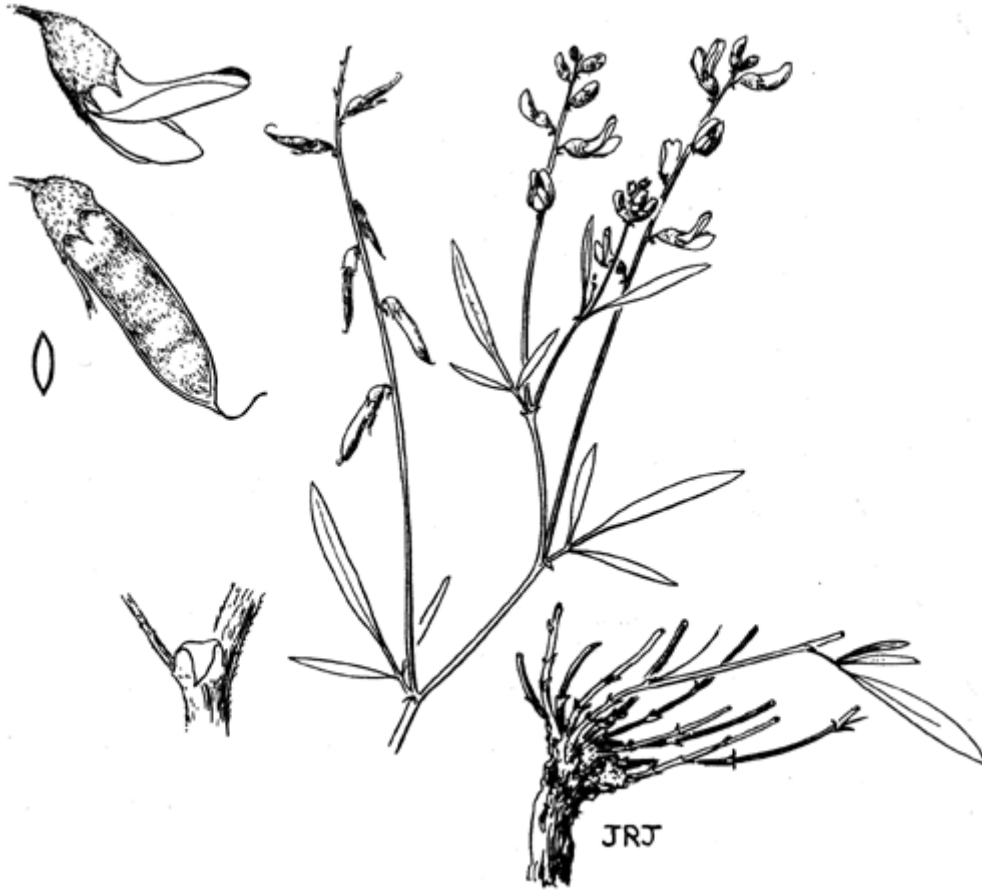
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Photo © Robert K. Moseley  
*Astragalus diversifolius*  
meadow milkvetch





*Astragalus diversifolius*  
meadow milkvetch

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. 1961. Vascular plants of the Pacific Northwest. Part 3. University of Washington Press, Seattle. 614 pp. Illustration by Jeanne Janish. Reprinted with permission of the University of Washington Press.

***Astragalus gilviflorus* E.  
Sheldon—plains  
milkvetch, plains  
orophaca**

**Fabaceae (Pea, Legume family)**

**Synonyms**—*Astragalus triphyllus* Pursh;  
*Orophaca triphylla* (Eaton & Wright) Britton

**General Description**—A stemless, tufted perennial forming small mats up to about 15

cm in diameter, and foliage with silvery, lustrous, straight, appressed hairs. The compound leaves are comprised of 3, sessile, palmately arranged leaflets 5–30 mm long, and having a reverse lance- or reverse egg-shape narrowing at the point of attachment. The short inflorescence has 1–3 (mostly 2) erect, yellowish to whitish flowers tucked in the leaf axils. Banner petals are 16–28 mm long. The calyx is narrowly cylindrical and 9–20 mm long. Fruit pods are erect and commonly concealed among the persistent sepals and stipules. They are ovoid-elliptic in

shape, hairy, one-celled, 6–10 mm long by 2.5–5 mm broad, and have thin fleshy valves that become leathery in age.

**Field Identification Tips**—The stemless, densely tufted habit, palmately tri-foliolate leaves of steely gray-blue color, and relatively large yellowish to whitish flowers tucked within or barely exceeding the leaves readily identifies plains milkvetch in the field.

**Phenology**—Flowering in early May to about early June.

**Similar Species**—Although a number of other low-growing *Astragalus* species occur in east-central Idaho, none should be confused with plains milkvetch. *Astragalus calycosus* (Torrey’s milkvetch) may look superficially similar when flowers or fruits are not present, but it does not have palmately 3-foliolate leaflets.

**Habitat**—Open, more or less sparsely vegetated, rocky, gentle to steeper limestone slopes with little soil development. It occurs on all aspects. Associated species include *Petrophytum caespitosum*, *Artemisia nova*, *A. frigida*, *Cercocarpus ledifolius*, *Tanacetum nuttallii*, *Penstemon* spp., *Hymenopappus filifolius* var. *idahoensis*, and *Arenaria kingii*.

**Global Distribution**—Widespread on the high plains from southern Alberta and

Manitoba, south to Oklahoma, west to the Rocky Mountain foothills, and in the Intermountain Region in east-central Idaho and northeastern Utah.

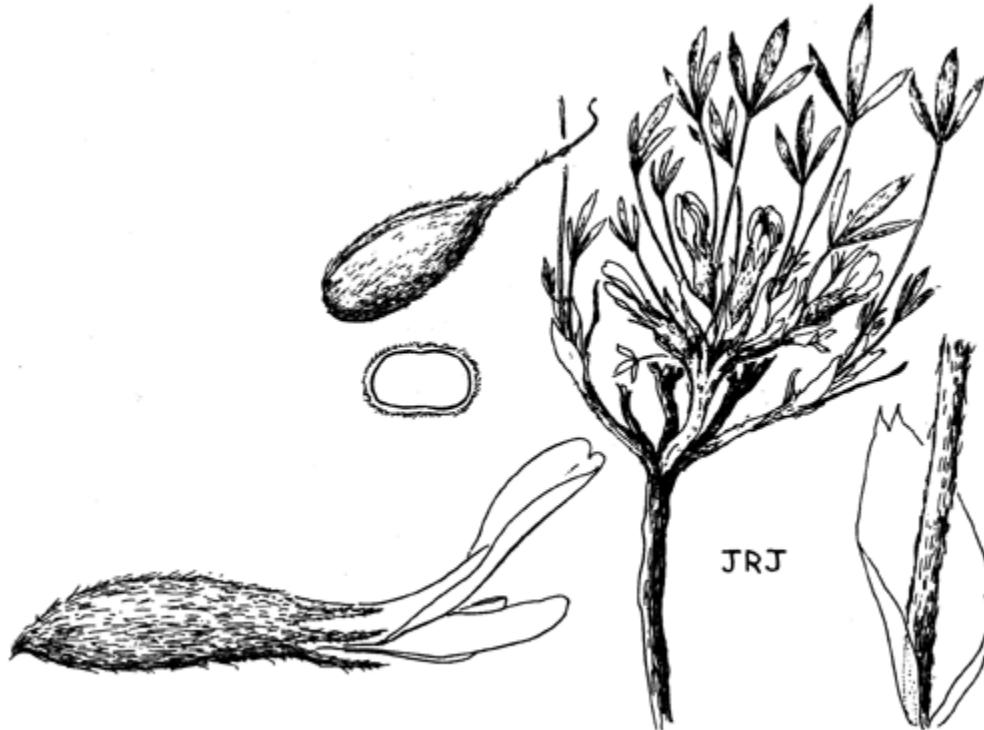
**Idaho Distribution**—West slope of the Beaverhead Range in and near the Lemhi River and Birch Creek valleys in Lemhi and Clark counties. Plains milkvetch has also been collected from near Henrys Lake in Fremont County. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/astdiv\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/astdiv_dis.cfm).)

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Photo © Robert K. Moseley  
*Astragalus gilviflorus*  
plains milkvetch, mlains orophaca



*Astragalus gilviflorus*  
plains milkvetch; plains orophaca

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. 1961. Vascular plants of the Pacific Northwest. Part 3. University of Washington Press, Seattle. 614 pp. Illustration by Jeanne Janish. Reprinted with permission of the University of Washington Press.

***Botrychium simplex* E.  
Hitchcock—least  
moonwort**

**Ophioglossaceae (Grape fern family)**

**Synonym**—*Botrychium tenebrosum* A.A. Eaton.

**General Description**—Glabrous plants comprised of a single above ground frond 3–13 cm tall divided into two segments, one sterile, the other fertile, and sharing a common stalk. The sterile segment is attached at or near ground level (common in our area), to higher up on the common stalk, is highly variable in shape and size, up to about 4 cm

long and 3 cm wide, and occurs on an evident, sometimes sheathing petiole. The sterile segment can be simple, or more commonly divided into 2 or 3 main branches, each with up to 7 pairs of pinnae. The lowest pair of pinnae are generally the largest, and in well-developed plants tend to be stalked and again cleft, the other pinnae commonly sessile. Pinnae are usually fan-shaped, flat, slightly overlapping, and with entire, rounded outer margins. Features of the pinnae can be variable, however. The fertile stalk is mostly 2–8 cm long, with the sporangia-bearing portion simple, or more often compound, and 1–4 cm long.

**Field Identification Tips**—This is a highly variable species. The many environmental forms and juvenile stages can complicate identification. Distinguishing features include a reduced to absent common stalk, the length of the fertile blade often at least three times that of the sterile blade, and a sterile stalk usually ternate with three equal segments.

**Phenology**—Leaves appear mid-spring to early fall.

**Similar Species**—Smaller plants can be confused with *B. crenulatum* or *B. lunaria*. Both of these species have a distinct common stalk and only once-pinnate sterile blades. In addition, *B. lunaria* has a bluish-green color and very crowded pinnae, while *B. crenulatum* has a yellow-green color and non-overlapping pinnae with crenulate margins.

**Habitat**—Moist to dry meadows, bogs, swamps, roadside ditches, dry fields, and forests at middle elevations in the mountains.

**Global Distribution**—Western North America from British Columbia, southward to southern California and the Pacific Northwest and Middle Rocky Mountain states; then from Minnesota and adjacent southern Canada, eastward to New England and other eastern states; also in Greenland and Europe.

**Idaho Distribution**—Northern and central portions of the state, including Bonner,

Boundary, Clearwater, Latah, and Custer counties. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/botsim\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/botsim_dis.cfm).)

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Photo © Robert Moseley  
*Botrychium simplex*  
 least moonwort

### ***Carex livida* (Wahlenb.) Willd.—pale sedge**

#### **Cyperaceae (Sedge family)**

**General Description**—Grass-like perennial growing in small clumps with flowering stems up to 20 cm tall arising from long-slender rhizomes. Leaves are deeply channeled, 1–4 mm wide, clustered on the lower third of the stem, and have a glaucous blue-green color. The inflorescence consists of 2–3, or sometimes 4, loosely clustered spikes. The narrow terminal spike is usually wholly staminate. The lateral spikes are pistillate and nearly sessile. Flowers have 3 stigmas, and the oval-shaped scales subtending the perigynia have a green midvein stripe, brown marginal stripes, and

membranous edges. The perigynia are 2–4 mm long, pale green, elliptic or ovate in outline, and have a minutely bumpy surface.

**Field Identification Tips**—The pale blue-green, stiff, channeled, more or less falcate-shape leaves are quite distinctive in the field.

**Phenology**—Fruit matures in late June–August.

**Similar Species**—*Carex aquatilis* has long-stalked lateral spikes and flowers with two stigmas. *Carex limosa* is rhizomatous and has three stigmas, but has drooping lateral spikes on slender stalks. *Carex buxbaumii* has 3 stigmas and bluish-green foliage, but differs in having pistillate flowers at the tip of the upper spike and long-awned scales.

**Habitat**—Bogs and fens, swampy woods, or sometimes on mineral substrates adjacent to slow moving streams; from low to moderately high elevations.

**Global Distribution**—Circumboreal; in the western part of North America it reaches from southern Alaska south to northwestern California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, and Utah.

**Idaho Distribution**—Known from four widely separated areas in Idaho. It occurs in the Panhandle region; the Sawtooth Valley in the central mountains; the upper Lemhi River in east-central Idaho; and the Greater Yellowstone region near the state's eastern border. See also:  
[http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/carliv\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/carliv_dis.cfm).)

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Photo © Robert Moseley  
*Carex livida*  
pale sedge





*Carex livida*  
pale sedge

Hitchcock, C. L., A. Cronquist, and M. Ownbey. 1969. Vascular plants of the Pacific Northwest. Part 1. University of Washington Press, Seattle. 914 pp. Illustration by Jeanne Janish. Reprinted by permission of the University of Washington Press.

***Coryphantha vivipara* (Nutt.)  
Britt. & Rose—cushion  
cactus, spinystar**

**Cactaceae (Cactus family)**

**Synonyms**—*Escobaria vivipara* (Nutt.) Buxbaum; *Escobaria vivipara* (Nutt.) Buxbaum var. *vivipara*; *Mammillaria vivipara* (Nutt.) Haw.

**General Description**—A low-growing cactus, 3–10 cm tall and about equally wide, with one to several stems that are more or less round to short-cylindric in outline and have a top-shaped base. Tubercles are spirally arranged, 5–15 mm long, and distinctly grooved on the upper side. Areoles (special cushions bearing the spines) have 3–5 main spines about 10 mm long, and 10–20 smaller, slender marginal spines. Flowers are showy, bright reddish-purple, and about 3–4 cm wide and long. Fruits are greenish, oblong, 1–2 cm long, and have brown seeds.

**Field Identification Tips**—Cushion cactus is more or less round in outline except for the top-shape base. The tubercles are not arranged on ribs, as the stem is ribless. The showy flowers make plants conspicuous for awhile, but then the plants dry and shrink downward into the substrate and are difficult to observe when dormant.

**Phenology**—Flowers May and June.

**Similar Species**—*Coryphantha missouriensis* (nipple cactus) is separated by its greenish-white or yellowish flowers, globular, reddish fruits, black seeds, and shorter tubercles about 6–9 mm long. Two other genera of cactus occur in Idaho. *Opuntia* species (prickly pear cactus) are readily distinguished by their jointed and flattened stems. Species of *Pediocactus* (hedgehog cactus) have longitudinally ribbed stems. Idaho material has whitish to pinkish flowers about 2 cm long.

**Habitat**—Dry valleys and plains. Open, gentle to steep, rocky slopes and flats with sagebrush or conifer species in Idaho.

**Global Distribution**—Alberta south to Arizona, east to Minnesota, and Texas, as far west as southeastern Oregon.

**Idaho Distribution**—Lemhi County, and also reported for Owyhee County. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/corviv\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/corviv_dis.cfm).)

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Photo © Peter Lesica  
*Coryphantha vivipara*  
cushion cactus, spinystar



*Coryphantha vivipara*  
cushion cactus, spiny star

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. 1961. Vascular plants of the Pacific Northwest. Part 3. University of Washington Press, Seattle. 614 pp. Illustration by Jeanne Janish. Reprinted with permission of the University of Washington Press.

## ***Douglasia idahoensis*—Idaho douglasia**

### **Primulaceae (Primrose family)**

**General Description**—*Douglasia idahoensis* forms a low, spreading cushion or mat on the soil surface. The leaves are small, green and succulent, forming a terminal rosette on the short stems. Stems are terminated by a cluster of 3 to 5, relatively large, pink to magenta flowers.

**Technical Description**—Perennial herbs, cushion- to more often mat-forming, loosely caespitose from a slender tap root; stems prostrate to ascending, minutely pubescent, terminating in rosettes of entire leaves; leaves succulent, oblong to oblanceolate, obtuse to acute, 7–11 mm long, 1–1.7 mm wide, puberulent, becoming glabrous and strongly reflexed in age; inflorescence umbellate, (2)3–5(7) flowered, involucrate; bracts 5–9, lanceolate to lance-ovate, acute to acuminate, 2.5–3.7(5) mm long, 0.7–1.5 mm wide, with scattered simple white hairs, the margins ciliate; peduncles 1–6 mm long with simple to forked hairs throughout; pedicels 3–7(10) mm long at anthesis, the length variable within the inflorescence, densely covered with simple to branched white hairs; calyx 4–7 mm long, the lobes 1–2 mm wide, the margins ciliate, the apices acute, the tube 2.4–3 mm with short, simple white hairs at least proximally; corolla salverform, (5)6–10(11) long, glabrous, the lobes broadly flared, 5–6 mm long, 3–4 mm wide in fresh specimens, 3–mm long, 1.8–3 mm wide in pressed ones, the apex emarginate to retuse (entire), the limb pink to magenta, the throat yellow with 5 fornications, the tube 3.5–6 mm long, exceeding the calyx, lighter in hue than the limbs; stamens 5, included; anthers oblong, 0.8–1.1 mm long, yellow; style 1–1.8 mm long, the stigma small, capitate; capsules ovate, 5-valved, 1.4–2.6 mm long; seeds 1–several per capsule,

dark reddish-brown to nearly black, minutely pitted, 0.9–2.5 mm long; n=18 (Henderson 1981).

**Diagnostic Characteristics**—*Douglasia idahoensis* is a distinctive member of the high elevation flora of central Idaho. It is easily recognized in flower by its profuse display of bright pink to magenta flowers, occurring as a mat on the ground. It is also distinctive when only vegetative material is available, as the leaves become suffused with anthocyanin (turning red) soon after flowering. This turns the mat a distinctive dark red-green. This feature is useful well into September.

**Infraspecific Taxa**—There are no infraspecific taxa for *Douglasia idahoensis*.

**Similar-Appearing Taxa**—*Arenaria aculeata* is a common cushion plant of the central Idaho mountains and occurs with *Douglasia idahoensis* at most sites, which it superficially resembles when there are no flowers. *Arenaria aculeata* is easily distinguished by its narrow, sharply pointed, non-succulent leaves.

No congeners are known to occur within the range of *D. idahoensis*. *Douglasia montana* is found in the Bitterroot Mountains, approximately 40 miles east, across the Selway River valley from the Elk Mountain-Wyilies Peak populations (Moseley 1990). *Douglasia montana* has fewer involucre bracts (1–3 versus 5–7) and fewer flowers per inflorescence (1–2 versus 3–5) than *D. idahoensis*. In addition, the pedicels of *D. idahoensis* are well-developed, whereas in *D. montana*, one of the pedicels is often sessile.

**Identification of This Taxon in Idaho**—*Douglasia idahoensis* is a distinctive member of central Idaho's high elevation flora. It is readily recognized when flowering by its profuse display of bright pink flowers. It is

also distinctive later in the season. The leaves become suffused with anthocyanin (turning red) soon after flowering, turning the mat/cushion a distinctive dark red-green. This feature can be used to identify *D. idahoensis* well into September (Moseley 1990).

## Global Comments

### Idaho Comments

#### Status

**Global**—*Douglasia idahoensis* is endemic to the mountains of central Idaho. Throughout its range, populations are small in extent and isolated, occurring in widely separated areas. Despite this narrow distribution, no imminently serious threats are foreseen, although many populations have incurred some level of anthropogenic disturbance in the past. *Douglasia idahoensis* is known from 30 scattered occurrences on open, subalpine ridges, summits, and upper slopes. Occurrences range in size from less than one acre, to over 100 acres. Most occurrences are small and support fewer than 2000 individuals, ranging from approximately 100 to over 10,000. These occur as widely spaced or clumps of individuals. Populations have low fecundity (Sondenna and Henderson 1995), but long-term trend information is lacking for this species. All known populations occur on National Forest lands, either the Boise or the Nez Perce national forests. A few populations are located within designated Wilderness Areas, and portions of another occur within the proposed Square Mountain Research Natural Area.

*Douglasia idahoensis* faces several threats, with habitat destruction the most serious, especially at small populations. Populations are most commonly threatened by their proximity to established roads and trails, where induced slope instability, maintenance activities, and increased human access and

possible trampling and collecting are potential problems. Livestock grazing has historically occurred in *D. idahoensis* habitat, but present impacts appear limited to a few sites. Many occurrences are located in allotments that are no longer active (Owen 1993). Identified potential threats include helicopter landing sites within the open ridge habitat of *D. idahoensis*, increased mechanized and non-mechanized recreational activity, and the resumption of livestock grazing on currently inactive allotments which could lead to increased disturbance problems. Mining is another potential threat to some populations. There has been molybdenum explorations around the Scott Mountain population in the past. Forest management practices of the past have emphasized fire suppression in the habitat types occupied by *D. idahoensis* populations. This has increased the potential for catastrophic fires that would likely be very damaging to some populations. Although *D. idahoensis* has potential to be a valuable horticultural species, collecting is presently not a problem. No disease or predation problems are known at this time.

Atwood and Charlesworth (1987) compiled a rudimentary status report for *D. idahoensis* in 1987. A comprehensive status survey report was compiled in 1990 (Moseley 1990). Field investigations have been conducted for portions of the Boise, Payette, and Nez Perce forests (Moseley 1988, 1989). National Forest botanists, especially on the Boise National Forest, have also conducted field surveys. Additional potential habitat remains to be searched in several areas. The Boise National Forest and U. S. Fish and Wildlife Service signed a Conservation Agreement for *D. idahoensis* in 1993. A study of the reproductive biology of *D. idahoensis* is currently underway (Sondenna and Henderson 1995).

*Douglasia idahoensis* is a Forest Service Regions 1 and 4 Sensitive Species. Until the

U. S. Fish and Wildlife Service revised their candidate system in 1996, *D. idahoensis* was a category 2 (C2) candidate for listing under the Endangered Species Act. Under the revised system, it is no longer a candidate species. The Idaho Conservation Data Center ranks *D. idahoensis* G3/S3. Both globally and for Idaho, this indicates the species is rare or uncommon, but not imperiled. The Idaho Native Plant Society includes *D. idahoensis* on their list of globally rare taxa.

**Idaho**—*Douglasia idahoensis* is on the Idaho Native Plant Society's list of globally rare taxa. It has a priority of 11, indicating threats are non-imminent and of low magnitude.

### Distribution

**Global**—*Douglasia idahoensis* is a regional endemic of central Idaho that occurs in small, scattered populations. These are clustered in five main areas: the Middle Fork and North Fork Boise river drainages in eastern Boise and adjacent northern Elmore counties; the South Fork Salmon River/South Fork Payette River drainages of northern Boise and adjacent southern Valley counties; the North Fork Payette and Middle Fork Payette river drainages in central to northern Valley County; the Gospel Peak area of central Idaho County; and the upper Selway River drainage of eastern Idaho County.

**Idaho**—See Global Distribution comments. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/douida\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/douida_dis.cfm).)

### Habitat

**Elevation (Global)**—7200 to 8900 feet

**Elevation (Idaho)**—7200 to 8900 feet

**Global**—*Douglasia idahoensis* occurs on subalpine ridges, summits, and adjacent upper slopes. Populations typically occur on well-

drained, shallow, decomposed granitic soils derived from the Idaho batholith. Most populations occur on northerly-facing slopes, rarely on southerly exposures. Elevations range from approximately 7,200 to 8,900 feet. It occurs in subalpine vegetation characterized by open, forb-dominated communities, and woodlands dominated by *Pinus albicaulis* and *Abies lasiocarpa*. Bare ground coverage is usually high. Several populations appear restricted to the lee sides of ridges, where wind-deposited snow accumulates and last later into the summer than adjacent areas. Beside rocks derived from the Idaho batholith, at least portions of one population (Square Mountain) also occurs on quartzite substrate.

Habitat types include *Abies lasiocarpa/Xerophyllum tenax-Vaccinium scoparium*, *A. lasiocarpa/Carex geyeri-C. geyeri*, *A. lasiocarpa/V.scoparium-Pinus albicaulis*, the *P. albicaulis-A. lasiocarpa* complex of habitat types, and possibly *A. lasiocarpa/Luzula hitchcockii-V. scoparium*.

Frequently associated species include *Pinus albicaulis*, *Vaccinium scoparium*, *Xerophyllum tenax*, *Luzula hitchcockii*, *Juncus drummondii*, *Antennaria lanata*, *Arenaria aculeata*, *Eriogonum pyrolifolium*, *Polygonum phytolaccifolium*. *Ivesia tweedyi*, a rare plant in Idaho, occurs with *D. idahoensis* at Elk Mountain.

**Idaho**—See Global Habitat comments.

### Ecology

**Global**—*Douglasia idahoensis* responds favorably to moderate levels of disturbance, including both natural processes such as sheet and gully erosion, and man-caused events such as road and trail construction, where it establishes on cut banks and fill slopes. It does not appear to re-establish in areas where

historical habitat has been completely destroyed, such as by road, trail, and lookout construction (Moseley 1990).

Most populations are part of communities maintained in an early successional state due to chronic physical instability of the site. It appears that the largest populations occur within unforested, relatively unstable sites, while the smallest populations are found in mature *Pinus albicaulis* woodlands. Plants are not found beneath full canopy conditions.

Plants are restricted to well-drained sites in open subalpine communities, where little inter- and intraspecific competition is evident. Several types of disturbances keep these communities open. Highest population densities are found in areas of moderate instability, such as erosion channels created by snow runoff, wind blowouts on ridgelines, and trail cuts. Portions of populations in chutes and channels on steep slopes are less dense. Populations generally occur on northerly-facing slopes, indicating *D. idahoensis* requires moist, cool conditions. Prior to fire suppression efforts within the range of *D. idahoensis*, fire intensity, frequency, and related factors, must have been compatible with the survival of *D. idahoensis* in most cases. The effects of a catastrophic fire regime due to years of fire suppression are unknown.

**Idaho**—See Global Ecology comments.

### Reproduction

**Global**—Breeding system experiments at the Square Mountain population (Sondenna and Henderson 1995) indicate that *Douglasia idahoensis* is a facultative outcrosser (primarily xenogamous, but partially self-compatible). Brood size averages  $1.60 \pm 0.64$  seeds per flower, with a seed/ovule ratio of  $28.92\% \pm 11.79\%$ . Visual inspection has shown that many ovules that are fertilized and

initiate development, are subsequently aborted. This suggests that limited resources or genetic factors may be contributing to low fecundity within the species. The presence of a red stigmatic ring prior to dehiscence and continuing through pollen dispersal indicates that *D. idahoensis* is protogynous. Hover flies (Syrphidae), halictid bees (Halictidae), brush-footed butterflies (Nymphalidae), and bumblebees (Apidae) are the most common community pollinators, and all except the bumblebees frequently visit *D. idahoensis* flowers. Dance flies (Empididae) and small ants (Formicidae) are also attracted to *D. idahoensis* flowers and may facilitate pollination on a limited scale. Plants excluded from insect visitors failed to set seed, indicating insects are required for successful reproduction. Pollinator rewards include products from glandular-trichomes near the corolla throat, pollen, and minute quantities of nectar from ovarian nectaries. Nectar sugar content has been tentatively estimated at 30–45%. This corresponds well with other small bee- or butterfly-pollinated species. It is possible that the ovarian nectaries discovered in *D. idahoensis* are unique within the Primulaceae (Sondenna and Henderson 1995).

**Idaho**—See Global Reproductive comments.

**Phenology (Idaho)**—*Douglasia idahoensis* has been observed to break bud within four days of emergence from snow cover (Sondenna and Henderson 1995). It is therefore, one of the earliest species to commence flowering in the subalpine communities where it occurs. This usually takes place in late June or early July, but can be as early as late May depending on snow accumulation and melt patterns. Flowering may last until late July in some places. Fruit maturation takes place in July and August and seeds are dispersed by early September.



## Management

**Global**—All known *Douglasia idahoensis* populations are located on National Forest lands. Populations located north of the main Salmon River occur on the Nez Perce National Forest, in Region 1. Those located south of the Salmon River occur on the Boise National Forest, in Region 4. *Douglasia idahoensis* is listed on the Sensitive Species lists of both Regions. It has also been recommended that this species be added to the Sensitive Species list for the Bitterroot National Forest because potential habitat exists in the upper Selway River drainage (Moseley 1990). The Forest Service is directed to develop and implement management practices to insure sensitive species do not become threatened or endangered. Habitat destruction represents the greatest threat to *D. idahoensis*, especially at small population. It is very important land managers are aware of *D. idahoensis* and avoid these areas in planning future habitat-altering projects (Moseley 1990).

In 1993, the U. S. Fish and Wildlife Service and the Boise National Forest signed a Conservation Agreement for *D. idahoensis*. This Agreement identifies *D. idahoensis* populations critical to the viability of the species in the southern part of its range. The Boise National Forest has established a monitoring program to identify site-specific threats and assess the demographic viability of each population (USDA Boise National Forest 1993). It has been recommended that the Nez Perce National Forest also develop a Conservation Agreement for *D. idahoensis* (Moseley 1990). The Nez Perce National Forest is providing partial funding for research studying the reproductive biology of *D. idahoensis* (Sondenna and Henderson 1995). This research is being conducted by a graduate student from the University of Idaho.

Several populations occur entirely or partly in areas with special management designations that have landscape conservation as primary goals. These include populations within the Selway–Bitterroot Wilderness Areas, the Gospel–Hump Wilderness Area, and the proposed Square Mountain Creek Research Natural Area.

**Idaho**—See Global Management comments.

## Inventory

### General Comments (Idaho)—

**Inventory Needs (Idaho)**—Moseley (1990) recommended the Vermillion Peak-Indian Peak-Grave Meadow Peak area, west of Elk and Bilk mountains on the Nez Perce National Forest be searched. On the Boise National Forest, Lind (1993) has identified several areas for further survey, including the ridge complexes that leads north from Tyee Mountain, the Shepard Peak ridges, and ridges in the Trinity Mountains. These latter ridges support the southernmost potential habitat on the Forest. Surveys around the ridges of Swanholm Peak, and the Goat Mountain and Wolf Mountain ridge complexes would better delineate populations already known from these areas. The Payette Crest on the Payette National Forest has also been recommended for investigation.

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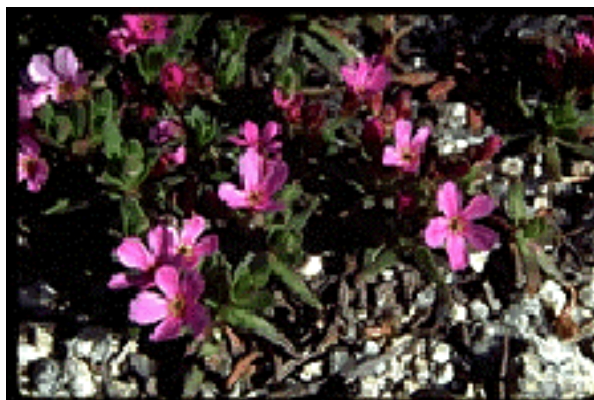
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### ***Drosera intermedia* Hayne— spoon-leaved sundew**

#### **Droseraceae (Sundew family)**

**Synonyms**—*Drosera longifolia* Michx.; *D. americana* Willd.; *D. intermedia* var. *americana* DC.

**General Description**—Plants 5–20 cm tall, bearing leaves in a rosette or also at intervals for several centimeters along the stem. The ascending, spoon-shaped blades are about 4–5 mm wide, 8–20 mm long, and narrow to a long glabrous petiole 3–4 times as long as the blade. Long glandular hairs cover the upper leaf surfaces. Rosettes produce a single scape with up to 20 flowers. The corolla is white or tinged with pink and 5–8 mm long, and the sepals are up to about 5 mm long. The capsule is scarcely as long as the sepals. After the growing season, plants die back to an overwintering bud.

**Field Identification Tips**—*Drosera intermedia* is a distinctive small, low-growing carnivorous plant. The basal rosette of leaves are covered by long, reddish, glandular hairs. A few white flowers occur on short stems, however, they bloom very early and the plants are most often found in fruit.

**Phenology**—June–August.

**Similar Species**—The leaves of *D. rotundifolia* are usually more spreading than ascending and more rotund in outline, generally being as broad as long. The leaves of *D. anglica* look more similar to *D. intermedia*, but have stipules adnate to the petiole except at the tip versus the stipules free nearly to the base for *D. intermedia*. In addition, the seeds of *D. anglica* are spindle-shaped and blackish, as opposed to the ellipsoid-obovoid, reddish-brown seeds of *D. intermedia*.

**Habitat**—Bogs, fens, and moist, acidic, sandy soils; often in standing water. Idaho populations occur in peatland habitats.

**Global Distribution**—North America, Europe, Asia Minor, and Cuba. Its main distribution in North America is between Minnesota and Newfoundland, south to eastern Texas and Florida, with isolated stations in Manitoba, Saskatchewan, British Columbia, and Idaho.

**Idaho Distribution**—Occurs in two separate areas in Idaho—the Selkirk Mountains in Boundary County and the Sawtooth Valley in Custer County. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/droint\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/droint_dis.cfm).)

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Photo © Robert Moseley  
*Drosera intermedia*  
 spoon-leaved sundew

### ***Epipactis gigantea* Douglas ex Hook—giant helleborine**

#### **Orchidaceae (Orchid family)**

**General Description**—A leafy, glabrous, perennial herb up to 1.5 m tall, with 1 to several stems from a creeping rhizome. Leaves are numerous, alternate, sessile, and 5–20 cm long. The lower are oval, but the leaves become more lance-shaped further up the stem. Flowers are rather showy and borne singly in a long, narrow, open, mostly one-sided, leafy-bracted inflorescence at the top of the stem. Sepals and upper petals are 1.3–1.7 cm long, greenish-yellow or brownish in color with purple veins. The lip petal is 1.5–2 cm long, greenish with purple veins, and divided

into 3 unequal segments. The fruit is an elliptic, drooping capsule 2–2.5 cm long.

**Field Identification Tips**—A relatively large stature, numerous long clasping leaves, large brownish flowers, and drooping fruits combine to make giant helleborine a distinctive species.

**Phenology**—Flowers June to August.

**Similar Species**—Vegetative plants may be confused with some members of the orchid genus *Platanthera*, or more likely with *Maianthemum stellatum*, in the lily family, species that can co-occur with giant helleborine. The prominently clasping leaf bases and taller habit of giant helleborine distinguishes it from *Maianthemum*, and its generally more numerous and larger leaves and taller habit from *Platanthera*.

**Habitat**—In general, giant helleborine occurs in moist areas along streambanks, lake margins, seeps and springs. In Idaho it is associated with thermal waters at higher elevations, or cold springs at lower elevations such as along the Snake River.

**Global Distribution**—From central Mexico northward to Texas and throughout the western United States to southern British Columbia.

**Idaho Distribution**—Widespread in Idaho: Bonner, Boundary, and Nez Perce counties in northern Idaho; Idaho, Adams, Valley, Boise, Custer, and Lemhi counties in central Idaho; Elmore, Camas, Gooding, Jerome, Twin Falls, and Owyhee counties in southern Idaho; and Clark and Madison counties in the eastern part of the state. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/epigig\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/epigig_dis.cfm).)

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*Epipactis gigantea*  
giant helleborine

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. 1969. Vascular plants of the Pacific Northwest. Part 1. University of Washington Press, Seattle. 914 pp. Illustration by Jeanne Janish. Reprinted with permission of the University of Washington Press.





Photo © Robert K. Moseley

*Epipactis gigantea*  
giant helleborine

### ***Haplopappus liatriformis*— Palouse goldenweed**

**Asteraceae (Aster family)**

**General Description**—Perennial from a stout taproot, with 1 to several stems up to about 3 feet tall. The stems, leaves, and involucre bracts have hairs that vary from being somewhat long and soft to stiff. Leaves usually have a rough texture and are sometimes toothed. Basal leaves are tufted and generally long and narrow while the stem leaves get progressively smaller going up the

stem. The narrow, elongate inflorescence is comprised of several flower heads. Individual flower heads are less than 1 inch across and approximately 0.5 inch high. The involucre bracts are pointed, firm and pubescent. The heads generally have 13–21 yellow ray flowers, which are less than 0.5 inch in length.

**Technical Description**—Perennial from a stout taproot and often a short, branched caudex; stems several or solitary, 3–7 dm tall, sometimes curved at the base; herbage and involucre evidently hairy, the pubescence

varying from loosely villous-tomentose to rather rough-hirsute (and the leaves often scabrous near the margins as well), often partly deciduous at maturity; leaves entire or with a few sharp teeth, the basal ones tufted, oblanceolate or narrowly elliptic, mostly 7–25 cm long (including the petiole) and 1–3 cm wide; cauline leaves more or less reduced upwards and becoming sessile, the stems appearing sparsely or moderately leafy; heads several or rather many in an elongate, racemiform or narrowly paniculiform inflorescence, campanulate, smaller than in *H. integrifolius*, the disk seldom over 2 cm wide; involucre 10–16 mm high, its firm, pointed bracts herbaceous throughout or prominently green-tipped, subequal or obviously imbricate; rays mostly 13–21, 6–10 mm long; disk corollas 7–10 mm long; style appendages equaling or usually longer than the stigmatic portion; achenes elongate (Hitchcock *et al.* 1955).

**Diagnostic Characteristics**—*Haplopappus liatrisiformis* is a relatively large plant, up to about three feet tall, often standing above most other forbs in the open grasslands. However, plants can be much shorter, especially in dry years. Diagnostic characters include the leaves which are tufted at the base and then progressively smaller up the stem. The leaves are inversely lance-shaped, have a rough texture, and may be toothed. The large, firm, green, and pubescent involucre bracts are also helpful for identification. Prominent yellow rays make the flower heads fairly showy.

**Infraspecific Taxa**—There are no infraspecific taxa recognized for *Haplopappus liatrisiformis*.

**Similar-Appearing Taxa**—The only congeneric known to occur sympatrically with *Haplopappus liatrisiformis* is *H. carthamoides* (Columbia goldenweed). It is shorter, generally less than one foot tall, has larger

flower heads, but less conspicuous ray flowers (these often absent), and larger involucre bracts. It often occurs in rocky, thinner soil sites as well. Plants intermediate between these two taxa, possibly hybrids, are known from one site in Washington (Gamon 1991). *Helianthella uniflora* (Rocky Mountain helianthella) can be sympatric with *H. liatrisiformis*. It is distinguished by larger yellow ray flowers and a taller, more lanky habit. It has a pappus of short awns, whereas *H. liatrisiformis* has capillary bristles.

**Identification of This Taxon in Idaho**—*Haplopappus liatrisiformis* flowers later in the summer than many other grassland species and is mostly restricted to mesic, deeper soil sites, belonging to the *Festuca idahoensis* habitat type series. It is a relatively large plant, up to about three feet tall, although it can be much shorter, especially in drought years. Leaves are tufted at the base and progressively smaller up the stem. The inversely lance-shaped leaves have a rough texture and may be toothed. The herbage is pubescent. Bracts subtending the flower heads (involucre) are relatively large (ca. 0.5 inch tall), firm and green. Prominent yellow rays make the flower heads fairly showy.

**Global Comments**—This is a distinct species (= *Pyrocoma liatrisiformis*).

**Idaho Comments**—A number of recent investigators have considered *Haplopappus*, as treated by Hall (1928) and largely followed by Cronquist (1955), to consist of several genera. The name *Pyrocoma liatrisiformis* would follow these new treatments.

### Status

**Global**—The historic range of *Haplopappus liatrisiformis* has undergone a dramatic change since European settlement in the late 1800's. It is assumed that *H. liatrisiformis* formerly occupied much of the Palouse Prairie region.



However, most of the species' suitable grassland habitat has since been converted to crop agriculture. Additional large acreage has been lost to livestock pasturing. Exotic weed invasion is a serious threat throughout its range. The loss of late-seral and climax community grassland habitats to aggressive weeds has been identified as the primary threat to populations in the Craig Mountain area (Mancuso and Moseley 1994). *Centaurea solstitialis* (yellow starthistle) is known from populations in Washington and Idaho. Herbicide poisoning and ORV use are identified threats at some populations as well. Road construction, and urban and other developments have also contributed to a significant rangewide reduction, degradation, and fragmentation of suitable habitat. As a result, most extant populations occur in small, often narrow, isolated fragments of remaining native vegetation. No direct threats due to disease are known, but *H. liatriformis* is subject to grasshopper herbivory and insect seed predation. Genetic and other demographic threats associated with the fact this species persists only in small, remnant populations, remain unknown. Over utilization for commercial, recreational, scientific, or educational purposes is not a threat at this time. *Haplopappus liatriformis* is known from 39 extant occurrences in Idaho and 18 in Washington. Two historical occurrences in Idaho, and five in Washington are known or assumed to be extirpated (Gamon 1991). In addition, one other occurrence in Idaho may have been recently extirpated due to extensive road construction. The majority of occurrences in both states consist of fewer than 100 individuals, with many supporting less than 50 plants. There are only five occurrences estimated to support 1,000 or more plants. The largest occurrences are comprised of approximately 2000 individuals. The majority of *H. liatriformis* occurrences are located on privately owned land. Prior to the U. S. Fish and Wildlife

Service revising their candidate system in 1996, *H. liatriformis* was a Category 2 (C2) candidate for federal listing under the Endangered Species Act. Under the revised system it is no longer considered a candidate species. The Washington Natural Heritage Program lists it as "Threatened" in Washington. This category contains taxa likely to become endangered in Washington within the near future if factors contributing to its population decline or habitat degradation or loss continue. In Idaho, it is ranked S2 (imperiled in the state because of rarity or because of other factors making it vulnerable to extirpation) by the Idaho Conservation Data Center. *Haplopappus liatriformis* is on the Idaho Native Plant Society's globally rare list. Several other plant species endemic to the Palouse Prairie region, such as *Aster jessicae* and *Silene spaldingii*, are also considered rare and vulnerable.

**Idaho**—*Haplopappus liatriformis* is on the Idaho Native Plant Society's globally rare plant list. It was recommended for reinstatement to the federal candidate list at the 1996 Idaho Rare Plant Conference.

### Distribution

**Global**—*Haplopappus liatriformis* is endemic to the Palouse Prairie region in southeastern Washington and adjacent northwestern Idaho. Its range is approximately 120 miles by 50 miles. Most populations are in Idaho, occurring in Latah, Lewis, Nez Perce, Idaho, and Clearwater counties. In Washington, it is known from Whitman and Spokane counties.

**Idaho**—In Idaho, *Haplopappus liatriformis* extends from northern Latah County, southward to northern Idaho County, and eastward to near Kamiah in Idaho County. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/haplia\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/haplia_dis.cfm).)

## Habitat

**Elevation (Global)**—2000 to 4800 feet

**Elevation (Idaho)**—2000 to 4800 feet

**Global**—*Haplopappus liatrisformis* most commonly occupies mesic Palouse Prairie grassland communities and transition zones between prairie and *Pinus ponderosa* habitats. It also occurs in mesic canyon grassland habitats in the Craig Mountain area. Habitats are bunchgrass-dominated and often with scattered patches of deciduous shrubs. It occurs on the lower to upper portions of moderate slopes (usually <35%) and along ridgecrests. It occurs on a variety of aspects, although in canyon grassland habitats it is restricted to northerly exposures. Elevations range from approximately 2000 to 4800 feet, but mostly below 3600 feet. Soils tend to be productive skeletal silt/loams (loess). It most commonly occurs within *Festuca idahoensis* habitat types, both in the Palouse Prairie and in the canyon grasslands. It also occurs in the *Pinus ponderosa*/*Symphoricarpos albus* habitat type. In Washington, it is most commonly found in the *Festuca idahoensis*/*Symphoricarpos albus* habitat type, while in Idaho, *Festuca idahoensis*/*Rosa* spp. is the dominant habitat type. Frequently associated species include *Festuca idahoensis*, *Agropyron spicatum*, *Helianthella uniflora*, *Solidago canadensis*, *Achillea millefolium*, *Balsamorhiza sagittata*, *Potentilla gracilis*, *Geum triflorum*, *Rosa nutkana*, *Rosa woodsii*, *Symphoricarpos albus*, and *Hypericum perforatum*.

**Idaho**—See Global Habitat comments.

## Ecology

**Global**—Little is known about the autecology of *Haplopappus liatrisformis*. It is native to late seral or climax Palouse Prairie and mesic canyon grassland communities and transition

zones between grassland and forested habitats. Plants can be locally common, but *H. liatrisformis* is not a community dominant. The major natural disturbance at *H. liatrisformis* sites is fire. Daubenmire suggests these grassland sites return to their pre-fire condition within a few years. The major anthropogenic-related disturbance besides outright conversion, is grazing. *Poa pratensis* is a common invader within the *Festuca idahoensis* habitat types following intensive grazing. Daubenmire found that once invasion has occurred, no amount of relief from grazing reverses this trend. *Haplopappus liatrisformis* does occur in areas which have undergone moderate grazing pressure, but generally is absent from places more heavily grazed. Similarly, it can tolerate moderate levels of non-native species invasion, but seems to decrease as these weeds increase. There are a few cases of *H. liatrisformis* occurring in roadcuts or overgrown roadbeds.

Competition with invasive weedy species appears to adversely effect *H. liatrisformis* (Gamon 1991). Grasshopper herbivory and insect seed predation have been noted. Reproductive losses incurred due to these pests are likely more important than prior to the species' widespread habitat loss and degradation.

**Idaho**—See Global Ecology comments.

## Reproduction

**Global**—*Haplopappus liatrisformis* presumably reproduces through production of seed. No vegetative reproduction has been documented. Pollination is assumed to be accomplished via insect vectors. Although specific pollinators are unknown, a variety of insects have been observed visiting flowers, including large bumblebees, small wasps and bees, orange skippers, and tiny rove beetles (Gamon 1991). Seeds are probably wind

dispersed, although some seed movement may be achieved through animal vectors. Plants generally occur as scattered individuals or in small clusters. Insect seed predation has been observed and can be heavy.

**Idaho**—See Global Reproductive comments.

**Phenology (Idaho)**—Most plants begin to flower in mid-July and flowering can continue into September. By early September, most plants are in fruit.

### Management

**Global**—Crop agriculture will continue to be the primary land use within the range of *Haplopappus liatrisiformis*. Most tillable land has already been converted, but many populations will likely be subject to herbicide spraying, storage of farm equipment, weed invasion, and other activities associated with agriculture. Grazing will also likely continue to be a major land use within several sites. Road construction and urban development are other land uses increasing in the Palouse region that complicate management options. Because of this widespread, drastic habitat loss, only small, scattered, remnant populations are still extant. Even relatively minor disturbances such as herbicide spray drift could have serious adverse impacts to these small, fragmented populations (Gamon 1991). The majority of known *H. liatrisiformis* occurrences in both Idaho and Washington are on private land. In Idaho, occurrences not on private land include five within the Nez Perce Indian Reservation. At Craig Mountain, seven occurrences are located at least partly on Idaho Department of Fish and Game land within the Craig Mountain Wildlife Management Area. Portions of two of these occurrences extend onto adjacent BLM land that is managed as part of the Craig Mountain Area of Critical Environmental Concern (ACEC). The Craig Mountain area supports the largest and probably most secure

populations known. Four occurrences in Washington are included within the Washington Register of Natural Areas, a voluntary, non-binding protection program. Three occurrences are within Washington State University's system of Biological Study Areas. One occurrence is within a State Park at Steptoe Butte. *Haplopappus liatrisiformis* is a BLM Sensitive Species and given special management consideration regarding its conservation on BLM land. Overall, the future of *H. liatrisiformis*, along with the other rare Palouse endemics, remains one of the most pressing plant conservation problems in Idaho and adjacent Washington.

**Idaho**—See Global Management comments.

### Inventory

**General Comments (Idaho)**—Extensive inventory in Idaho was conducted by Chris Lorain (Idaho Conservation Data Center) in 1990, to support a rangewide conservation status report prepared for the U.S. Fish and Wildlife Service (Gamon 1991). Additional inventory at Craig Mountain was conducted in 1993, as part of extensive rare plant field investigations conducted by the Idaho Conservation Data Center (Mancuso and Moseley 1994). Further surveys at Craig Mountain were conducted by Janice Hill (The Nature Conservancy) in 1995, in conjunction with a botanical survey and vegetation map produced for the BLM's Captain John Creek ACEC/RNA.

**Inventory Needs (Idaho)**—Revisiting and updating population and threat information at known occurrences will likely be the focus of future inventory needs.



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Author: M. Mancuso

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Produced by The Nature Conservancy, the Natural Heritage Network, and the Idaho Conservation Data Center.

***Lomatogonium rotatum* (L.)  
Fries ex fern—marsh  
felwort**

**Gentianaceae (Gentian family)**

**General Description**—A glabrous annual or biennial herb with branched or unbranched stems 10–5 cm tall. Leaves are opposite, entire, and scattered on the stem; the lower ones spoon-shaped, the others more lance-shaped, and up to about 3 cm long. Flowers are white to bluish and borne singly at the top of branches or the upper leaf axils. The corolla is flat in outline, with 5 ovate, sharp pointed petals between 5–15 mm long, each one having a basal pair of distinctive, scale-like, fringed appendages. Sepals are conspicuous, linear, and usually exceed the corolla. The fruit is an oblong capsule with numerous small seeds.

**Field Identification Tips**—Marsh felwort can be recognized by its hairless habit, scattered pairs of opposite leaves, flat, white to bluish flowers borne on slender pedicels in the upper leaf axils, and leaf-like sepals usually longer than the petals. The restrictive habitat for this species in Idaho is another tip.

**Phenology**—Flowers August and September.

**Similar Species**—Marsh felwort is sufficiently distinct that it should not be confused with other members of the gentian family found in Idaho.

**Habitat**—In Idaho, it occurs in spring-fed, alkaline, sometimes hummocky, meadows, fens, and streamside areas in the montane zone. Associated species include *Potentilla fruticulosa*, *Salix* spp., *Juncus balticus*, *Carex simulata*, *C. aquatilis*, *C. nebrascensis*, and *Primula alcalina*.

**Global Distribution**—Circumpolar; in western North America from Alaska south to Alberta and in the Rocky Mountains from Idaho and Montana south to New Mexico. In eastern North America from Hudson Bay, south to Maine. Also in Greenland, Iceland, northern Europe and Siberia.

**Idaho Distribution**—Upper reaches of intermountain valley bottoms and tributaries in Custer and Lemhi counties in the east-central part of the state. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/lomrot\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/lomrot_dis.cfm).)

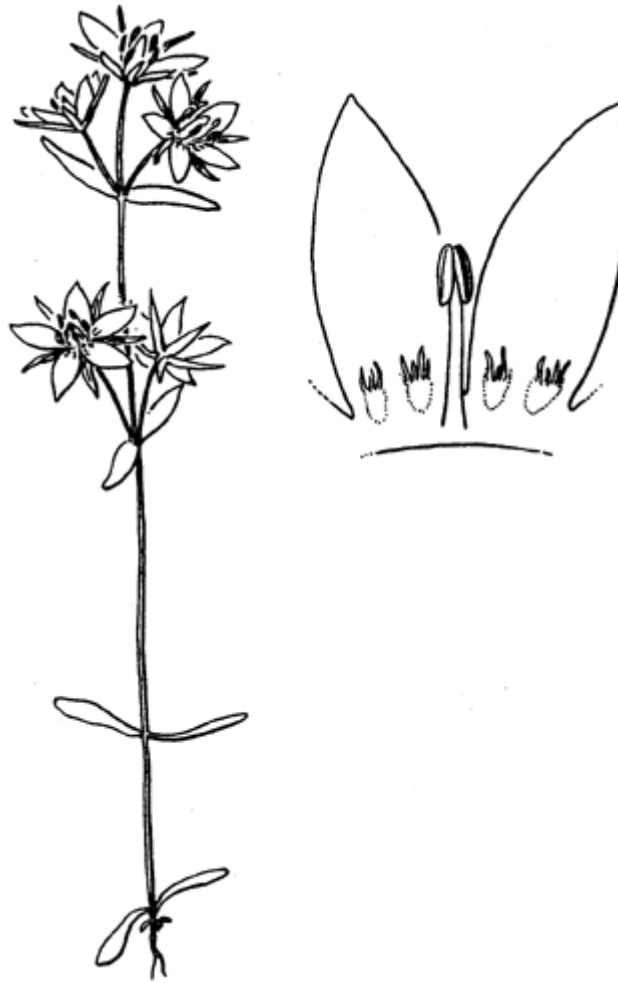
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Photo © Robert K. Moseley  
*Lomatogonium rotatum*  
marsh felwort



*Lomatogonium rotatum*  
marsh felwort

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. 1959. Vascular plants of the Pacific Northwest. Part 4. University of Washington Press, Seattle. 510 pp. Illustration by Jeanne Janish. Reprinted with permission of the University of Washington Press.

### ***Mirabilis macfarlanei*— Macfarlane's four-o'clock**

**Nyctaginaceae (Bougainvillia family)**

**General Description**—*Mirabilis macfarlanei* is a perennial forb with a stout, deep-seated taproot, and freely branched, decumbent or ascending stems forming small to large clumps. Leaves are opposite, somewhat

succulent, green above, and glaucous below. The lower leaves are orbicular or ovate-deltoid in shape, becoming progressively smaller towards the tip of the stem. The inflorescence is comprised of a cluster of 4–7 flowers subtended by an involucre. The striking, bright magenta-colored flowers are up to 25 mm long and 25 mm wide. They are funnel-form shaped with a widely expanding limb and exerted stamens.

**Technical Description**—Stout perennial from a deep-seated root, forming large clumps as much as 10 dm tall, the branches several, decumbent or ascending, puberulent at least above; leaves opposite, rather fleshy, the blade ovate to nearly ovate-rotund, mostly (3) 4–7 cm long, often truncate or slightly cordate at the base, the petiole mostly (2) 5–20 (30) mm long; flower clusters in the upper axils as well as terminal on stalks mostly about 1 cm long; involucre 4- to 7-flowered, greenish to purplish, broadly campanulate to semirostrate, mostly 15–25 mm long, with broadly obtuse to slightly acute lobes about 1/3–1/2 as long as the tube; perianth bright rose-purple, broadly funnelform, 15–25 mm long, stamens 5, exserted, basally expanded and slightly connate for about 0.5 mm; fruit ellipsoid, 6–9 mm long, grayish, glabrous, lightly 10-ribbed and rugose-tuberculate at least on the ribs (Hitchcock *et al.* 1964).

**Diagnostic Characteristics**—The clusters of showy, bright magenta flowers help readily identify this species. The often spreading stems, and nearly round and somewhat succulent opposite leaves are other good field characteristics.

**Infraspecific Taxa**—There are no infraspecific taxa within *Mirabilis macfarlanei*.

**Similar-Appearing Taxa**—When in flower, *Mirabilis macfarlanei* should not be confused with any other species occurring within its range. *Asclepias cryptoceras*, which can occur with *M. macfarlanei*, looks similar when only vegetative material is available.

**Identification of This Taxon in Idaho**—The clusters of bright magenta flowers with exserted stamens, and the nearly succulent, rotund, opposite leaves are good field characteristics.

**Comments (Global)**—

**Comments (Idaho)**—

### Status

**Global**—In 1979, *Mirabilis macfarlanei* was listed as Endangered by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act. A Recovery Plan was approved and signed by the USFWS in 1985 (U.S. Fish and Wildlife Service 1985). The Recovery Plan called for: additional systematic field surveys the protection of sites and development of habitat management plans, establishment of baseline studies, identifying limiting factors, and determining threats establishment of new colonies establishment of propagule banks

Twelve years of recovery efforts led the USFWS to reclassify *M. macfarlanei* as Threatened in 1996. The discovery of additional populations on public lands, improved livestock grazing management on public and private lands, and the stable condition of known populations contributed to the USFWS's determination that the species' status had substantially improved. Presently, there are 16 documented occurrences for *M. macfarlanei*, three in Oregon and 13 in Idaho. Populations in Oregon contain an estimated 3000 plants and cover about 90 acres (Kaye 1992). An estimated 3000–4000 plants occur in Idaho. Two Idaho populations contain more than 1000 plants, while eight have fewer than 100. Most sites are less than an acre in size, ranging from a few square meters to 7+ acres. Most populations face few or no serious direct threats. However, canyon grassland habitats at most sites have been degraded by past management and land uses, especially activities associated with livestock grazing. Three populations in the Hells Canyon area monitored between 1990 and 1995 appear stable (Kaye 1995). Seedling recruitment appears sporadic and of limited success. Instead, vegetative spread is probably a more significant form of population



maintenance and growth. Permanent monitoring plots at seven Idaho and two Oregon occurrences are designed to provide trend and other information that will be needed to gauge the long-term conservation of *M. macfarlanei*. Besides its designation as a federally listed species, *M. macfarlanei* is listed as Endangered in the state of Oregon.

**Idaho**—The Idaho Native Plant Society places *Mirabilis macfarlanei* in the globally rare category of the state's rare plant list.

### Distribution

**Global**—*Mirabilis macfarlanei* is narrowly endemic to portions of the Snake, Salmon, and Imnaha river canyons in Wallowa County in northeastern Oregon, and adjacent Idaho County in Idaho. The species global range is approximately 28.5 miles (46 km) by 17.5 miles (28.5 km).

**Idaho**—See Global Distribution Comments. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/mirmac\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/mirmac_dis.cfm).)

### Habitat

**Elevation (Global)**—1200 to 2700 feet

**Elevation (Idaho)**—1200 to 2700 feet

**Global**—*Mirabilis macfarlanei* occurs in river canyon habitats characterized by regionally warm and dry conditions. Precipitation occurs mostly as rain during the winter and spring. Sites are dry and open, or with scattered shrubs. Plants can be found on all aspects, but most often on southeast to western exposures. Slopes are often steep, but range to nearly flat. Plants can occur along any slope position. Soils vary from sandy to rocky. Talus rock often underlies the soil substrate and several sites are relatively unstable and prone to erosion. The associated vegetation is usually in early to mid-seral

condition, and the grasslands are typically grazing modified versions of *Agropyron spicatum* communities. *Sporobolus cryptandrus*, *Aristida longiseta*, and *Poa secunda* are other common native bunchgrass associates. Other commonly associated species include *Bromus tectorum*, *Bromus mollis*, *Alyssum alyssoides*, *Hypericum perforatum*, *Phacelia heterophylla*, *Achillea millefolium*, *Oenothera cespitosa*, *Astragalus inflexus*, *Rhus glabra*, *Chrysothamnus nauseosus*, and *Celtis reticulata*. In a habitat analysis study conducted at a site in Oregon, the vegetation associated with a population of *M. macfarlanei* appeared to be influenced by aspect, soil development, and topographic position, at least on a local scale (Kaye 1992). Nearby sites without *M. macfarlanei* had a higher number of weedy annual species, and tended to occupy gentler slopes with deeper, more stable soils.

**Idaho**—See Global Habitat comments.

### Ecology

**Global**—*Mirabilis macfarlanei* is a taprooted perennial that reproduces by seed, but also colonizes via long spreading rhizomes. Individual plants tend to produce a few to several hundred stems in clusters ranging up to about nine square meters in size (Callihan 1988). The species has been able to persist in areas historically grazed by livestock since the 1870's, and presently in poor ecological condition. Preliminary data suggests grazing may have a negative effect on plant height, but additional research is needed (Kaye 1995). The most serious consequences of livestock grazing are likely indirect, most notably habitat degradation. At one site in Idaho, the number of *M. macfarlanei* plants appears to be stable several years after a range fire. An increase in *Bromus tectorum*, however, suggests that habitat degradation is an ongoing problem. The underground stems of *M. macfarlanei* would survive most natural

fires, especially since they would likely occur later in the summer, when the plant is dormant. Genetic studies (Barnes 1994; 1995; Wolf *et al.* 1994) have shown that measures of genetic diversity in *M. macfarlanei* were lower than for plants with a similar life history. The greatest level of gene flow occurred between populations that were 0.5 km apart. Levels of gene flow decreased as distances between populations increased. Spittlebugs (*Aphrophora* sp. and *Philaenus* sp.) are significant pests in certain years as the feeding nymphs can cause shoot death and floral abortion. Larvae of three lepidopteran families (Arctiidae, Heliodinidae, and Sphingidae) are known to feed on the leaves of *M. macfarlanei*. A heliodinid moth (*Lithariapteryx* sp.) is apparently host specific to *M. macfarlanei*. The larvae usually mine in the leaves and the adults are diurnal spider mimics on the flowers and shoots (Baker 1985).

**Idaho**—See Global Ecology comments.

### Reproduction

**Global**—*Mirabilis macfarlanei* reproduces by seed, as demonstrated by the presence of seedlings with cotyledons and the documented survival of some of these seedlings in population monitoring studies (Kaye 1992). Vegetative reproduction by off-shoots beneath the soil surface also occurs. *Mirabilis macfarlanei* is primarily an outcrosser, but is able to produce a small proportion of one-seeded fruits through autogamy (self-pollination). Inflorescences bagged to exclude pollinators produced fewer fruits than open-pollinated inflorescences. *Mirabilis macfarlanei* is pollinated by several genera of bees. Species of *Bombus* (e.g., *Bombus fervidus*) are apparently the most effective (Baker 1985). Seed dispersal has not been studied, but apparently seeds fall to the ground and are transported by gravity and rain (Kaye 1992). Seed viability is unknown.

**Idaho**—See Global Reproduction comments.

**Phenology (Idaho)**—Germination probably occurs in the early spring. Established *Mirabilis macfarlanei* plants generally start growth in early April. Flowering begins in early May and peaks later in the month. Flowering is complete by mid-June. Seeds are dispersed from mid-June to mid-July. Plants are typically dry by early to middle July (Johnson n.d.). The bloom time and duration of flowering appears to be strongly impacted by annual precipitation. Periods of drought cause plants to be stunted and mostly vegetative. During wet years, plants are larger and flower abundantly (Kaye 1992).

### Management

**Global**—The three Oregon, and seven of the Idaho occurrences are located within the Hells Canyon National Recreation Area (NRA). Four other Idaho occurrences are located at least partly on lands administered by the BLM's Cottonwood Resource Area. Three occurrences on BLM land are managed as Research Natural Areas/Areas of Critical Environmental Concern (RNA/ACEC). An experimental planting of 60 *M. macfarlanei* plants at one of the RNA/ACEC's was completed in 1988 (Johnson 1988). Permanent monitoring plots have been established at the four occurrences on BLM land and three occurrences within Hells Canyon NRA.

**Idaho**—Seven Idaho occurrences are located within the Hells Canyon National Recreational Area (NRA). Management activities and restrictions generally favor conservation measures. One occurrence is partially contained within an enclosure erected in 1990. Permanent research plots are associated with the enclosure. Four other occurrences along the Salmon River Canyon are located on BLM land. One is an experimental outplanted population. Three of

the occurrences on BLM land are managed as Research Natural Areas/Areas of Critical Environmental Concern. These designations afford special management and protection measures. Permanent monitoring plots have been established at all of the BLM occurrences. Two occurrences are located on private land, one of which has not been revisited since the 1980s. Several research projects, such as population monitoring (Kaye 1995; and unpublished BLM studies), a cattle grazing study (Johnson n.d.), genetic investigations (Barnes 1994, 1995; Barnes *et al.* 1993; Wolf *et al.* 1994), and plant-insect interactions (Baker 1985) have been conducted at Idaho populations.

## Inventory

**General Comments (Idaho)**—*Mirabilis macfarlanei* was first found in Idaho in 1947. This and one site in Oregon were the only ones known for many years. Henderson searched extensively for the species in Hells Canyon in 1977, but did not find it (Siddall 1978). In 1980, a new population was discovered along the Salmon River. During 1983, the U. S. Fish and Wildlife Service and BLM conducted a reconnaissance survey along the lower Salmon River canyon using a helicopter. One new population was discovered at that time (Johnson 1983). Intensive surveys were conducted in Hells Canyon by the Idaho Conservation Data Center (IDCDC) in 1991 (Mancuso and Moseley 1991). This resulted in the discovery of several new populations. Additional field surveys conducted by the IDCDC along the lower Salmon River canyon and at Craig Mountain in 1993, failed to find any new populations (Moseley 1993). The BLM has also initiated a few localized, intensive surveys along the Salmon River canyon over the years. These have resulted in new discoveries or expanded the distribution of known populations.

**Inventory Needs (Idaho)**—The species' distribution is well delineated in Idaho. Additional inventories within the Salmon River canyon corridor between White Bird and Riggins may find new populations or additions to previously known sites. Additional inventory work is most urgently needed on the Oregon side of Hells Canyon.

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Author: M. Mancuso  
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Produced by The Nature Conservancy, the Natural Heritage Network, and the Idaho Conservation Data Center.



*Mirabilis macfarlanei*  
Macfarlane's four-o'clock

***Physaria didymocarpa* var.  
*lyrata*—salmon twin  
bladderpod**

**Brassicaceae (Mustard family)**

**General Description**—Salmon twin bladderpod has a large, thick taproot, surmounted by a tight rosette of silvery leaves. The leaves are spatulate-shaped, the blade gradually tapering to a winged petiole that is often lyrate (pinnately lobed, with the terminal lobe the largest and rounded). The few-flowered inflorescence occurs on a long, thin, generally curving stem. The yellow flowers produce large, inflated fruits that are obviously bilocular (Moseley *et al.* 1990).

**Technical Description**—Heavy-rooted perennial, often with a branched caudex, silvery-stellate, the hairs not closely

appressed; stems usually many, somewhat decumbent-based, 2–17 cm long; basal leaves numerous, rosulate, marcescent, 2–8 cm long, the blades obovate or broadly oblanceolate to somewhat rhombic or even ovate, mostly obtuse, usually with a few inconspicuous to prominent teeth or entire, narrowed rather gradually to broad, winged, mostly lyrate, petiole-like bases about as long as the blades; cauline leaves several, reduced, mostly oblanceolate and entire; racemes somewhat closely flowered; pedicels slender to rather stout, 7–18 mm long, ascending, straight or somewhat curved but not sigmoid; lateral sepals not saccate at the base; petals yellow, broadly spatulate–obovate, 9–12 mm long; silicles much-inflated, 15–20 mm long and at least as broad, didymous, the base very slightly cordate, the apical sinus narrow, nearly closed, 2–4 mm deep; replum obovate to oblanceolate, more nearly obtuse than acute at the apex, 3–6 mm long, 2–3 mm broad;

style 6–9 mm long; seeds 2–3 per locule (Hitchcock *et al.* 1964).

**Diagnostic Characteristics**—The tight rosette of silvery basal leaves quickly distinguishes this species from most others members of the east-central Idaho flora. The genus *Physaria* is most likely to be confused with the related genus *Lesquerella*. The fruits (silicles) of *Physaria* are usually didymous, or at least with a prominent apical sinus 2–4 mm deep, a character absent in *Lesquerella*. The large size of the inflated valves of the mature silicles, (12)15–20 mm long, and the fruits not being strongly obcompressed, are the most reliable field characteristic to distinguish *Physaria didymocarpa* var. *lyrata* from other congeners occurring in east-central Idaho. Although the varietal epithet refers to the lyrate petioles, this character is not a constant feature that can be used definitively to distinguish between the infraspecific taxa of *P. didymocarpa*.

Chromosomal studies by Mulligan (1968), who apparently was unaware of Hitchcock's (1964) then recent description of var. *lyrata*, found that *Physaria didymocarpa* from low elevations near Salmon represented a different chromosome race than other *P. didymocarpa* taxa. The two counts he made from plants around Salmon were hexaploid ( $2n = 24$ ), while all other *P. didymocarpa* taxa were diploid or tetraploid. The higher ploidy level of var. *lyrata* is inconsistent with morphological data and other observations collected for this taxon. The var. *lyrata* is consistently larger in size than var. *didymocarpa*. Gigantism is a common characteristic of higher ploidy levels within groups of closely related species.

**Infraspecific Taxa**—*Physaria didymocarpa* var. *didymocarpa*.

**Similar-Appearing Taxa**—No other *Physaria* taxa are known to be sympatric with Salmon twin bladderpod. Two taxa do,

however, occur elsewhere in east-central Idaho, and may cause some confusion: *Physaria geyeri* and *Physaria didymocarpa* var. *didymocarpa*.

*Physaria geyeri* is represented in central Idaho by two varieties, the widespread var. *geyeri*, and the Lemhi and Custer county endemic, var. *purpurea*. Because var. *purpurea* was once considered a rare plant, surveys were conducted by botanists from the University of Idaho Herbarium. They found it did not occur east of the Challis Creek and Camas Creek drainages. *Physaria geyeri* has not been observed in the Lemhi and Salmon river valleys near Salmon. *Physaria geyeri* can be distinguished from *P. didymocarpa* by its strongly obcompressed, only slightly inflated fruits.

*Physaria didymocarpa* var. *didymocarpa* occurs at high elevations, largely alpine, in the southern Beaverhead Mountains and on the east slope of the southern Lemhi Range. The length of mature silicles for var. *didymocarpa*, are generally significantly smaller than the average found in populations of the var. *lyrata*.

Although the varietal epithet refers to the lyrate petioles, this character is not a constant feature that can be used definitively to distinguish between the two *P. didymocarpa* taxa. As reported by Rosentreter (1982) and used by Hitchcock *et al.* (1964) in his keys, the most distinguishing feature is mature fruit size. Variety *didymocarpa* has valves 8–12 (15) mm long as compared with var. *lyrata* that has valves (12) 15–20 mm long. However, Rosentreter (1982) often found immature unpollinated, or poorly developed fruits on the inflorescences that measured less than 12 mm in length.

**Identification of This Taxon in Idaho**—Mature fruits are required for positive identification. *Physaria didymocarpa* var.

*lyrata* is also geographically separated from similar-looking species that occur in east-central Idaho.

### Global Comments—

**Idaho Comments**—The validity of this taxon has been questioned in the past, but this is no longer the case.

### Status

**Global**—*Physaria didymocarpa* var. *lyrata* is a rare taxon endemic to the Salmon area in east-central Idaho. This taxon was described in 1964, and for many years was known only from the type locality on Williams Creek. Because of this, it was made a federal Category 2 candidate for listing under the Endangered Species Act. Due to its rarity, *P. didymocarpa* var. *lyrata* was recommended for threatened status when it was evaluated as part of the Idaho rare plant project of the Idaho Natural Areas Council. This recommendation was later changed to endangered due to habitat destruction taking place at the Williams Creek site. The conservation of *P. didymocarpa* var. *lyrata* has been addressed by a series of Conservation Agreements between the U. S. Fish and Wildlife Service and the BLM. The initial Conservation Agreement was signed in 1984 (U. S. Fish and Wildlife Service 1984). A new Conservation Agreement was signed in 1990 (Elzinga 1990). This expired in 1995, and has not been renewed.

Presently, *P. didymocarpa* var. *lyrata* is known from seven occurrences, supporting an estimated total of 5,000 plants. Population numbers vary from less than 100 to approximately 3,000, with only three populations estimated to contain 1,000 or more plants. All occurrences are local in extent. A population and habitat study was conducted between 1991 and 1995, at four populations (Pattee Creek 001, Williams

Creek 002, Agency Creek 003, and Basin Creek 004). Analysis of life history stages, mortality, and recruitment at these four occurrences indicates that, in the long-term, the Williams Creek and Agency Creek populations are probably the least stable. They have fewer individuals, and the substrate at the Williams Creek site is very unstable, making it especially susceptible to disturbance. Pattee Creek is the largest and apparently the most stable of the study populations. However, this population is comprised largely of relatively recently recruited individuals, which tend to be more vulnerable to environmental stresses. The Basin Creek population also appears stable.

Other findings include, that small plants, particularly seedlings have a higher mortality rate than larger plants. Well-established (large) plants are apparently able to survive more environmental stress than small plants. Therefore, plant size is an important attribute when determining population demographics. The recruitment of seedlings in all study populations after years in which few plants were reproductive, indicates the presence of at least a short-term seed bank. During the study, weather conditions were a major factor in determining the short-term fate of individual plants. The total number and density of *Physaria didymocarpa* var. *lyrata* plants fluctuated yearly with the amount of spring and summer precipitation. Numbers decreased in dry years and increased in wet ones. All the study populations, except Pattee Creek, show a general downward trend in reproducing plants from 1991 to 1995, although the proportion of established (non-seedlings) plants that reproduced each year, remained fairly constant, except at Williams Creek. Elimination of reproducing plants at Williams Creek was the result of substrate movement during periods of heavy rain. All life stages were present at each site, each year, except Williams Creek. Photodocumentation monitoring at the

Williams Creek population began in 1986, and the trend appears to be stable to slightly downward (Elzinga 1990).

All populations of *Physaria didymocarpa* var. *lyrata* have been disturbed to some degree in the past, and each faces some level of ongoing, human-influenced disturbance. Habitat modification or destruction related to materials removal, and road construction and maintenance have been documented. Roadside herbicide spraying has been identified as a potential threat. Recent studies (Craig 1996) indicate that cheatgrass (*Bromus tectorum*) is presently not a major competitor of *P. didymocarpa* var. *lyrata*, as was previously suggested (Rosentreter 1982; Elzinga 1990). Livestock grazing occurs at all but the Williams Creek site, but does not appear to be a major threat (Craig 1992; 1996). Several specific threats have been identified for *Physaria didymocarpa* var. *lyrata*.

Mineral exploration has occurred throughout the area supporting the Pattee Creek population (001). Because major exploration would require road maintenance, mining activity in the area would likely impact at least portions of the population. The Williams Creek population (002) is located in an area that was a community material pit for many years. Under terms of an earlier Conservation Agreement (U. S. Fish and Wildlife Service 1984), shale removal was limited to portions of the pit where there were no *P. didymocarpa* var. *lyrata* plants. In February 1990, excessive material removal by users resulted in a decision by the BLM to close the pit. The area of the pit containing plants has been fenced and signed. At the Agency Creek (003) occurrence, some individual plants are threatened by minor road maintenance and roadside spraying. Several plants were removed by placement of a county road sign in 1989. Major road work could possibly eradicate much of this

population. Most of the Basin Creek population (004) is undisturbed, with the exception of cattle trails and one old road and cutbank. No threats or special management concerns have been identified for the Bear Valley Creek (005) population. Cattle grazing occurs at the Dry Creek (006) and Lake Creek (007) populations, but is not considered a threat to *P. didymocarpa* var. *lyrata*.

Six of the seven known occurrences are located on land managed by the BLM's Upper Columbia-Salmon Clearwater Districts, Lemhi Resource Area. A portion of one of these populations (Basin Creek, 004) extends onto adjacent private land. One occurrence (Bear Basin Creek, 005), discovered in 1992, is located on the Leadore Ranger District, Salmon National Forest. *Physaria didymocarpa* var. *lyrata* is an Idaho State BLM Sensitive Species. It was originally added to the Forest Service Region 4, Salmon-Challis National Forest Sensitive Species list prior to the species' discovery on Forest land due to the close proximity of most populations to the Forest.

Until the U. S. Fish and Wildlife Service recently revised their candidate system, *P. didymocarpa* var. *lyrata* was a category 2 candidate. Under the revised system it is no longer considered a federal candidate species. At the 1994 Idaho Rare Plant Conference it was recommended for federal category 1 (C1) status. The Idaho Native Plant Society presently includes this species on its list of globally rare taxa. The Idaho Conservation Data Center currently ranks *P. didymocarpa* var. *lyrata* as G5T1 S1 [G5 = *Physaria didymocarpa* is demonstrably secure; T1 = var. *lyrata* is critically imperiled throughout its range because of extreme rarity or because of some other factor of its biology making it vulnerable to extinction; S1 = because var. *lyrata* is endemic to Idaho, the state (S) rank equals the global rank for the taxon (T)].



**Idaho—****Distribution**

**Global**—A narrow endemic known only from the Salmon and Lemhi river valleys near the town of Salmon, Lemhi County, in east-central Idaho.

**Habitat**

**Elevation (Global)**—4500 to 6800 feet

**Elevation (Idaho)**—4500 to 6800 feet

**Global**—*Physaria didymocarpa* var. *lyrata* occurs on rocky, sparsely vegetated, gentle to steep southerly slopes. It can be found from upper to lower slope positions. Vegetation cover is low and bare ground and rock coverage high. The substrate is dominated by rocks 1–3 inches in diameter, and can be loose, or more often fairly stable. Parent material consists of rocks belonging to the Challis Volcanics group. These are undifferentiated andesite and latite flows, quartz latite and rhyolite flows, ignimbrites, and tuffs. Plants can be found in roadcuts and other sites subject to disturbance.

This species occurs in areas of low vegetation cover within the *Artemisia tridentata* ssp. *tridentata*/*Agropyron spicatum* habitat type. Canopy cover of all species is low, usually less than 20%. In study plots, Craig (1996) found that plant species diversity was usually low, averaging less than eight taxa per plot. Associated species include *Phacelia hastata*, *Oenothera caespitosa*, *Chaenactis douglasii*, and *Agropyron spicatum*. *Bromus tectorum* is a common associate at some sites as well.

**Idaho**—See Global Habitat comments.

**Ecology**

**Global**—There is limited specific information regarding the autecology of *Physaria*

*didymocarpa* var. *lyrata*. It generally occurs in areas where bare ground or rock coverage is 80% or greater. Rocks 1 to 3 inches in diameter are the dominant size class. The substrate can be loose, but more commonly is somewhat stable, indicating this taxon is adapted to some level of periodic disturbance. Most plants are found on southerly aspects, further indicating this species adaptation to xeric, harsh sites. Vegetation cover is sparse at most sites, rarely exceeding 20%, although it varies from a trace to 70%. Plants do not occur in areas of heavy shrub coverage. In sampled plots, the density of *P. didymocarpa* var. *lyrata* varied from 6.5 to 3 plants/square yard (Craig 1992). As part of this same study, it was found that all life stages were represented at each population except one.

Most occurrences consists of several metapopulations, or clusters of plants spatially separated from one another. The total number and density of *Physaria didymocarpa* var. *lyrata* plants apparently fluctuate yearly with the amount of spring and summer precipitation. Numbers decrease in dry years and increase in wet ones (Craig 1996). Recruitment of individuals varies annually, also increasing with wet and cool weather conditions (Craig 1996). *Physaria didymocarpa* var. *lyrata* is just one of several species narrowly endemic to the Challis Volcanics of east-central Idaho. It has been speculated that *P. didymocarpa* var. *lyrata* has always been rare (Craig 1992).

**Idaho**—See Global Ecology comments.

**Reproduction**

**Global**—*Physaria didymocarpa* var. *lyrata* is an outbreeding species (Mulligan 1968). Reproduction is predominantly by seed. The seeds disperse almost entirely by gravity, although wind sometimes rolls the fruits on the ground for a limited distance (Craig 1992). It is pollinated by non-specific insect

vectors; species that do not cover great distances in search of specific flowers (Rosentreter 1982). It is likely that all of the seven known occurrences are reproductively isolated by distance between them. Although there has been no specific research concerning the seed bank of *Physaria didymocarpa* var. *lyrata*, studies indicate some seeds must remain dormant throughout at least one growing season and probably longer (Craig 1996). High recruitment levels after years when reproduction was poor and mortality high suggest that visible plants represent only a portion of the population. Good seedling germination was observed in all years when moisture and temperatures were favorable (Craig 1996).

Plants are considered long-lived and possess an extensive tap root that grows upward whenever the plant is covered by moving substrate. This has been likened to a form of layering (Rosentreter 1982). A new whorl of leaves forms after each burial and swellings of the root record the number of times this has occurred. This morphological characteristic indicates the disturbance history at a site. Consequently, a large plant is not necessarily older than a small individual, but may be one that has regrown following disturbance to the overlying substrate. In addition, it has been shown that even plants undisturbed by substrate movement can become smaller between years (Craig 1996). In research conducted by Craig (1996), plants scored as dead one year regrew in later years. As it turned out, they were merely dormant. Results from this research showed that some plants were at least six years old, although few of the original cohorts were still alive after five summers. The average age of non-seedling plants at the Pattee Creek occurrences was 3 years ( $\pm 1.4$  years). Counting seedlings drops this to 2.1 years ( $\pm 1.4$  years).

**Idaho**—See Global Reproductive comments.

**Phenology (Idaho)**—The early season phenology of *Physaria didymocarpa* var. *lyrata* is variable, being related to spring weather patterns. Flowering usually begins sometime in May, but appears to be opportunistic. For instance, in 1992, many plants did not flower until after rainstorms in late June. In 1993, when moisture and cool temperatures prevailed all summer, plants also bloomed throughout the summer. Fruits are generally dehiscent by August.

### Management

**Global**—Six of the seven known populations of *Physaria didymocarpa* var. *lyrata* occur on BLM land, with part of the Basin Creek population extending onto adjacent private land. One population, discovered in 1992, is located in the Bear Lake Creek drainage on the Salmon National Forest. A Conservation Agreement between the U. S. Fish and Wildlife Service and the BLM, addressing the conservation of this taxon expired in 1995. The primary actions agreed to in the expired conservation Agreement (Elzinga 1990) are that efforts will be made by the BLM to remove threats facing *P. didymocarpa* var. *lyrata*, and to implement site-specific management plans to protect the species.

The BLM sponsored a demographic and habitat characterization study covering the four populations known prior to 1992 (Craig 1992; 1996). Based on results of this study, Craig (1996) recommended protection of known populations from additional human-induced disturbance to be the best management approach. If deemed necessary, a seed collection and storage plan is also noted.

**Idaho**—See Global Management comments.

### Inventory

**General Comments (Idaho)**—The range of *Physaria didymocarpa* var. *lyrata* has been

thoroughly surveyed over the past 15 years by botanists from the University of Idaho Herbarium, Conservation Data Center (see Moseley *et al.* 1990), and especially the BLM. Additionally, personnel associated with the Salmon National Forest have also searched for this species.

**Inventory Needs (Idaho)**—There are large amounts of potentially suitable habitat in the Lemhi and Salmon river valleys south of Salmon, Idaho, that do not contain *Physaria didymocarpa* var. *lyrata*. Most of this potential habitat is either BLM or private land. However, not all areas with potential habitat have been searched, especially where access is difficult, and along some private lands. New populations may continue to be periodically discovered, but most likely these will not be much outside the species presently known restricted range.

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- Author: M. Mancuso  
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Produced by The Nature Conservancy, the Natural Heritage Network, and the Idaho Conservation Data Center.



*Physaria didymocarpa* var. *lyrata* (salmon twin bladderpod) habitat



*Physaria didymocarpa* var. *lyrata*  
salmon twin bladderpod

### ***Primula alcalina* A. Cholewa & D. Henderson—alkali primrose**

#### **Primulaceae (Primrose family)**

**General Description**—A perennial herb from a flat basal rosette of light green, crinkly leaves, each 1–4 cm long. Young leaves have a white mealy coating that disappears as the leaves age. The leaf blades are elliptic and gradually narrow at the base to a winged petiole. Flowering stems are leafless and range between 5–30 cm tall. The inflorescence is a tight cluster of 3–10 erect flowers terminating the leafless stem. Flowers

are white with a yellow center; the petals fused into a tube for their lower half, then flaring into 5 lobes, each about 1 cm long and clearly notched at the apex. The calyx is bell-shaped, with a somewhat white mealy coating. The involucral bracts at the base of the inflorescence also have a somewhat white mealy coating.

**Field Identification Tips**—Alkali primrose is distinguished by its tight rosette of crinkly leaves, and solitary, leafless flower stalk usually around 15 cm tall terminated by a tight umbel of white flowers. The white mealy bloom covering young leaves is absent from older, mature leaves.

**Phenology**—Flowers in May and early June. Fruits develop through June, July, and August. The basal rosettes, with their distinctive wavy leaves remain green at least until the end of August. The leaves and flowering stem enlarge over the growing season, and by the time the capsules are ripe, may be several times their length compared to when first flowering.

**Similar Species**—*Primula incana* (Jones' primrose) is a widespread species rare in Idaho. It occurs in wetland habitats, but differs from alkali primrose in having lavender-colored flowers and mature leaves covered with a white, mealy powder. There are also technical differences in the flowers to distinguish the occasional white (albino) Jones' primrose plant that may be found. Other *Primula* species known for Idaho do not occur in wet, alkaline meadow habitats. The basal rosettes of alkali primrose and another member of the primrose family, *Dodecatheon pulchellum* (few-flowered shooting star), are similar in size and shape. However, the *Dodecatheon* leaves are not white-mealy at any stage, nor do they have crenulate margins.

**Habitat**—Alkali primrose occurs in wet, spring-fed, alkaline, intermontane valley meadow systems. The alluvial soils are fine-textured, light-colored, and derived from predominantly calcareous outwash. Plants occur in the lowest topographic position in the meadows, where the subirrigated soil is saturated throughout the growing season. Plants are found on low, relatively level benches immediately adjacent to creeks and spring heads, as well as on low benches with hummocky microtopography, where plants are restricted to the tops and sides of the hummocks. Alkali primrose is not known

from creeks having large seasonal or annual flows, or channel scouring from floods. Graminoids dominate the wet meadow habitats supporting alkali primrose, including *Eleocharis pauciflora*, *Carex scirpoidea*, *C. simulata*, *Kobresia simpliciuscula*, and *Juncus balticus*. Associated forbs are diverse, but have relatively low cover, and include *Dodecatheon pulchellum*, *Triglochin maritimum*, and *Thalictrum alpinum*. Hummocks are sometimes shared with shrubs such as *Betula glandulosa*, *Potentilla fruticosa*, and several *salix* species.

**Global Distribution**—Narrowly endemic to east-central Idaho and immediately adjacent southwestern Montana.

**Idaho Distribution**—Known from a series of wet, spring-fed, alkaline meadows in the large intermontane valleys of east-central Idaho, in Lemhi, Butte, and Custer counties. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/prialc\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/prialc_dis.cfm).)

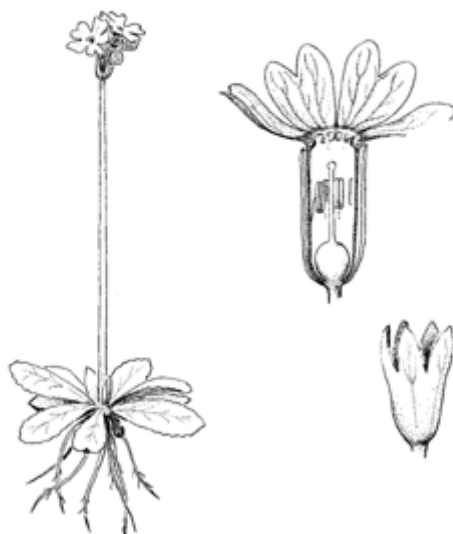
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Photo © Robert K. Moseley

*Primula alcalina* (alkali primrose) habitat



*Primula alcalina*  
alkali primrose

Cholewa, A. F., and D. Henderson. 1984. *Primula alcalina* (Primulaceae): a new species from Idaho. *Brittonia* 36(1): 59–62. Reprinted with permission of The New York Botanical Press.



## ***Rhynchospora alba* (L.) Vahl—white beakrush**

### **Cyperaceae (Sedge family)**

**General Description**—A grass-like perennial, 15–50 cm tall that grows in densely tufted clumps. The thin stems are triangular and solid. It has several leaves, the lowest often more or less reduced to scales, the others slender and no more than about 1 mm wide. The inflorescence has 1–3 compact head-like clusters that are whitish in appearance, especially at anthesis. They are mostly 5–15 mm wide, with the terminal cluster of spikelets larger than the others. Achenes are 1.5–2 mm long and capped by an elongate, narrow tubercle. They are subtended by 10–12 well developed, minutely barbellate perianth bristles.

**Field Identification Tips**—The inflorescence's whitish appearance is a good field character.

**Phenology**—Flowers in July–August.

**Similar Species**—The whitish, head-like inflorescence, fruits with bristles, and the lack of a perigynia distinguish *R. alba* from all sedge (*Carex*) species.

**Habitat**—Bogs, fens, and other very wet places at moderate and low elevations.

**Global Distribution**—Interruptedly circumboreal, but not at the highest latitudes. In North America it ranges from

Newfoundland to North Carolina, inland to the Great Lakes region. The range is continuous across southern Canada to the Pacific, where it occurs from the Alaskan panhandle to central California. It is chiefly found west of the Cascade–Sierran summits, but also inland in northern Idaho.

**Idaho Distribution**—Boundary, Bonner, and Kootenai counties in the Panhandle region, and at Warm Lake in central Valley County.

(See also:

[http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/rhyalb\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/rhyalb_dis.cfm).)

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Photo © Robert Moseley  
*Rhynchospora alba*  
white beakrush





*Rhynchospora alba*  
white beakrush

Hitchcock, C. L., A. Cronquist, and M. Ownbey. 1969. Vascular plants of the Pacific Northwest. Part 1. University of Washington Press, Seattle. 914 pp. Illustration by Jeanne Janish. Reprinted by permission of the University of Washington Press.

***Saxifraga bryophora* var.  
*tobiasiae*—Tobias'  
saxifrage**

**Saxifragaceae (Saxifrage family)**

**General Description**—*Saxifraga bryophora* var. *tobiasiae* (Tobias' saxifrage) is a diminutive annual with one main stem (rarely 2–3) that has several lateral branches. The main stem is terminated by a prominent white flower, as is an occasional lateral branch. The remaining flowers are replaced with numerous bulbils. The herbage is covered with glandular hairs. Although Grimes and Packard (1981) noted the branches are never terminated by a flower, further field investigations have found that one to several of the branches can bear terminal flowers (Moseley 1989).

**Technical Description**—Glandular-pubescent annual, 4–20 cm tall; stems usually one, rarely more, much branched, terminated by a single flower, other flowers replaced by bulbils; leaves to 15 mm long, ciliate with multicellular hairs; petals 4 in number, 4–6 x 2 mm, with sagittate bases up to 0.25 mm long (modified from Grimes and Packard 1981).

**Diagnostic Characteristics**—Diagnostic characters for Tobias' saxifrage include its annual habit, the main stem being terminated by a single flower, and most other flowers replaced by bulbils.

**Infraspecific Taxa**—*Saxifraga bryophora* var. *tobiasiae* is the only infraspecific taxa of *S. bryophora* occurring in Idaho.

**Similar-Appearing Taxa**—Five other species of *Saxifraga* have been observed in the vicinity of Tobias' saxifrage populations on the Payette National Forest. All five are

perennial species. In addition, they occur in different habitats.

*S. arguta* occurs along perennial streams and rivulets.

*S. debile* is restricted to steep, north-facing outcrops that rarely receive direct sunlight.

*S. ferruginea* generally is found on north-facing rock outcrops or moist slopes with thin soil over bedrock.

*S. tolmiei* var. *ledifolia* is restricted to the immediate vicinity of late-lying snowbanks on north-facing slopes.

*S. rhomboidea* usually occurs on moist, north-facing slopes with more organic material at the surface. *Saxifraga rhomboidea* has been observed sympatric with Tobias' saxifrage in one place (Moseley 1989).

**Identification of This Taxon in Idaho**—The combination of its annual habit, and the main stem being terminated by a single flower with most other flowers being replaced by bulbils, distinguishes Tobias' saxifrage.

**Global Comments**—

**Idaho Comments**—When originally discovered at Fisher Creek Saddle in 1978, specimens were identified as *Saxifraga foliolosa* var. *foliolosa*, a taxon whose distribution is mainly arctic. The taxonomic disposition of this population was later reevaluated and found to be an undescribed variety of *S. bryophora*, a species previously thought to be endemic to California (Grimes and Packard 1981).

**Status**

**Global**—Tobias' saxifrage is endemic to the western Salmon River mountains north of McCall, Idaho, where it is known from five

populations, all on the Payette National Forest. It was originally discovered by Nelle Tobias in 1978, and is one of the rarest taxa in the state. One population is large, containing more than 10,000 plants over approximately 200 acres. Another population covers approximately 10 acres and supports an estimated 1500 plants. Three small populations contain an estimated 200–250 widely scattered plants each. One of these small population may have been recently extirpated. In 1989, it was estimated to be one acre in size and contain 200 plants.

Four populations of Tobias' saxifrage are located within the perimeters of the large Corral and Blackwell fires, which burned during August through October 1994. Surveys by Moseley in 1995, found that habitat containing three populations actually burned, and one was in an unburned portion of the Blackwell Fire (Moseley 1996). His preliminary assessments indicate that two of the burned populations were not greatly affected because of the low intensity or spotty burn pattern of the fires. One population (North Fork Pearl Creek, 002) was not found, and may be extirpated. A combination of the plant's life history characteristics and the severe intensity of the burn and subsequent erosion may have contributed to its disappearance from the site. This site will have to be revisited to verify whether the population is extirpated, or if more than one year of post-fire recovery of the habitat is needed.

Aside from erosion and other deleterious effects to the species' habitat due to high-magnitude disturbances such as severe wildfires, no factors have been identified which threaten Tobias' saxifrage. Populations occur on high elevation ridges in areas of low productivity and high amounts of exposed bedrock that are generally unsuitable for timber harvest. Past, and possibly ongoing sheep grazing takes place in some

populations, but does not appear to negatively affect Tobias' saxifrage (Moseley 1989).

Until the U. S. Fish and Wildlife Service revised their candidate system in early 1996, Tobias' saxifrage was a Category 2 (C2) candidate for listing under the Endangered Species Act. Under the revised system it is no longer considered a candidate species. Tobias' saxifrage is a U. S. Forest Service Region 4 Sensitive Species for the Payette National Forest. The Idaho Conservation Data Center ranks Tobias' saxifrage as G5T1 S1 [G5 = *Saxifraga bryophora* is demonstrably secure; T1 = var. *tobiasiae* is critically imperiled globally because of rarity or because of some factor of its biology making it especially vulnerable to extinction; because it is endemic to Idaho, the state (S) rank is the same as the taxon's global (T) rank]. Tobias' saxifrage is on the globally rare plant list maintained by the Idaho Native Plant Society, and was recommended for federal candidate status at the 1996 Idaho Rare Plant Conference.

**Idaho**—Tobias' saxifrage is on the globally rare plant list maintained by the Idaho Native Plant Society. At the 1996 Idaho Rare Plant Conference, it was recommended for reinstatement as a federal candidate species.

### Distribution

**Global**—Tobias' saxifrage is endemic to the western Salmon River Mountains, north of McCall, Idaho.

**Idaho**—See Global Distribution comments. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/saxbry\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/saxbry_dis.cfm).)

### Habitat

**Elevation (Global)**—7400 to 8400 feet

**Elevation (Idaho)**—7400 to 8400 feet

**Global**—Tobias' saxifrage occurs in openings in subalpine forest communities, classified as the *Vaccinium globulare* phase of the *Abies lasiocarpa/Xerophyllum tenax* habitat type. Within this community it occurs in microhabitats characterized by considerable amounts of bare soil and substrate instability. The cause of the instability has two sources: earth cores created by pocket gopher activity and meltwater channels between bedrock or areas stabilized by perennial vegetation. Plants are found on the flat to gently sloping portions of the meltwater channels. It does not occur in the steeper channel sections, where the substrate is continually subject to downslope movement, nor in gravelly depressions where ephemeral ponding takes place.

Although saturated early in the growing season, soils at all sites are dry by about mid-July. Populations occur mostly on aspects other than north. Elevations of known populations range from 7,400 to 8,400 feet. The underlying geology is uniformly intrusive, although several rock-types are present, including quartz monzonite, granodiorite, and quartz diorite.

Associated species include *Lewisia triphylla*, *Hypericum formosum*, *Polygonum phytolaccifolium*, *Polygonum austiniiae*, *Castilleja miniata*, *Antennaria lanata*, *Erythronium grandiflorum*, *Arenaria capillaris*, *Trisetum spicatum*, *Poa gracillima*, *Vaccinium scoparium*, *Mimulus breweri*, *Phlox diffusa*, *Cymopterus glaucus*, *Suksdorfia ranunculifolia*, and *Pinus albicaulis* (Moseley 1989).

**Idaho**—See Global Habitat comments.

## Ecology

**Global**—Tobias' saxifrage is rarely found beneath the forest canopy, suggesting a relatively high light requirement. Tobias'

saxifrage occurs in sites characterized by considerable amounts of exposed bare soil and substrate instability (Moseley 1996). Competition for space and resources appears to limit plants to these open soil areas (Moseley 1989). Like many annuals, these observations indicate Tobias' saxifrage is adapted to and probably requires periodic disturbance to maintain open habitats. However, high-magnitude disturbance events may be detrimental, at least on a local scale. Evidence for this comes from a recent resurvey of populations located in areas where large wildfires occurred in 1994. Preliminary indications are that one population may have been extirpated, perhaps due to a combination of the species' life history characteristics and the severe intensity of the burn and subsequent erosion. Tobias' saxifrage puts most of its reproductive energy into producing bulbils as a means of propagation. These bulbils may not be able to withstand burial by high levels of sediment such as after a severe fire, or other major disturbance event.

**Idaho**—See Global Ecology comments.

## Reproduction

**Global**—Most flowers in the inflorescence are modified into bulbils, and it appears that Tobias' saxifrage places most of its reproductive energy into asexual propagation rather than sexual reproduction by seeds. Nothing is known about seed longevity, seed banking, or other aspects of the species' reproductive biology.

**Idaho**—See Global Reproductive comments.

**Phenology (Idaho)**—Seeds probably germinate in early summer. Plants flower later in the summer, usually beginning around mid-July, and continuing well into August at some sites. The species reproduces largely via vegetative propagules (bulbils). These drop

off the parent plant, overwinter, then resume growth early the next summer.

## Management

**Global**—All known populations are located on the Payette National Forest. A small portion of the Fisher Creek Saddle population occurs within the Bruin Mountain Research Natural Area. Moseley (1996) has recommended the North Fork Pearl Creek population (002) be resurveyed (in 1996) to determine if it is extirpated, or if more than one year of post-fire recovery is needed for plants to become apparent above-ground. A graduate student is researching aspects of the population biology and reproductive ecology of Tobias' saxifrage. This research has important implications regarding conservation management and planning for the species, and should continue to receive adequate funding. Research plots should be made permanent for long-term post-fire population and habitat monitoring. There are considerable amounts of potentially suitable habitat remaining to be surveyed on the Payette National Forest. Sensitive plant clearances should be conducted for all projects that occur in areas of suitable habitat on the Forest.

**Idaho**—See Global Management comments.

## Inventory

**General Comments (Idaho)**—Prior to 1989, two populations had been discovered opportunistically. The type locality at Fisher Creek Saddle was discovered in 1978, and another in the North Fork Pearl Creek in 1988. Moseley (1989) conducted a systematic inventory of potential habitat in the Payette River drainage in 1989, and discovered three additional populations. One of these was later found to be connected by intermediate subpopulations to the type locality and now considered one large population. One new

population was discovered during a revisit to the Payette National Forest in 1995 to assess the effects of recent wildfires on previously known sites (Moseley 1996).

**Inventory Needs (Idaho)**—A considerable amount of suitable-appearing habitat remains to be surveyed on the Payette National Forest. Further searches should include the Granite Mountain-Hard Butte-Patrick Butte divide, Squaw Point-Bear Pete Mountain divide, and the Payette Crest east of McCall.

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- Author: M. Mancuso  
Updated: 96-04-29  
Produced by The Nature Conservancy, the Natural Heritage Network, and the Idaho Conservation Data Center.



*Saxifraga bryophora* var. *tobiasiae*  
Tobias' saxifrage



*Saxifraga bryophora* var. *tobiasiae* (Tobias' saxifrage) habitat

## ***Scheuchzeria palustris* L.— pod grass**

### **Scheuchzeriaceae (Scheuchzeria family)**

**General Description**—Pod grass is a trailing, strongly rhizomatous rush-like plant, 20–40 cm tall. Each erect stem has 3 or 4 linear, stiff, alternate leaves that are gradually reduced upward and arranged in a 2-ranked fashion. Leaves are round in cross section, and broadly sheathing at the base with a prominent ligule 2–10 mm long at the juncture of the sheath and blade. The inflorescence is a few- to several-flowered raceme. The obscure flowers produce three compressed fruits arranged in a spreading, triangular cluster.

Illustration (see [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/schpal\\_illus.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/schpal_illus.cfm).)

**Field Identification Tips**—The entire plant has a greenish-brown appearance. The broadly sheathing leaf bases and prominent ligule help distinguish this species.

**Phenology**—Flowers in May and June, but can be identified in the field throughout the summer.

**Similar Species**—Possible to confuse with sedge (*Carex*) or rush (*Juncus*) species until closer examination reveals many differences, most notably in the fruits. It could also be confused with an arrow-grass (*Triglochin*), which has mostly basal leaves and a different kind of fruit.

**Habitat**—In bogs, where it is usually associated with *Sphagnum*, or on lake margins, where often with *Carex* spp.

**Global Distribution**—Southern Alaska to Labrador and Newfoundland, south in British Columbia and Washington to northern

California, and to Idaho, North Dakota, Indiana, Iowa, and New Jersey. It is also found in Eurasia.

**Idaho Distribution**—Known from Boundary, Bonner, and Kootenai counties in the Panhandle region. Also known from Valley County, and the Yellowstone National Park area. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/schpal\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/schpal_dis.cfm).)

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[http://fishandgame.idaho.gov/tech/CDC/cdc\\_ pdf/moser89i.pdf](http://fishandgame.idaho.gov/tech/CDC/cdc_pdf/moser89i.pdf).)



Photo © Joe Duft  
*Scheuchzeria palustris*  
pod grass





*Scheuchzeria palustris*  
pod grass

Hitchcock, C. L., A. Cronquist, and M. Ownbey. 1969. Vascular plants of the Pacific Northwest. Part 1. University of Washington Press, Seattle. 914 pp. Illustration by Jeanne Janish. Reprinted by permission of the University of Washington Press.

### ***Silene spaldingii*—Spalding's silene**

#### **Caryophyllaceae (Carnation family)**

**General Description**—Perennial with a simple or branched rootcrown and stems up to 45 cm tall. There are 4–7 pairs of sessile, broadly lance-shaped leaves, 6–7 cm long, up to ca. 1 cm wide, and gradually reduced in size upward; herbage is long-hairy and very

sticky. There are few to many flowers in a leafy, somewhat open inflorescence; the tubular calyx, ca. 15 mm long, has 10 nerves on the surface and is very sticky; corolla has 5 separate, white petals, each composed of a narrow claw ca. 15 mm long, expanding into a broadened blade above; only the entire or shallowly-lobed blade with 4 tiny wings at the base protrudes beyond the mouth of the calyx. Fruit is a capsule, 10–15 mm long, filled with numerous tiny seeds.

**Technical Description**—Villous-tomentose and more or less viscid-pubescent perennial from a simple or branched caudex, 2–6 dm tall; cauline leaves 4–7 pairs, oblanceolate below to lanceolate above, 6–7 cm long, 0.5–1.5 cm broad, sessile and slightly connate; flowers several to many in a leafy and usually compact cyme; calyx tubular-campanulate, about 15 mm long at anthesis, becoming more nearly clavate-campanulate in fruit, 10-nerved; corolla white, the claw of the petals about 15 mm long, not auriculate above, the blade very short, ovate, about 2 mm long, entire to shallowly emarginate; appendages 4 (5 or 6), ovate-lanceolate, about 0.5 mm long; carpophore about 2 mm long, glabrous; styles 3; capsule 1-celled; seeds light brown, about 2 mm long, corrugate-wrinkled and inflated. Chromosome number  $2N=24$  (adapted from Hitchcock *et al.* 1964).

**Diagnostic Characteristics**—Superficially similar to several congeners. It can be distinguished from other perennial *Silene* species by the very sticky foliage and petal blades that are very short and entire or only shallowly lobed.

**Infraspecific Taxa**—

**Similar-Appearing Taxa**—*Silene spaldingii* is similar in appearance to several congeners. Flowers are needed for positive identification.

*Silene spaldingii* flowers are distinguished by a long, sticky-glandular calyx tube, petal blades about 2 mm long that are only shallowly emarginate/bilobed and containing 4–6 appendages.

*Silene scouleri* is also a very glandular species; however, it has bilobate petals with only 2 appendages.

*Silene oregana* has petal blades deeply 4-lobed and much longer and narrower.

*Silene cseri* is an annual species with long petal blades and foliage that is often not sticky-pubescent.

*Silene douglasii* has more slender stems and leaves, and rarely has glandular pubescence.

**Identification of This Taxon in Idaho**—Vegetatively, *Silene spaldingii* appears similar to several other perennial, very sticky (glandular) congeners with overlapping ranges and habitat requirements. In Idaho, *S. scouleri* and *S. oregana* are probably the most likely species to be confused with *S. spaldingii*. Flowers in good condition (to observe size and shape of flower petals and their appendages) are very important for accurate identification.

**Commons (Global)**—This is a distinct species.

**Comments (Idaho)**—

**Status**

**Global**—Throughout its range, much of the Palouse Prairie grassland habitat of *Silene spaldingii* has been converted to crop agriculture or pastureland. Although probably once widespread in the Palouse region, *S. spaldingii* is now known from mainly small, fragmented sites on the periphery of its former range. Most remaining populations are small and threatened by weed invasion (including yellow starthistle in places), herbicide treatment (particularly because many populations are small and located near farmlands and roads), and livestock grazing (Gamon 1991; Lorain 1991; Schassberger 1988). Activities such as road construction and maintenance, gravel mining, off-road vehicles, and urban developments are additional threats (Lorain 1991; Heidel 1995).

*Silene spaldingii* is presently known from a total of 63 occurrences, supporting an estimated 14,000 individuals (Heidel 1995). Only seven occurrences are known to contain more than 100 individuals. The large population located within The Nature Conservancy's Dancing Prairie Preserve in northwestern Montana is the only site with more than 500 plants. There are 31 occurrences in Washington, 14 in Oregon, 10 in Idaho, and 8 in Montana. At least nine occurrences are considered extirpated (Heidel 1995), and declining populations have been documented at several other sites (Lesica 1992; Heidel 1995).

*Silene spaldingii* is a serious conservation concern in all four states where it occurs. It is listed as endangered by the Washington Natural Heritage Program, and threatened by the Montana Natural Heritage Program. It is a candidate for state listing as threatened or endangered in Oregon, while in Idaho, it is on the Idaho Native Plant Society's globally rare list. The Association of Biodiversity Information's global rank for *S. spaldingii* is 2. This rank includes taxa imperiled because of rarity or because of other factors demonstrably making it vulnerable to extinction. It has been assigned a rank of 1 for the states of Oregon, Idaho and Montana. This rank includes state taxa critically imperiled because of extreme rarity or because of some factor of its biology making it especially vulnerable to extinction. The state rank for Washington is 2. Status reports have been completed for Washington (Gamon 1991), Idaho (Lorain 1991), and Montana (Schassberger 1988). Until the U. S. Fish and Wildlife Service recently revised their candidate system, *S. spaldingii* was a federal category 2 candidate for listing under the Endangered Species Act. Under the revised system, it is no longer a federal candidate species. It is a U. S. Forest Service Region 6 sensitive species.

**Idaho**—The Idaho Native Plant Society places *Silene spaldingii* in the globally rare category of the state's rare plant list.

### Distribution

**Global**—*Silene spaldingii* is endemic to mesic grasslands of the Palouse Prairie region in eastern Washington and adjacent portions of northeastern Oregon and north-central Idaho, and also in northwestern Montana. In addition, one Montana population extends into adjacent British Columbia.

**Idaho**—In Idaho, *Silene spaldingii* occurs in the Palouse Prairie region in Nez Perce, Lewis, and adjacent Idaho counties. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/silspa\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/silspa_dis.cfm).)

### Habitat

**Elevation (Global)**—1900 to 3600 feet

**Elevation (Idaho)**—2800 to 4200 feet

**Global**—*Silene spaldingii* is restricted to *Festuca idahoensis* habitat types and phases throughout its range. These areas are often referred to as Palouse Prairie. Sites are often near lower treeline, or near scattered ponderosa pine trees. Populations have been found on all aspects, but there seems to be a preference for northerly-facing aspects. It occurs at elevations ranging from about 1900 to 3600 feet, and on flat to steep slopes. Soils are almost always productive silt/loams (loess) that are moderately deep and sometimes gravelly (Gamon 1991; Lorain 1991).

**Idaho**—In Idaho, *Silene spaldingii* occupies Palouse Prairie and mesic canyon grassland communities (Lorain 1991; Mancuso and Moseley 1994). It is associated with relatively undisturbed slopes or flats in swales and drainages, upper canyon slopes, and in small strips of native vegetation surrounded by

cultivated fields. Sites often occur near lower treeline or scattered *Pinus ponderosa* trees. The vegetation is dominated by *Festuca idahoensis*, with numerous perennial forbs and scattered shrubs such as *Rosa nutkana* and *Symphoricarpos albus*. It occurs within the following habitat types: *Festuca idahoensis/Rosa nutkana*, *F. idahoensis/Symphoricarpos albus*, *Crataegus douglasii/S. albus*, *Pinus ponderosa/S. albus*, and *F. idahoensis/Koeleria cristata*. Soils are mostly productive silt/loams (loess) with occasional loams and skeletal silt/loams. These mesic prairie habitats also support two other rare regional endemics, *Aster jessicae* and *Haplopappus liatrisformis*.

### Ecology

**Global**—*Silene spaldingii* most frequently occurs in relatively intact climax or successional advanced mesic grassland communities (Lorain 1991). It does not occur at sites where the native vegetation has been displaced by aggressive weeds. It is apparently tolerant of light to moderate grazing (Schassberger 1988). Lesica (1994) found that prescribed burning at a site in Montana increased growth, recruitment and flowering of *Silene spaldingii*.

**Idaho**—See Global Ecology comments.

### Reproduction

**Global**—*Silene spaldingii* is a partially self-compatible, hermaphroditic perennial. Reproduction is apparently via seed only, as rhizomes or other means of vegetative propagation are lacking. Seeds appear to require cold stratification, so germination occurs mainly in the spring. Rosettes are formed the first year and flowering may occur during or after the second season. Flowers are protandrous (Lesica and Heidel 1996). Anthers mature and dehisc pollen first.

During this time, the styles are unexpanded, and the unexposed stigmatic surfaces are held well below the level of the anthers. After the anthers shrivel and fall from the filaments, the three styles expand and the stigmas become receptive. Each flower persists for two to several days, and two or more flowers may be in bloom on the same plant, so geitonogamous pollination is possible. This system promotes outcrossing while allowing the possibility of selfing (Lesica 1991; 1993). The bumblebee, *Bombus fervidus*, appears to be the only significant pollination vector for *S. spaldingii* throughout its range (Lesica and Heidel 1996). At least at some populations, *S. spaldingii* appears to be subject to pollinator limitations, inbreeding depression, and a large genetic load (Lesica 1991; 1993).

**Idaho**—See Global Reproductive comments.

**Phenology (Idaho)**—Germination takes place mainly in the spring. Flowering occurs in mid-summer or later, peaking around the third week in July. Plants on exposed southerly slopes flower first, while those on north and east aspects bloom later. Fruit and seed maturation occurs in August, with seed dispersal taking place in late August to early September (Lorain 1991).

### Management

**Global**—Throughout its range, most occurrences of *Silene spaldingii* are located on private land. In Washington, occurrences are also located on Washington State University, Washington Department of Natural Resources, Washington State Parks and Recreation, and BLM land. A portion of the largest occurrence known is located on The Nature Conservancy's (TNC) Dancing Prairie Preserve in northwestern Montana. Another occurrence occurs on TNC's Garden Creek Preserve in Idaho. *Silene spaldingii* occurs on Indian Reservation land in Montana and Idaho. Occurrences are known from

Forest Service land in Oregon, and BLM land in Idaho. Preliminary genetic analysis (Baldwin and Brunsfeld 1995), pollination and reproductive studies (Lesica 1988; 1991; 1993; Lesica and Heidel 1996), fire ecology research (Lesica 1992; 1995), and monitoring studies (Lesica 1988) have been conducted for *S. spaldingii*. Several of these projects are ongoing.

**Idaho**—Five of the ten Idaho occurrences of *Silene spaldingii* are located on private land. Two occurrences are located on tribally owned land within the Nez Perce Indian Reservation. Two occurrences are on The Nature Conservancy's Garden Creek Preserve at Craig Mountain. Except for the Garden Creek Preserve, there has been no monitoring or other management activities concerning this species in Idaho.

### Inventory

**General Comments (Idaho)**—The first and most comprehensive systematic survey for *Silene spaldingii* in Idaho was conducted by C. Lorain (1991) with the Idaho Conservation Data Center in 1990. The survey was part of a state conservation status report being prepared for the U. S. Fish and Wildlife Service.

Additional surveys were conducted at Craig Mountain by Idaho Department of Fish and Game and The Nature Conservancy botanists during the period 1993–1995. The BLM has also conducted field inventories associated with regular project clearance and related work.

**Inventory Needs**—Several Idaho occurrences have not been revisited since 1990, or earlier. Population reassessments need to be completed at these sites.



*Silene spaldingii*  
Spalding's silene

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Updated: 96-05-24  
Produced by The Nature Conservancy, the

Natural Heritage Network, and the Idaho Conservation Data Center.

## ***Thelypodium repandum*— wavy-leaf thelypody**

### **Brassicaceae (Mustard family)**

**General Description**—*Thelypodium repandum* is a short-lived biennial or winter annual with a single taproot ranging from 8–24 inches tall. Leaves are hairless, bluish-green in color, and somewhat fleshy. Most leaves are basal and petiolate with an oblong blade and wavy margins. Stem leaves are alternate, narrow, untoothed, less than 3 inches long and 0.75 inches wide, lacking petioles, and even somewhat clasping the stem. The inflorescence arises from the center of the basal rosette as a single stem. It may remain unbranched, forming a single-stemmed flowering head, or be branched just above the base. Flowers are light purple to occasionally white, with one to several spike-like (dense racemes) inflorescences. Fruits are spreading to ascending, 1–3 inches long, narrow, and slightly flattened. Fruits are technically described as “stipate,” an important characteristic in keying plants in the mustard family. The stipe is the narrowed stalk-like portion of the fruit between the expanded seed-holding portion and the fruit petiole (Elzinga 1996).

**Technical Description**—Glabrous, glaucous biennial or annual with a simple to rather freely branched, thick stem (but not fistulose), stem (1) 2–6 dm tall; leaves all petiolate and not auriculate at the base, rather fleshy, mostly basal or suprabasal the blades 1.5–8 cm long, ovate-lanceolate to obovate, sinuate-repand to (the basal) often somewhat lyrate; racemes very densely flowered, typically 2/3–4/5 the total height of the plant; ebracteate; pedicels divaricate, 5–15 mm long; calyx and corolla lavender-purplish, the sepals narrow,

spreading, not saccate at the base, 2.5–3.5 mm long; petals narrowly spatulate, barely exceeding the sepals; stamens subequal to the petals, the anthers purple, about 1 mm long; siliques spreading to arcuate-ascending, strongly 1-nerved, 4–7 cm long, about 1.5 mm broad, the stipe about 0.5 mm long; style 0.5–1 (1.5) mm long; stigma small, not lobed; cotyledons obliquely accumbent (Hitchcock *et al.* 1964).

**Diagnostic Characteristics**—*Thelypodium repandum* is an erect, hairless, glaucous, somewhat fleshy annual or biennial with mostly basal leaves, and a dense raceme(s) of light purple to white flowers. This suite of characters combined with its rocky, sparsely vegetated habitat, make this taxon distinctive.

**Infraspecific Taxa**—There are no subspecies recognized for *Thelypodium repandum*.

**Similar-Appearing Taxa**—No congeners are known to be sympatric with *Thelypodium repandum*. The only other species of *Thelypodium* that may occur within the same range and habitat is *T. laciniatum*. This species has white flowers and basal leaves that are narrow and usually subpinnatifid. Species of *Stanleya* (*S. pinnata*, *S. tomentosa*, and *S. viridiflora*) may be confused with *T. repandum*. A key technical difference between the two genera is stipe length, which is usually <6 mm for *Stanleya* (and often as much as 20 mm long), and <5 mm for *Thelypodium*.

*Stanleya tomentosa* has been found with *T. repandum*. The hairy, pinnatifid leaves are very different from those of *T. repandum*.

*Stanleya pinnata* also has pinnatifid basal leaves.

*Stanleya viridiflora* has entire leaves that are much longer and narrower than *T. repandum*.

All of the *Stanleya* species found in the Challis area are robust plants, sometimes reaching a meter or more in height. The basal leaves of *Enceliopsis nudicaulis*, a member of the composite family, may be mistaken for *T. repandum*, in the absence of inflorescences (Elzinga 1996).

#### Identification of This Taxon in Idaho—

*Thelypodium repandum* is an erect, hairless, glaucous, somewhat fleshy annual or biennial with mostly basal leaves, and a dense raceme(s) of light purple or occasionally white flowers. It is distinctive when in flower.

#### Global Comments—

#### Idaho Comments—

#### Status

**Global**—*Thelypodium repandum* is a local endemic of the Challis vicinity in east-central Idaho. It is one of the rarest of the suite of endemic plant species occurring in the area. The species is known from 62 extant occurrences, plus one occurrence that has been extirpated. Most populations are small. Forty of the 62 extant occurrences in the Idaho Conservation Data Center (IDCDC) data base have been reported to contain 10 or less individuals. Only five have been reported as 50 or more individuals. However, populations vary dramatically from year to year. As a general rule, small populations are more at risk of local extirpation due to small scale disturbances than large populations. Because *T. repandum* is a winter annual-biennial, population sizes are largest in late summer to early fall when individuals from the current year, and new plants that will flower the following year, are both present.

About half of the known occurrences are located adjacent to roads. These populations are vulnerable to road maintenance activities, weed control, and mining activities. These

activities have led to the contraction of several populations. At least one population is known to be extirpated from realignment of Highway 75. Mining activities can affect *T. repandum* in several ways. The most common is removal of scree from the base of slopes containing the species. This has a direct impact on portions of the population at the slope base, and may also affect plants higher on the slope, as the angle and rate of slope movement, increases. *Thelypodium repandum* often is found in historic hardrock mining districts that may become revitalized as new technology allows the extraction of remaining mineralization.

Impacts from off-road vehicles (ORV) are local, but can be severe within *T. repandum* habitat. Most ORV use takes place near the town of Challis. Herbicides application to control roadside weed infestations is a threat at some populations. *Thelypodium repandum* plants killed by roadside herbicide application have been observed. The BLM has found it difficult to coordinate conservation concerns for *T. repandum* with Custer County spray crews. Knapweed and cheatgrass are found at some *T. repandum* sites. Leafy spurge also occurs with some populations. Threats from these aggressive weeds has not been assessed.

Grazed and trampled plants have been observed. These effects are generally local, and it seems unlikely that livestock or native animal use cause substantial, direct negative consequences to populations. Herbivory by an unknown lepidopteran can be locally severe.

Of the 63 occurrences for *T. repandum*, 44 occur on Salmon District, BLM lands, two on the Salmon-Challis National Forest, two on State of Idaho lands, and seven on private land. The exact location of eight populations is unknown, occurring either on BLM lands or adjacent private property. Two populations are protected within the BLM's Germer Basin and Malm Gulch Areas of Critical



Environmental Concern/Research Natural Areas.

*Thelypodium repandum* is an Idaho BLM Sensitive species, and a Region 4, Forest Service Sensitive species. Until the U. S. Fish and Wildlife Service revised their candidate system in early 1996, *T. repandum* was a Category 2 (C2) candidate for listing under the Endangered Species Act. Under the revised system it is no longer a candidate species. It is ranked globally rare by the Idaho Native Plant Society. Presently, the CDC designation for *T. repandum* is G3/S3. This indicates that globally, the species is rare or uncommon, but not imperiled. Because it is an Idaho endemic, it has the same state (S) as global (G) rank.

*Thelypodium repandum* is monitored annually at a number of populations on BLM land. A life history study and seed germination study (Bureau of Land Management 1992) have been completed for the species. A management plan for *T. repandum* has also been drafted (Atwood no date). A Conservation Agreement between the U. S. Fish and Wildlife Service and BLM was signed in 1990 (Bureau of Land Management 1990), but expired in 1995, and has not been renewed. A Habitat Conservation Assessment and Conservation Strategy are being prepared for *T. repandum* under contract from the U. S. Fish and Wildlife Service. These documents will be completed during 1996.

**Idaho**—*Thelypodium repandum* is on the globally rare plant list maintained by the Idaho Native Plant Society.

### Distribution

**Global**—*Thelypodium repandum* is endemic to east-central Idaho. It occurs in Custer and a small portion of Lemhi counties. Populations are found along the Salmon River and lower elevations of its tributaries from Ellis, south

to Clayton; along the lower East Fork Salmon River and its tributaries; and south of Challis along the Lost River Range. The species total distribution is approximately 60x20 miles (Elzinga 1996).

**Idaho**—See Global Distribution comments. (See also [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/therep\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/therep_dis.cfm).)

### Habitat

**Elevation (Global)**—4900 to 7000 feet

**Elevation (Idaho)**—4900 to 7000 feet

**Global**—*Thelypodium repandum* occurs on moderate to steep, unstable, generally southerly-facing slopes of rocky, gravelly to cindery substrate derived from Challis volcanic and metamorphic rock. Associated vegetation is sparse (5–20% cover), and bare ground coverage is high. Common associates include *Chaenactis douglasii*, *Enceliopsis nudicaulis*, *Phacelia hastata*, *Cryptantha interrupta*, *Elymus ambiguus* var. *salmonensis*, *Oryzopsis hymenoides*, and *Atriplex confertifolia*. Elevations range from 4,900 to 7,000 feet, with most populations found below 6,000 feet elevation. The species is found on road cuts and fills, although these are often colonized from portions of the population further upslope.

**Idaho**—See Global Habitat comments.

### Ecology

**Global**—The life cycle of *Thelypodium repandum* exceeds 12 months, technically making the species a biennial, but because it germinates in the fall, it more closely resembles a winter annual. Most of the seed crop is released after the main germination period, but it is possible that some seed germinates late in the fall and produces seed the following year, a true annual life cycle. It

is likely, however, that some after-ripening or dormancy breaking mechanism prevents many seeds from germinating the year they are produced.

Mortality can occur at any time of the year, but is highest in winter. Freezing damage may be responsible for much of the loss. Snow cover at the elevations where *T. repandum* occurs is sparse. Unprotected by snow cover, plants are exposed to hard freezing temperatures. Once rosettes have survived the winter, they usually become reproductive. It is also adapted to hot, dry summer climatic condition. Climatic variation appears to have an effect on the size of populations from one year to the next, a pattern not uncommon for annual species. Populations tend to be small and comprised of scattered plants.

*Thelypodium repandum* occurs on unstable slopes that undergo natural disturbance due to steepness and low vegetative cover. It is often found in erosion trails mostly caused by breakage of bedrock outcrops and slope slippage. *Thelypodium repandum* also has shown a flush of germination after minor road maintenance caused slope movement on a roadcut. Extreme erosion, however, appears to be detrimental, as it does not occur on actively moving slopes. *Thelypodium repandum* occurs in open communities with sparse vegetation comprised of few species. Such a restricted habitat may be indicative that it is a poor competitor.

**Idaho**—See Global Ecology comments.

### Reproduction

**Global**—Reproduction is strictly by seed. Seed production can be prolific, over 20,000 seeds per plant (Elzinga 1996). Aborted flowers have not been observed in *Thelypodium repandum*. It is unknown if *T. repandum* requires a pollinator under natural conditions. Manipulative experiments

showed it is self-compatible (Al-Shehbaz 1973), but floral morphology does not appear conducive to selfing. The species' showy flowers suggests an insect pollinator. Bees and butterflies have been observed visiting flowers. In some populations, ants are found abundantly on plants throughout the flowering season, as well as later in the year. It is uncertain if ants play any role in pollination or seed dispersal. No dispersal mechanisms have been documented. Habitat across the species' range is discontinuous, so seeds must be dispersed in some manner. Al-Shehbaz (1973) notes that the small seed size of the genus *Thelypodium* suggests wind dispersal. Biotic dispersal mechanism have also been postulated (Elzinga 1996).

It is clear that *T. repandum* forms a seedbank. It has been observed to reappear at a site after being absent for several years. In germination trials, no pretreatment was required to germinate seed after five months of storage. However, germination percentages increased over an additional six-month period, suggesting an after-ripening requirement. Although germination occurred over the range of temperatures tested, it was highest at 300 C, and consistency lower at 50 C. *Thelypodium repandum* most readily germinated under moist conditions. The ecological implications of these germination trials is that *T. repandum* can respond to warm, moist conditions very rapidly (within four days). These conditions are most likely to be met in the late summer or fall after a ground-soaking rain shower. Such weather conditions occur erratically in the Challis area, both temporally and spatially (Elzinga 1996).

**Idaho**—See Global Reproductive comments.

**Phenology (Idaho)**—Germination occurs between July and October. These seedlings overwinter as rosettes, 2–30 cm in diameter. They initiate reproduction in May of the

following year. Seed ripe initiates by middle to late July, and by mid-August, most of the seed capsules have split and released seed.

## Management

**Global**—*Thelypodium repandum* is perhaps the rarest of the suite of species endemic to the Challis area in east-central Idaho. Populations tend to be local and comprised of relatively few plants. Many are vulnerable to threats related to road maintenance, weed control, and mining activity. One occurrence was extirpated during a realignment project along Highway 75. Of the 63 occurrences known for *T. repandum*, 44 occur on Salmon District, BLM lands, two on the Salmon-Challis National Forest, two on State of Idaho lands, and seven on private land. The exact location of eight populations is unknown, occurring either on BLM lands or adjacent private property. Two populations are protected within the BLM's Germer Basin and Malm Gulch Areas of Critical Environmental Concern/Research Natural Areas. *Thelypodium repandum* is monitored annually at a number of populations on BLM land. A life history study and seed germination study (Bureau of Land Management 1992) have been completed for the species. A status report for *T. repandum* was originally compiled by Packard (1979). A more comprehensive revised status report was completed in 1988 (Caicco 1988). The BLM has conducted additional surveys since that time.

A Conservation Agreement between the U. S. Fish and Wildlife Service and the BLM for *T. repandum* was signed in 1990. It expired in 1995, and has not been renewed. To varying degrees, some, but not all portions of the Conservation Agreement were implemented while it was in force. As part of the Idaho Conservation Effort, a Habitat Conservation Assessment and Conservation Strategy for *T. repandum* are being prepared. They are

scheduled for completion during 1996. The specific objectives of the Conservation Strategy are to: identify populations critical for the maintenance of the species throughout its range, develop specific management objectives and actions for these populations and outline monitoring needs, stratify remaining populations by importance and specify management activities and monitoring for each group, identify populations of limited or no conservation value to release these areas for other uses, and specify information gaps, and the studies and activities needed to fill these gaps. *Thelypodium repandum* is an Idaho BLM Sensitive species, and a Region 4 Forest Service Sensitive species. As such, it is subject to special management considerations that will maintain the species' viability on lands these agencies administer. Prior to the U. S. Fish and Wildlife Service's recent revision of their candidate system, *T. repandum* as a category 2 (C2) candidate for listing under the Endangered Species Act. Under the revised system it is no longer considered a federal candidate.

**Idaho**—See Global Management comments.

## Inventory

**General Comments (Idaho)**—Fairly intensive survey work was conducted in 1988, by both the BLM and Idaho Conservation Data Center. In another intensive effort, approximately 700 polygons of potential habitat on BLM lands were located on aerial photographs. Field checks were completed on a 20% random sample of these (Elzinga 1996).

**Inventory Needs (Idaho)**—Populations are local and small, and it is likely there are additional sites not yet discovered (Elzinga 1996). Caicco (1988) listed areas west of Clayton as worthy of additional survey.

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- Author: M. Mancuso  
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*Thelypodium repandum*  
Wavy-leaf thelypody

***Triantha occidentalis* (S. Watson) Gates ssp. *brevistyla* (C. L. Hitchc.) Packer—short-style *tofieldia***

**Liliaceae (Lily family)**

**Synonym**—*Tofieldia glutinosa* (Michaux.) Pers. ssp. *brevistyla* (C.L. Hitchc.); and includes *Tofieldia glutinosa* (Michaux.) Pers. var. *absona* (Hitchc.) Davis.

**General Description**—Short-style *Tofieldia* is a perennial forb, 10–60 cm tall, with a tuft of flat and narrow basal leaves 5–20 cm long by 3–8 mm wide. The inflorescence is comprised of small terminal clusters of white

to green-white flowers. The tepals all appear similar, although the inner set averages 4.2 mm long, a little longer than the outer set, which averages about 3.8 mm long. The upper stem and inflorescence are covered with numerous glandular hairs about twice as long as thick. Fruits are 4–9 mm long, with the seeds enclosed in a spongy testa and usually having appendages.

**Field Identification Tips**—The genus is recognized by its small, whitish, lily-like flowers, long leaves, and strongly glandular-hairy stems. Subspecies *brevistyla* is usually a robust plant with numerous basal leaves and stems in a single clump.

**Phenology**—Flowers June to August.

**Similar Species**—Technical differences between the three subspecies of *Triantha occidentalis* are slight. Subspecies *brevistyla* is distinguished by its outer tepals averaging 3.8 mm long and inner tepals 4.2 mm long, and having hairs of the upper stem and inflorescence about twice as long as thick, tapered, and semi-papillose (with short, rounded, blunt projections). In comparison, subspecies *montana* has outer tepals averaging 3.5 mm and inner tepals 4 mm long, and relatively slender hairs 3–4 times as long as thick. The subspecies *occidentalis* is not known east of the Sierra Nevada. It is generally a taller plant 60–80 cm tall with longer styles. *Triantha glutinosa* is separated from members of the *T. occidentalis* complex based on differences in stem pubescence and the seeds. *Triantha glutinosa* has conical glands, versus the more cylindrical hairs in *T. occidentalis*. It also has the testa of the seed more or less tightly appressed to the seed body, versus the loose, white, spongy, inflated testa around the seed body for *T. occidentalis*.

**Habitat**—Wet meadows, streambanks, and peatlands.

**Global Distribution**—Southern Alaska and western British Columbia, south in the Olympic and Cascade Mountains to southern Oregon, and eastward to southeastern British Columbia and Idaho.

**Idaho Distribution**—The Priest Lake area in Bonner County, and scattered populations further south in Clearwater, Idaho, and Valley counties. (See also: [http://fishandgame.idaho.gov/tech/CDC/spp\\_accounts\\_plants/triocc\\_dis.cfm](http://fishandgame.idaho.gov/tech/CDC/spp_accounts_plants/triocc_dis.cfm).)

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Photo © Christine Lorain  
*Triantha occidentalis* ssp. *brevistyla*  
short-style tofieldia