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N11ucav report on the
1989 conservation
status of
Claytonia
lanceolata var.

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Update to the report on the conservation



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UPDATE TO THE REPORT ON THE CONSERVATION STATUS OF
Claytonia lanceolata var. flava, A CANDIDATE THREATENED TAXON

Taxon name: Claytonia lanceolata Pursh
var. flava (A. Nels.) C. L.
Hitchcock

Common name: Yellow springbeauty

Family: Portulacaceae

States where taxon occurs: U.S.A., Idaho, Montana,
Wyoming

Current Federal status: USFWS Notice of Review,
Category 2

Recommended Federal status: USFWS Notice of Review,
Category 2

Author of update: J. Stephen Shelly

Original date of report: 30 November 1986 (H. Marriott)

Date of most recent revision: 13 February 1989

**Individual to whom further
information and comments should
be sent:**

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V. New information

21. Record of revisions: 13 February 1989; J. Stephen Shelly; Topics: as indicated. NOTE: Within the text, numbers in parentheses following site names refer to the three-digit occurrence numbers given in Table 1 (pp. 7-8). Topic numbers match those given in Henifin et al. (1981).

I.1.A.4. Taxon codes: PDPOR03092 (The Nature Conservancy); 8226, CLALVF (U.S. Forest Service, Region 1).

I.1.D. History and knowledge of taxon: Prior to 1988, Claytonia lanceolata var. flava was recently documented from four sites: one in Idaho (Fremont County), one in Wyoming (Fremont County; four subpopulations), and two in Montana (Beaverhead and Gallatin counties). In addition, it was historically known from two locations in Montana (Deer Lodge and Jefferson counties). In 1988, the Montana Natural Heritage Program (MTNHP), under sponsorship by the U.S. Fish and Wildlife Service (Section 6 Project Agreement SE-5-P), conducted field surveys for the taxon. Field work was conducted in May and June by the author, with assistance from Peter Lesica (University of Montana), Lisa Schassberger (MTNHP), Ken Scow (Helena), and Jan Nixon (Bozeman). Surveys were conducted in Beaverhead, Deer Lodge, Gallatin, Jefferson, and Silver Bow counties.

The two recently documented populations in Montana were surveyed in detail, and were found to be more extensive than previously known. In addition, it is believed that surveys in the vicinity of the two historical locations resulted in their rediscovery. One previously unrecorded population was found. Thus, the taxon is currently known from a total of seven occurrences. All data and photos are from 1988, except where noted.

I.2.C. Legal or other formal status.

2. Montana.

- a. Present designated or proposed legal protection or regulation: None.

- b. Other current formal status recommendations: Claytonia lanceolata var. flava is now ranked as G5T1S1 by the MTNHP (Shelly 1988).
- c. Review of past status: Previously listed as "recommended threatened" ("(a)ny species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range in Montana) by the Montana Rare Plant Project (Lesica et al. 1984).

I.3.A. General nontechnical description: Claytonia lanceolata var. flava is a small perennial herb, with stems that arise from deep-seated corms. The aboveground portions of the stems are about 2-6 inches tall. The middle of each stem bears two opposite leaves, which are much longer (ca. 2-4 inches long) than wide (ca. 1/4-1/2 inch wide). The tops of the stems bear from 2 to 12 or more flowers; the results of systematic studies currently in progress indicate that the petals may be either yellow or white. The five petals are rounded at the tips, and narrow to a small base. In Montana, the plants are generally in bloom from mid-May to mid-June, although at the highest elevations some flowers may persist into early July.

I.3.B. Technical description: Glabrous perennial from a usually rather deep-seated, semiglobose corm 5-20 (40) mm. in diameter; basal leaves (often lacking in flowering plants) 1 or 2, narrowly oblanceolate, 2-10 mm. broad, up to about 10 cm. long (including the subterranean portion of the slender petiole); flowering stems 1-several, up to about 12 cm. tall (not including the subterranean portion or raceme), bearing (from slightly below to above midlength) 2 opposite, sessile or subsessile, narrowly lanceolate leaves that are commonly about 3-10 (12) mm. wide and 2-6 cm. long; racemes loosely (2) 3- to 12-flowered, often secund, reduced-bracteate below; pedicels stout to slender, 1-5 cm. long, usually arched-recurved in fruit; sepals 4-7 mm. long; corolla deep yellow or white, the petals 7-12 mm. long; stamens 5, basally adnate to the petals; styles 3; capsule ovoid, firm-walled, about 4 mm. long; seeds (1-2) 3-6, black and shining, 2-2.5 mm. long, very indistinctly

warty-papillate, with a fairly evident strophiole (adapted from Hitchcock et al. 1964).

- I.3.C. Local field characters:** The two varieties of Claytonia lanceolata that occur in Montana (vars. flava and lanceolata) both possess deep-seated, roundish corms. However, systematic studies currently in progress indicate that the two are distinguishable by leaf morphology. Variety flava has leaves which are much longer than wide, being lanceolate (often narrowly so) in shape. Variety lanceolata has leaves that are shorter and broader. In addition, var. flava can have either yellow or white flowers, with petals that are most often rounded at the tips. Variety lanceolata possesses white petals that are frequently tinged and/or lined with pink, and that are often notched at the tips.
- I.3.E. Photographs:** The color slides (p. 4) are duplicates of those taken at the sites indicated. Additional slides are housed at the MTNHP office, Helena, Montana.
- I.4.A. Natural significance:** Claytonia lanceolata var. flava is a geographically restricted taxon in the C. lanceolata complex that will continue to be important in studies of the evolutionary relationships within the group.
- I.4.B. Human significance:** Systematic studies (including electrophoretic and morphological analyses) are currently being conducted. The results to date indicate that C. lanceolata var. flava is very distinct from C. lanceolata var. lanceolata, apparently at the species level. This distinctiveness raises the importance of conservation of the taxon. It will continue to be very important in biosystematic studies of the cormose Claytonia species. Also, the white- and yellow-flowered forms of var. flava would provide valuable subjects for studies addressing the basis of such variation. Otherwise, the taxon has no known agricultural, economic, horticultural, or other human uses or significance at this time.
- I.5.A. Geographical range:** Claytonia lanceolata var. flava is currently known from seven

sites: one in east-central Idaho (Fremont County), one in northwestern Wyoming (Fremont County), and five in southwestern Montana (Beaverhead, Deerlodge, Gallatin, Jefferson, and Silver Bow counties). The distribution in Montana is shown in Figure 1, p. 6.

I.5.B.1. Populations currently known extant:

e. Montana: All known populations are listed in Table 1, pp. 7-8; exact locations are provided in the maps on pp. 9-13.

I.5.B.4. Locations not yet investigated believed likely to support additional natural populations: Other areas where this taxon potentially occurs exist in southwestern Montana. The areas most likely to contain additional habitat are in the Gravelly Range; large meadow areas are visible in the southern part of the range from the vicinity of Reynolds Pass. Though less likely to contain large, level meadow areas, potential habitat might also occur in the Tobacco Root, Madison, and Gallatin ranges. Also, it is suspected that the taxon could be found in Yellowstone National Park (mainly in Wyoming); the area lies between known sites in southwestern Montana and northwestern Wyoming, and contains areas of extensive moist grasslands at high elevations (i.e., Lamar Valley, Hayden Valley).

I.5.C. Biogeographical and phylogenetic history: The details regarding the phylogenetic history of *C. lanceolata* var. *flava* remain unknown. However, detailed systematic studies are in progress; these are being conducted in conjunction with Peter Lesica (University of Montana, Missoula) and the Department of Botany, Washington State University (Dr. Douglas Soltis' laboratory). Two analyses are involved: 1.) electrophoretic comparisons of populations of the two varieties, and 2.) morphological comparisons of the two taxa. The results of the electrophoretic analysis indicate that vars. *lanceolata* and *flava* are genetically distinct, at a level typically observed for congeneric species (Wolf 1988). The results of this analysis are summarized in Appendix B, p. 38. The morphological studies also indicate that the two varieties are taxonomically distinct, especially with

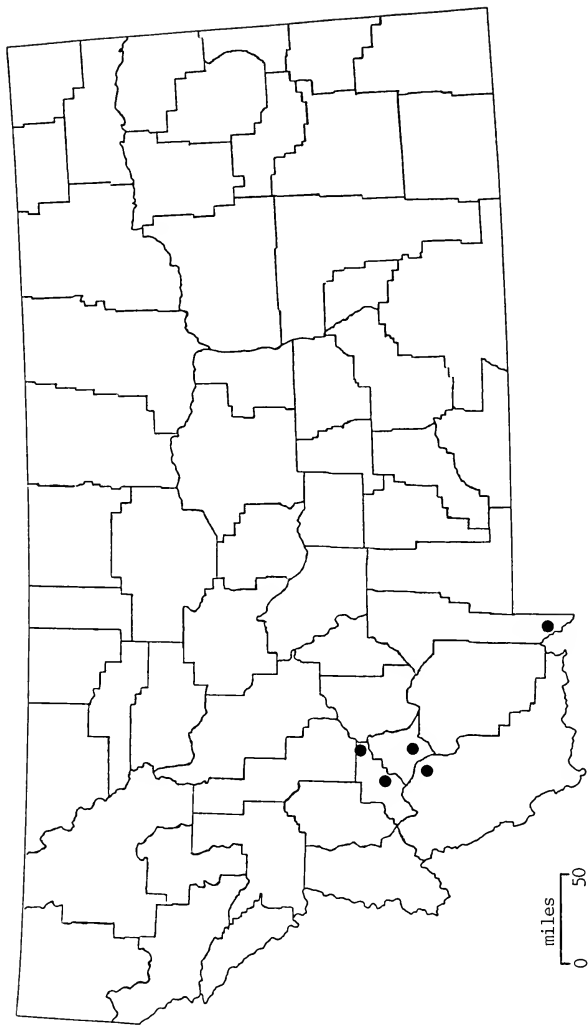


Figure 1. Distribution of Claytonia lanceolata var. flava in Montana.

TABLE 1. Claytonia lanceolata var. flava locations, Montana.

Occurrence number: 001
 Site name: LOCKHART MEADOWS (CHAMPION PASS)
 COUNTY: JEFFERSON
 Township & Range: 006N008W Sections: 35 NE¼; 25 E½; 26 SE¼; 36
 006N007W Sections: 30 NW¼; 31 SW¼
 005N008W Sections: 1; 2 NE¼NE¼
 Latitude: 461409 Longitude: 1123325 Elevation: 6550
 USGS Quad: BUTTE NORTH (15')
 Location: POWDERHORN CREEK AND LOCKHART MEADOWS, UPPER BOULDER RIVER DRAINAGE, 2.6-3.0
 AIR MILES ENE TO SOUTHEAST OF CHAMPION PASS.

Occurrence number: 002
 Site name: FRENCH CREEK (ANACONDA)
 COUNTY: DEER LODGE
 Township & Range: 002N012W Sections: 12 NW¼; 1; 2; 11
 003N011W Section: 31
 003N012W Sections: 25; 35; 36
 Latitude: 455641 Longitude: 1130225 Elevation: 6500
 USGS Quad: LINCOLN GULCH
 Location: FRENCH AND CALIFORNIA CREEKS, MT. HAGGIN WILDLIFE MANAGEMENT AREA, ALONG HWY. 274
 CA. 17.5-20 MILES SSW OF ANACONDA.

Occurrence number: 003
 Site name: VIPOND PARK
 COUNTY: BEAVERHEAD
 Township & Range: 002S011W Sections: 2; 1 N½; 11 W½; S2SE¼; 12 SW¼SW¼; 13 NW¼; 14 N½
 001S011W Section: 35 SE¼
 Latitude: 454154 Longitude: 1125508 Elevation: 8200
 USGS Quad: VIPOND PARK (15)
 Location: PIONEER MOUNTAINS, CA. 8 MILES SOUTH OF DEWEY, UP QUARTZ HILL GULCH RD. TO
 VIPOND PARK; EAST OF ROAD.

Occurrence number: 004
 Site name: HEBGEN LAKE
 COUNTY: GALLATIN
 Township & Range: 013S004E Sections: 3 SW¼; 4 SE¼; 9 NE¼; 10 N½; 14 NW¼; 15; 23 NW¼
 Latitude: 444338 Longitude: 1111359 Elevation: 6550
 USGS Quad: MADISON ARM
 Location: SOUTH OF HEBGEN LAKE, WEST SIDE OF MADISON VALLEY, CA. 0.5-3 AIR MILES SOUTH OF
 LONESOMEHURST CAMPGROUND, EAST AND SOUTH OF HEBGEN LAKE RD. (#167).

TABLE 1. (cont.).

Occurrence number: 005
Site name: BURTON PARK
COUNTY: SILVER BOW
Township & Range: 001N008W Sections: 27 SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SE $\frac{1}{4}$; 20 E $\frac{1}{2}$ SE $\frac{1}{4}$; 22 S $\frac{1}{2}$ SW $\frac{1}{4}$;
26 SW $\frac{1}{4}$ SW $\frac{1}{4}$; 35 NW $\frac{1}{4}$ NW $\frac{1}{4}$
Latitude: 454840 Longitude: 1123447 Elevation: 6880
USGS Quad: BUTTE SOUTH (15)
Location: HIGHLAND MOUNTAINS, BURTON PARK AND UPPER NORTH FORK TUCKER CREEK, CA. 12 AIR
MILES SSW. OF BUTTE; ALONG HIGHLAND RD. (N.F. RD. #84).

respect to leaf morphology (see I.3.C. above). The final results, including any necessary change in nomenclature, are planned for publication in the systematic literature. The U.S. Fish and Wildlife Service will be provided a copy of the final results.

I.6.A.

Concise statement of general environment and habitat: Claytonia lanceolata var. flava occurs in moist meadows and poorly drained swales at relatively high elevations. The associated vegetation is dominated by grasses and perennial forbs. In Montana, it occurs at elevations from 1980-2500 m. (6500-8200 ft.).

At three locations in Montana, C. lanceolata var. lanceolata was found growing in close proximity to var. flava: Lockhart Meadows (001), French Creek (002), and Vipond Park (003). However, there appears to be a difference in the habitats usually occupied by the two varieties. Variety lanceolata often occurs on fairly well-drained, open areas of loamy to gravelly soil, sometimes on rather steep slopes or along intermittent drainages. In contrast, variety flava usually occurs in level to gently sloping meadows that contain dense vegetation, often in large basins or areas of outwash sediments. These latter sites have heavier, more poorly drained soils that are clayey in texture. The noteworthy exceptions to these observations are at the French Creek and Lockhart Meadows sites. At French Creek, var. flava occurs in some areas on steeper slopes (up to 10%), and var. lanceolata grows directly adjacent to it in a few small open areas. At Lockhart Meadows, the two varieties coexist in a slightly higher, better-drained area near the west end of the site. Otherwise, the varieties do not overlap significantly at any of the known locations.

I.6.B.1.a.

Koppen climate classification: Type Dfb (cool temperate climate, with numerous summer thunderstorms) (Visher 1954).

I.6.B.1.b.

Regional macroclimate: The climate of southwestern Montana can generally be classified as dry and cool, although greater amounts of precipitation occur in the mountains. For the distributional area of C.

lanceolata var. flava in Montana, the nearest climatological stations are located at East Anaconda (1680 m. (5511 ft.)), Divide (1648 m. (5406 ft.)), and West Yellowstone (2031 m. (6662 ft.)). Data for the period 1951-1980 are provided by the U.S. Department of Commerce (1982). At East Anaconda, the mean annual precipitation was 35.15 cm. (13.84 in.); the mean annual temperature was 5.78°C (42.4°F), the mean January minimum was -9.72°C (14.5°F), and the mean July maximum was 25.94°C (78.7°F). At Divide, the mean annual precipitation was 31.47 cm. (12.39 in.); the mean annual temperature was 4.83°C (40.7°F), the mean January minimum was -13.06°C (8.5°F), and the mean July maximum was 26.33°C (79.4°F). These two stations are at considerably lower elevations than the nearby sites; the sites are thus expected to be cooler and moister than these recorded figures. The West Yellowstone station is at nearly the same elevation as the site near Hebgen Lake, which is approximately 6 air miles to the west-northwest. The mean annual precipitation was 56.74 cm. (22.34 in.); the mean annual temperature was 1.61°C (34.9°F), the mean January minimum was -17.83°C (-0.1°F), and the mean July maximum was 26.33°C (79.4°F).

I.6.B.4.

Physiographic and topographic characteristics: In Montana, populations of C. lanceolata var. flava are found in level to gently sloping areas that vary from approximately zero to ten percent slope. It was found on all aspects. Although found throughout the meadows and swales where it occurs, C. lanceolata var. flava is particularly abundant in depressions in these habitats, especially at the Hebgen Lake (004) site.

I.6.B.5.

Edaphic factors: In Montana, the areas occupied by C. lanceolata var. flava are generally comprised of heavy clay loam soils. These soils are poorly drained, owing to the clayey soil textures and gentle topography of the sites. Also, snow accumulation is deep, and snowmelt is often relatively late, in these high meadows. This results in soil saturation through the early growing season.

Claytonia lanceolata var. flava does not appear to be restricted to soils derived from

specific parent materials. The rock types associated with the sites range from volcanic to sedimentary in origin (Veseth and Montagne 1980). The Lockhart Meadows (001) site is in an area of Udic/Ustic-Frigid/Cryic Inceptisols (moderately sloping soils on mountains); the French Creek (002) site is in an area of Ustic-Cryic Mollisols (nearly level to steep soils on fans, benches, and terraces); the Vipond Park (003) site is in an area of Udic/Ustic-Frigid/Cryic Mollisols-Inceptisols-Alfisols (gently sloping soils on mountains); the Hebgen Lake (004) site is in an area of Udic-Frigid/Cryic Inceptisols-Entisols (nearly level soils on outwash terraces); and the Burton Park (005) site is in an area of Udic-Cryic Inceptisols-Alfisols (moderately sloping soils on mountains) (Montagne *et al.* 1982).

I.6.C.2. Regional vegetation types: In Montana, within the Silty Range Site and Subalpine Fir and Douglas-fir Climax Forest zones mapped by Ross and Hunter (1976), and the Rocky Mountain Forest Province, Douglas-fir Forest Section mapped by Bailey (1976).

I.6.C.3. Frequently associated species: Associated species observed in Montana in 1988 include:

Agropyron caninum (slender wheatgrass)
Arabis nuttallii (Nuttall's rockcress)
Artemisia cana (silver sagebrush)
Camassia quamash (common camas)
Danthonia intermedia (timber danthonia)
Deschampsia cespitosa (tufted hair-grass)
Dodecatheon conjugens (slimpod shooting star)
Festuca scabrella (rough fescue)
Geum triflorum (old man's whiskers)
Lomatium cous (Cous biscuit root)
Lomatium longiflora (small bluebells)
Microseris nigrescens (black-hairy microseris)
Polygonum bistortoides (American bistort)
Potentilla diversifolia (diverse-leaved cinquefoil)
Potentilla fruticosa (shrubby cinquefoil)
Ranunculus alismaefolius (dwarf plainleaf buttercup)
Saxifraga rhomboidea (diamondleaf saxifrage)
Senecio foetidus (sweet-marsh butterweed)
Wyethia helianthoides (whiteheaded wyethia)

- I.6.C.4.** **Dominance and frequency of the taxon:** In Montana, the populations of C. lanceolata var. flava are all very extensive, and consist of patchily distributed colonies. The plants vary in density from sparse to locally common. The greatest percent cover observed was approximately 20-30%.
- I.6.C.5.** **Successional phenomena:** The moist meadow habitats occupied by C. lanceolata var. flava appear to be climax vegetation types, which vary in condition from fair to good depending on the extent of impacts from livestock grazing.
- I.6.C.6.** **Dependence on dynamic aspects of biotic associations and ecosystem features:** The habitats occupied by C. lanceolata var. flava appear to be stable, level to gently-sloping montane meadows.
- I.7.B.1.** **Demography - known populations:** Seven populations of C. lanceolata var. flava have been located. All five populations of C. lanceolata var. flava in Montana are very large. The number of plants at each site was roughly estimated in 1988. They range in size from 10,000+ to 35,000+ individuals. The populations are typically subdivided into patchily distributed large colonies, spread over extensive areas. The element occurrence records for each of these populations are included in Appendix A, pp. 32-37.
- I.7.B.2.** **General demographic details.**
- a. Lockhart Meadows (Champion Pass)**
1. **Area:** Numerous large colonies over ca. 600 acres of extensive meadow.
 2. **Number and size of plants:** Ca. 30,000-35,000+ plants.
 3. **Density:** Sparse to locally common.
 4. **Presence of dispersed seeds:** Unknown.
 5. **Evidence of reproduction:** Presence of flowering plants.
 6. **Evidence of expansion/contraction:** None.

b. French Creek (Anaconda)

1. **Area:** Seven major subpopulations, over ca. 800 acres.
2. **Number and size of plants:** Ca. 10,000-20,000+ plants.
3. **Density:** Sparse to abundant.
4. **Presence of dispersed seeds:** Unknown.
5. **Evidence of reproduction:** Presence of flowering plants.
6. **Evidence of expansion/contraction:** None.

c. Vipond Park

1. **Area:** Ca. 800 acres.
2. **Number and size of plants:** Ca. 10,000+ plants.
3. **Density:** Sparse to common.
4. **Presence of dispersed seeds:** Unknown.
5. **Evidence of reproduction:** Presence of flowering plants.
6. **Evidence of expansion/contraction:** None.

d. Hebgen Lake

1. **Area:** Two main subpopulations, ca. 1200 acres.
2. **Number and size of plants:** Ca. 15,000-20,000+ plants.
3. **Density:** Sparse to common.
4. **Presence of dispersed seeds:** Unknown.
5. **Evidence of reproduction:** Presence of flowering plants.
6. **Evidence of expansion/contraction:** None.

e. Burton Park

1. **Area:** Six subpopulations, ca. 200 acres total area.
2. **Number and size of plants:** Ca. 16,100 plants.
3. **Density:** Sparse to common.
4. **Presence of dispersed seeds:** Unknown.
5. **Evidence of reproduction:** Presence of flowering plants.
6. **Evidence of expansion/contraction:** None.

- I.7.C.1. Phenology patterns:** In Montana, C. lanceolata var. flava begins flowering in early May. Peak flowering at most sites occurs in mid- to late May, and may extend into early June. The latest observed flowering date was in the first week of July at Vipond Park (003), the highest elevation site in Montana (2500 m. (8200 ft.)).
- The flowers of C. lanceolata var. flava are open only during the day; they close completely one to two hours before sunset, and open in the morning as the temperature rises.
- I.7.D.1. Type of reproduction:** Claytonia lanceolata var. flava appears to reproduce by sexual production of seeds; these give rise to plants with deep-seated corms. Vegetative spread by growth or splitting of the corms was not observed in specimens collected during field surveys in 1988.
- I.7.D.2. Pollination:** The details are unknown, but it is possible that C. lanceolata var. flava is predominantly self-pollinating; as discussed, the flowers close in the late afternoon, and open again with warming during the morning. This corolla closure is tight enough that self-pollination may occur as a result of the anthers being pressed toward the stigma. However, insects (small bees) were observed visiting the flowers at the French Creek site on 18 May 1988; it is possible that some pollination results from such activity.
- I.7.D.3. Seed dispersal:** Details unknown; the seeds of these perennial Claytonia taxa are relatively large, and it is likely that dispersal does not extend far from the parental plants.
- I.7.D.4. Seed biology:** The large seed size in C. lanceolata is possibly an adaption allowing for efficient germination and corm establishment in the dense associated vegetation of the meadow habitats.
- I.7.D.7. Overall assessment of reproductive success:** All populations in Montana are extensive, and currently appear to be stable. No evidence of serious population declines was observed.

- I.8.A.** **General summary of population ecology:**
Although it occurs in dense vegetation, C. lanceolata var. flava is relatively frequent within the known habitats. Its early season of growth and reproduction, prior to vigorous growth by associated species, may allow for more efficient growth and reproduction of mature plants, as well as efficient seedling germination and establishment. However, the taxon does not appear to readily invade disturbed, open soil habitats, such as roadbanks or gravel pits.
- I.8.C.1.** **Herbivores, predators, pests, etc., affecting the taxon:** During surveys in 1988, it did not appear that the habitats occupied by C. lanceolata var. flava had been influenced by recent heavy grazing by domestic livestock. Much of the occupied habitat at three sites (Lockhart Meadows (001), Hebgen Lake (004), and Burton Park (005)) is privately owned, and grazing appeared to be mainly restricted to these inholdings. Also, most grazing probably occurs primarily after the flowering and fruiting times for the taxon. Thus, it does not appear that serious impacts from livestock grazing are occurring under present management practices. However, potential impacts to the habitats later in the growing season should be assessed, to determine if grazing use is influencing soil erosion patterns or resulting in weed invasion.
- I.8.D.** **Hybridization:** The preliminary results of systematic studies indicate that C. lanceolata var. flava is specifically distinct. In addition, it was found that it may be either white- or yellow-flowered. In only one case was an individual found with intermediate, cream-colored corollas (Hebgen Lake (004)); this suggests the possibility of limited gene flow between the two color forms. The color morphs may be genetic forms that differ with respect to only one or a few genes. Also, no molecular or morphological evidence was observed that indicates hybridization between vars. lanceolata and flava.
- I.9.A.** **General nature of land ownership (Montana):**
U.S.D.A. Forest Service, U.S.D.I. Bureau of Land Management, State of Montana, private.

I.9.B.

Specific landowners:

1. U.S.D.A. FOREST SERVICE:
 - i. Beaverhead National Forest, Wise River Ranger District:
 - French Creek (002) - portion
 - Vipond Park (003) - all
 - ii. Deerlodge National Forest:
 - Jefferson Ranger District:
 - Lockhart Meadows (001) - portion
 - Butte Ranger District:
 - Burton Park (005) - portion
 - iii. Gallatin National Forest, Hebgen Lake Ranger District:
 - Hebgen Lake (004) - portion
2. U.S.D.I. BUREAU OF LAND MANAGEMENT:
 - i. Butte District Office, Headwaters Resource Area:
 - French Creek (002) - portion
3. STATE OF MONTANA:
 - i. Department of Fish, Wildlife and Parks, Mt. Haggin Game Management Area:
 - French Creek (002) - portion
 - ii. Department of State Lands:
 - French Creek (002) - portion
4. PRIVATE OWNERSHIP (PARTIAL):
 - Lockhart Meadows (001)
 - Hebgen Lake (004)
 - Burton Park (005)

I.10.

Management practices and experience: No detailed information is available regarding the response of C. lanceolata var. flava to

management practices (grazing, habitat alteration through road construction or mining). Because the taxon blooms and fruits early in the growing season, and persists as deep-seated corms approximately six to twelve cm. beneath the soil surface, impacts from grazing later in the season are not expected to be intense. Once uprooted or exposed by major soil disturbance or erosion, however, it is not expected that the corms would survive. Also, no evidence was found during field surveys to indicate that C. lanceolata var. flava is capable of aggressively invading disturbed areas such as roadbanks or rock pits; it appears to be adapted to undisturbed, moist montane grasslands and herb meadows.

I.11.A.3.

Potential threatened destruction, modification, or curtailment of habitat or range: Based on field observations in 1988, the five known populations of Claytonia lanceolata var. flava currently appear to be stable. They are large, and cover extensive areas. However, the sites are potentially threatened by several land uses, including: 1.) road construction, 2.) mining, and 3.) recreational use. Potential impacts from grazing and timber harvesting are possible, but it does not appear that these threats are imminent. The sites that may potentially be influenced by these activities are reviewed below:

1. **ROAD CONSTRUCTION:** All known sites could potentially be impacted by further road construction, and/or maintenance of existing routes. The habitats of all five populations are partially bisected by major U.S. Forest Service access routes. If more roads are constructed, it is expected that additional portions of the sites would be eliminated. The site where potential road construction seemed to be most imminent is Vipond Park (003); the potential for increased mining activity in this area (discussed below) might result in the construction of new roads in the meadow habitats.

2. **MINING:** The site that could be most impacted by this activity is Vipond Park (003). Nearby areas in Quartz Hill Gulch (Daisy Vein, Great Western, Knoby, and Lone Pine mines) have been extensively mined in the past. In addition, test pits and claim stakes are located in the sparsely forested areas just north of the site along the Quartz Hill Gulch road (east side of Gray Jockey Peak). The increase in mining activity throughout western Montana, especially for gold, may result in expanded exploration in the Vipond Park area, and future mining operations should take this population of C. lanceolata var. flava into consideration. The four other populations do not appear to be threatened by existing or potential mining at this time.
3. **RECREATIONAL USE:** Recreational use of areas in Vipond Park (003) poses potential threats to the C. lanceolata var. flava population in the meadows. Off-road vehicle disturbance was noticeable; a number of jeep trails have been formed in the turf of the meadows, and these trails are deeply rutted in many places. The main time period for this use appears to be during the spring, when off-road travel to avoid snow drifts and puddles is frequent, and also possibly during the fall hunting season. Long-term use of the trails may eventually result in local soil compaction or erosion, which could have an impact on the corms of the plants. Portions of the Lockhart Meadows (001) population are traversed by Deerlodge N.F. Rd. #82, and some plants were probably destroyed during construction. Much of the meadow habitat at this site is privately owned, however, and it did not appear to be seriously impacted by off-road vehicle use at the present time. The French Creek (002) site is traversed by State

Highway 274, and in part by Beaverhead N.F. Rd. #1000 and other little-used jeep trails. The Hebgen Lake (004) site is traversed in part by Gallatin N.F. Rd. #167, which serves as a major access route to the lake. However, most of the habitat area near Hebgen Lake is privately owned ranch land. Serious off-road impacts were not observed at either of the latter two sites.

II.12.

General assessment of vigor, trends, and status: Claytonia lanceolata var. flava is a regional endemic currently known from seven sites in the northern Rocky Mountains: five locations in southwestern Montana (Beaverhead, Deer Lodge, Gallatin, Jefferson, and Silver Bow counties), one location in Idaho (Fremont County), and one location in Wyoming (Fremont County). Field surveys in Montana in 1988 resulted in the rediscovery of two historical locations (Lockhart Meadows (Champion Pass) and French Creek (Anaconda)), and the discovery of one previously unrecorded site (Burton Park). Surveys of the two recently discovered sites (Vipond Park (003) and Hebgen Lake (004)) showed them to be more extensive than previously documented. All five populations in Montana occur wholly or partially on U.S. Forest Service lands. Systematic studies, which are currently in progress, indicate that C. lanceolata var. flava is very distinct from C. lanceolata var. lanceolata, evidently at the species level. Final results will be provided when available. The five known populations of C. lanceolata var. flava in Montana are all very large, and currently appear to be stable. However, potential impacts resulting from road construction, mining, and recreational use should be closely monitored.

II.13.A.

Recommendation to U.S. Fish and Wildlife Service: On the basis of information obtained from field surveys and ongoing systematic studies, it is recommended that C. lanceolata var. flava be retained in Category 2. Since the taxon appears to be specifically distinct, and is currently known globally from only seven sites, its conservation remains important. Detailed

population monitoring studies are recommended, in order to more accurately assess trends at the known sites. Also, the observed genetic differentiation among five of the seven known populations increases the importance of protection of all known sites, in order to preserve the full range of genetic adaptation possessed by the taxon (Wolf 1988; see Appendix B, p. 38).

II.13.B. **Recommendations to other U.S. federal agencies:** Claytonia lanceolata var. flava has been placed on the list of sensitive plant species in Region 1 of the U.S. Forest Service; it is recommended that it be retained on this list.

II.14.A. **Recommended critical habitat:** Critical habitat is not being recommended at this time, as the taxon should be retained in Category 2 pending monitoring studies and final publication of its systematic status.

II.15.A. **Conservation/recovery recommendations:** The following recommendations have been made to the U.S. Forest Service (Shelly 1989):

1. Protection of natural habitats which currently support populations. All known populations occur, wholly or partially, on U.S. Forest Service lands. They should be considered in any habitat alteration projects that may occur in their vicinity. If disturbance is proposed within or near the population areas, detailed surveys should be conducted, and mitigation measures developed to reduce or eliminate project impacts. The most likely impacts may be from increased mining activity in the Vipond Park area in the Pioneer Mountains.

It should be noted that the electrophoretic analysis revealed genetic differentiation among populations of C. lanceolata var. flava (see Appendix B, p. 38). Thus, it will be important to maintain all known populations, in order to protect the full range of genetic variation within the taxon.

2. Notification of weed control and road maintenance crews, range conservationists, and all other appropriate U.S. Forest Service personnel, of population locations. Maps detailing the site locations should be

provided to all such personnel, to aid in reducing or eliminating unnecessary impacts to these areas.

3. Monitoring of early-season livestock grazing in native habitats. As noted above, grazing does not currently appear to pose a threat to the known populations. However, changes in grazing use patterns, especially in the Vipond Park area, should be closely monitored if early season use is planned.

II.15.B. Monitoring activities and further research recommended:

1. Further field surveys in potential habitats in southwestern Montana. Although likely montane grassland habitat was surveyed in the vicinity of Fleecer Mountain, Elk Park, the southeast flank of the Anaconda-Pintlar Range, and along the Continental Divide north of Butte, there are other areas of potential occurrence in southwestern Montana. The areas most likely to contain additional habitat occur in the Gravelly Range; large meadow areas are visible in the southern part of the range from the vicinity of Reynolds Pass. Though less likely to contain large, level meadow areas, potential habitat might also occur in the Tobacco Root, Madison, and Gallatin ranges. Also, it is likely that the taxon could be found in Yellowstone National Park (mainly in Wyoming); the area lies between known sites in southwestern Montana and northwestern Wyoming, and contains areas of extensive moist grasslands at high elevations.
2. Establishment of monitoring studies on U.S. Forest Service lands. Permanent belt transects, using the methods of Lesica (1987), may be useful in assessing any future impacts that might arise from grazing or mining activities.

II.16. Interested parties :

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 106 N. Parkmont
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 Butte, MT 59702

Montana Department of State Lands
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U.S. Forest Service, Region 1
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U.S. Fish and Wildlife Service
 ATTN: Dr. James Miller
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 Denver Federal Center
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The Nature Conservancy
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The Nature Conservancy
 ATTN: Dr. Joan Bird and Bernard Hall
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 P.O. Box 258
 Helena, MT 59624

III.17.A. **Publications:** List appended (p. 30).

III.17.B. **Herbarium collections consulted:** Specimens have been examined at the University of Montana (MONTU).

Voucher specimens from all Montana populations were collected, and will be deposited at the University of Montana (MONTU); most of these specimens are cited in the COMMENTS field of the element occurrence print-outs (Appendix A, pp. 32-37). The

following specimens, organized by occurrence number, were collected as vouchers for the morphological studies currently being completed:

MONTANA:

- 001: Shelly, J.S. (1417) (yellow-flowered)
Shelly, J.S. (1423) & P. Lesica (white-flowered)
- 002: Shelly, J.S. (1412) & P. Lesica (white-flowered)
Shelly, J.S. (1413) & P. Lesica (yellow-flowered)
- 003: Shelly, J.S. (1444) & K. Scow (yellow-flowered)
Shelly, J.S. (1445) & K. Scow (white-flowered)
- 004: Shelly, J.S. (1419) & P. Lesica (yellow-flowered)

WYOMING:

- Shelly, J.S. (1446) & P. Lesica (yellow-flowered)
- Shelly, J.S. (1447) & P. Lesica (white-flowered)

III.17.C.

Fieldwork: The following fieldwork was conducted in southwestern Montana, in support of status surveys and systematic studies summarized in this update:

J. Stephen Shelly (MTNHP) and Peter Lesica (University of Montana):

8, 17-18, 25-27 May; 4 June 1988

J. Stephen Shelly (MTNHP) and Ken Scow (WESTECH):

10 June 1988

Lisa A. Schassberger (MTNHP):

5-9 June 1988

Field survey forms and photographs were compiled, and voucher specimens were collected. Material for the electrophoretic analysis was collected by Shelly, Lesica and Scow, as well as morphological measurements from living plants.

III.17.D. Knowledgeable individuals:

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- III.18. Summary of materials on file:** All detailed field forms, maps and color slides are on file at the office of the Montana Natural Heritage Program. Herbarium vouchers for the five Montana populations will be deposited at the University of Montana Herbarium (MONTU).

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- Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1964. Vascular Plants of the Pacific Northwest, Part 2. University of Washington Press, Seattle. 597 pp.
- Lesica, P., G. Moore, K.M. Peterson, and J.H. Rumely. 1984. Vascular Plants of Limited Distribution in Montana. Monograph No. 2, Montana Academy of Sciences, Supplement to the Proceedings, Vol. 43. 61 pp.
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- Veseth, R., and C. Montagne. 1980. Geologic Parent Materials of Montana Soils. Montana Agricultural Experiment Station, Montana State University, Bulletin 721. 117 pp.
- Visher, S.S. 1954. Climatic Atlas of the United States. Harvard Univ. Press, Cambridge, Massachusetts. 403 pp.
- Wolf, P.G. 1988. Analysis of electrophoretic variation in Claytonia lanceolata vars. lanceolata and flava. Unpublished report to Montana Natural Heritage Program, Helena. 29 pp., appendices.

APPENDIX A: ELEMENT OCCURRENCE PRINT-OUTS

ELEMENT OCCURRENCE RECORD

OPCODE: PDPOR03092.001
 AAME: CLAYTONIA LANCEOLATA VAR FLAVA
 OMNAME: YELLOW SPRINGBEAUTY
 ARGNUM: 3 TENTEN: 8,1 IDENT: Y EORANK: A
 URVEYSITE: LOCKHART MEADOWS (CHAMPION PASS)
 ORANKCOMM: VERY EXTENSIVE POPULATION, IN FAIRLY UNDISTURBED AREA.
 URVEYDATE: 1988-06-04 LASTOBS: 1988-06-04 FIRSTOBS: 1966 GRANK: GST1
 RANK: S1 STATE: MT COUNTYNAME: MTJEFF
 UADCODE: 4611225
 UADNAME: BUTTE NORTH (15') PRECISION: SC
 AT: 461409 LONG: 1123325 S: 461228 N: 461455 E: 1123155 W: 1123341
 OWN RANGE: 006N008W SECTION: 35 MERIDIAN: PR TRSCOMM: NE4,25E2,26S
 4,36;+
 HYSPROV: NR WATERSHED: 10020006 RIVERREACH: 10020006 00.00
 DIRECTIONS: ALSO T6NR7W:30NW4,31SW4;T5NR8W:1,2NE4NE4. POWDERHORN CREEK
 AND LOCKHART MEADOWS, UPPER BOULDER RIVER DRAINAGE, 2.6-3.0
 AIR MILES ENE TO SOUTHEAST OF CHAMPION PASS.
 ENDESC: MOIST, POORLY DRAINED MONTANE MEADOWS; WITH DODECATHEON
 CONJUGENS, POLYGONUM BISTORTOIDES, POTENTILLA FRUTICOSA,
 RANUNCULUS ALISMAEFOLIUS.
 ELEV: 6550 SIZE: 600
 EODATA: EST. 30,000-35,000+ PLANTS, IN NUMEROUS LARGE COLONIES OVER
 EXTENSIVE MEADOW AREAS; PLANTS RANGING FROM MOSTLY YELLOW-
 FLOWERED TO CA. 2/3 WHITE-FLOWERED.
 COMMENTS: VOUCHERS-SHELLY, J.S. (1417), 1988, MONTU; PROBABLE
 RELOCATION OF TRASK, F. (377), 1966, MONT.
 1ACODE1: PRIVATEOWNMTUS CONTAINED1: N MACODE2: FFSNFDEER2MTUS CONTAINED2:
 N
 1ACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 1DREMGMT: B SITECODE:
 1SITENAME:
 1OWNER: PRIVATE; DEERLODGE N.F.
 1OWNERCOMM:
 1PROTCOMM:
 1MGMTCOMM:
 1MONITOR: MONITORNUM: -
 1BESTSOURCE: SCHAASSBERGER, L.A. 1988. FIELD SURVEYS IN JEFFERSON,
 MADISON, SILVERBOW, AND BEAVERHEAD COUNTIES.
 1SOURCECODE: F88SCH03MTUS PND8SCH02MTUS S88SHEUMMTUS PND8SHE01MTUS PNDLES01MTUS
 U85LES02MTUS S66TRAMTMTUS
 1DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 1TRANSCRIBR: 88-08-09 JSS CDREV: Y MAPPER: 88-08-09 JSS QC: Y
 1UPDATE: 88-08-09 JSS

ELEMENT OCCURRENCE RECORD

OPCODE: PDPOR03092.002
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMMONNAME: YELLOW SPRINGBEAUTY
 ARGNUM: 4 TENTEN: 7,5 IDENT: Y EORANK: A
 SURVEYSITE: FRENCH CREEK (ANACONDA)
 EORANKCOMM: VERY LARGE POPULATION, AREA FAIRLY UNDISTURBED.
 SURVEYDATE: 1988-05-17 LASTOBS: 1988-05-18 FIRSTOBS: 1911 GRANK: G5T1
 GRANK: S1 STATE: MT COUNTYNAME: MTDEER
 QUADCODE: 4511381
 QUADNAME: LINCOLN GULCH PRECISION: SC
 LAT: 455641 LDNG: 1130225 S: 455607 N: 455832 E: 1130032 W: 1130330
 DOWNRANGE: 002N012W SECTION: 12 MERIDIAN: PR TRSCOMM: NW4,1,2,11;+

PHYSPROV: NR WATERSHED: 10020004 RIVERREACH: 1701020104500.00
 DIRECTIONS: ALSO T3NR11W:31;T3NR12W:25,35,36. FRENCH AND CALIFORNIA
 CREEKS, MT. HAGGIN WILDLIFE MANAGEMENT AREA, ALONG HWY. 274
 CA. 17.5-20 MILES SSW OF ANACONDA.

DESC: MOIST MONTANE GRASSLANDS; WITH DESCHAMPSIA CESPITOSA,
 DANTHONIA INTERMEDIA, DODECATEON CONJUGENS, POLYGONUM
 BISTORTOIDES, POTENTILLA DIVERSIFOLIA, LOMATIUM COUS.

ELEV: 6500 SIZE: 800
 ECODATA: CA. 10,000-20,000+ INDIVIDUALS, IN SEVEN AREAS; YELLOW
 PLANTS OCCUR MIXED WITH WHITE ONES, IN VARYING RATIOS FROM
 ALL YELLOW TO 1:100+ YELLOW:WHITE, THROUGHOUT THE AREA; SITE
 PROBABLY SAME AS ORIGINAL "ANACONDA" RECORDS - SEE GMF, EF.

COMMENTS: VOUCHERS-SHELLY, J.S. (1413) & P. LESICA, 1988, MONTU;
 ALBRIGHT (807), 1911, MONT; BLANKINSHIP (768), POM.

MACODE1: SFWMMTHA1MTUS CONTAINED1: N MACODE2: FBLDOBUTT4MTUS CONTAINED2:
 N
 MACODE3: FFSNFBEAV2MTUS CONTAINED3: N ADLMAS: Y MORELAN: MOREPROT:
 MOREMGMT: B SITECODE:

SITENAME:
 OWNER: STATE OF MONTANA, BLM, USFS
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM: -

BESTSOURCE: SHELLY, J.S. 1988. FIELD SURVEYS IN SOUTHWESTERN MONTANA OF
 8 MAY, 17-18 MAY, 25-27 MAY, 4 & 10 JUNE.

SOURCECODE: F88SHE01MTUS PND8SHE01MTUS PNDLES01MTUS S88SHEUMMTUS PND8CAM01MTUS
 S11ALBMTMTUS

DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIBR: 88-08-03 JSS CDREV: Y MAPPER: 88-08-03 JSS QC: Y
 UPDATE: 88-12-01 JSS

ELEMENT OCCURRENCE RECORD

ECODE: PDPOR03092.003
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMNAME: YELLOW SPRINGBEAUTY
 MARGNUM: 3 TENTEN: 4,3 IDENT: Y EORANK: AB
 SURVEYSITE: VIPOND PARK
 EORANKCOMM: ROADS, MINING ACTIVITIES AND GRAZING ARE POTENTIAL THREATS.
 SURVEYDATE: 1988-06-07 LASTOBS: 1988-06-10 FIRSOBS: 1982 GRANK: G5T1
 SRANK: S1 STATE: MT COUNTYNAME: MTBEAV
 QUADCODE: 4511268
 QUADNAME: VIPOND PARK (15) PRECISION: SC
 LAT: 454154 LONG: 1125508 S: 453943 N: 454207 E: 1125320 W: 1125607
 TOWNRANGE: 0025011W SECTION: 02 MERIDIAN: PR TRSCOMM: 1N2,11W2,S2S
 E4,+
 PHYSPROV: NR WATERSHED: 10020004 RIVERREACH: 1002000415600.00
 DIRECTIONS: ALSO 12SW4SW4,13NW4,14N2;T1SR11W:35SE4. PIONEER MOUNTAINS,
 CA. 8 MILES SOUTH OF DEWEY, UP QUARTZ HILL GULCH RD. TO
 VIPOND PARK; EAST OF ROAD.
 GENDESC: OPEN PARK LAND, WITH LATE SNOWMELT AND POOR DRAINAGE; WITH
 POTENTILLA FRUTICOSA, POLYGONUM BISTORTOIDES, RANUNCULUS
 ALISMAEFOLIUS, GEUM TRIFLORUM, MERTENSIA LONGIFLORA.
 ELEV: 8200 SIZE: 800
 EODATA: CA. 10,000+ PLANTS; MIXED YELLOW AND WHITE, GRADING TO WHITE
 ONLY TO THE SOUTH; RELOCATION OF 1982 SITING BY K. SCOW.

COMMENTS: VOUCHER-SCHASSBERGER, L.A. (206), 1988, MONTU; SCOW, K.
 (S.N.), 1982, WESTECH (HELENA, MT).

MACODE1: FFSNFBEAV2MTUS CONTAINED1: Y MACODE2: CONTAINED2:
 MACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 MOREMGMT: B SITECODE:
 SITENAME:
 OWNER: BEAVERHEAD NATIONAL FOREST
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM:
 BESTSOURCE: SCHASSBERGER, L.A. 1988. FIELD SURVEYS IN JEFFERSON,
 MADISON, SILVERBOW, AND BEAVERHEAD COUNTIES.
 SOURCECODE: F88SCH03MTUS PND8SCH02MTUS S88SCHUMMTUS PND8SHE01MTUS PND8SC01MTUS
 S88SHEUMMTUS S82SC0WMTUS
 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIBR: 88-08-03 LAS CDREV: Y MAPPER: 88-08-09 JSS OC: Y
 UPDATE: 88-12-01 JSS

ELEMENT OCCURRENCE RECORD

LOCODE: PDPDR03092.004
 NAME: CLAYTONIA LANCEOLATA VAR FLAVA
 COMMONNAME: YELLOW SPRINGBEAUTY
 ARGNUM: 1 TENTEN: 2,2 IDENT: Y EORANK: B
 SURVEYSITE: HEBGEN LAKE
 RORANKCOMM: EXTENSIVE OCCURRENCE, BUT HABITAT ALTERED IN MANY LOCATIONS.
 SURVEYDATE: 1988-05-26 LASTOBS: 1988-05-27 FIRSTOBS: 1986 GRANK: G5T1
 GRANK: S1 STATE: MT COUNTYNAME: MTGALL
 QUADCODE: 4411162
 QUADNAME: MADISON ARM PRECISION: SC
 LAT: 444338 LONG: 1111359 S: 444136 N: 444342 E: 1111240 W: 1111415
 DOWNRANGE: 013S04E SECTION: 03 MERIDIAN: PR TRSCOMM: SW4,4SE4,9NE
 1,10N2,+
 HYSPROV: MR WATERSHED: 10020007 RIVERREACH: 1002000707000.00
 DIRECTIONS: ALSO 14NW4,15,23NW4. SOUTH OF HEBGEN LAKE, WEST SIDE OF
 MADISON VALLEY, CA. 0.5-3 AIR MILES SOUTH OF LONESOMEHURST
 CAMPGROUND, EAST AND SOUTH OF HEBGEN LAKE RD. (#167).
 SENDESC: MOIST GRASSLANDS, IN LOAM AND CLAY LOAM SOILS; WITH WYETHIA
 HELIANTHOIDES, CAMASSIA QUAMASH, POLYGONUM BISTORTOIDES,
 POTENTILLA FRUTICOSA, ARTEMISIA CANA, DODECATHEON.
 ELEV: 6550 SIZE: 1200
 EODATA: EST. 15,000-20,000+ INDIVIDUALS, IN TWO MAIN AREAS; PLANTS
 VIRTUALLY ALL YELLOW-FLOWERED, WITH ONLY A FEW WHITE-
 FLOWERED INDIVIDUALS OBSERVED (POPULATION UNUSUAL IN THIS
 RESPECT).
 COMMENTS: VOUCHERS-SHELLY, J.S. (1419) & P. LESICA, 1988, MONTU;
 NIXON, J. (1), 1987, MONT.
 1ACODE1: PRIVATEOWNMTUS CONTAINED1: N MACODE2: FFSNFGALL7MTUS CONTAINED2:
 N
 1ACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 MOREMGMT: B SITECODE:
 SITENAME:
 OWNER: PRIVATE; GALLATIN N.F.
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM:
 BESTSOURCE: SHELLY, J.S. 1988. FIELD SURVEYS IN SOUTHWESTERN MONTANA OF
 8 MAY, 17-18 MAY, 25-27 MAY, 4 & 10 JUNE.
 SOURCECODE: F88SHE01MTUS PND8SHE01MTUS PNDLES01MTUS S88SHEUMTUS PNDNIX01MTUS
 S87NIXMTMTUS
 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIBR: 88-08-05 JSS CDREV: Y MAPPER: 88-08-05 JSS QC: Y
 UPDATE: 88-08-08 JSS

ELEMENT OCCURRENCE RECORD

ECODE: PDPOR03092.005
 NAME: CLAYTONIA LANCEDATA VAR FLAVA
 COMNAME: YELLOW SPRINGBEAUTY
 MARGNUM: 4 TENTEN: 7,8 IDENT: Y EORANK: A
 SURVEYSITE: BURTON PARK
 EORANKCOMM: LARGE, REPRESENTATIVE POPULATION; ALL WHITE-FLOWERED.
 SURVEYDATE: 1988-06-05 LASTOBS: 1988-06-05 FIRSTOBS: 1988 GRANK: G5T1
 BRANK: S1 STATE: MT COUNTYNAME: MTSILV
 QUADCODE: 4511275
 QUADNAME: BUTTE SOUTH (15) PRECISION: SC
 LAT: 454840 LONG: 1123447 S: 454746 N: 454913 E: 1123345 W: 1123652
 TOWNRANGE: 001N008W SECTION: 27 MERIDIAN: PR TRSCOMM: SW4NE4,NE4NW
 4,E2SE4+
 PHYSPROV: NR WATERSHED: 10020004 RIVERREACH:
 DIRECTIONS: ALSO 22S2SW4,26SW4SW4,35NW4NW4,20E2SE4. HIGHLAND MOUNTAINS,
 BURTON PARK AND UPPER NORTH FORK TUCKER CREEK, CA. 12 AIR
 MILES SSW. OF BUTTE; ALONG HIGHLAND RD. (N.F. RD. #84).
 GENDESC: LARGE LEVEL MEADOW, WITH POTENTILLA FRUTICOSA, DODECATHEON
 CONJUGENS, POLYGONUM BISTORTOIDES, GEUM TRIFLORUM.
 ELEV: 6880 SIZE: 200
 EODATA: CA. 16,100 PLANTS IN 6 SUBPOPULATIONS; ONLY WHITE-FLOWERED
 PLANTS OBSERVED.
 COMMENTS: VOUCHER-SCHASSBERGER, L.A. (204). 1988. MONTU.
 MACODE1: PRIVATEOWNMTUS CONTAINED1: N MACODE2: FFSNFDEER4MTUS CONTAINED2:
 N
 MACODE3: CONTAINED3: ADLMAS: MORELAN: MOREPROT:
 MOREMGMT: SITECODE:
 SITENAME:
 OWNER: PRIVATE; DEERLODGE N.F.
 OWNERCOMM:
 PROTCOMM:
 MGMTCOMM:
 MONITOR: MONITORNUM:
 BESTSOURCE: SCHASSBERGER, L.A. 1988. FIELD SURVEYS IN JEFFERSON,
 MADISON, SILVER BOW AND BEAVERHEAD COUNTIES, 5-9 JUNE.
 SOURCECODE: FB8SCH03MTUS PND5SCH02MTUS 588SCHUMMTUS
 DATASENS: N BOUNDARIES: Y PHOTOS: Y OWNERINFO:
 TRANSCRIBR: 88-12-13 LAS CDREV: Y MAPPER: 88-12-13 LAS QC: N
 UPDATE: 88-12-14 JSS

APPENDIX B.

Summary of genetic differences amongst populations of Claytonia lanceolata vars. flava and lanceolata, as determined by electrophoresis (analysis conducted by Dr. Doug Soltis' laboratory, Department of Botany, Washington State University). Populations are labeled as follows:

1.) Variety flava (yellow and white forms):

Lockhart Meadows (001) - CHAMPION YELLOW
 CHAMPION WHITE

French Creek (002) - ANACON YELLOW
 ANACON WHITE

Vipond Park (003) - VIPOND YELLOW
 VIPOND WHITE

Hebgen Lake (004) - HEBGEN YELLOW

Wyoming - WYOMING YELLOW
 WYOMING WHITE

2.) Variety lanceolata:

Raynolds Pass - HEBGEN LANCEOL

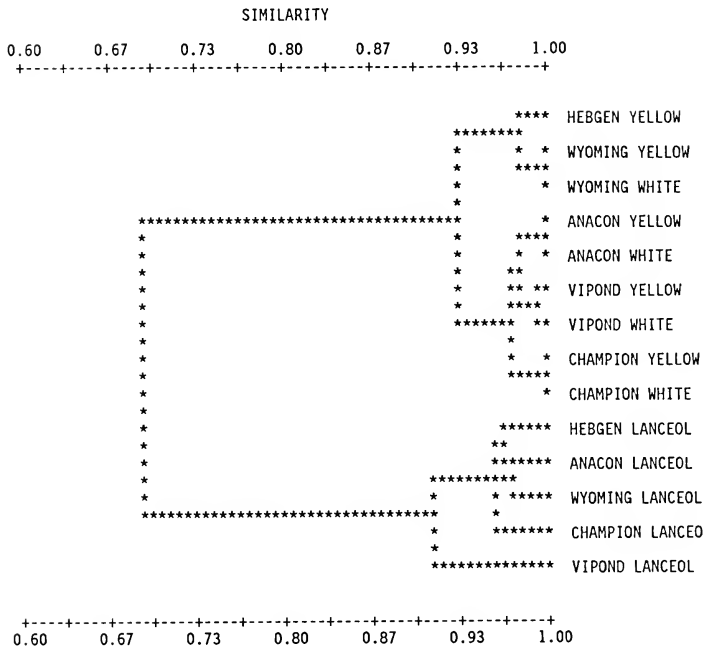
French Creek - ANACON LANCEOL

Champion Pass - CHAMPION LANCEOL

Vipond Park - VIPOND LANCEOL

Wyoming (Togwotee Pass) - WYOMING LANCEOL

PHENOGRAM OF NEI'S GENETIC IDENTITY RELATIONSHIPS
 AMONG POPULATIONS OF CLAYTONIA LANCEOLATA





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