

FIELD INVESTIGATION OF ERYTHRONIUM GRANDIFLORUM VAR. NUDIPETALUM  
(BEAR VALLEY FAWN LILY)  
ON THE BOISE AND CHALLIS NATIONAL FORESTS

by

Michael Mancuso and Robert K. Moseley

Idaho Conservation Data Center  
Nongame and Endangered Wildlife Program

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Idaho Department of Fish and Game  
600 South Walnut, P.O. Box 25  
Boise, Idaho 83707  
Jerry M. Conley, Director

Cooperative Challenge Cost-share Project  
Challis National Forest  
Idaho Department of Fish and Game

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## ABSTRACT

A field investigation of Erythronium grandiflorum var. nudipetalum (Bear Valley fawn lily) was conducted on the Challis and Boise National Forests by the Idaho Department of Fish and Game's Conservation Data Center (formerly the Idaho Natural Heritage Program). The investigation was a cooperative Challenge Cost-share project between the Department and the Challis NF. Bear Valley fawn lily is endemic to the Bear Valley area of central Idaho (Valley County). It is a category 2 candidate for federal listing.

Prior to our 1991 investigation, this species was known from only a couple of historical collections, and one reported find in 1990. We documented eleven populations in 1991, including the probable relocation of the historical collection sites. All of these occurrences are fully or partly on the Boise NF. Part of one population (Poker/Ayers Meadows) occurs in the Frank Church River of No Return Wilderness, on land administered by the Challis NF.

Bear Valley fawn lily was found to be locally common in the well-drained portions of the extensive meadow complexes that are characteristic of the Bear Valley area. To a smaller extent it occurs in forest openings, including occasionally along roadways. The level and pattern of current land management activities appears compatible with the species long-term viability, and no special management directives are recommended. In light of the new information discussed in this report, we recommended the U.S. Fish and Wildlife Service drop Bear Valley fawn lily as a conservation concern.

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## INTRODUCTION

The National Forest Management Act and Forest Service policy require that Forest Service land be managed to maintain populations of all existing native animal and plant species at or above the minimum viable population level. A minimum viable population consists of the number of individuals, adequately distributed throughout their range, necessary to perpetuate the existence of the species in natural, genetically stable, self-sustaining populations.

The Forest Service, along with other Federal and State agencies, has recognized the need for special planning considerations in order to protect the flora and fauna on the lands in public ownership. Species recognized by the Forest Service as needing such considerations are those that (1) are designated under the Endangered Species Act as endangered or threatened, (2) are under consideration for such designation, or (3) appear on a regional Forest Service sensitive species list.

Erythronium grandiflorum var. nudipetalum (Bear Valley fawn lily) is locally endemic to the Bear Valley area in the southern Salmon River Mountains of central Idaho. Bear Valley fawn lily is a category 2 candidate for federal listing (U.S. Fish and Wildlife Service 1990), but has never been designated as a Forest Service Sensitive Species. A field investigation for Bear Valley fawn lily was initiated as a Cooperative Challenge Cost-share project between the Challis NF and the Idaho Department of Fish and Game's Conservation Data Center. During the course of the survey it became apparent that it would be necessary to search portions of the Boise NF to gain a comprehensive view of the species distribution and abundance. Towards this end, some Sawtooth National Recreation Area (NRA) and private ownership lands were also searched.

The primary objectives of this investigation was as follows:

- 1) Attempt to relocate historical population sites and search potential habitats for new occurrences of Bear Valley fawn lily on the Challis NF.
- 2) Attempt to gain an understanding of the species distribution and range.
- 3) Characterize habitat conditions for all populations found.
- 4) Assess population data on, and threats to existing populations and make management recommendations to the Challis NF based on these assessments.

## RESULTS

Between May 28 to 31 and June 5-6, 1991, Conservation Data Center botanists surveyed suitable-appearing habitat for Bear Valley fawn lily in the northern Sawtooth Mountains and southern Salmon River Mountains. The survey concentrated initially on lands administered by the Challis NF, but it became apparent that Boise NF land in Bear Valley needed to be surveyed to obtain a comprehensive view of the species distribution and abundance. Some Sawtooth NRA and private lands were also surveyed during this investigation.

Eleven populations of Bear Valley fawn lily were documented during the 1991 investigation. While there is a degree of uncertainty as to which occurrences, two of these populations are undoubtedly the same ones as the two historical sites from which Elmer Applegate (1933) first described the species. Populations can range from being relatively small and distinct, to very extensive and consisting of several groupings that can be viewed as a metapopulation (= a system of multiple separate populations, interconnected by small amounts of dispersal; see Murphy et al. 1990). Bear Valley fawn lily was confirmed to be endemic to the Bear Valley area, but is more or less common in this area. No long-term threats to its viability are apparent, and special conservation measures are unwarranted at this time.

The following is a detailed discussion of Bear Valley fawn lily, including information on its taxonomy and identification, range and habitat, conservation status, and recommendations to the Regional Forester, Challis NF, Boise NF, and U.S. Fish and Wildlife Service, concerning its status in Idaho.

Erythronium grandiflorum var. nudipetalum (Applegate) C.L. Hitchc.

CURRENT STATUS    USFS Region 4 - None  
                      USFWS - C2  
                      Idaho Native Plant Society - None  
                      Heritage Rank - G5T1S1

TAXONOMY

Family: Liliaceae [Lily]

Common Name: Bear Valley fawn lily

Citation: Contributions from the Dudley Herbarium of Stanford University. 1(3): 189. 1933.

Synonymy: Erythronium nudopetalum Applegate, Contrib. from the Dudley Herbarium of Stanford University 1(3): 1933.

Technical Description: Corm small and slender, about 4 cm long, 5 mm thick; mature scapes not more than 15 cm high; leaves commonly oblanceolate or sometimes lanceolate, rather narrow, acute, attenuate to the base without evident petiole, plain yellow-green; perianth segments less than 25 mm long 3-4 mm wide, narrowly lanceolate, acuminate, golden-yellow, the bases of the inner ones naked; filaments slender, thin attenuate, equalling the young anthers; these long, dark red or maroon; style slender, shorter than young stamens; stigma practically entire or occasionally obscurely lobed or toothed (Applegate 1933).

Nontechnical Description: Distinctive, early season, herbaceous, perennial wildflower, emanating from an underground stem (corm); flowering stems usually less than 15 cm high; with two opposite leaves that originate near or at the base and are basically without any leaf stalks (petiole), leaf shape is lance-shaped to reverse lance-shaped with margins typically rolled upward to wavy; flowers comprised of six similar-looking golden-yellow tepals, these reflexed and fully exposing the anthers and stigma at anthesis, the tepals fade whitish in age and are without any appendages; filaments are more slender than the anthers; anthers dark-red to maroon; style slender with an entire or minutely (usually less than 0.5 mm) lobed stigma.

Distinguishing Features and Similar Species: Bear Valley fawn lily is similar to the closely related and widespread Erythronium grandiflorum var. grandiflorum (fawn lily, dogtooth violet). Both are very distinctive and not readily confused with anything else found in Idaho's flora. A suite of characteristics helps distinguish Bear Valley fawn lily (variety nudipetalum) from the type variety (variety grandiflorum), and are presented below. Var. grandiflorum occurs in a broad range of montane to subalpine habitats, from dry sagebrush slopes to moist coniferous forest floors. This contrasts with var. nudipetalum which is restricted to the well-drained portions of meadow and forest openings in the subalpine habitats of Bear Valley.

.....				
•			•	
•	variety <u>nudipetalum</u>	variety <u>grandiflorum</u>	•	
•			•	
•	stigma lobes	absent or < 0.5 mm	1-2(3) mm	•
•				•
•	anthers	red to maroon color	often cream-colored	•
•				•
•	tepala appendages	absent	present	•
•				•
•	leaf shape	relatively narrow,	relatively broad,	•
•		lance to reverse-	oblong-elliptic,	•
•		lance shaped, margins	margins flat	•
•		rolled upward to wavy		•
•				•
•	petioles	basically absent	present	•
.....				

In addition, variety grandiflorum is typically a taller plant and with its pair of basal leaves more ascending compared to variety nudipetalum.

In several Bear Valley fawn lily populations there exists a small percentage of individuals with stigma size greater than 0.5 mm, in some cases approaching and even exceeding 1.0 mm. Hitchcock (1969) uses stigma length as the lead character in his key differentiating the two varieties. It is therefore important to consider the whole suite of characteristics when identifying this species. One should be especially careful when in the Bear Valley or surrounding areas.

DISTRIBUTION

Bear Valley fawn lily is endemic to the Bear Valley area in the southern Salmon River Mountains. All known occurrences are in southeastern Valley County, Idaho. Prior to the 1991 investigation, Bear Valley fawn lily was known only from three historical collection sites, all somewhat ambiguous in location.

Two of these sites were discovered by Elmer Applegate (1933) in 1930 "at the head of Bear Valley Creek", and "a few miles farther east". A few years later he described the species from these collections. Then, probably in the early 1940's, Hitchcock and Muhlick made a collection of a similar-looking plant "from Morgan Creek, perhaps 15 miles north of the type locality". In reporting this in The Vascular Plants of the Pacific Northwest, however, Hitchcock states the species occurs in northern Custer County. It was decided that Morgan Creek must be known by a different name now, but is likely near the Morgan Airstrip on lower Sulphur Creek, north of Dagger Falls on the Challis NF. In 1990, Ann Keysor of the Lowman District, Boise NF, reported a discovery in Bear Valley. This represented the first record for the species in several decades.

Bear Valley fawn lily was found to be locally common in portions of the extensive meadow complexes that are characteristic of the Bear Valley area. To a smaller extent it occurs in forest openings, including occasionally along roadways. At first glance, the paucity of collection information seems contradictory to the relative, albeit local abundance of the species. However, this is just another example of how relatively botanically poor parts of Idaho have been documented. Early season mountain species such as Bear Valley fawn lily, which flower long before the majority of species in the area, can be especially prone to being overlooked during plant collection trips. For Bear Valley fawn lily this situation has been compounded because in some years access to Bear Valley during fawn lily flowering is limited by snow on mountain passes.

Several large populations of Bear Valley fawn lily were discovered in the Elk Creek and Bear Valley Creek areas near USFS Road 579. It likely extends to some of the similar meadow systems in the Frank Church River of No Return Wilderness, north of this road. It does not extend too much further north though, as it was not found in the Sulphur Creek drainage nor Tyndall Meadows at the head of Johnson Creek. Interestingly, variety grandiflorum was found in these places instead. At the southern edge of its known distribution, Bear Valley fawn lily occurs in the very upper reaches of Bear Valley Creek near the Valley/Boise County line. It is not known south of the divide separating Bear Valley from the South Fork of the Payette River drainage. Its known eastern limit is the Bruce Meadow, Ayers Meadow, Poker Meadow area. Bear Valley fawn lily apparently does not occur east of the Cape Horn divide into the Marsh Creek drainage. The western demarcation for the species is uncertain, but it was found near the Deadwood River in the Deer and Ross Creek areas. Because the kind of meadow systems typifying Bear Valley are not found west of the Deadwood River (basically wooded mountain slopes instead), it seems unlikely its distribution extends much further west. Further survey work on the Boise NF would be necessary to delineate the full distributional limits for this species.

We found Bear Valley populations to be several acres to approximately one sq. mile in extent. A couple of populations in forest openings were less than one acre in size. Populations can occur as widely scattered individuals and small clusters, to being locally abundant over a relatively large area. Portions of several populations are comprised of groups separated from one another by intervening forested habitat. Because some gene exchange likely occurs between these groups, they can be viewed as part of the same metapopulation (Murphy et al. 1990). The eleven populations together support over one million individuals. The Big Meadows population alone may support this many. Two populations, Elk Creek and Poker/Ayers Meadows support well over 10,000 individuals, perhaps even a magnitude more. Five populations, Bruce Meadow, Cache Meadows, Bearskin Meadows, Wet Meadows and Clear Creek Summit are known to support well over 1000 individuals and probably many more also. Three populations, Deer Creek, Lower Deer Creek and Ross Creek were found to contain between 100 and 1000 individuals. Survey work in these three places was quite cursory however.

It is speculated that either the population we found north of Clear Creek Summit near the Bear Valley Creek headwaters or the Big Meadows population downstream, represents one of the historic Applegate sites, and perhaps the Elk Creek population being the other site. We further suspect that the similar-looking plants reported by Hitchcock and Muhlick, are actually variety grandiflorum found near Sulphur Creek in the vicinity of the Morgan Airstrip.

Despite intensive searching, Bear Valley fawn lily was not found in any of the extensive meadow systems of Marsh Creek and Valley Creek nor their tributaries, on the Challis NF and adjacent Sawtooth NRA lands. Nowhere did we encounter the typical variety grandiflorum sympatric with variety nudipetalum.

Below is a summary of the eleven known populations of Bear Valley fawn lily.

1) Bruce Meadow - Bear Valley; not fully surveyed, present in eastern half of meadow complex, but not found in western portions, Boise NF; elevation 6370 feet; in grass-forb community; over 1000 individuals (conservative estimate); ca 10% of plants looked at with stigma lobes approaching or greater than 1 mm; first documented in 1991.

2) Poker/Ayers Meadows - Bear Valley, in both Poker and Ayers Meadows; only portions near USFS Road 568 delineated, population extends into Wilderness Area, Boise NF and Boise NF land administered by the Challis NF; elevation 6375 feet; extensive population with well over 10,000 individuals, over 1 sq. mile of additional potential habitat exists; first documented in 1991.

- 3) Elk Creek - Bear Valley, includes series of meadows from Twin Brides area, east to Nameless Creek, elevation ca 6400 feet; in grass-forb communities; a conservative estimate of over 30,000 individuals with ca 1 sq. mile of suitable-appearing habitat; additions to this population may exist in large meadow systems less than 1 mile north within the Frank Church River of No Return Wilderness; first documented in 1991.
- 4) Cache Meadows - Bear Valley, includes the series of meadows from Mace Meadows arcing northeast to Sack Meadows, Boise NF; elevation ca 6600 feet; grass-forb communities; comprised of at least 5 subpopulations and supporting between 1000-10,000 individuals; 1 sq. mile of estimated potential habitat; first reported in 1990, confirmed in 1991.
- 5) Wet Meadows - Bear Valley, series of meadows and forest openings from the Deer Pass area, east and south to Wet Meadows, Boise NF; elevation 6440-6480 feet; grass-forb community in meadows and lodgepole/fescue community in woodland areas; over 1000 individuals, an estimated 50 acres of potential habitat; first documented in 1991.
- 6) Bearskin Meadows - Bear Valley, in area where lodgepole has been clearcut, extending to Bearskin Meadows along Bearskin Creek, Boise NF; elevation 6500 feet; in grass-forb and cut lodgepole/elk sedge communities; an estimated minimum of 5000 individuals and ca 100 acres of potential habitat; first documented in 1991.
- 7) Big Meadows - Bear Valley, Big Meadows area, a mixture of private and Boise NF land; elevation ca 6600 feet; grass dominated portions of very large meadow complex; population scattered throughout meadow area; probably supporting ca one million individuals in an area greater than one sq. mile; perhaps the original Applegate collection site (see also #8).
- 8) Clear Creek Summit - upper Bear Valley, Boise NF; elevation 7000 feet; within willow community, wetter than other population sites; ca 10,000 individuals; may be the original Applegate collection site.
- 9) Deer Creek - west of Deer Flat Campground, Boise NF; elevation 6320 feet; openings within subalpine fir/elk sedge habitat type; relatively small area and population, less than 1000 individuals, but not fully searched; first documented in 1991.
- 10) Lower Deer Creek - west of Deer Creek population, Boise NF; elevation 6000 feet; not fully surveyed; ca 100 plants covering a small forest opening; first documented in 1991.
- 11) Ross Creek - near USFS Road 579 ca 4 miles south of Blue Point Campground in Deadwood River drainage, Boise NF; elevation 5590 feet; not fully surveyed; ca 100-1000 plants within forest

openings; first documented in 1991.

Habitat and Associated Species: Populations of Bear Valley fawn lily were found between approximately 5600 to 7000 feet elevation, on flat to occasionally very gentle slopes. Portions of a few populations occupied lower slope positions, otherwise they are restricted to the drainage bottomlands. Substrate is typically from alluvium and loamy in texture and can be quite stony.

Bear Valley fawn lily is most commonly found in well-drained portions of the extensive subalpine meadow complexes that characterize Bear Valley's physiography. These meadow systems display a mosaic of plant communities reflecting the meadow's variable hydrology. Very wet portions of the meadows, saturated throughout much or all of the growing season and supporting sedge and willow communities, grade to better drained patches supporting grass-forb communities. With few exceptions, Bear Valley fawn lily is restricted to these grass-forb communities that are wet during the spring, but dry to the surface by early to mid-summer. It frequently extends to the edges of the lodgepole forests surrounding these meadows, but is not found beneath a full canopy. These grass-forb communities are mostly dominated by Festuca idahoensis (Idaho fescue), and seem to most closely fit the Aster integrifolius - Festuca idahoensis community type described by Tuhy (1981) for the upper Sawtooth Valley. Positive recognition of this community type is tentative because the survey was done too early in the season to identify to species many of the associates (including Aster integrifolius). Associated species included Festuca idahoensis, Danthonia intermedia, Poa spp., Bromus carinatus, Geum triflorum, Potentilla gracilis, Fragaria vesca, F. virginiana, Claytonia lanceolata, Ranunculus alismaefolius, Antennaria microphylla, Achillea millefolium, Senecio integerrimus and Sisyrinchium inflatum.

Bear Valley fawn lily can also occur in openings where forest canopy cover is sparse. This was seen near both roads and meadows. In these situations it was found within Pinus contorta/Festuca idahoensis and Abies lasiocarpa/Carex geyeri habitat types (Tuhy 1981), but again did not extend beneath the full canopy.

In any of these habitats, Bear Valley fawn lily commonly occurs on disturbed, bare soil microsites. These are usually quite small in size, but can be common. Mounds of soil excavated by pocket gophers is an example of this. Such exposed soil sites apparently provide ideal conditions for establishment.

Some observations supplementing the habitat information already presented seem noteworthy. The Clear Creek Summit population was unique in that it was the only place where Bear Valley fawn lily was found within a willow (Salix sp.) community. It was also growing sympatric with marsh marigold (Caltha leptosepala), further indicating this site to be wetter than any of the others.

The Bear Valley fawn lily was absent from the wettest areas supporting various sedge (*Carex* spp.) species, however. A portion of the Elk Creek population was vigorously invading a forested area where a relatively recent, crown-destroying fire had occurred. The Bear Valley fawn lily was most abundant where it originally grew right to the forest edge and provided a ready seed source into the burned area. Portions of the Bearskin Meadows and Elk Creek populations occupy areas where lodgepole pine has been clearcut, but no canopy has regenerated yet. These portions of a population are undoubtedly ephemeral.

Less than ten miles east of Bear Valley, in portions of Marsh and Valley Creeks and their tributaries, are extensive meadow systems that appear in part to contain suitable habitat for Bear Valley fawn lily. Despite considerable looking, none was found in these meadows, however. Large expanses of these meadows can be dismissed as prime Bear Valley fawn lily habitat. Wet sedge and willow dominated communities, or drier sagebrush (predominately *Artemisia tridentata* ssp. *vaseyana*) dominated communities both indicate sites different than the grass-forb communities where Bear Valley fawn lily is typically found. Still, suitable-appearing habitat can be found in at least part of many of these meadows, and the absence of Bear Valley fawn lily (or var. *grandiflorum*) remains somewhat puzzling.

#### CONSERVATION STATUS

Conservation Status - Idaho: Bear Valley fawn lily does not appear in the Federal Register's review of plant taxa for listing as endangered or threatened until 1990 (U.S. Fish and Wildlife Service 1990). It was also apparently overlooked when the rare plant taxa of Idaho were originally compiled and evaluated in the late 1970's and early 1980's by the Rare and Endangered Plants Technical Committee of the Idaho Natural Areas Council (Henderson et al. 1977; Steele et al. 1981). The first reference of Bear Valley fawn lily as a conservation concern in Idaho is in Henderson's (1982) report of rare plants on the Middle Fork District of the Challis NF. Henderson notes it as a species of concern likely to be present on the Middle Fork District, but not encountered during their 1982 field season. He further notes that the species was originally collected on the headwaters of the Middle Fork, but had not been recently seen.

Bear Valley fawn lily has never appeared on the Region 4 Sensitive Species list.

Since it is a federal candidate, Bear Valley fawn lily is not included in a state-rare category by the Idaho Native Plant Society.

The Idaho Conservation Data Center currently ranks Bear Valley

fawn lily as G5T1/S1 [G5 = Erythronium grandiflorum is demonstrably secure throughout its range; T1 = var. nudipetalum is critically imperiled throughout its range because of extreme rarity or because of some other factor of its biology making it vulnerable to extinction; S2 = since var. nudipetalum is endemic to Idaho, the state (S) rank equals the global rank for the taxon (T); Moseley and Groves 1990]. In light of discoveries made during 1991, the Conservation Data Center will update this ranking at the next Idaho Rare Plant Conference.

Conservation Status - Elsewhere: Bear Valley fawn lily is endemic to Idaho.

Ownership: Part of the extensive Big Meadows population is on private land, otherwise all known populations occur on the Boise National Forest. The bulk of the Poker/Ayers Meadow population occurs in the Frank Church River of No Return Wilderness. This part of the Boise NF is now administered by the Middle Fork District of the Challis NF. Some of the most likely areas where additional populations may occur are also in the Wilderness in places such as Corduroy Meadows, Elk Meadow and Crane Meadow.

Threats: Bear Valley fawn lily is found in areas that have been impacted by several management activities over the years. Part of the extensive Big Meadows population was likely impacted by past mining activities. If large-scale mining operations were to be resumed or initiated in any of the bottomlands where populations of Bear Valley fawn lily occur, at least local negative impacts could be expected. Bear Valley fawn lily was found within a couple of recent lodgepole cuts. The importance of these ephemeral extensions into cleared areas is likely minor at the population level. Bear Valley fawn lily is persisting well in areas that are grazed by livestock, the major disturbance factor to its habitat. Its early season phenology probably exempts it from at least some potential livestock impacts. Allowing livestock grazing earlier in the season than currently practiced is a potential source of negative impacts. A portion of most populations occurs adjacent to or in close proximity to roads. Projects such as road widening would destroy some plants in these cases.

The greatest potential long-term threat to Bear Valley fawn lily would be large-scale alteration of the hydrology of the meadow complexes in Bear Valley. Such alterations could affect most populations by rendering its habitat too wet or too dry. Because these meadow complexes are generally recognized as important watershed and fishery resources, such large-scale alterations would mark a dramatic change in the stewardship of these areas.

Plants are often found on bare soil microsites within their natural habitat, and in general, this species seems adapted to a limited amount of disturbance.

Management Implications: Most populations of Bear Valley fawn lily are large and vigorous. Current land management activities do not appear to be having a negative impact on overall population and species long-term viability.

#### ASSESSMENT AND RECOMMENDATIONS

Summary: Results of our 1991 field investigation confirms that Bear Valley fawn lily is endemic to the Bear Valley region of central Idaho. It was found to be widespread and often locally abundant in the well-drained, grass-forb dominated portions of the extensive meadow systems that are an important feature of Bear Valley. To a lesser extent it occurs in forest openings, including along roadways. Most populations are large, and in total support over one million individuals. Current land management practices appear to pose minimal threat to the species long-term viability.

Recommendations to the Regional Forester: Based on information discussed in this report, Bear Valley fawn lily does not appear to meet Sensitive Species criteria and should not be added to the Regional list. Although its distribution is restricted to the Bear Valley area, it is more or less common within this range. All known populations occur fully or partially on Forest Service lands, but current land management activities seem to pose no significant threats to the long-term viability of the species. If land management activities change to include large-scale alterations to the species' meadow habitat, then its conservation status may need to be re-evaluated.

Recommendations to the Challis National Forest: One population (Poker/Ayers Meadow) is known and others suspected to occur in the Frank Church River of No Return Wilderness Area administered by the Challis NF. Decisions consistent with wilderness management should pose no threats to the long-term viability of the species. As stated above, we do not recommend adding Bear Valley fawn lily to the Sensitive Species list.

Recommendations to the Boise National Forest: The majority of Bear Valley fawn lily populations occur on land administered by the Boise NF. As previously discussed, current land management activities appear consistent with the long-term viability of the species. As stated above, we do not recommend adding this species to the Sensitive Species list.

Recommendations to the U.S. Fish and Wildlife Service: Based on information discussed in this report showing it to be much more abundant than previously known, we recommend the federal status for Bear Valley fawn lily (*Erythronium grandiflorum* var. *nudipetalum*) be changed from C2 to C3c.

Other Recommendations: The Conservation Data Center will make a recommendation to the Idaho Native Plant Society, at the 1992 Rare Plant Conference, to place Bear Valley fawn lily in its Monitor category. This classification will better reflect its conservation status in Idaho.

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Appendix 1

Line drawing of Erythronium grandiflorum var. nudipetalum  
(From Hitchcock et al. 1969).

## Appendix 2

### Locations of Erythronium grandiflorum var. nudipetalum.

- Map 1. Overview of total distribution. Portion of 1987 Boise NF map.
- Map 2. Bruce Meadows and Poker/Ayers Meadows populations. Portion of Blue Bunch Mountain 7.5' USGS quadrangle.
- Map 3. Elk Creek population. Portion of Bear Valley Mtn. 7.5' USGS quadrangle.
- Map 4. Bearskin Meadows and part of Wet Meadows populations. Portion of Bear Valley Mtn. 7.5' USGS quadrangle.
- Map 5. Part of Wet Meadow population. Portion of Bernard Mountain 7.5' USGS quadrangle.
- Map 6. Ross Creek, Lower Deer Creek, and Deer Creek populations. Portion of Bernard Mountain 7.5' USGS quadrangle.
- Map 7. Cache Meadows population. Portion of Cache Creek 7.5' USGS quadrangle.
- Map 8. Northern part of Big Meadows population. Portion of Cache Creek 7.5' USGS quadrangle.
- Map 9. Southern part of Big Meadows population. Portion of Cache Creek 7.5' USGS quadrangle.
- Map 10. Clear Creek Summit population. Portion of Miller Mtn East 7.5' USGS quadrangle.

### Appendix 3

List of areas searched unsuccessfully for Erythronium grandiflorum var. nudipetalum on the Challis and Boise National Forests and Sawtooth NRA.

#### Challis NF

1. Lower Cape Horn Creek meadow complexes.
2. Marsh Creek meadow complexes in Cape Horn area.
3. Knapp Creek; lower Knapp Creek, and meadow complexes west of F 82 Lake.
4. Beaver Creek; from Shake Creek downstream to confluence with Marsh Creek.
5. Lower Lolo Creek.
6. Trail #237 (Middle Fork trail), north of Lolo Creek Campground to Marsh Creek crossing.
7. Lower Sulphur Creek; including adjacent private lands.
8. Several meadows near Highway 21 between Banner Summit and Cape Horn, including extensive series west of Highway 21 to Bull Trout Lake. This latter area also includes part of the Boise National Forest.

#### Boise NF

1. Tyndall Meadows.
2. Clear Creek drainage along USFS Road #582, from north of Lowman to Horse Creek.

#### Sawtooth NRA

1. Meadow Creek, south of Trap Creek Narrows.
2. Elk Meadows.
3. Lower Park Creek.
4. Lower Stanley Lake Creek.
5. Portions of Valley Creek meadow complex.

#### Appendix 4

Slides of Erythronium grandiflorum var. nudipetalum and its habitat.

1. Close-up; flower with several tepals removed revealing lobeless stigma and red-colored anthers (Elk Creek population).
2. Close-up; note basal leaves without petioles and with wavy, rolled margins (Elk Creek population).
3. Open, well drained meadow habitat; yellow flowers are Bear Valley fawn lily (Elk Creek population).
4. Growing in burn area near Nameless Creek (Elk Creek population)