

SPECIES MANAGEMENT GUIDE FOR
GRINDELIA HOWELLII (Howell's gumweed),
ON THE ST. JOE NATIONAL FOREST

by

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INTRODUCTION

The National Forest Management Act of 1976 (16 U.S.C. 1600. Planning Regulations Section 219.19, Fish and Wildlife Resource) 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 (USDA Forest Service 1984). 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 Species¹ list.

Grindelia howellii (Howell's gumweed) is a highly restricted regional endemic² to northern Idaho and western Montana. The species exhibits an unusual distribution pattern with two disjunct populations centers located some 150 miles apart: Benewah County in Idaho and Missoula and Powell Counties in Montana. All of the Idaho populations of Howell's gumweed occur on lands administered by the St. Joe National Forest.

At present, Howell's gumweed is listed as a Sensitive Plant Species for Region 1 of the Forest Service and the Montana Bureau of Land Management. The species is also a Category 2 candidate

¹ Sensitive Plant Species - a plant species, or recognized subspecies or variety, for which the Regional Forester has determined there is a concern for population viability, within a state, as evidenced by significant current or predicted downward trend in populations or habitat (USDA Forest Service 1984, 1988).

² A species confined naturally to a certain limited area or restricted locality.

species³, under the Endangered Species Act (USDI Fish and Wildlife Service 1990).

The objective of this Management Guide is to present recent survey information and outline a plan for the management of Grindelia howellii on the St. Joe National Forest in Idaho. The guide is designed to ensure the species' survival through time and prevent the need for its listing as federally threatened or endangered. The guide is divided into two major sections. The first summarizes the most recent biological information about Grindelia howellii. The second section identifies the management strategies needed to conserve and enhance the species. This guide will be updated periodically as new information is obtained.

³ Candidate Species - "those plant and animal species that, in the opinion of the Fish and Wildlife Service, may become endangered or threatened". Three types of candidate species exist, C1, C2 and 3C. Category 2 - "taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules" (USDI Fish and Wildlife Service 1990).

BIOLOGICAL INFORMATION

Nomenclature and Description

Grindelia howellii Steyerem. is a member of the Asteraceae or Compositae (Sunflower) family. The type specimen of was collected by L.F. Henderson in 1894 from dry arid bluff tops, St. Maries River, "Kootenai" County, Idaho. Some 40 years later, J.A. Steyermark (1934) described the species in a monograph of the genus Grindelia.

Scientific Name: Grindelia howellii Steyerem.
Family: Asteraceae or Compositae (Sunflower)
Common Name: Howell's gumweed, Howell's gumplant
Synonymy: none

The following nontechnical description of Grindelia howellii is adapted from Cronquist (1955) and Steyermark (1934):

A distinctive stout, short-lived perennial with upright stems mostly 6-9 dm tall. Plants are shiny green in color due to strongly resinous herbage. Stems are glandular and somewhat villous, especially on the upper portions and on the branches below the heads. Leaves are rough, relatively thin, dotted with glands, and strongly clasp the stem. Mature plants possess 1-several, large, bright yellow flowers heads (radiate) with short, erect ray flowers. The surrounding involucre is spherical (ca. 1 inch diameter) with long, strongly reflexed, sticky bracts. Plants bloom from late July to mid-August.

Distinguishing Features and Similar Species:

Howell's gumweed is most conspicuous and easily identifiable in the field during late summer when blooming. Flowers are in radiate heads with rather short, erect, bright yellow ray flowers. The most distinguishing feature is the spherical (ca. 1 inch diameter) involucre, a set of bracts located beneath and partially surrounding the flowers. These bracts are relatively long, strongly reflexed, and extremely sticky. In the vegetative stage, Howell's gumweed can be identified by the strongly clasping leaf bases on the lower leaves and the sticky, glandular foliage. Individual plants tend to grow in a clumped distribution pattern and prefer grassy, open habitats that have often been subjected to past disturbance (see Appendix I for line drawings).

Two other similar Grindelia species, Grindelia nana and Grindelia squarrosa, occur in northern Idaho. Neither taxon was found growing sympatrically with Howell's gumweed at the Idaho sites. Howell's gumweed is most easily distinguished from these similar

taxa by its strongly glandular and resinous foliage. In contrast, Grindelia nana and Grindelia squarrosa have stems that are essentially glabrous (without hairs or glands).

Range and Distribution:

Grindelia howellii is a highly restricted regional endemic with an unusual distribution pattern of two disjunct population centers located some 150 miles apart in northern Idaho and western Montana. The majority of the known locations of Howell's gumweed occur in western Montana within Missoula and Powell Counties. A total of 45 extant locations have been documented for Montana, 38 of these were discovered during a 1985 survey for the U.S. Fish and Wildlife Service (Shelly 1986). In Idaho, Howell's gumweed is documented from bluffs above the St. Maries River in Benewah County on lands administered by the St. Joe National Forest (see Appendices II and III).

A field inventory survey for Grindelia howellii was conducted on the St. Joe National Forest during the summer of 1990 by the Idaho Department of Fish and Game's Natural Heritage Program through the Cooperative Challenge Cost Share Program. This investigation concentrated on delineating the distribution of Grindelia howellii in northern Idaho.

The primary objectives of this investigation were as follows:

- 1) Relocate and survey known populations of Grindelia howellii in northern Idaho.
- 2) Survey for potential habitats and new populations of Grindelia howellii on the St. Joe National Forest.
- 4) Acquire population data and assess habitat conditions and threats for known populations.
- 5) Prepare a Species Management Guide to outline a plan for the management of Grindelia howellii on the St. Joe National Forest.

Prior to 1990, Howell's gumweed was known from two extant populations in Idaho, though one site had not been relocated since its discovery in 1978. A thorough survey of all the open, grassy, bluffs both up and down stream from the known locality was conducted and all surveyed areas were documented, both successful and unsuccessful (see Appendix II). Results of the 1990 Idaho survey for Howell's gumweed documented two new populations from the general vicinity of the previous localities with all populations occurring within a single section, sec. 26, T45N, R2W. One of the extant sites is now believed to have been incorrectly located.

Background Information:

J.A. Steyermark (1934) described the species Grindelia howellii from a specimen collected by L.F. Henderson in 1894 on dry arid bluff tops, St. Maries River, "Kootenai" County, Idaho. Since the St. Maries River is not located in Kootenai County, but instead Benewah County, it has been assumed that the original county designation was incorrect (Johnson 1977, Brunsfeld 1981). In 1978, Howell's gumweed was recollected in Idaho from the breaks of the St. Maries River in Benewah County. Although it can not be confirmed, this collection may indeed be a relocation of the type locality.

Howell's gumweed was next collected in 1966 by D.W. Woodland from Powell County, Montana near Placid Lake. Subsequent surveys in Montana have resulted in the discovery 45 locations for the species and indicates that the principal distribution of Howell's gumweed is in Montana (Shelly 1986).

In Idaho, prior to the 1990 field season, Howell's gumweed was known from two populations (see occurrence #001 and #002). Both locations were located by Forest Service employee T.I. Rieger (1990) who worked on the St. Maries Ranger District, St. Joe National Forest. One population (#001) had not been relocated since its discovery in 1978 (Blake 1990)(see Appendix III).

At the time of discovery, population #002 consisted of several thousand plants from along bluffs and in an old roadbed above the St. Maries River (Appendices II and III). This population has been revisited periodically over the years and monitoring plots have been established (Caicco 1987). During the 1990 field season this population was again relocated, but the number of individuals observed were much fewer and extensive grasshopper defoliation was evident.

Several attempts were made to relocate population #001, however, difficulties and contradictions in location data became evident. For documentation this collection is:

Steve Brunsfeld (Herb. #79438; IDF). Sept. 24, 1978. Idaho: Benewah Co., breaks of the St. Maries River in T45N, R2W, sec. 20; elev. 2750 ft., 30% slope, west aspect; opening in Pseudotsuga menziesii-Pinus ponderosa forest, mesic site adjacent to moist seep; dominant species on rocky basaltic soil with many native and weedy species including Achillea millefolium, Fragaria vesca, Symphoricarpos albus, and Verbascum thapsus; grazing evident; populations spotty where present.

Within section 20 I found no slopes less than 60% and no habitat that fit the collection label. Apparently, the original collector, Steve Brunsfeld (1990) did not have a map of the area

at the time of collection and relied on the information given to him by the Forest Service employee he was with, T.I. Rieger from the St. Maries Ranger District.

It is now believed that the township is correct, but the section number is incorrect. As a Forest Service employee, it is most likely that Rieger found the population on Forest Service land. Past records indicate that section 20 has not been part of Forest Service lands at least as far back as 1957. The only section managed by the Forest Service in the entire area is section 26. Armed with additional information provided by Brunnsfeld (1990) about the habitat, I once again tried to relocate the site, this time focusing on section 26. Although two new sightings were discovered, neither matched the elusive #001 population.

Finally, T.I Rieger (1990) was tracked down, now working on the Custer National Forest. Aerial photos and topographic maps of the area were forwarded to him in hopes that he could relocate site #001. It appears that the section number was indeed incorrect, confirming suspicions. Rieger recalled the habitat and indicated that it was a very small, rocky opening, which was probably not visible on the aerial photo. He mapped an approximate location on the quad map, very near to one of the new 1990 sightings, but apparently not the same. Unfortunately, this new data arrived in late October, way past flowering and potential relocation. This location will need to be resurveyed to determine if the population still exists or has been extirpated.

Habitat Description:

In Idaho, Howell's gumweed occurs within a single section on open, grassy, bluffs surrounded by mixed conifer forest communities. Microhabitats are non-timbered openings that are exposed to direct sunlight, with some individuals in semi-shaded conditions in surrounding ponderosa pine trees. Slopes are moderate (10-35%) and are restricted to southern exposures. Plants are typically found growing in dry, skeletal, basalt-derived soils forming thin layers over basalt rock. Elevations range from 2750 to 2950 feet.

The thin soils and dry microclimate result in openings dominated by a grass and shrub understory with scattered Pinus ponderosa and Pseudotsuga menziesii trees. Although these habitat types are relatively xeric, they occur within a regional macroclimate that supports Thuja plicata and Tsuga heterophylla communities. These grasslands were originally dominated by Agropyron spicatum and Festuca idahoensis, but now support many introduced weeds. The likely corresponding habitat types are (Cooper et al. 1987):

Pseudotsuga menziesii/Agropyron spicatum habitat type
(Douglas fir/bluebunch wheatgrass)

Pseudotsuga menziesii/Symphoricarpos albus habitat type
(Douglas fir/snowberry)
Pinus ponderosa/Physocarpus malvaceus habitat type
(ponderosa pine/ninebark)

Native species commonly found growing in association with Howell's gumweed in Idaho include, Agropyron spicatum, Poa secunda, Symphoricarpos albus, Holodiscus discolor, and Achillea millefolium. In addition, high densities of introduced weeds are common at all population sites, principally due to a long history of past grazing disturbance. Typical introduced weeds include, Poa compressa, Bromus tectorum, B. japonica, Phleum pratense, Hypericum perforatum, Tragopogon sp. and Potentilla recta.

A considerable amount of data is also available on Howell's gumweed from Montana (Shelly 1986). Montana populations most frequently occur in lightly to heavily disturbed sites. Disturbance is due to natural and man-caused factors. Shelly (1986) notes that the species does not tolerate canopy closure or shade, but can tolerate and apparently flourish in early successional disturbed area.

Population and Reproductive Biology:

Three extant populations of Howell's gumweed are documented from Idaho with a total number of individuals between 200 and 450 plants in 1990. All populations are rather small and consist of 50-200 individuals scattered in small patches over a large, open, grassy slope. In Montana, 45 extant populations have been discovered within an area of approximately 370 square miles. The total number of individuals from all known populations is estimated to be 13,000 to 15,000 with a typical population consisting of 10-300 plants (Shelly 1986). Howell's gumweed has been observed blooming from late July to late August and produced seeds in September.

Very little is known about the reproductive biology of Howell's gumweed except that it is a short-lived perennial. No evidence of asexual reproduction has yet been observed (Shelly 1986). Outcrossing as well as selfing is likely and possible pollinators include bumblebees (Bombus), which have been observed visiting flowers in Montana (Shelly 1986). Seed dispersal by animals and vehicles is probable, since the involucre is extremely sticky and can easily adhere to passing objects.

Reproductive success appears to be vigorous and adequate in Montana populations of Howell's gumweed (Shelly 1986). Sterile basal rosettes were present at all Montana sites, suggesting successful seedling establishment and survivorship (Shelly 1986). Idaho populations appear to mirror the Montana scenario. In 1987, Caicco (1987) found that 54% of the sampled population consisting of non-reproductive seedlings. In 1990, one population (#004) was

composed entirely of juvenile plants, and the other two populations averaged 50% immature.

In Idaho, a low percentage of reproducing individuals was observed in 1987 and 1990 (Caicco 1987, Lorain pers. obs.). Caicco (1987) noted that only 16% of the recorded plants were reproductive. Although no definitive measurements were made in 1990, less than 50% of the observed plants were flowering. No percentages for reproducing versus non-reproducing individuals have been documented for Montana (Shelly 1986).

Howell's gumweed appears to be a seral species that prefers early successional sites and tolerates lightly to heavily disturbed habitats (Shelly 1986). In Montana, 42 of the 45 populations occur in disturbed sites such as roadsides, timber sales, grazed pastures, and trails. In Idaho, site #002 inhabits disturbed grassy openings and an old roadbed on bluffs above the St. Maries River (Appendix II and III). Recent disturbance from off-road-vehicles, campers, and other recreationists is evident. The two new populations (#003 and #004), have not been subjected to recent disturbance, but have undergone past disturbances.

The abundance of disturbed habitats may play an important role in species distribution and abundance. Shelly (1986) believes that Montana populations may be persisting in fluctuating numbers within their known distribution based on the amount of suitable disturbed habitats. While certain activities may result in the extirpation of some individuals or populations, they subsequently create potentially new habitat for future populations. The degree of interspecific competition for early successional habitats may also be playing an important role in the species population biology.

Endangerment Status:

Grindelia howellii is listed as a Sensitive Species with Region 1 of the Forest Service and the Montana Bureau of Land Management. The taxon is also a federal Category 2 Candidate under the Endangered Species Act (USDI Fish and Wildlife Service 1990). In Idaho, Howell's gumweed is considered "critically imperiled because of extreme rarity or because of some factor of its biology making it especially vulnerable to extinction" (State rank = S1) by the Idaho Natural Heritage Program (Moseley and Groves 1990). In Montana, the species is listed as "rare in Montana" (State rank = S3) by the Montana Natural Heritage Program (1990).

THREATS:

Natural Threats: A high degree of defoliation was observed on individuals and populations in Idaho during the 1990 field season. Additionally, insect predation of flowering and seed heads was observed by Heidel (1979) and could be responsible for a partial reduction in reproductive potential.

Man-caused Threats: Locations of Idaho populations of Howell's gumweed have a long history of overgrazing use by both sheep (prior to 1940) and cattle. Grazing has been terminated in the area and it is now being managed for wildlife winter range by the Idaho Department of Fish and Game as part of the St. Maries Wildlife Management Area (Brodson 1990). Although some trespass cattle have been observed in past years (Caicco 1987), Howell's gumweed is an unpalatable species that tends to be left ungrazed (Shelly 1986). Trampling from cattle, however, could be a cause for concern (Caicco 1987). Moreover, the spread of introduced weeds poses a potentially significant indirect threat from overgrazing. Overgrazing frequently alters species structure and composition over time, often resulting in the invasion of exotic weeds. Competition for suitable habitats from weeds, which have similar life history strategies, could substantially reduce the population size of Howell's gumweed.

Additional man-caused threats are posed by recreational users and off-road-vehicle activity in the area. The largest Idaho population (#002) occurs along a Recreation and Fishing Access road. Recreational use includes sightseers, snowmobilers, picnickers, campers, hunters, and fishermen. Although these activities are not likely to cause significant harm to the population, off-road-vehicle use is evident and could impact local portions of this population (Caicco 1987).

Montana populations are threatened by logging, grazing, road construction, and cultivation (Shelly 1986). However, it is difficult to assess these threats in light of the fact that Howell's gumweed appears to tolerate and potentially benefit from disturbance (Shelly 1986).

Survey Methods and Findings:

As previously mentioned, an extensive survey for new populations and suitable habitat of Grindelia howellii was conducted during the 1990 field season. A thorough survey, utilizing aerial photos and topographic maps, focused on all the nearby open, grassy, bluffs both up and down stream from the previously known localities (Appendix III). As a result, two new populations were located and one previously extant site, Lindstrom Peak (#002), was relocated (see Appendices II and III for mapped locations and demographic data). At present, all extant populations occur within a single section. A second previously known extant site

(#001), has not been relocated since its discovery in 1978 and the location data apparently is incorrect.

In 1987, monitoring plots to provide baseline information on population size and structure were established (Caicco 1987). The perimeters of two population clusters were mapped and delineated. In addition, data was collected on the location of individual plants and their corresponding size/reproductive classes (Caicco 1987).

MANAGEMENT PLAN

Management of *Grindelia howellii*:

As stated in the introduction, the Forest Service is required to manage and maintain populations of native species at or above the minimum viable population level. To maintain this level, protected populations must be self-sustaining, genetically stable, and adequately distributed throughout the species range.

The purpose of this plan is to establish management direction for *Grindelia howellii* populations on the St. Maries Ranger District, St. Joe National Forest. The objectives are to ensure the species' survival through time and prevent the need for federal listing, while minimizing conflicts with other resource values.

The largest number of extant populations of Howell's gumweed occur in Montana. In comparison, Idaho populations are very isolated, small, and occur in a somewhat different habitat. For these reasons, it was decided that a separate Species Management Guide should be prepared for the Idaho populations. However, a comprehensive conservation strategy for *Grindelia howellii* will necessitate cooperation between the two states.

Montana Populations:

Due to the large number of extant populations in Montana, it is recommended that a Species Management Guide for Montana populations be prepared using this guide as a model, to assure consistency. Those responsible for the management of Howell's gumweed in Montana include the Flathead and Lolo National Forests, the Montana Department of Fish, Wildlife and Parks, and the Montana Division of Forestry. Populations also occur on private land owned by individuals and corporations such as Champion International and Burlington Northern (Shelly 1986).

Idaho Populations:

At present, only three extant populations of Howell's gumweed are documented from Idaho. Management responsibilities in Idaho are the St. Maries Ranger District of the St. Joe National Forest and possibly the Idaho Department of Fish and Game. To meet the management objectives established by the Forest Service, while simultaneously minimizing conflicts with other resource values, the following management objectives are proposed for *Grindelia howellii* in Idaho:

- 1) Delineate and protect known populations of *Grindelia howellii* on the forest.
- 2) Identify known population threats and inform district personnel and managers of the existing populations.

- 3) Collect further data on Grindelia howellii population biology and establish additional permanent monitoring plots within the extant Idaho populations.
- 4) Evaluate the effects of disturbance on populations and individuals.
- 5) Develop a Conservation Agreement between the Idaho Panhandle National Forest and the U.S. Fish and Wildlife Service for the long-term conservation of Idaho populations of Grindelia howellii.

1. Delineate and Protect Populations:

In Idaho, Howell's gumweed is only known from three small extant populations found within a single section of land managed for wildlife winter range and administered by the St. Maries Ranger District, St. Joe National Forest. Suitable potential habitat in the surrounding area has been surveyed in 1987, 1989, and 1990 for additional populations with no success (see Appendix II, Map B for sites surveyed in 1990). Population #002 was thoroughly delineated by surveyors in 1987, and such action needs to be taken on the two additional populations (#003 and 004). Moreover, population #001, which was incorrectly located, needs to be resurveyed and delineated.

Due to the small size and number of populations in Idaho, all possible precautions should be made to protect these three sites. The forest should carefully consider the impacts of its future management activities on the conservation status of this species and avoid any activities that may threaten individuals or populations.

2. Identify Threats and Inform Forest Service Personnel:

Past threats principally resulted from extensive overgrazing, both by sheep and cattle. Grazing has since been terminated in the area, although some trespass cattle have been observed in past years (Caicco 1987). At present, recreational activity and competition from aggressive introduced weeds pose the most significant threats to Howell's gumweed populations in Idaho. The negative effects from such activities are unknown and need to be investigated (see also #4 - Evaluate the effects of disturbance). This is especially important since Montana data indicates that Howell's gumweed is a seral species that tolerates and potentially benefits from disturbance (Shelly 1986).

Land managers and field personnel on the St. Joe National Forest should be informed of the occurrence of Grindelia howellii in their area. All possible precautions should be made to protect

these three extant populations. Moreover, clearance surveys should be conducted for any projects in suitable habitat along the St. Maries River and tributaries that may support Howell's gumweed populations. Possible sightings of this species should be documented by specimens (if the size of the population warrants collecting), and should include both flowers and roots. Specimens should be sent to the Forest Botanist/Ecologist or University of Idaho Herbarium for verification of their identity. Confirmed sightings of Howell's gumweed should be submitted to the Forest Supervisors Office and the Idaho Natural Heritage Program for entry into their permanent data base on Sensitive Species.

3. Collect Population Data and Establish Additional Permanent Monitoring Plots:

In 1987, baseline demographic monitoring of Howell's gumweed in Idaho was initiated by the Idaho Panhandle National Forest in conjunction with the Idaho Natural Heritage Program (Caicco 1987)(see Appendix V). Population #002 was divided into two plant groups that were staked along their parameters. Permanent rebar reference points were installed and the location of each parameter stake was recorded using a computerized transit. This data will be used to track expansion and/or contraction of the plant clusters. In addition, data on population structure, location of individuals, and size class/reproductive status was gathered for one of these groups (Caicco (1987)). Results of this monitoring are presented in Appendix V.

To insure consistency, the methodology initiated by Caicco (1987) should be continued. However, since such a small percentage of flowering plants were noted in the initial measurements, it is recommended that additional reproductive information be gathered. Data collection should follow the Forest Service Ecodata Sampling Methods including the gathering of General Plot Data (Form 3) and Ocular Plant Species Data (Form 4)(USDA Forest Service 1987). After 10 years of data collection and analysis, a full reevaluation of the populations and management plan will need to be conducted. The following is a recommended monitoring implementation plan:

- 1) Reread and analyze the permanent monitoring plots established in 1987.
- 2) Expand database by establishing permanent plots and quadrats at new population sites using methodology established by Caicco (1987) including:
 - number of plants (density)
 - location of plant
 - size class/reproductive status
 - juvenile (seedling)

vegetative
mature
reproductive

- 3) Initiate more detailed reproductive measurements including:
 - ave. # of flowers/plant
 - ave. # of seeds/flower
 - % seed viability
- 4) Assess any site specific threats to the population and/or individuals.
- 5) Establish paired plots to compare and correlate the effects of disturbances on population size, numbers, and survival.
- 6) Continue annual monitoring of plots and collecting/analyzing data for a period of no less than 10 years to establish long-term averages.

4. Evaluate the Effects of Disturbances:

Frequently, the future size of a population may be dependant on factors other than reproduction (Palmer 1987). For example, Grindelia howellii appears to be strongly influenced by disturbance (Shelly 1986). The availability of disturbed habitats, such as exposed mineral soils, may be critical to seed germination, growth, flowering, and seed production. The effects of certain kinds and degrees of disturbance in addition to the effects of competition for suitable habitat from weedy species with similar life history strategies should be evaluated. Comparisons of different experimental treatments, utilizing a paired plot study, is recommended. Treatments involving scalping or other types of soil/vegetation disturbance should be compared with a no-treatment control.

5. Develop a Conservation Agreement:

Grindelia howellii is listed as a Category 2 Candidate species under the Endangered Species Act (USDI Fish and Wildlife Service 1990). This category includes species that may be listed as threatened or endangered, but lack substantial data on biological vulnerability and threats. Because such taxa are tracked by the U.S. Fish and Wildlife Service, a Conservation Agreement between the Service and the Idaho Panhandle National Forests would be beneficial to both parties. This agreement would address the long-term conservation and monitoring of Idaho populations of Grindelia howellii.

Implementation and Review:

The following activities should be accomplished within the specific times:

Year One

1. Resurvey for population #001 in area pinpointed by the original discoverer (T.I. Reiger) as noted in Appendix II.
2. Reread demographic monitoring plots established in 1987 and analyze data.
3. Delineate and protect the three known populations in Idaho.
4. Inform Forest Service personnel of populations and conduct clearance surveys for any projects in areas of potential habitat.
5. Work in cooperation with the U.S. Fish and Wildlife Service to develop a Conservation Agreement.

Year Two

1. Continue demographic monitoring, clearance surveys, and implementation of monitoring plan.
2. Meeting of Forest Service, U.S. Fish and Wildlife Service, and Idaho Natural Heritage Program to discuss management guidelines and recent information.
3. Revise plan if applicable.

Year Three-Four: same as year two

Year Five

1. Meeting of Forest Service, U.S. Fish and Wildlife Service, and Idaho Natural Heritage Program to discuss success of management strategy.
2. Continue monitoring and clearance work.
3. Revise Management Guide as appropriate.

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APPENDIX I

Line drawings of Grindelia howellii.
(from Cronquist 1955)

APPENDIX II

Maps of Grindelia howellii.

Map A. Overall distribution of Grindelia howellii.

IDAHO

Known extant sites and potential relocation site:

Map B. Portion of Lindstrom Peak 7.5' Quad.

Areas Surveyed in 1990:

Map C. Portion of Lindstrom Peak 7.5' Quad.

APPENDIX III

Demographic data for extant populations of
Grindelia howellii in Idaho.

Unknown extant site -	Breaks of the St. Maries River	(#001)
Known extant sites -	Lindstrom Peak	(#002)
	Lindstrom Peak SW	(#003)
	River Access NE	(#004)

IDAHO

Unknown site:

- #001. Breaks of the St. Maries River (#001)
- a. Location:
 - b. Area: dominant 10-100 yd²
 - c. Number of plants: "Grindelia howellii is dominant species...spotty where present" in 1978
 - d. Density: locally High
 - e. Evidence of expansion/contraction: No evidence; unable to relocate site; grazing was evident in 1978.

Known extant sites:

- #002. Lindstrom Peak (#002)
- a. Location:
 - b. Area: scattered clumps in 100 yds² - 2 acres
 - c. Number of plants: several thousand in 1987
 - d. Density: Moderate
 - e. Evidence of expansion/contraction: several thousand in 1987, perhaps 100-200 in 1990; extensive grasshopper defoliation evident in 1990.
- #003. Lindstrom Peak Southwest (#003)
- a. Location:
 - b. Area: scattered in clumps in 10-100 yds²
 - c. Number of plants: 101-200 plants in 1990
 - d. Density: Moderate
 - e. Evidence of expansion/contraction: No evidence
- #004. River Access Northwest (#004)
- a. Location:
 - b. Area: 1-5 yds²
 - c. Number of plants: 11-50 plants in 1990
 - d. Density: Low
 - e. Evidence of expansion/contraction: No evidence

APPENDIX IV

Slides of Grindelia howellii and its habitat.

APPENDIX V

Demographic monitoring established in 1987
(from Caicco 1987)