CONSERVATION STRATEGY AND SPECIES MANAGEMENT GUIDE

FOR

GRINDELIA HOWELLII (Howell's gumweed)

ON THE LOLO NATIONAL FOREST

BY

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In Cooperation with the BLM, FWP, TNC, and private land owners.

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INTRODUCTION

Forest Service sensitive plant species, designated by the agency's Regional Foresters, are species "for which population viability is a concern, as evidenced by significant current or predicted downward trends in 1) population numbers or density and/or 2) habitat capability that would reduce a species' existing distribution" (FSM 2670.5). Forest Service management practices should "avoid or minimize impacts" on sensitive species to ensure they do not become threatened or endangered because of Forest Service actions and to maintain viable populations of all native species throughout their geographic range on National Forest System lands (FSM 2670.22 and 2670.32). Where impacts cannot be avoided, the agency will analyze "the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole" (FSM 2670.32). For sensitive species, effects are considered adverse if they "contribute to a trend toward federal listing or loss of viability for the species".

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.

Additionally, the Lolo Forest Plan addresses the preservation of sensitive species in Forest Plan Standard 27 (USFS 1986). The standard states: "…For plant and animal species that are not threatened or endangered, but where viability is a concern (i.e. sensitive species), manage to maintain population viability…"

The objective of this Management Guide is to present recent survey information and outline a plan for the management of *Grindelia howellii* on the Lolo NF in Montana. 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.

BIOLOGICAL INFORMATION

Description and Nomenclature

Howell's gumweed (*Grindelia howellii*) is a short-lived perennial in the Asteraceae (Composite/Aster/Sunflower) family. This gumweed has stems up to 35 inches in length that are woody at the base and clustered on a taproot. The basal leaves are lance-shaped, broadest toward the tip, and up to 7 to 8 inches long. The basal rosettes are similar looking to the noxious weed, spotted knapweed (*Centaurea maculosa*); the two species are usually found together in the project area. Herbage is sticky (resinous) and have hairs with glands at the tip (glandular). Flowers are yellow and formed during the second year of growth. The yellow rays are less than 0.5 inches long and are typical of the composite family which includes asters, daisies, and sunflowers. This plant flowers in July and August.

Howell's gumweed is a highly restricted regional endemic 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. The Montana populations are distributed across all landownerships from private, State of Montana, BLM, and Forest Service (Lolo and Flathead NFs).

Scientific Name: *Grindelia howellii* Steyerm.

Family: Asteraceae or Compositae (Sunflower)

Common Name: Howell's gumweed, Howell's gumplant

Synonymy: potentially *Grindelia paysonorum* St. John, Payson's gumweed

Distinguishing Features and Similar Species

This species is similar to the more common curlycup gumweed (*Grindelia squarrosa*) and Idaho gumweed (*Grindelia nana*). However, Howell's gumweed is distinguished by having glandular, often hairy, rather than hairless (glabrous), stems and resinous foliage. Howell's gumweed has been found to hybridize with curlycup gumweed making identification difficult.

A review of the *Grindelia* species in 2012 determined Howell's gumweed also corresponds to the characteristics of Payson's gumweed (*Grindelial paysonorum*) as well (Bartoli and Tortosa 2012). Diagnostic features of Payson's gumweed include the radiate heads, the acuminate phyllaries, in graduated, six or seven series, the somewhat clasping leaves, with stipitate and sessile glandular trichomes scattered across both blade surfaces.

Photo 1: Acuminate phyllaries.

Range and Distribution

Howell's gumweed is a regional endemic species, divided in distribution between northern Idaho and western Montana. It is currently known to occur in Montana in Missoula and Powell Counties, including on the Seeley Lake Ranger District of the Lolo NF (other sites include the Swan Lake District of the Flathead NF, Lincoln Ranger District of the Helena-Lewis and Clark NF, private lands, and roadways).

A report on the conservation status of Howell's gumweed was published in 1986, and was updated in 1991. In 1986, there were 55 known populations in Montana. Four new populations were located from 1987 to 1989 (Pavek 1991). By 1991, there were 60 known locations in Montana. Management actions identified as potential negative impacts in the 1991 update to the conservation strategy were herbicide spraying, cattle grazing, and lack of awareness of known populations. Since 1991 the Lolo NF has been striving to protect individual sub-populations by an avoidance strategy from management actions where known sub-populations of Howell's gumweed occur. This is similar to if not an increase from the 1991 assessment; some of which can be explained from land exchanges and an increase in awareness to protect known populations.

The Montana Natural Heritage NatureServe mapping systems identifies 153 locations for Howell's gumweed across the Seeley-Swan and Blackfoot Valleys (which includes the locations on Seeley Lake RD) for approximately 22,476 genets on 2,511.3 acres. The Seeley-Swan and Blackfoot Valleys includes the

region from Gold Creek to north of Ovando (Blackfoot Valley) and Clearwater Crossing to Condon (Seeley-Swan Valley), equating to approximately 1,849 miles^2. Populations on the Flathead NF and Swan Lake RD are in good condition based on surveys completed in 2018 in relation to a noxious weed roadside treatment project (pers. comm. Delay 2018), as are Idaho populations (pers. comm. Hays 2018). Currently, there are 16 mapped populations on the Lolo NF according to the Forest Service national database known as NRIS (data retrieved August 2018). Along with three populations in Idaho, these are currently the only documented locations of Howell's gumweed on NFS lands.

In 2016, a plant habitat detection model was developed for Howell's gumweed on the Lolo and Flathead National Forests (Ingegno 2017). The model used habitat characteristics, slope, aspect, and elevation of existing populations to identify potential habitat. Field verification surveys took place from July 19 – 22, 2016 during flowering. Over 16,300 acres were classified as moderate or high probability habitat in the modeled area. Within survey transects, 31% of habitat was classified as "likely" by the field technician; however, no new populations were observed.

In 2017, a genetic study was done to determine if the known populations on the Seeley Lake RD are genetically distinct or similar to individual populations as those found in Idaho and on the Lincoln Ranger District. The results indicate that the populations on the Seeley Lake RD are all genetically similar and could be considered a meta-population. The results also indicate that there is sufficient cross pollination between populations on the Seeley Lake RD to sustain the genetic diversity needed to perpetuate the meta-population (NFGEL 2017). (Of note: The study determined the Lincoln RD population was most likely a hybrid population between *G. howellii* and *G. squarrosa* and recommended the Idaho population be re-keyed to another species due to the vast genetic difference.)

In 2018, the known locations were visited again to determine if the Rice Ridge Fire had significant impacts on the populations. As the site were located, it became apparent, resource protection measures were not implemented and resulted in a loss of several sub-populations. Results are listed in Table 1.

Background Information

The largest known sub-population of Howell's gumweed on the Seeley Lake RD is a sub-population that is approximately 52 acres with 9,130 genets on the road prism of RD 17465, 46146, 46152, 46153, 46148, and 46149. Genets are located within and adjacent to the roadbed surface. Together with the smaller sub-population along West Morrell Road (RD 4353), these occurrences of Howell's gumweed are considered core population areas for the species within the Seeley RD. Other sub-populations are considered satellite or incidental populations, and though they contribute to the overall genetic diversity to the meta-population, their role in the viability of the meta-population is less than the core populations. There is an additional satellite sub-population in the Horseshoe Hills area (outside the project area but on Seeley Lake RD) that is also intact and is approximately 25 ft.^{2} with 18 genets.

Howell's gumweed populations are typically found growing on disturbed roadsides, where a seasonal supply of moisture is available for plant growth. This plant has been found at elevations from 3,350-5,500 feet, with the majority of locations at 4,000-4,500 feet. In 2017, prior to the Rice Ridge Fire, there were nine sub-populations known within the Center Horse TAP project area. Locations were observed and monitored in 2017 as part of a genetic study (NFGEL 2017) and were marked prior to a noxious weed treatment contract in 2016.

Table 1. Monitoring Results for the nine Howell's gumweed Locations (2018)

Associated Road	Howell's Gumweed Population Size Pre-2018 surveys	Current Howell's Gumweed Population Size	Activity causing impacts
Intersection of Black Canyon (RD 4385) and Cottonwood Lakes Road (RD 477)	0.8 acres, 200 – 300 genets	No plants observed	Crushing (past)
Remick Spur (RD 17507)	0.4 acres, 150 genets	No plants observed	Culvert installation (past)
Cottonwood Lakes Road (RD 477)	0.4 acres, 100 genets	No plants observed	Log decking (past)
Cottonwood Lakes Road (RD 477)	0.1 acres, 50 genets	No plants observed	Blading (past, ongoing)
Cottonwood Lakes Road (RD 477), near Monture	0.1 acres, 30 – 50 genets	No plants observed	Herbicide application (past, ongoing)
East Morrel (RD 467)	0.2 acres, 150 genets	Plant observed but curled due to herbicide application	Herbicide application (past, ongoing)
West Morrel Road (RD 4353)*	2.1 acres, 412 genets	2.1 acres, 350 genets	Intact
West Dry Road (RD 16377)	0.2 acres, 50 genets	0.01 acre, 14 genets	Intact
RDs 17465, 46146, 46148, 46149, 46152, and 46153 *	52 acres, 9,130 genets	52 acres, 9,130 genets	Intact
*Core populations			

Reproductive Biology and Genetic Analysis

Howell's gumweed appears to be a seral species that prefers early successional sites and tolerates lightly to heavily disturbed habitats (Shelly 1986). 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, 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. However, the disjunct distribution of the population was documented before vehicles and should not be considered the main dispersal method.

In 2017, leaf samples were collected from nine populations of *G. howellii*, one population of *G. squarrosa*, and one population of a putative *G. squarrosa X G. howellii* hybrid. The Clear Creek (Idaho) population of *G. howellii* was also sampled while all the other samples occurred in Montana. At each population, 3-5 leaves per individual were collected from 16 to 33 individual plants; thus, a total of 280 plants were sampled. The only exception to this occurred at the *G. squarrosa* "Blue Mountain" population, where 3-5 leaves were collected from 7 individual plants.

Microsatellite loci and samples from *G. howellii* and *G. squarrosa* populations were examined to determine genetic diversity and possible hybridization. The main questions to be answered in this study

were: 1) Are the *G. howellii* populations' sizes, genetic diversity, and variability ideal to preserve genetic integrity? 2) How do the genetics of *G. howellii* interact with conservation efforts, restoration, and management for this species? 3) How closely related are *G. howellii* and *G. squarrosa*? 4) What is the relationship between geographic range size and levels of genetic diversity in *G. howellii* and *G. squarrosa*?

The findings are as follows:

(1) Are the *G. howellii* populations' sizes, genetic diversity, and variability ideal to preserve genetic integrity?
The number of total individuals in the sampled populations varies greatly (30 – 8,800), but genetic diversity is not strikingly different across populations. If we accept the general northern, central, and eastern groupings of the Seeley Lake (Montana) populations as 'meta-populations', the northern meta-population has lower genetic diversity than the central and eastern meta-populations. If the northern populations are large, the relatively low genetic diversity could be of concern.

(2) How do the genetics of *G. howellii* interact with conservation efforts, restoration, and management for this species?
Our results do not indicate any immediate threat to the sampled populations in terms of low genetic diversity, and indeed the Montana populations seem to be acting as a large meta-population, with few genetic differences between populations. In particular, SO-143 is found along a road that may be developed in the future. Looking at its genetic diversity and the STRUCTURE results, it is not distinctly different from SO-148 and SO-82/83. However, it does have a private allele found only in that population. If the population is destroyed, it may be worth transplanting individuals and/or collecting seeds to add to the SO-148 and SO-82/83 populations.

(3) How closely related are *G. howellii* and *G. squarrosa*?
Species identification within Grindelia is hard due to the wide range of morphological variation within and among species, and previous genetic studies have found that 'species' aren't always unique genetic units. The putative hybrid population in this study, SO-171, is quite distinct from the other *G. howellii* Montana populations. However, if it is a hybrid, we'd expect it to share genetics with both the Blue Mountain population of *G. squarrosa* and Montana populations of *G. howellii*. However, Blue Mountain, though different from the Montana populations, isn't strikingly so – as a different species, we'd expect it to be quite distinct. The SO-171 population could be a hybrid, or it could be that geographic distance from the other Montana populations has led to genetic differentiation.

The Clear Creek (Idaho) population is also quite distinct. This could be because of geographic distance or because it is not *G. howellii*. At this point, it is recommend collecting from more populations of *G. squarrosa* and putative hybrid populations.

(4) What is the relationship between geographic range size and levels of genetic diversity in lineages?
Without more G. squarrosa populations, population genetic levels to range sizes cannot be corelated. The single included putative G. squarrosa population doesn't have markedly different levels of genetic diversity compared to the G. howellii populations.

Endangerment Status

The species was proposed for Threatened status in 1978 when extant populations were known to be only nine populations in the Swan Range (in Powell and Missoula counties), Montana and on the St.

Maries River in Benewah County, Idaho. An environmental assessment was completed to list the species as threatened with critical habitat which was reviewed by the U.S. Fish and Wildlife Service. The species was considered a Category 2 candidate species, under the Endangered Species Act in 1990 (USDI Fish and Wildlife Service 1990). In 1991 it was still considered a candidate species (Pavek 1991). The state ranking for Howell's gumweed is S2, S3 with a global ranking of G3 because of "very limited and/or declining population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in the state".

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. A "Threats Reporting Form" was submitted to the Montana Natural Heritage Program to update the status of populations found on the Seeley Lake Ranger District, Lolo National Forest.

Threats

In 2018, following the Rice Ridge Fire, the sites were monitored for population trends post-fire. Only two of the nine sub-populations were observed at this time. Six locations were covered over or directly impacted by fire suppression actions, BAER or other post fire road maintenance actions. Fire suppression deck sales and noxious weed treatments also may have impacted sub-populations (Table 1). Although Howell's gumweed survives on disturbed sites, it is unlikely these satellite sub-populations will recover based on past monitoring efforts and the permanency of some of the disturbances. Pavek 1991 and Shelly 1986 demonstrate sub-populations are impacted by disturbance causing actions such as road maintenance and weed spraying that can cause direct removal of the plant and disturb the seedbank.

Post Wildfire Road Restoration and Maintenance

The Rice Ridge Fire (2017) burned a considerable amount of vegetation, causing potential threats to the road system from excess runoff. In order to get ahead of the potential disasters, roads were maintained and improved immediately after the fire. Culverts were installed, roads bladed, and machinery was parked on top of known sub-populations of Howell's gumweed. Due to the permanency of most of the improvements and the disturbance of the seed bank, the sub-populations are not expected to return.

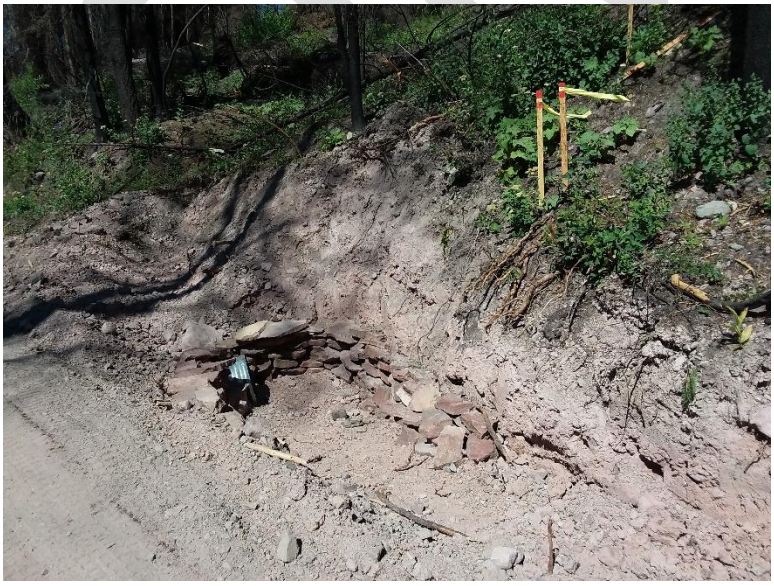

Photo 2: Culvert located at a GRHO sub-population site

Timber Removal Projects

One of the known sites of a sub-population was along the Cottonwoods Lake Road. In an effort to create a fuel break during the Rice Ridge Fire and prevent the fire from entering the town of Seeley Lake, the roadside of Cottonwoods Lake Road was heavily thinned, and the timber was decked along the sides of the road (see photo below). The sub-population under the log deck has the best likelihood of recovery since individual plants may be located between logs placed on the ground.

Several sub-populations occur along the sides of roads identified for haul routes as part of the Rice Ridge Salvage project. Roads identified for hauling are improved to allow for various equipment to travel to the cutting unit and haul away timber. Improvements could include culverts, widening, drainage, etc. and increased traffic associated with the project and administration. All these things are considered threats to sub-populations that occur on the road, in the median of the road, or alongside the road because, in some cases, avoidance will not be possible.

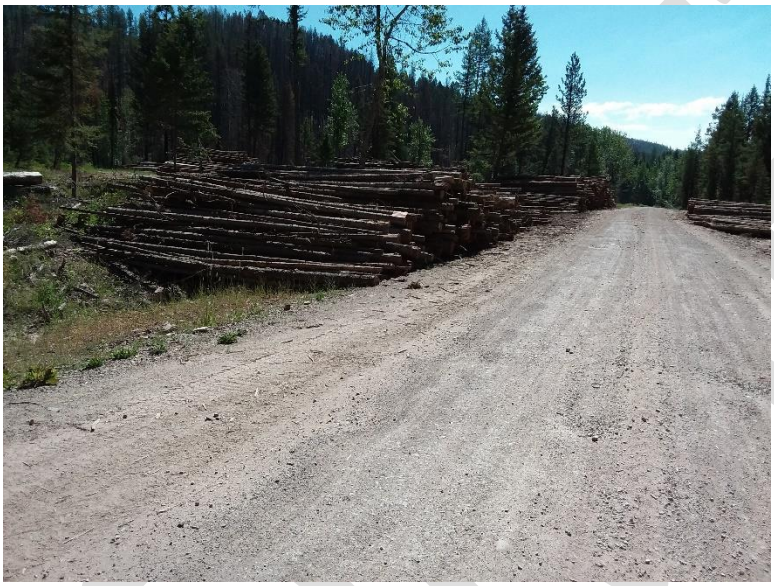

Photo 3: The location of the GRHO population would be under these log decks

Herbicide Application

During monitoring completed in 2018, it was observed that the population along East Morrell Road (RD467) was sprayed with herbicide. It is unknown if individuals will recover. Herbicide applications are usually restricted around Howell's gumweed locations.

Photo 4: The sprayed GRHO population along RD 467

Center Horse Transportation Analysis Plan (TAP)

The Center Horse TAP will be implemented in the near future. What started as a landscape restoration project (Center Horse) was interrupted by the Rice Ridge Fire which removed a good portion of the vegetation that was to be managed by Forest Service actions. The Center Horse Tap will provide for a minimum number of roads to support future resource management and public recreation access while emphasizing protection of water quality and soils, fish and wildlife habitat and visual quality. This will be accomplished by constructing about 2.6 miles of road as part of road re-routes and decommissioning 2.1 miles of road that would be abandoned as a result of the re-routing. The main roads that would be re-routed would be the Cottonwood Lakes Road (FSR 477) at Dunham Creek, North Fork of Cottonwood Creek, and at Shanley Creek. Road 56087 would also be re-routed. These actions will have the greatest impact on Howell's gumweed populations. The Center Horse TAP also includes decommissioning 110 mile of road and storing an additional 27.8 miles of road. The most relevant decommissioning is along

West Morrell Road (FSR 4353) which could potentially eliminate a core population without the implementation of resource protection measures.

Survey Methods and Findings

Section still to be completed: Surveys will occur on Forest Service, BLM, State of Montana (FWP and DNRC), TNC, and private lands where allowed access. See Management Plan below

Future Threats

Road maintenance and herbicide application to treat noxious weeds along road sides will continue to threaten potential habitat and possible future sub-populations.

MANAGEMENT PLAN

Currently Under Review

REFERENCES

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Personal communication Hays, M. 2018. Karen Stockmann, botanist for the East Zone of the Lolo National Forest contacted Mike Hays (botanist for the Nez Perce National Forest) regarding the status of Howell's gumweed populations on the Nez Perce NF.

Shelly, J. Stephen. 1986. Report on the conservation status of Grindelia howellii, a candidate threatened species. Montana Natural Heritage Program, Helena, MT. 144 p.

USDI – Fish and Wildlife Service. 1990. Environmental Assessment: Propose Determination that *Grindelia howellii* Steyermark (Howell's Gumweed) is a Threatened Species Pursuant to the Endangered Species Act. U.S. Department of the Interior, Washington, D.C. 20240

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USFS. 2008. US Forest Service official Element Occurrence form. Missoula, MT 59804

APPENDIX A – TES Plant Element Occurrence Field Form (USFS 2008)

® = REQUIRED

General Information

1) SITE ID:	**2) DATE:**	**3) SITE NAME:**
4) NRCS PLANT CODE: GRHO		
5) SCIENTIFIC NAME: GRINDELIA HOWELLII		
6) RECORD SOURCE:	**7) SURVEY ID:**	**8) Survey Name:**

9) EXAMINER(S)- LAST:	**FIRST:**	**MIDDLE INITIAL:**
LAST:	**FIRST:**	**MIDDLE INITIAL:**

10) OWNERSHIP ®:	**11) Location Uncertain:**	**12) Uncertain District:**
13) E.O. # ®	**14) STATE: MONTANA**	**15) COUNTY: MISSOULA / POWELL**

16) REGION: R1	**17) FOREST: LOLO**	**18) DISTRICT: SEELEY LAKE**
19) Area (Est) ®:		**20) Area UOM ®: Acres Ft^2**

Element Occurrence Data

22) EO Canopy Cover ®: %Cov: ***or*** Cover Class Code:		**23) Lifeform:**
24) Number of subpopulations ®:	**25) Plant Found (Revisit) ®: Yes or No**	
26) Plant Count ®:	**27) Count Type ®: *Genets/Ramets/Undetermined***	**28) Count ®: *Actual* or *Estimate***
29) Revisit needed - Yes *or* No	**30) Revisit Date ®:**	
31) Revisit Justification ®:		

32) Phenology by % *(Sum to 100%):* Vegetative . . . . . ___ Flower/Bud . . . ___ Fruit/Dispersed . ___ Seedlings/ Juvenile . . . . . ___	**33) Population Comments ®:** (e.g., distribution, vigor, density, phenology, dispersal) **34) Evidence of disease, competition, predation, collection, trampling, or Herbivory ®:** Yes___ *or* No ___ **35) Evidence Comments (required if yes):**

36) Pollinator observed ® – Yes *or* No	**37) Pollinator type(s) (required if yes):**
38) Pollinator comments:	

Site Morphometry

39) Percent Slope:	**40) Slope position:**

41) Aspect: azimuth: ***or*** cardinal:	
42) Elev.: Ave: Min: Max:	**43) Elev UOM: ®***

Soil Characteristics and Light Conditions

44) Substrate on which EO occurs:		
45) Parent Material:	**46) Soil Moisture:**	**47) Soil Texture:**
48) Soil Type:		**49) Light Exposure:**

SITE ID:

Site Classifications®

Record taxonomic units of the given type(s) if published classifications exist for the area.

CLASSIFICATION TYPE	CLASS CODE	CLASSIFICATION SHORT NAME	CLASSIFICATION SET
50) Existing Veg			
51) Potential Veg			
52) Ecotype			

Habitat Quality and Management Comments®

53) Habitat Description:	
54) Dominant Process:	
55) Process Comment:	
56) Community Quality *(L, M, H):*	**57) Landscape Integrity *(L, M, H):***
58) Disturbance/Threats (present or imminent):	
59) Disturbance/Threats Comment:	
60) Non-Native Comment:	
61) Current Land Use Comment:	

Canopy Cover®

Record % canopy cover by actual percent, ***or*** by cover class (*as indicated in General Information Block*).			
Lifeform Canopy Cover	**62) % Cov *or* Code**	**Ground Cover**	**63) % Cov *or* Code**
Tree		Bare	
Shrub		Gravel	
Forb		Rock	
Graminoid		Bedrock	
Non-vascular		Moss	
Lichen		Litter/Duff	
Algae		Basal Veg	
		Water	
		Road surface	
		Lichen	

Associated Species®

List species directly associated with the EO species on this site. Record the NRCS Plant Code, scientific name or both. If desired, indicate lifeform, dominant species, % cover for each species and flag non-native species.

64) Completeness of Species List: ®* C, R, OR S

65) Species List Comment:

66) NRCS Plant Code	**67) Scientific Name**	**68) Life Form**	**69) Dom. (Y/N)**	**70) % Cov or Class**	**71) Non-native**

EO Specimen Documentation®

72) Reference for ID:		
73) Primary Collector – Last Name:	**First Name:**	**M.I.**
Other Collectors – Last Name:	**First Name:**	**M.I.**
74) Collection #: ®*	**75) ID Confirmed: ®*** Y: or N: or Questionable:	
76) Verification:		
77) Specimen Repository: ®*	**SITE ID:**	

Image Information

78) Image ID	79) Image Description

Location Information®

(State, County, Region, Forest, District will be auto-populated by the database application when the spatial feature is entered)

85) Latitude and Longitude (either in degrees, minutes, seconds or in decimal degrees)		
Geodetic Datum:		
Latitude: Degrees __ __ N	**Minutes**	**Seconds __ __.__ __**
Longitude: Degrees __ __ __ W	**Minutes**	**Seconds __ __.__ __**
GPS Datum:		
GPS Lat. Dec. Degrees:	**GPS Long. Dec. Degrees:**	

90) Sketch of Site or Area®

91) General EO Comments, as necessary

APPENDIX B – Survey Site Revisit in 2019

Total numbers of individuals in *Grindelia howellii* populations 1986-1990.

Element Occurrence Number	Survey Site	(Shelly) 1986 Observations	(Pavek) 1990 Observations	2019 Observations
001	Holland Lake	1500-2000	*	
002	Monture Creek	1000's	*	
003	Blanchard Lake	*	*	
004	Sunflower Mountain	*	*	
005	Blanchard Flats	14	*	
006	Vaughn Ranch	9	6	
007	McNamara Bridge	*	*	
008	Potomac	*	*	
009	Blue Slide	*	*	
010	Salmon-Seeley Road	14	*	
011	Clearwater Access	*	*	
012	Jones Lake	42	10	
013	Spring Creek	49	*	
014	Angevine	*	*	
015	Greenough Roadside	*	*	
016	Holland-Pierce Creek	*	*	
017	Condon	*	*	
018	Dick Creek	150-200	797	
019	Ovando-Champion	250-300	1594	
020	Mollet Park	500-600	272	
021	Mollet Park South	70-90	125	
022	Martin Park	50	*	
023	Doney Lake	60	86	
024	Vaughn Creek	54	1	
025	Placid-Lost Prairie Road	45	248	
026	Horsehead Road	325-400	*	
027	Lost Horse Creek	200-250	11	
028	Lost Horse Road	45	6	
029	Lost Horse Spur Road	175-200	536	
030	Lost Horse-Blanchard Road	85	60	
031	Blanchard Uplands	800-1000	*	
032	Spring Creek Lake	16	*	
033	Dick Creek East	38	84	
034	Pearson Creek	228	61	
035	Blackfoot Roadside	80	0@	
036	Blackfoot Roadside II	15	130#	
037	Champion Game Range Road	126	*	

Element Occurrence Number	Survey Site	(Shelly) 1986 Observations	(Pavek) 1990 Observations	2019 Observations
038	Upsata Lake	250-300	648	
039	Upsata-Woodworth Junction	350-400	172	
040	Cottonwood Creek	1200-1400	4	
041	Blackfoot Backroads	68	42	
042	Woodworth	500-600	*	
043	Monture Creek Access	225-250	7	
044	Clearwater Backroad	150-160	415	
045	Shanley Creek	44	*	
046	Lower Cottonwood Road	27	21	
047	Cozy Corners	3000	>3000	
048	Spring Creek Road	40	1	
049	Owl Creek Uplands	140	*	
050	Placid Lake Clearcut	8	*	
051	Barber Creek	12	*	
052	South Fork Barber Creek	23	*	
053	Greenough School Pasture	500-600	*	
054	Little Fish Creek	27	*	
055	Greenough	150	*	
056	Smith Creek	30-40	*	
057	Elk Creek	40	9	
058	Black Canyon Road Junction	300	*	
059	Lost Prairie Creek	150	*	
060	Glacier Creek Road	*	9	
*Population not surveyed in 1986 or 1990				
# New subpopulation; main population was not seen				
@ Population apparently extirpated				