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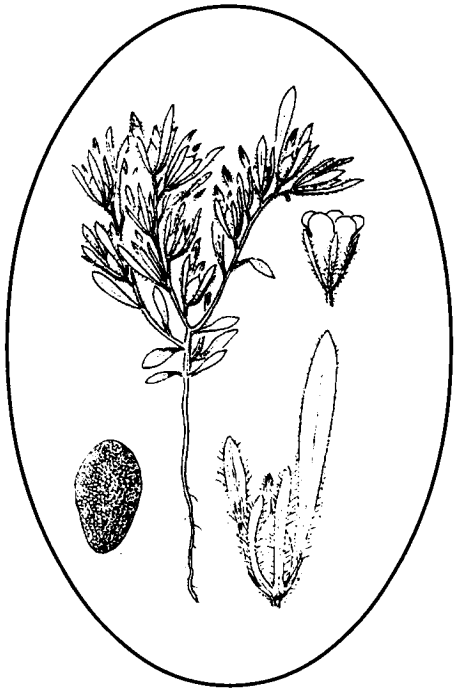
Inventory for Least Phacelia (Phacelia minutissima)



A Bureau of Land Management Special Status Plant

by
Dr. Duane Atwood

Final Report
for

CHALLENGE COST SHARE PROJECT
INVENTORY FOR LEAST PHACELIA
(Phacelia minutissima)
A BUREAU OF LAND MANAGEMENT
SPECIAL STATUS PLANT

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to
Bureau of Land Management
Lower Snake River District Office
3948 Development Avenue
Boise, Idaho 83705

by

Dr. Duane Atwood
6027 West 4600 South
Hooper, Utah 84301

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ABSTRACT

Phacelia minutissima L.F. Henderson (Least Phacelia, Snowbank Phacelia) was known only from eight locations prior to 1995. Three from Idaho (Owyhee and Camas counties, including the type), one from Washington (Kittitas County), three from Nevada (Elko and Eureka counties) and one from Oregon (Wallowa County).

The species was identified as a Candidate Category 2 species by the U.S. Fish and Wildlife Service prior to 1996 and is currently a species of conservation concern in all states with known populations.

In 1994 Bob Moseley, Idaho CDC, conducted extensive surveys for the species in Idaho but was unable to find any plants. Moseley prepared a summary report of existing data from herbarium records. Surveys have also been done in other states with mostly negative results, prior to 1995.

The 1995 surveys, conducted in southwestern Idaho (Owyhee County), and Elko County, Nevada resulted in discovery of numerous new sites and relocation of the 1972 Bratz collection area on the Owyhee Mountains. All sites are located at middle elevations (5,920 to 8,600 feet).

Surveys conducted during the 1996 field season resulted in discovery of twelve additional populations in Idaho and five in Oregon.

Least or Snowbank Phacelia is closely associated with snowbank areas in the upper portions of mountain drainages. Most sites were in damp to moist (not wet) meadows or springs and seeps. Snowbank Phacelia occurs mostly in stands of Veratrum californicum and adjacent tall-low forb areas in or near the edge of mixed aspen-drummonds willow-subalpine fir communities (sagebrush-steppe and lower montane forests). Soils are well drained basalts (Owyhee Mountains) and granitics (Silver City Range).

Population areas occur on State, BLM, Forest Service and private lands. Livestock grazing and mining are the primary threats to the species. Additional surveys are needed in Oregon, Washington, Nevada and Idaho. Conservation concern still exists due to the current threats and low number of occupied acres. Improvements in habitat conditions are needed to reduce existing threats.

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I. INTRODUCTION

Least Phacelia was recognized by the U.S. Fish and Wildlife Service (FWS) as a Candidate Category 2 species prior to publication of the 1996 Notice of Review (FR 61 number 40: 7596-7613). It is currently recognized as a sensitive species by the U.S. Forest Service (FS) in Oregon, Nevada, Washington, and Idaho, Idaho Bureau of Land Management (BLM), and of conservation concern by each of the State Heritage Programs (SHP).

Prior to the 1995 field season Last Phacelia (Phacelia minutissima L.F. Henderson) was only known from eight disjunct locations in Nevada, Idaho, Oregon and Washington (Moseley 1995). At that time the most recent Idaho collection had been made by R.D. Bratz in 1972. No recent collections were known from Oregon.

The field work by Moseley in 1994 was the most recent comprehensive survey for the species. He surveyed the vicinity of known Idaho populations and throughout much of southwest Idaho during June and July of 1994 (Moseley 1995). His report provides a fairly good summary of existing data based on herbarium records, the literature and discussions with some of the knowledgeable field workers. Very little data was provided on specific survey routes, habitats searched and conditions of these habitats, or times during June and July when his work was completed. These data may have provided valuable information for the 1995 surveys, documentation of habitat conditions in 1994, and been a source of information for comparing conditions in 1995 to evaluate phenological requirements of the species.

In 1995 surveys of this species were initiated in Idaho, on the Boise District of the BLM, and the Humboldt National Forest in Nevada. These surveys resulted in relocation of historic and new populations in both states. Surveys in Nevada were completed by Frank Smith and those in Idaho by Duane Atwood. A report on their findings are available from them or the respective agency for which the surveys were done.

The 1996 surveys on the Owyhee Resource Area, BLM Boise District concentrated on the south side of the Silver City Range, south to South Mountain, Indian Springs and vicinity. These surveys resulted in location of thirteen populations in southwestern Idaho. Additional surveys were conducted on the Wallowa-Whitman National Forest in high potential habitat on the Hells Canyon NRA. Five new populations of Least Phacelia were discovered, three of these by independent contractors.

II. STUDY OBJECTIVES

The primary objectives of this survey were to:

1. Review Bureau of Land Management aerial photographs,

USGS topographic maps, and interview BLM staff and others knowledgeable about potential habitat areas in southwestern Idaho prior to field work.

2. Search additional high priority areas not yet surveyed during the optimum growing period. Identify any threats to the species. Make recommendations regarding the appropriate status of the species (proposed to list, remove from special status list, etc). Make any appropriate management recommendations.

3. Complete field data forms for known populations visited and any new populations discovered.

4. Evaluate essential habitat needs for the species.

5. Provide a draft report after completion of the study and a final report to the BLM Boise District, Boise, Idaho after the agency contact person reviews the draft report.

6. The report will include a complete analysis of the survey results and conclusions, a set of USGS topographic maps with population locations, photographs of the species and its habitat, and completed field forms for each population discovered. Management recommendations will be included in the report and will be based on scientific data and professional observations of the author.

7. Botanical voucher specimens will be collected for all new populations of Least Phacelia discovered. Observations and vouchers will also be completed for any other rare plant species observed within the survey area. A set of mounted specimens will accompany the final report for all populations of Least Phacelia where collections can be made without harming the vitality of the populations being studied.

METHODS

A. PREFIELD

Upon approval of this Challenge Cost Share Project, a review of the current literature [Atwood (1995), Smith (1995), Moseley (1994), Cronquist (1984), Morefield & Knight (1992), and Rosentreter (1986)] was completed to determine known locations, habitat and phenology.

Contact was made with Steve Anderson, Humboldt National Forest Wildlife Biologist, and with Frank Smith, private consultant, for information on the status and findings of surveys completed in 1996, for Least Phacelia.

I met with Ann Debolt and other BLM staff on the morning of

July 18 at the Boise District office to discuss livestock grazing issues, review allotment management grazing plans, discuss potential habitat for Least Phacelia, develop a field schedule and obtain USGS topographic maps for the survey areas.

Prior to completing surveys on the Sawtooth National Forest, I met with Gary Fullmer, Fairfield District Ranger, and John Shelly, Range Conservationist for the Sawtooth National Forest.

Surveys on the Wallowa-Whitman National Forest were coordinated through Paula Brooks.

B. SURVEY PROTOCOL

All surveys were carried out in accordance with the Work Plan for this project (Appendix XIIA). Surveys included both cursory and intensive searches for the species in potential habitat.

Based on previous collection data this would include dried mud areas in aspen groves at 6400'(Bratz 1972), moist banks of brooks in sheltered sagebrush at 5480'(Ripley & Barneby 1951), dry gravelly or rocky ground at 8000' (Henderson 1895), dry creek beds near springs at 7700' (Tiehm 1979), mud banks of small gullies through a drying, seasonally wet meadow at 8100' (Tiehm & Williams 1983), meadows below alder and Veratrum in fairly dry rocky meadows (Burnett & Elroy 1986), and ephemerally wet snowbanks, springs, and damp to moist meadow areas (Atwood 1995).

C. SURVEYS

Owyhee RA, Boise District BLM-The 1996 field work was initiated on the afternoon of July 18 and continued to July 24th. These surveys concentrated on the south side of the Silver City Range south to South Mountain, Indian Springs and vicinity. Some additional surveys were conducted on the western end of the Owyhee Mountains resulting in discovery of one additional population at the head of Cow Creek. Ann Debolt and I visited the Rich Gulch populations on the Silver City Range with a Mining Company representative. We also looked at some of the new populations discovered on South Mountain and in the Indian Springs area. The 1995 surveys completed July 17 through July 23rd concentrated primarily on the Owyhee Mountains. One population was also discovered in Rich Gulch on the north side of the Silver City Range during the 1995 survey.

Sawtooth National Forest-Surveys were conducted on the Sawtooth NF the evening of July 24 and July 25. The surveys covered potential habitat from Fairfield along FS road 094 to the Boise River, from Couch Summit west along FS road 010 to Smoky Dome Canyon, along FS road 015 up Little Smoky Creek 3 miles and 2.5 miles up Soldier Creek (FS road 093). Numerous habitats were observed and searched along these routes. The best potential

habitat observed and surveyed was on private property in lower Soldier Creek, T1N, R14E, S5 NE 1/4. No Least Phacelia was observed in any of the sites surveyed. Many of these areas had been heavily grazed by livestock reducing the potential presence of Least Phacelia.

Wallowa-Whitman NF-Field work was initiated on the Wallowa-Whitman NF the afternoon of July 14 and continued through the evening of July 17, 1996. Paula Brooks and I attempted to relocate the historic Hash Springs location and surveyed additional areas on the north end of the forest. These surveys were conducted on July 15. The morning of July 16 was also spent surveying potential habitat in this area. Surveys were conducted on the south end of the forest the afternoon of July 16 through the evening of July 17. Forty-six hours or 5.5 person days were devoted to the study with most of the time spent conducting surveys, collecting and pressing voucher specimens and completion of field data forms documenting the survey results. Three days were spent at Brigham Young University identifying and curating voucher specimens and preparation of the report.

IV. RESULTS

A. TAXONOMY

1. DISCUSSION

The original description of Phacelia minutissima (Henderson 1900) is included in Appendix B, along with a key to the species of Phacelia for the Intermountain Region (Cronquist 1984). Henderson (1900) cites his number 3386 from the Soldier Mountains as the type with the holotype deposited at the Washington Herbarium (WTU) and isotypes in the Idaho (ID) and Gray (GH) herbaria. Cronquist (1984) cites the holotype as being at the US herbarium. Moseley (1995), page 3, cites the holotype and isotypes as being at the US and G herbaria respectively, but in Appendix 3 indicates the type is at NY. Due to these conflicting reports it is uncertain where the holotype is deposited. However, if a specimen of Henderson's number 3386 does exist at the Washington herbarium then I assume this would be the holotype since it was so designated by Henderson in his 1900 publication. The 1913 collection by Nelson and Macbride (number 2232) from Gold Creek, Nevada described as Phacelia foliosepala, is a synonym and the type is deposited at RM.

An updated description is provided below based on observations and measurements of 1995 and 1996 collections by the author.

2. DESCRIPTION

Small erect, simple or branching annual, 0.4-2.0 dm tall; stems simple or often branching from at or near the base, short spreading-hairy and stipitate-glandular throughout; leaves mostly cauline, oblanceolate or linear-oblong, tapering to a short petiole (up to 1 cm long), entire or rarely slightly denticulate, middle and upper blades up to 2 cm long and 0.8 cm wide, the lower ones up to 3 cm long and 1 cm wide; inflorescences usually short and few flowered (3-12 flowers in smaller plants) and more elongate and many flowered (15-45 [70] flowers in larger branched plants), leafy-bracteate and comprising most of the plant height; pedicels 1-2 mm long in flower and elongating up to 1.2 cm in fruit; calyx 4-5, spatulate or linear, 2-4 mm long at early anthesis, soon elongating in flower and extending beyond the corolla, markedly accrescent in early fruit and distinctly unequal in length and width with one or more of the lobes foliaceous and up to 2.2 cm long, and 4 mm wide; corolla small, lavender, deciduous, 2.5-4 mm long, tubular-campanulate with short corolla lobes, the veins distinct (in pressed specimen); stamens and style included; anthers 0.3 mm long, filaments 1-1.5 mm long (3 long and two shorter), attached near the base of the corolla tube; style 1.5 mm long and cleft about 1/2 its length; capsule ovate, acute, 5 mm long, 4 mm wide, thinly spreading hairy and stipitate-glandular, the glands becoming black with age; seeds 8-12, 1.1-1.2 mm long, 0.6-0.8 mm wide, oval-oblong, angled and finely pitted.

The illustration (Cronquist 1984) which depicts the calyx lobes as being shorter than the corolla is somewhat misleading since the majority of plants observed have the calyx longer than the corolla. Only 4 calyx lobes are present in many of the flowers observed in the Idaho plants. The more vigorous branching plants, in southwestern Idaho, occur in stands of Veratrum californicum where open spaces are present and light is allowed to penetrate. Plants growing in more dense stands of Veratrum with less light were short, spindly, and unbranched.

Least Phacelia observed on the Wallowa-Whitman National Forest were small unbranched plants. The few plants observed occupied small open areas with seasonal water in forb/grass dominated communities.

3. KEY FIELD CHARACTERS

The most unique character is the distinctly 4-5 unequal calyx lobes (in length and width), even in flower. This character, along with the stipitate-glandular pubescence, deciduous flowers, and filaments equally inserted at the base of the corollas clearly set this species apart from any other

associated species in its habitat. The three long and two short filaments (stamens) may also be a useful character.

4. LOOK-A-LIKES

Two look-alikes associated with this species are Microsteris gracilis and Veronica biloba. Other species which add some difficulty, due to the dense understory, in locating the species are Nemophila breviflora, Plagiobothrys scouleri, Collomia linearis, Trifolium cyathiferum and Polygonum kelloggii. Although these species cannot be confused with Least Phacelia they do add considerable difficulty in finding the species in some populations. In such cases one has to look harder and more slowly to locate the phacelia. To my knowledge, no other annual Phacelia occurs in mid elevation moist settings with such a late phenology, at least within the known habitat for the species.

B. FIELD SURVEYS AND FINDINGS

1. DISTRIBUTION AND ABUNDANCE

a. **RANGEWIDE DISTRIBUTION**-The range-wide distribution, as described by Moseley (1995), has been expanded based on survey work completed during 1995 in Nevada and Idaho and in Idaho and Oregon in 1996. The map in Appendix C is an updated distribution map for the species.

Least Phacelia is known from 35 sites in Idaho (Camas and Owyhee counties), 25 sites in Nevada (Elko and Eureka counties), 6 sites in Oregon (Wallowa County) and 1 site in Washington (Kittitas County). These are listed in Tables 1-5.

Additional potential habitat exists in southwestern Idaho, on the Sawtooth and Boise National Forests, BLM Owyhee Resource area, and adjacent areas in Oregon, Washington and Nevada.

b. **ABUNDANCE**-No population numbers are available for the Buckhorn Springs population in Oregon. The 1996 Oregon populations discovered are all very small in number of plants (two dozen or less) and size of area (1 acre or less). Populations in Idaho and Nevada vary from a few to as large as 5,000. No population numbers are available for the type collection from Camas County, Idaho. Approximately 15,300 plants on a total of 4 acres have been estimated for Nevada.

2. **SURVEYS**

a. **OREGON**-All known populations discovered in

Oregon occur on the Wallowa-Whitman National Forest. The oldest collection (Peck in 1934) occurs to the north of the five populations discovered in 1996. The populations located in 1996 occur on the south end of the forest in the Skookum Creek and Beaverdam Creek areas. All five populations were very small in number of plants and size of area. These populations are listed in Table 4.

Thirteen plants were observed in the first population in T5SR47ES11 SENWNW, an area 20 by 20 square yards. Total potential habitat was approximately 1/2 acre. These plants were located in the lower part of the habitat adjacent to the access road in a forb/grass seasonally wet area surrounded by conifers.

The second population in T5SR47ES10 SESW, was also in a forb/grass seasonally wet area surrounded by conifers. Plants observed were in or adjacent to tire track ruts. Twenty-five plants were counted in this population. The three other populations were located in T5SR47ES13 NENENE, T5SR47ES23 NENWNE and T5SR47ES23 SENWNE.

Nineteen areas with potential habitat were searched on the north end of the Hells Canyon District. They included two sites near the junction of FS roads 46/760 (areas 1 and 4), Deadhorse Spring (area 2), Buckhorn Campground (area 3), Yandal Spring (area 5), reservoir area west of junction FS roads 46/595 (area 6), Dougherty Spring (area 7), areas 18 and 19 west of FS road 4630 along road 46, riparian area west of Billy GS (area 8), Veratrum stand south of Billy GS (area 9) south to FS road 4625, along Chesnimnus Creek from Vigne Campground north along FS road 4625 (area 10) and 4695 (area 11) to road 697, along Devils Run Creek via FS road 4625 and 4690 (areas 12-15) to site 13, along Summit Creek via FS road 4625 (area 16). These areas were primarily Veratrum stands, seasonally wet scabland sites, or wet riparian areas. Some had been heavily grazed by livestock (i.e. Devils Run Creek).

Approximately twenty-seven sites were searched in the Skookum area between Gumboot Creek and the Imnaha River. These sites were all scabland areas dominated by forbs and grasses. Some sites did have Veratrum present and the two populations discovered were associated with Veratrum. The Lick Creek Campground area was also searched.

b. **WASHINGTON**-The only known Washington population was discovered by Elroy Burnett in 1986 above Naneum Creek, T21N, R18E, S36 SENE 1/4.

c. **IDAHO**-Table 1 lists the populations in Idaho. Table 2 provides additional data on the number of acres, elevations, and number of acres and plants in each population. Table 3 summarizes land ownership data for Idaho populations. Sites listed are those on the USGS topographical maps in Appendix E. Known populations in Idaho are from the Owyhee Resource Area, BLM Boise District (34 sites, some on private and state lands) and Sawtooth National Forest, 1 site the type collection.

Ten new populations were discovered on the south side of the Silver City Range south to South Mountain, Indian Meadows and vicinity. Two populations were also discovered in Rich Gulch, on the north side of the Silver City Range, and one on the west side of the Owyhee Mountains in Cow Creek.

d. **NEVADA**-Nevada surveys conducted in 1995 resulted in discovery of twenty-two populations, 18 on the Humboldt National Forest, 1 on BLM, and 4 on private property, including two populations discovered by Atwood in Gold Creek on July 18 while in route to southwestern Idaho. No surveys were conducted on the Humboldt National Forest in 1996. These populations are listed in Table 5.

Table 1. Location of all known Idaho populations

NORTH SLOPE OF THE OWYHEE MOUNTAINS, OWYHEE RA

1. Upper reaches of Peters Gulch, a tributary of Reynolds Creek; one location, in T4S, R3W, S6 SESESW 1/4 (site 5a).

2. East Fork of Reynolds Creek, six locations; four at the headwaters of the East Fork between Peters Gulch and Slacks Corner, sites 5b-5e in (T4S, R3W, S7 NW 1/4), one at the head of Slacks Creek, site 4 in T4S, R3W, S19 NWNWNW and one in an unnamed stream below the USDA climatological station east of Glass Hill in T4S, R4W, S13 SWSESE (site 17).

3. West Fork of Reynolds Creek headwaters; four locations in T4S, R4W, S22 center of the NE 1/4 (site 6) NWNWNW, (site 7); S16 SWSWSW, (site 8) and (sites 2a and 2b) SESWNE and NWSWNE S16 respectively.

4. Headwaters of Dobson Creek, seven locations in T4S, R4W, S16 SWNWNE (sites 1), SENWNW (site 3A), and SWNWNW (sites 3b), and S8 SESESE (sites 12 and 13).

5. Unnamed creek west of Dobson Creek (Johnston Lakes drainage), five locations in T4S, R4W, S8 SESESE (site 14a)

Table 1 Cont.

NESESE sites 14b and 14c), NENESE (site 15a and 15b) and S8 NE 1/4 and S5 SE 1/4 (site 16).

6. Succor Creek, two small sites in T4S, R4W, S6 NENENE (site 19).

SOUTH SLOPE OF OWYHEE MOUNTAINS, OWYHEE RA

1. Headwaters of Cunningham Creek 1/2 air mile SSE of Glass Hill in T4S, R4W, S23 NWNWNE (site 20).

2. Headwaters of unnamed tributary of Jordan Creek between Pole and China Creeks in T4S, R4W, S16 NENWNW (site 9a and 9b); S21 SENWNW (site 10) and S16 NWSWSW (site 11a) and center of south 1/2 of SW 1/4 (site 11b).

3. Tributary springs in headwaters of Cow Creek ESE of Willingger Spring in T4S, R4W, S18 E 1/2 SE 1/4 (site 26).

WEST SLOPE OF THE OWYHEE MOUNTAINS, OWYHEE RA

1. Headwaters of Jacks Creek in T4S, R4W, S6 SESENW (site 18a) and NWSESE (site 18b).

NORTH SIDE OF SILVER CITY RANGE, OWYHEE RA

1. Headwaters of Rich Gulch, two small locations in T5S, R4W, S11 NWNWSE (site 21).

2. Head of Rich Gulch, N of haul road and W of dirt road up Rich Gulch in aspen patch. One population in T5S, R4W, S11 SENWNW (site 24).

3. Head of Rich Gulch and .4 miles W on haul road, thence south just above road in aspen/fir/Veratrum in T5S, R4W, S11 NWSWSW (site 25).

SOUTH SIDE OF SILVER CITY RANGE, OWYHEE RESOURCE AREA

1. Head of Bridge Creek below Quick Silver Mountain in T6S, R3W, S1 NESWSE (site 22).

2. Right Fork headwaters of N Boulder Creek in T5S,R3W, S11 NWNESE (site 23).

SOUTH MOUNTAIN, OWYHEE RESOURCE AREA

1. Drainage ESE of Lookout in T8S,R5W, S10 SE 1/4 (site 27).

2. Drainage on the N side below Lookout in T8S, R5W, S10 NE

Table 1 Cont.

1/4 (site 28).

3. NE side below Lookout in T8S, R5W, S11 SENW and N 1/2 of SW 1/4 (site 29).

4. E of South Mountain T8SR5WS14 SWNE (site 35), BLM Owyhee RA, private property.

INDIAN MEADOWS AND VICINITY

1. Noon Creek Spring West of Indian Meadows in T8S, R4W, S33 NWNE (site 30).

2. .4 miles E of Indian Meadows road junction to Noon Creek Spring Meadows road in T8S, R4W, S34 NWNW (site 31).

3. North of Indian Meadows Spring in T8S, R4W, S35 SENW (site 32).

4. Indian Meadows Spring in T8S, R4W, S35 NWSE (site 33).

SAWTOOTH NATIONAL FOREST

1. **TYPE COLLECTION**:Hash Spring, T2S, R15E, S21. Camas County (site 34).

Table 2. Locations, elevation, abundance and population size of Phacelia minutissima in Idaho.

Site	Location	Elevation	# Acres	# of plants
1	T4S,R4W,S16 SWNWNE	7,000-7,080'	2	3,000-5,000
2a	T4S,R4W,S16 SESWNE	7,000'	100'X50'	300
2b	T4S,R4W,S16 NWSWNE	7,000'	100'X50'	250
3a	T4S,R4W,S16 SENWNW	7,160'	250'X225'	75
3b	T4S,R4W,S16 SWNWNW	7,120'	40'X50'	35
4	T4S,R3W,S19 NWNWNW	6,800'	1-2 acres	5,000
5a	T4S,R3W,S6 SESESW	5,920'	1/4 acre	12
5b	T4S,R3W,S7 NENWNW	6,170'	1/4 acre	5
5c	T4S,R3W,S7 SENWNW 1/4	6,360'	1/4 acre	50
5d	T4S,R3W,S7 SENWNW 1/4	6,380'	1/4 acre	50
5e	T4S,R3W,S7 NENWNW	6,400'	1/4 acre	125
6	T4S,R4W,S22 CNE 1/4	6,760'	1 acre	1,000+
7	T4S,R4W,S22 NWNWNW	6,880'	1/2 acre	500

Table 2 Cont.

8	T4S,R4W,S16	SWSWSW	6,960'	30'x30'	300+
9a	T4S,R4W,S16	NENWNW	7,160'	75'x75'	125
9B	T4S,R4W,S16	NENWNW	7,140'	150'x50'	150
10	T4S,R4W,S21	SENWNW	6,800'	1 acre	700
11a	T4S,R4W,S16	NWSWSW	7,140'	1/2 acre	200
11b	T4S,R4W,S16	CS 1/2 SW 1/4	6,960'	1 acre	225
12	T4S,R4W,S8	SESESE	7,080'	20'x20'	110
13	T4S,R4W,S8	SESESE	6,960'	15'x15'	12
14a	T4S,R4W,S8	SESESE	7,000'	75'x75'	150
14b-c	T4S,R4W,S8	NESESE	6,920'	200'x30'	175
15a-b	T4S,R4W,S8	NENESE	6,940'	100'x50'	320
				30'X30'	210
16	T4S,R4W,5	SE 1/4	6,720-6,800'	20+ acres	1525
	T4S,R4W,S8	NE 1/4	6,800-6,840'	---	---
17	T4S,R4W,S13	SWSESE	6,720'	10'x10'	25
18a	T4S,R4W,S6	SESENW	6,560'	30'x10'	9
18b	T4S,R4W,S6	NWSESE	6,600'	1.5 acres	56
19	T4S,R4W,S6	NENENE	6,800'	15'x15'& 10'x100'	51
20	T4S,R4W,S23	NWNWNE	6,400'	120'x60'	780
21	T5S,R4W,S11	NWNWSE	6,840'	25'x25'x2	172
22	T6S,R3W, S1	NESWSE	6,360'	10'x10'	12
23	T5S,R3W,S35	NWNESE	6400'	100 M SQ	55
24	T5S,R4W,S11	SENWNW	6860'	75X50 YDS	200
25	T5S,R4W,S11	NWSWSW	6830'	10'X10'	25
26	T4S,R4W,S18	E1/2SE	6560'-6720'	3 AC	90+
27	T8S,R5W,S10	SE 1/4	2300 M	30 SF	600+
28	T8S,R5W,S10	NE 1/4	2200 M	160 AC	3500
29	T8S,R5W,S11	SENW	2200 M	5 + AC	5000+
30	T8S,R4W,S33	NWNE	6600'	160 AC	31
31	T8S,R4W,S34	NWNW	6600'	213 AC	5
32	T8S,R4W,S35	SENW	6400'	8 AC	76
33	T8S,R4W,S35	NWSE	6400'	40X40 YDS	22
34	T2S,R15E,S21		?	?	?
35	T8S,R5W,S14	SWNW	7120'	30x40 YDS	5+

				Total	30,418+

Table 3. Summary of land ownership data for populations of Least Phacelia in Idaho.

Site	BLM	State	Private	Total Area	# plants
1		x		2	3-5,000
2		x		200'x100'	550
3		x		1 acre	110
4	x			1-2 acres	5,000+
5	x	x		1.25 acres	250

Table 3 Cont.

6	x			1 acre	1,000
7	x			1/2 acre	500
8		x		30'X30'	300+
9		x		225'X125'	275
10	x			1 acre	700-1,000+
11	x			1 acre	425
12	x			20'X20'	110
13		x		15'X15'	12
14		x		100'X30'	175
15		x		100'X50'	530
16		x	x	20+ acres	1525+
17	x			10'X10'	25
18		x		1.5 acres	65
19		x		25'X115'	51
20	x			120'X 60'	780
21			x	50'X50'	172
22			x	10'x10'	12
23			x	100 M sq	55
24			x	75x50 sq yds	200
25			x	10'x10'	25
26	x			3 acre +	90+
27	x?			30 sq ft	600+
28			x	160 acre	3500
29	x			5+ acre	5000+
30	x			160 acre	31
31	x			213 acre	5
32	x			8 acre	76
33	x			40x40 yds	22
34	Sawtooth NF			?	?
35			x	1/3 ac	50
Total	15	12	8		30463

Twelve of the populations occur on state administered lands (ca 25 acres), fifteen on BLM (416+ acres) and eight on private lands (ca 170 acres). Estimated numbers of plants on the BLM are approximately 10,000 and those on the state lands around 3,800 plants. The largest of the known populations in southwestern Idaho is number 16 with over 5,000 plants. Three of the largest sites (with the most plants) are on BLM administered lands, two on private property and one on state administered lands.

Table 4. Location of Oregon populations

1. Hells Canyon District: Skookum Creek area 0.3 miles E of Junction of FS road 3950/115 along FS road 115. T05S, R47E, S10 NESW.

2. Hells Canyon District: Skookum Creek area 4.6 miles from

Table 4 Cont.

Junction of FS road 135/131/140 along FS road 140. Accessed via FS road 3950. T05S, R47E, S11 SENWNW.

3. Hells Canyon District: Beaverdam Creek area south of FS road 181, T05S, R47E, S13 NENENE.

4. Hells Canyon District: Skookum Creek area a short distance ESE of Junction of FS roads 196/189 along 189, south of road.

5. Hells Canyon District: Skookum Creek area a short distance SSE of Junction of FS roads 196/189 along 196, south of road.

Table 5. Location of Nevada populations

INDEPENDENCE MOUNTAINS

1. Dorsey Cr. headwaters E of Jacks Cr., three locations T42N R53E S10 NWNWSW, center of the SW 1/4, NESESW; S14 center of NENW.

2. North Fk. Humboldt River headwaters W. of Sammy Cr., four locations T42N R53E S2 SWNWSW, NWSWSW; S3 N 1/3 SESE; S10 N 1/2 NWNE.

3. McAfee Cr. watershed, T42N 54E S30 SESESW.

4. Pratt Cr. watershed, T42N R53E S36 SWSESE.

5. Foreman Cr. watershed, four locations T41N R53E S2 NENENE;S12 SWNWNW; S12 NWNE & SESW; S7 SWSWSW.

6. Snow Canyon watershed, T41N R53E S27 NWSWNE.

7. Stump Cr. watershed, T40N R53E S13 NWNENW.

8. Jim Cr., T40N R54E S30 NWNESW.

9. Gance Cr., T40N R53E S26 S 1/2 NE.

10. Water Pipe Cyn., T39N R53E S16 NENENE.

11. Mahala Cr., T40N R53E S12 NWSW.

POORMAN PEAK AREA

1. 1.1 airmiles NNW of Poorman Peak, T44N R55E S2 NWSWSW.

WILDHORSE RESERVOIR AREA

1. Penrod Cr. at confluence with Blackburn Cyn., T44N R55E S26 SENWNW.

Table 5 Cont.

TENNESSEE MOUNTAINS

1. Big Bend Cr., T45N R56E S29 center of NWNE.

JARBRIDGE MOUNTAINS

1. Copper Basin, Seventysix Cr. watershed, T44N R58E S6 N 2/3 of E 1/2.

ROBERTS CREEK MOUNTAIN

1. Southwest of Peak, T23N R51E S19.

GOLD, DORA & BIG BEND CREEKS

1. Gold Cr., T44N R56E S18.

2. Dora Cr., T44N R55E S24 NE 1/4.

3. Big Bend Cr., T45N R56E S29 NWSW.

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2. HABITAT REQUIREMENTS/POPULATION BIOLOGY

Prior to the 1995 field season very little was known about the specific habitat requirements of Least Phacelia. Data generated from surveys in 1995 in Idaho and Nevada and in 1996 in Idaho and Oregon provides significant new information for Least Phacelia.

This Phacelia is apparently closely associated with snowbank areas in the upper portions of mid elevation mountain drainages.

Idaho populations discovered in the Owyhee and Silver City Range, on South Mountain, Indian Meadows and vicinity occur between 5,920' and 7,160 feet elevation. Most of the occurrences were in damp to moist (not wet) meadows or below springs or seeps in association with Veratrum/mixed low forb associations. Some were also observed under aspen, in aspen/Veratrum mixed stands, aspen-Veratrum-Salix drummondii stands, in adjacent snowbank forb communities, tall forb-Carex areas dominated by Senecio integerrimus and in meadow areas dominated by Wyethia amplexicaulis. These snow bank areas are probably the primary reason why this annual phacelia flowers much later than other annuals in the genus. This appears to be true also for the few populations observed in the Independence Mountains, Nevada and those from Oregon.

Nevada populations, according to Smith (1995), are "in

vernally-saturated/aestivally drying, sparsely vegetated, and partially to fully exposed areas in meadows, at perimeters of Veratrum californicum stands, in sagebrush swales, and along creekbed high-water lines at elevations ranging from 6240 to 8900 feet". My limited observations of Least Phacelia in Nevada also observed plants in open areas along the banks of streams, in disturbed areas adjacent to livestock watering troughs, and in open soil areas of more dryish meadows than those observed in Idaho. The phacelia appears to be mostly intolerant of shade. It was observed on all exposures.

The Washington population occurs at 4,000 feet elevation and those in Oregon between 5300 and 5560 feet elevation.

The Oregon populations discovered in 1996 occurred in open vernally wet forb/grass dominated habitats. The commonly associated species in these populations were: Perideridia bolanderi, Navarretia intertexta, Polygonum aviculare, Galium triflorum, Stellaria longipes, Collomia linearis, Veronica peregrina, Madia glomerata, Orthocarpus luteus, Trifolium cyathifolium, Plagiobothrys scouleri, Floerkea proserpinacoides, Gilia capillaris, Mimulus breviflorus, Mimulus breweri, Juncus bufonius, Antenaria luzuloides, Deschampsia danthonioides, and Arnica sororia.

The few populations discovered in Oregon were in small open areas less than an acre in size and had very few Least Phacelia plants in the populations. The sites were at a lower elevation, 5300 to 5560 feet, than those in Idaho and Nevada.

Most annual phacelias occur at lower elevations and flower in the spring or very early summer with germinaton requirements dependent on fall and/or spring precipitation. The few Oregon sites are primarily dominated by forbs and grasses.

The primary low forb species associated with Least Phacelia differs slightly in Oregon from areas in Idaho. Associated species in Idaho were: Polygonum kelloggii, Collomia linearis, Veronica peregrina, Nemophila breviflora, Madia glomerata, Navarretia breweri, Collinsia parviflora, Orthocarpus luteus, Trifolium cyathifolium, Polygonum douglasii, Plagiobothrys scouleri, Floerkea proserpinacoides, Mimulus breweri, and Juncus bufonius. Polygonum kelloggii appeared to be the most commonly associated species of the low forbs, in all populations, that assisted in locating Least Phacelia. When it was present I usually located some Phacelia minutissima.

Tall forb associates in Idaho were: Perideridia gardneri, Mertensia ciliata, Senecio integerrimus, Potentilla gracilis, P. anserina, P. glandulosa, Carex microptera, Wyethia

amplexicaulis, Veratrum californicum, Deschampsia danthonioides, Sidalcea neomexicana, and Delphinium nuttallianum.

Commonly associated species in Nevada populations were: Salix lasiandra, Populus tremuloides, Amelanchier alnifolia, Artemisia cana, A. tridentata, A. ludoviciana, Eriogonum heracleoides, Symphoricarpos oreophilus, Achillea millefolium, Agastache urticifolia, Aquilegia formosa, Epilobium ciliatum, Mimulus breweri, Mimulus gutattus, Navarretia breweri, Plagiobothrys scouleri, Potentilla gracilis, Senecio serra, Sidalcea oregana, Urtica dioica, Veratrum californicum, Veronica americana, Veronica peregrina, Wyethia amplexicaulis, Deschampsia danthonioides, D. elongata, Juncus tenuis, Hordeum brachyantherum, Polygonum douglasii, Carex microptera, Collomia linearis, Poa ampla, P. secunda, Navarretia intertexta, Polygonum kelloggii, Bromus marginatus, Elymus spicatus and E. trachycaulis,

Veratrum was the most commonly associated species in Idaho and provided the majority of suitable habitat for Least Phacelia, with the exception of dense Veratrum stands which appeared to provide too much shade and/or competition for the species; and heavily grazed and trampled stands. Least phacelia was rarely found under the edge of willow and aspen. Two Idaho populations did have a mixed community of aspen, Veratrum, and Wyethia and the phacelia was located in part of this association, but most of the plants were in the more open areas of the community. Site 24 at the head of Rich Gulch, Idaho was also an aspen community where the phacelia was quite common. The other commonly associated tall forbs were Senecio integerrimus. Areas where Senecio was commmon usually did have Least Phacelia, when other parts of the potential habitat did not.

Some populations in southwestern Idaho occur in the drier edges of Veratrum stands. Apparently the Phacelia in these areas are able to germinate when moisture and temperature conditions are adequate and then depend, to a large degree, on the frequent afternoon storms that pass over the Owyhee and adjacent ranges weekly in mid to late summer. Some of the drier stands of Veratrum which I surveyed did not have any Least Phacelia. This was also true for stands of Veratrum which were very tall and/or dense. Least Phacelia was observed in one Veratrum stand which was quite dense but the individual Phacelia plants demonstrated signs of overshading and apparently did not receive sufficient light for preferred growing conditions. Moisture at this site did appear adequate. In some Veratrum stands Least Phacelia often occurred on the upper end of the stand or along the sides and less commonly on the lower, more moist areas of the stand.

All populations observed were on well drained basalt or granitic (Silver City Range) soils with surface and subsurface water flow. Wet areas within the above described habitat rarely had any Least Phacelia and in those areas where it did occur the plant occupied only drier open areas elevated above the wet ground or along the moist to dry edges mixed with other low forbs. Least Phacelia was most prevalent in open soil areas with the least competition. In areas where the other low forbs were quite abundant and formed a dense understory, the Phacelia was less common or not present at all.

Least Phacelia plants in the core area at the head of Slacks Creek on Slacks Mountain were among the most robust of any site located in Idaho. Some plants were up to 2 dm tall and 1 dm wide, with calyx segments 2.2 cm long and 4 mm wide; a few leaves exceeded 3 cm long and were 1 cm wide. Capsules per plant ranged from 6 to 70 and in places the Phacelia was the dominant understory species, too numerous to count. At these larger sites a vast number of seeds are deposited in the soil seed bank. Seed germination requirements are not known at this time but seeds probably germinate in the spring when adequate moisture/soil/temperature conditions are right for the species.

The more vigorous branching plants, in southwestern Idaho, occur in open areas or areas in the edge, or scattered in more open stands of Veratrum californicum. Plants growing in more dense stands of Veratrum with less light were short, spindly, and unbranched.

Least Phacelia observed on the Wallowa-Whitman National Forest were small unbranched plants. The few plants observed occupied small open areas with seasonal water in a forb/grass dominated community.

D. POPULATION IMPACTS

1. IDAHO BUREAU OF LAND MANAGEMENT ADMINISTERED LANDS

In Idaho, the most heavily impacted populations were those located on BLM administered lands. These include the Slacks Creek, Slacks Corner, Cow Creek, South Mountain population on the north side(site 28), Noon Creek Spring; sites 31 south of Indian Meadows, site 33 east of South Mountain and the Cunningham Creek populations were the three locations with the most impacts. The impacts were primarily from heavy livestock grazing.

The Slacks Corner population was the only location where Veratrum plants were mostly eliminated from the habitat. This site also had large, dense stands of Iris missouriensis which

is a non-palatable increaser species on sites overgrazed by livestock. This population also had signs of heavy soil compaction.

The Cunningham Creek population and other potential habitat searched in the vicinity, were also very heavily impacted by livestock, rendering most sites unsuitable for Least Phacelia. This was especially true for good potential habitat along the streams. The Phacelia was only located at two sites of the several searched in this drainage (Cunningham Creek). The populations located were upslope from the stream in stands of Veratrum that had not received heavy use at the time of the survey. The majority of Veratrum plants were all either completely eaten and/or badly trampled, leaving the site unsuitable as a habitat for most annual species, including Least Phacelia. These factors were the only observed impacts and therefore are probably the primary cause for the low numbers of Least Phacelia plants at these survey locations.

The Slacks Creek population was less impacted but did show signs of heavy use over the years. These locations have the same habitat potential for Least Phacelia as other areas where the species was found in greater numbers during the course of the 1995 survey.

During the 1995 survey in southwestern Idaho several 4x4's and ATV's were observed on the primary roads. Some older OHV tracks were present on some of the sites but these did not appear to have a significant impact on the habitat. In 1996 the main and secondary roads in southwestern Idaho had a lot of recreational use. Only one recent ATV track was observed in Phacelia habitat. Impacts to Least Phacelia habitat were minimal. Construction of the primary and secondary roads in southwestern Idaho did dissect some of the populations and probably eliminated some habitat and resulted in loss of plants. Recreation activities do not appear to be a serious threat to the species at this time but may be in the future as recreation increases in southwestern Idaho.

Mining on the Silver City Range has and will probably continue to impact populations of the Phacelia. No current mining activities were observed in the Owyhee Mountains.

A few deer and elk tracks were observed during the course of the survey and several deer were observed in Veratrum stands where populations of Least Phacelia occur. I did not observe any other game sign within the specific areas where Least Phacelia was located.

2. FOREST SERVICE

Construction of logging roads on the Wallowa-Whitman National Forest has resulted in loss of some Least Phacelia habitat and plants. Many of these roads cross through the small openings where Least Phacelia grows but the extent of the impacts are difficult to assess based on the limited field work conducted in 1996.

Sawtooth National Forest areas surveyed in 1996 had received excessive livestock grazing that appeared to be more than a single year occurrence. A lot of recreational vehicles were also observed on the roads used to conduct the surveys and in camping areas in potential habitat for the Phacelia.

3. STATE LANDS

Of the twelve sites located on State lands in 1995 only the Cunningham Creek site had significant impacts and these impacts were equalvent to populations on adjacent BLM administered lands. The other eleven Idaho sites discovered in 1995 were in good to excellent condition. Veratrum plants at these sites were in very good condition and Least Phacelia was rather easy to find, even though some sites were relatively small. The State lands, approximately 25 acres at twelve locations, represent over one-half of the populations and acreage discovered during the 1995 survey, and therefore serve as essential habitat areas for Least Phacelia.

4. PRIVATE LANDS

Very little effort was devoted to surveying potential habitat on private property in 1995. Least Phacelia was located on two sites under private ownership while in route to or during surveys of potential habitat on BLM or State administered lands.

The population between Succor Creek and Dobson Creek above Johnston Lakes, Owyhee Mountains, is the largest of the two locations and has the potential for a very large number of acres and plants of Least Phacelia. This population probably extends down the drainage to at least the 5,600 foot level and includes nearly a section of BLM lands with possible Phacelia habitat, providing suitable habitat is present for the species. Other potential habitat, accessible via these private lands, also occur around Johnston Lakes and in Succor Creek.

Several stands of Veratrum were searched on July 23, 1995 at the completion of the survey, in an attempt to locate Least Phacelia on the Silver City Range. The first sites were just

above Jordan Creek in Barnes Gulch, and above the junction of Jacobs Gulch and Rich Gulch. These sites, mostly on BLM, were heavily used by livestock and no Phacelia was found. Least Phacelia was located at three small sites at the head of Rich Gulch, two on private lands, and one on BLM. Two of these upper locations where Least Phacelia were discovered are immediately below the main haul road for the mining company and one is above the haul road. Two of these were discovered in 1996. Additional habitat was surveyed in this area during 1996 but no Least Phacelia was found. The largest area surveyed was in Sullivan Gulch and Louse Creek south of De Lamar Mine on the south slope of De Lamar Mountain.

E. OTHER RARE SPECIES OBSERVED

One population of Ivesia baileyi was located on the south side of the of De Lamar Mountain in southwestern Idaho in the canyon below the old mining town of Flint, T6S, R4W, S11 SW 1/4. This was a very large population of plants in excellent condition. Heavy livestock use has occurred in the area but has not affected the species which hang on cliff faces and rocky outcrops.

Several populations of Myosotes laxa were observed on the Wallowa-Whitman National Forest. These were located along Chesnimnus Creek (T3N, R46E, S14 NENE) and Devils Run Creek in T3N, R46E, S32.

F. MONITORING STUDIES

Three monitoring plots were established on the Humboldt National Forest in 1996: 1) on the Jarbidge Mountains on seventy-six Creek; 2) on the North Fork of the Humboldt River; and 3) on Stump Creek. Monitoring studies should be established on other populations in Idaho, Oregon and Washington.

V. RECOMMENDATIONS

A. POTENTIAL HABITAT

Additional potential habitat exists on state and private lands in southwestern Idaho on the Owyhee Mountains, Silver City Range and probably on Juniper Mountain. The potential habitat on the Owyhee Mountains and Silver City Range have the primary access through private lands with locked gates and were not accessible during the 1996 survey. These are the primary areas for additional work in southwestern Idaho. Additional surveys are needed in some of the areas searched with negative results, but during a year when livestock are not present in the allotments. Additional field work is

needed on the Wallowa-Whitman, Sawtooth, Payette and Boise National Forests.

Field surveys on the Wallowa-Whitman National Forest and in Washington should focus on areas adjacent to known populations.

B. LEGAL STATUS

Based on the impacts from livestock grazing and mining in both Idaho and Nevada, the impacts from logging activities in Oregon, the number of actual acres of occupied habitat, and the lack of biological data, this species should be maintained as a Forest Service sensitive species. Bureau of Land Management "Special Status Plant" status should also continue for the present time. In Region 6 of the Forest Service this would include all Forests with known populations and those with potential habitat. In Region 4 it should include the Boise, Sawtooth and possibly the Payette NF's.

C. MANAGEMENT RECOMMENDATIONS

Emphasis should be placed on completion of project clearances for all activities in extant, historical or other potential habitat of Least Phacelia on BLM, FS, and State administered lands.

Range resource compliance checks are needed to insure the current allotment management plan standards are not exceeded and additional habitat degradation is not allowed.

A review of livestock allotment management grazing plans is needed and adjustments made in numbers and/or season of use to reduce impacts to the species and its habitat. At the minimum, adjustments should be made to the annual operating plans for affected allotments. These reviews should be initiated as soon as possible and modifications made, where utilization standards have been met or exceeded. It may be necessary to close some logging roads on the Wallowa-Whitman National Forest to protect the existing populations of Least Phacelia. Monitoring studies are needed on some sites in all states to determine use, conditions and trends for the species.

D. ADDITIONAL STUDIES/RESEARCH

This species apparently does not do well in heavily grazed, or dense stands of associated vegetative cover. It is apparent that some degree of disturbance or grazing is needed to reduce competition that can provide the threshold of spacing, sunlight, and moisture for establishment, growth and reproduction. Monitoring studies are needed to determine these thresholds in the various communities occupied by the species.

An evaluation of livestock grazing seasons of use, livestock numbers, utilization standards, and carrying capacity is needed to determine proper stocking rates and seasons within extant and potential habitat of Least Phacelia and any other rare plant or animal species. This evaluation should be done in concert with the monitoring study results.

An updated status report is needed based on the results of the 1995 and 1996 surveys in Nevada, Oregon and Idaho, which includes a review of potential habitat survey needs throughout the range of the species, overall impacts to the species, and monitoring needs.

Seeds should be collected and stored in one of the seed storage facilities to insure the genetic diversity of the species is maintained. Seeds should be mature by the middle of August or sooner.

Surveys should be completed throughout the range of the species through a coordinated interagency effort involving the FWS, BLM, State, FS and private interests over the next two to three years.

Based on these surveys, monitoring studies, and the evaluations and adjustments of livestock grazing, review the species status at the appropriate State and Federal levels.

E. ESSENTIAL HABITAT

I recommend that all known extant and historical populations of Least Phacelia in Idaho, Oregon and Washington be recognized as essential habitat for this species, at least until habitat improvements and monitoring studies are established to determine use, conditions and trends for the species. Idaho Bureau of Land Mangement populations in poor or fair condition should be improved to good condition. An improvement is also needed in potential habitat on the Sawtooth National Forest. This may require a change in season of use and/or reductions in the numbers of livestock in allotments where potential habitat, and populations of Least Phacelia are expected to occur, based on data from existing populations.

VI. ACKNOWLEDGEMENTS

The help of Ann Debolt during the course of the 1995 and 1996 surveys is greatly appreciated. The assistance of Paula Brooks in completing the surveys on the Wallowa-Whitman NF is also greatly appreciated. I appreciate the help of Gary Fullmer and John Shelly for providing information on access routes for surveys on the Sawtooth National Forest.

VII. LITERATURE CITED

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VIII. LIST OF USGS QUADRANGLE MAPS INCLUDED IN THE REPORT

1. De LaMar 7.5 minute Provisional Edition 1990 with site locations of Least Phacelia discovered in 1995, 1996 and potential habitat surveyed with negative results.

2. Silver City 7.5 minute Provisional Edition with site locations discovered or re-located in 1995 or potential habitat surveyed with negative results.

3. Cliff 7.5 minute Series Topographic Quad with site locations of populations discovered and potential habitat surveyed in 1996 with negative results.

4. Indian Meadows 7.5 Minute Series Topographic Quad with site locations of populations discovered and potential habitat surveyed with negative results.

5. Cinnabar Mountain 7.5 Minute Series Topographic Quad with site locations of populations discovered and potential habitat surveyed with negative results.

6. Triangle Flat 7.5 Minute Topographic Quad with potential habitat surveyed with negative results.

7. Williams Creek 7.5 Minute Topographic Quad with potential habitat surveyed with negative results.

8. Wickiup Creek 7.5 Minute Topographic Quad with potential habitat surveyed with negative results.

XI. List of photographs for populations included in this report.

1. Phacelia minutissima population and habitat (#27), south side of South Mountain in T8SR5WS15 W 1/2, BLM Owyhee RA. Cliffs Quad.

2. Close-up of Phacelia minutissima population and habitat (#27) on the south side of South Mtn below Lookout and spring in T8SR5WS15 w/1/2, BLM Owyhee RA. Cliffs Quad.

3. Phacelia minutissima population and habitat (#28) NW of South Mountain Lookout on N side of South Mountain T8SR5WS10 NE 1/4, BLM Owyhee RA. Cliffs Quad.

4. Phacelia minutissima population and habitat (#29) NE of South Mountain Lookout on N side of South Mountain T8SR5WS11 W 1/2 SW 1/4, BLM Owyhee RA. Photograph looking east. Cliffs Quad.

5. Phacelia minutissima population and habitat (#29) NE of South Mountain Lookout on the S side of South Mountain, T8SR5WS11 west 1/2, BLM Owyhee RA. Photograph looking N. Cliffs Quad.

6. Phacelia minutissima population and habitat (#30) at Noon Spring west of Indian Meadows T8SR4WS33 NWNE, BLM Owyhee RA. Indian Meadows Quad.

7. Phacelia minutissima population and habitat (#30) at Noon Spring west of Indian Meadows T8SR4WS33 NWNE, BLM Owyhee RA. View from rocky point W of spring.

8. Phacelia minutissima population and habitat (#31) between Indian Meadows and Noon Spring T8SR4WS34 NWNW, BLM Owyhee RA.

Indian Meadows Quad.

9. Phacelia minutissima population and habitat (#32) south end of Indian Meadows T8SR4WS35 S 1/2 NW 1/4, BLM Owyhee RA. Indian Meadows Quad.

10. Phacelia minutissima population and habitat (#33) at Indian Meadows Spring T8SR4WS35 SE 1/2 NW 1/4, BLM Owyhee RA. Indian Meadows Quad.

11. Phacelia minutissima potential habitat searched west of Indian Springs on lower part of Combination Rdge, BLM Owyhee Ra. Wickiup Creek Quad.

12. Closeup of Ivesia baileyi below old Mining town of Flint in canyon along Flint Creek T6SR4WS11SW 1/4.

X. LIST OF TABLES

XI. APPENDICES

APPENDIX A
WORK PLAN FOR *PHACELIA MINUTISSIMA* SURVEY

INVENTORY FOR LEAST PHACELIA (Phacelia minutissima): A PREVIOUSLY RECOGNIZED CATEGORY 2 CANDIDATE SPECIES

WORK PLAN

Submitted May 1, 1996

by

Dr. Duane Atwood

A 1996 Challenge Cost Share Project

Bureau of Land Management
Lower Snake River District
Boise Office
3948 Development Avenue
Boise, ID 83705

and

Dr. Duane Atwood
6027 West 4600 South
Hooper, UT 84315

I. Project Description - Prior to 1995, least phacelia had not been seen in Idaho for over twenty years. Populations of Phacelia minutissima were located in northern Nevada and southwestern Idaho in 1995, based on inventories of part of the potential habitat in these states. Surveys conducted in previous years resulted in negative findings. Based on the 1995 field observations, the species occurs in small populations with significant impacts from livestock grazing and mining. Many of these populations occur on State or private lands where management and protection may not be possible. Therefore, extant populations and potential habitat on public lands may provide the key habitat areas necessary for viable populations of the species.

One of the core extant and potential habitat areas is in southwestern Idaho on Bureau of Land Management administered lands. Twenty-five to thirty percent of the potential habitat in this part of the state was surveyed in 1995 where the new populations were discovered. As a rare species the FWS and BLM places special management emphasis on this and other rare species in an attempt to reduce the trend toward and need for federal listing. The proposed study will provide the necessary baseline data which will allow managers to make informed management decisions for this species.

II. Management Implications - In the past, most recognized sensitive plant species have been those species identified by the U.S. Fish and Wildlife Service (FWS) in Federal Register Notices. They included listed threatened and endangered species, category 1 and 2 candidate species, and category 3 species. The most recent Federal Register recognizes only category 1 candidates. The Idaho BLM Special Status Plant List still includes many of the species previously recognized by the FWS as category 2 and 3 candidates. With the elimination of the candidate 2 category by the FWS, more responsibility and emphasis is needed for management of these former candidates.

The Challenge Cost Share program provides a cost efficient way to accomplish these necessary studies.

III. Purpose of the Project - To determine the species' distribution, population biology, and habitat condition in southwestern Idaho. Provide up-to-date information to land managers for informed decision making to insure management provides quality habitat for species' viability.

IV. Methods - Prior to any field work, an evaluation will be made of all existing data currently available for the species, with emphasis on new data collected in 1995 (Atwood 1995). A review of Bureau of Land Management aerial photographs, USGS topographic maps, and interviews with BLM staff and others knowledgeable about potential habitat areas in southwestern Idaho will be completed before field work begins.

Field surveys would be conducted during the flowering period for this species (mid June to late July). These surveys will be completed using standard cursory and intensive botanical survey methods. When populations are located they will be mapped on 7.5' topographic maps, detailed observations will be recorded on the number of individuals present, the associated species and plant community type, geology, land management uses, habitat conditions and current and historic impacts. All field work and preparation of the reports would be completed by Dr. Atwood.

V. Statement of Work -

A. Bureau of Land Management, Lower Snake River District, agrees to provide:

1. The transfer of $4400 to Dr. Atwood as that office's portion of the CCS funding. Final payment will not be made until the Lower Snake River District receives the final report.

2. Provide the necessary maps, including USGS topographic and land management ownership maps.

3. Provide a government vehicle for field work from the Boise District Office.

4. Assist in determining potential habitat where field surveys are needed for least phacelia.

5. Assist in gaining access through private property to public lands requiring surveys.

B. Challenge Cost Share Partner, Duane Atwood, agrees to:

1. Provide the equivalent of $5300, primarily in

labor, data entry, plant identification and curation and equipment for the accomplishment of this study.

2. The following specific items will be accomplished:

a. Review Bureau of Land Management aerial photographs, USGS topographic maps, and interview BLM staff and others knowledgeable about potential habitat areas in southwestern Idaho prior to field work.

b. Search additional high priority areas not yet surveyed during the optimum growing period. Identify any threats to the species. Make recommendations regarding the appropriate status of the species (i.e. propose to list, remove from special status list, etc). Make any appropriate management recommendations.

c. Complete Rare Plant Observation Report Forms for known populations visited and any new populations discovered.

d. Evaluate essential habitat needs for the species.

e. Provide a draft report after completion of the study and a final report to the BLM Boise District, Boise, Idaho after the agency contact person reviews the draft report.

f. The reports will include a complete analysis of the survey results and conclusions, a set of USGS topographic maps with population locations, photographs of the species and its habitat and completed field forms for each population discovered. Management recommendations will be included in the report and will be based on scientific data and professional observations of the author.

g. Botanical voucher specimens will be collected

for all new populations of least phacelia discovered. Observations and vouchers will also be completed for any other rare plant species observed within the survey area. A set of mounted specimens will accompany the final report for all populations of least phacelia where collections can be made without harming the vitality of the populations being studied.

3. The work will be accomplished over a single field season and the final report will be provided by December 31, 1996.

4. Field data will be submitted on field data forms and summarized in the report.

5. Duane Atwood will provide a general travel agenda prior to field work. This will allow BLM personnel to be involved in on-the-ground activities. Ann DeBolt, in the Lower Snake River District Office, will be the contact specialist.

VI. Key Officials -

It is mutually agreed that the following shall be designated as key officials for each party:

A. For BLM:

Ann DeBolt
Bureau of Land Management
Lower Snake River District
Boise Office
3948 Development Avenue
Boise, Idaho 83705

B. For Duane Atwood:

Dr. Duane Atwood
6027 West 4600 South
Hooper, Utah 84315
Work: (801) 378-4955
Home: (801) 825-0868

VII. Detailed Budget -

Operating Costs	Total	FY 96 BLM Share	FY 96 Partner Share
Salary:			
Prefield analysis	$ 800	$ 400	$ 400
Field surveys	$4800	$3000	$1800
Plant identification	$ 600		$ 600
Processing herbarium specimens	$ 300		$ 300
Report preparation	$2000	$ 500	$1500
Travel:			
Vehicle & per diem	$ 650	$ 450	$ 200
Supplies & equipment:			
Maps, herbarium paper,glue, film, plant presses	$ 550	$ 50	$ 500
Totals	$9700	$4400	$5300

APPENDIX B
ORIGINAL DESCRIPTION AND KEY TO *PHACELIA* SPECIES

In aspect the plant resembles small forms of *N. phacelioides* Nutt., but easily separable from that species in opposite leaves, smaller stature, vari-colored corolla, and deeply pitted seeds, to say nothing of its far different range. From *N. aurita* it differs in absence of winged petioles and clasping base of leaves, less divisions to the leaves, and color of flowers. From *N. racemosa* it differs in not having a racemose inflorescence and in larger flowers.

No. 3082. Growing in warm, loose soil under *Pinus ponderosa*, Salmon River hill, beyond Florence, Idaho County, July 1, 1895.

I take pleasure in dedicating this species to my young friend and companion of my 1895 trip, Charles Kirtley, of Salmon, Idaho.

Type in the National Herbarium at Washington, co-types in the herbaria of Idaho and Harvard.

Phacelia minutissima

Annual, 2–6 cm. in height, hirsutely pubescent, glandular above, branching from the base, erect: leaves narrowly oblanceolate to spatulate, the base narrowed into a slender petiole, the blade entire or rarely slightly denticulate: flowers not numerous, shortly pedicelled: sepals spathulate-linear, 2–4 mm. long, moderately or far surpassing the small, bluish-white, oblong-campanulate corolla: the appendages of the latter not long, somewhat v-shaped at the base of the filament: anthers not small for size of flower, on filaments rather stout and one half to two thirds the length of the corolla: capsule rather large, ovate, acute: seeds 1–1.5 mm. in length, somewhat angled by pressure, oval-oblong, marked with a delicate net-work of roundish figures.

Very near to *P. saxicola* Gray, but it differs from that species in seeds being 3 or 4 times larger, (those of *P. saxicola* being only 0.35 mm. in diameter), not round but widely oblong and with much smaller reticulations, in shorter corolla, larger anthers on shorter thicker filaments, in appendages not so "linear" but shorter and making a much more noticeable angle at their juncture with the stamen base.

No. 3386. Dry, gravelly or rocky ground, at 8000 feet elevation, Soldier Mountain, Blaine County, July 16, 1895.

Type in the Washington Herbarium, co-types in the Idaho and Gray herbaria.

10 Ovules and seeds numerous, more than 25.
11 Principal leaves rounded-cordate to somewhat reniform, about as wide as long, usually more or less evidently toothed.
12 Leaves coarsely and conspicuously toothed or lobulate; calyx not much accrescent, only 4–6 mm long in fruit, the segments up to about 1 mm wide; seeds tiny, ca 0.4–0.5 mm long ..... 6. *P. rotundifolia*
12 Leaves rather inconspicuously and irregularly toothed or subentire; calyx evidently accrescent, 6–8.5 mm long in fruit, the segments mostly 1–3.5 mm wide; seeds larger, mostly 1.0–1.3 mm long ..... 8. *P. peirsoniana*
11 Principal leaves narrower, evidently longer than wide, variously entire or toothed.
13 Corolla marcescent-persistent; seeds very shallowly reticulate-pitted or nearly smooth, 0.3–0.5 mm long ..... 19. *P. saxicola*
13 Corolla soon deciduous; seeds evidently reticulate-pitted, often more than 0.5 mm long.
14 Low, very widely branched plants with the principal leaves at or near the base; mostly on playas and alkaline flats; s. Calif. and s. Nev. ..... 15. *P. parishii*
14 More erect (though sometimes bushy-branched) plants with the leaves more or less well distributed along the stems; plants not of playas and alkaline flats.
15 Leaves, or many of them more or less evidently toothed ..... 16. *P. lemmonii*
15 Leaves all or nearly all entire or nearly so.
16 Herbage, or at least the stem and petioles, very finely glandular, without longer hairs; local in s. Nye Co., Nev., just to the s. of our range ..... *P. beatleyae* Reveal and Constance
16 Herbage more loosely glandular-hairy; widespread in our range ..... 17. *P. incana*

10 Ovules and seeds fewer, less than 25.
17 Cymes sessile, mostly appearing in the forks of the prostrate stem, very compact and head-like, never elongating or becoming loose; s. Utah, from Washington Co. eastward ..... 13. *P. cephalotes*
17 Cymes mostly evidently pedunculate (or scarcely so in *P. demissa*), elongating with age and often becoming loose below.
18 Stem densely and shortly spreading-hairy, but scarcely or not at all glandular ..... 14. *P. curvipes*
18 Stem evidently glandular or glandular-hairy.
19 Leaves or many of them more or less evidently toothed; Nye Co., Nev. ..... 18. *P. barnebyana*
19 Leaves all or nearly all entire or nearly so.
20 Plants brittle and when well developed very widely branched, as wide as or wider than high; leaf-blades mostly 0.8–1.5 times as long as wide; occasional small-flowered forms of ..... 12. *P. demissa*
20 Plants more narrowly branched, not brittle; leaf-blades often more than 1.5 times as long as wide.
21 Principal leaves elliptic to nearly ovate, (2) 4–10 mm wide, the blade shorter than or about as long as the well developed petiole; calyx-segments only slightly or scarcely unequal; seeds more than 15; fairly widespread in our range ..... 17. *P. incana*
21 Principal leaves more or less oblanceolate, 2–4 mm wide, the blade much longer than the short (to 4 mm) petiole; calyx-segments conspicuously unequal in fruit; seeds fewer than 15; local in the mts. of Elko Co., Nev., ne. Oregon, and c. and sw. Idaho ..... 4. *P. minutissima*

Key to the Species of Group II

1 Leaves shallowly lobed (not more than about half-way to the midrib) or merely toothed, or entire.
2 Ovules 8–14 (the seeds often fewer); leaves mostly elliptic to spatulate-obovate or rotund-ovate, usually tapering at the base; sp. of the w. Great Basin ..... 20. *P. gymnoclada*
2 Ovules numerous, commonly 50–100 or more, the seeds often somewhat fewer, but still well over 15 in number; leaves broader, more or less rotund, the base of the blade mostly truncate or cordate; spp. of the *Larrea* desert, approaching our range from the southwest.
3 Corolla relatively large and showy, mostly 8–14 mm long, violet to purple; plants mephitic, often well over 1 dm tall, the inflorescences projected above the leafy part; anthers lavender ..... *P. calthifolia* A. Brand

3 Corolla short and inconspicuous, 4–6 mm long, whitish or pinkish; plants not mephitic, up to about 1 dm tall, the inflorescences not projected above the leafy part; anthers yellow ..... *P. neglecta* M. E. Jones

1 Leaves deeply lobed (more than half-way to the midrib) or divided to bipinnatifid.
4 Flowers relatively large and showy, the corolla (7) 8–20 mm long, conspicuously surpassing the calyx; style 3–8 mm long.
5 Inflorescences usually projected well above the leafy part of the plant; stamens attached at or just above the base of the corolla; filaments usually glabrous; sp. of the *Larrea* zone, barely entering the sw. portion of our range ..... 21. *P. fremontii*
5 Inflorescences not projected above the leafy part of the plant; stamens usually attached well above the base of the corolla; filaments usually sparsely hairy below the middle; widespread in se. Oregon, Nev., and adj. Calif. ..... 22. *P. bicolor*
4 Flowers relatively small and inconspicuous, the corolla 2.5–6.5 mm long, shorter than to only slightly surpassing the calyx; style 0.5–3 mm long.
6 Inflorescences usually projected well above the leafy part of the plant; calyx-segments in fruit relatively broad, more or less spatulate ..... 23. *P. affinis*
6 Inflorescences not projected above the leafy part of the plant; calyx-segments narrower, linear to linear-oblanceolate; widespread in our range.
7 Corolla 4–6.5 mm long, the limb lavender; style 2–3 mm long; filaments more or less hairy; leaves tending to be subbipinnatifid; se. Oregon, the Snake River Plains of Idaho, and n. Nev. ..... 24. *P. glandulifera*
7 Corolla 2.5–4 (4.5) mm long, the limb white; style 0.7–2 mm long; filaments glabrous; leaves mostly merely pinnatifid, seldom subbipinnatifid; widespread, but most abundant in the Colorado River drainage ..... 25. *P. ivesiana*

Key to the Species of Group III

1 Flowers 5-merous as to the calyx, corolla, and stamens; corolla mostly more than 2 mm long.
2 Seeds pitted-reticulate, with transversely oriented rows of areolae, but only inconspicuously or scarcely corrugated; plants characteristically growing in habitats that are inundated for part of the year ..... 26. *P. inundata*
2 Seeds evidently cross-corrugated as well as pitted-reticulate; plants not of periodically inundated habitats.
3 Corolla-lobes and tube subequal, the corolla nearly rotate at anthesis; local in c. Nev. ..... 27. *P. glaberrima*
3 Corolla-lobes much shorter than the tube, the corolla campanulate or tubular-campanulate at anthesis.
4 Seeds more than 1 mm long, or, if not so, then the filaments and the inner surface of the corolla-tube somewhat hairy; widespread sp. ..... 28. *P. lutea*
4 Seeds 0.6–0.8 mm long; filaments and inner surface of the corolla-tube glabrous; local in Inyo and Mono cos., Calif. ..... 29. *P. inyoensis*
1 Flowers mostly or all 4-merous as to the calyx, corolla, and stamens; corolla up to about 2 mm long ..... 30. *P. tetramera*

Key to the Species of Group IV

1 Plants perennials or coarse biennials; filaments conspicuously exserted.
2 Leaves entire, or with a large, entire terminal segment and 1 or 2 (4) pairs of much smaller lateral segments at the base.
3 Plants perennial from a taproot that is generally surmounted by a branching caudex, usually with several more or less equal, suberect to prostrate stems that are seldom more than 5 dm long; leaves all entire, or sometimes some of them with a single pair of small lateral lobes near the base; plants variously hairy, but in most of our range not notably spreading-bristly, often more or less silvery with mainly appressed hairs ..... 31. *P. hastata*
3 Plants biennial or short-lived perennial from a taproot, typically with a single erect stem that is well over 5 dm tall, or this surrounded by several ascending lesser stems; some of the middle and lower leaves usually with 1 or 2 (4) pairs of lateral lobes at the base; herbage often somewhat griseous, but scarcely silvery, and often markedly spreading-hairy ..... 32. *P. heterophylla*
2 Leaves pinnatifid to pinnately compound or dissected, with sessile or subsessile, coarsely toothed, or cleft and again toothed leaflets ..... 40. *P. ramosissima*
1 Plants annuals or winter-annuals; filaments included or only shortly exserted beyond the corolla-lobes.
4 Leaves entire, or with only 1 or 2 coarse teeth or small lobes on one or both sides.

5 Flowers relatively showy, the corolla mostly 4–7 mm long and wide; filaments rather sparsely spreading-hairy near the middle; style 4–7 mm long; anthers ca 0.4–0.5 mm long ... 33. *P. humilis*
5 Flowers small and inconspicuous, the corolla up to about 5 mm long and wide; filaments glabrous; style 2–4 mm long; anthers ca 0.2–0.4 mm long.
6 Herbage spreading-hairy, but not at all glandular; leaves all entire; Pershing Co., Nev., and Butte Co., Idaho ... 34. *P. inconspicua*
6 Herbage spreading-hairy, with many of the hairs in the inflorescence gland-tipped; usually some of the leaves with 1 or 2 coarse teeth or small lobes on one or both sides; mts. of s. Calif., as far n. as the White Mts., and with outlying stations in the Pine Valley Mts. of Washington Co., Utah and the Toquima Mts. of Nye Co., Nev. ... 35. *P. austromontana*
4 Leaves evidently (sometimes shallowly) pinnatilobate to pinnately compound or subbipinnatifid.
7 Corolla relatively small and inconspicuous, mostly 3–7 mm long, shorter than or about equaling the calyx.
8 Plants merely glandular-hairy, not at all bristly-hispid; calyx-segments lance-elliptic or somewhat oblong, about equally accrescent, firm and veiny in fruit; nw. part of our range ... 36. *P. thermalis*
8 Plants rather thinly bristly-hispid in the inflorescence or throughout; calyx-segments linear or oblanceolate to spatulate.
9 Leaves only shallowly lobed, with the lobes again few-toothed; calyx-segments unequally accrescent, the larger ones spatulate and generally 1.5–3 mm wide in fruit; nw. part of our range ... 37. *P. rattanii*
9 Leaves pinnatifid, with a narrow rachis, the segments again toothed or cleft; calyx-segments subequally accrescent, up to about 1 or 1.5 mm wide in fruit; sw. part of our range ... 38. *P. cryptantha*
7 Corolla larger and more showy, mostly 8–16 mm long, evidently longer than the calyx; sw. portion of our range ... 39. *P. vallis-mortae*

Key to the Species of Group V

1 Leaves relatively strongly dissected, with mostly discrete, often again toothed or cleft segments or leaflets, only the upper segments more or less confluent.
2 Corolla-lobes evidently erose-fimbriate or erose-denticulate; leaves subbipinnatifid, the principal segments conspicuously toothed or again pinnatifid; ventral ridge of the seeds symmetrically placed, the seed rather shallowly excavated on both sides of the ridge; sp. of the s. Rocky Mts. and of the Utah Plateaus segment of the Colorado Plateau region, extending n. in our range only to Sevier and Wayne cos., Utah ... 50. *P. alba*
2 Corolla-lobes entire or nearly so; leaves merely once pinnatifid, the primary segments entire or with a few inconspicuous low teeth, the upper segments generally confluent; ventral ridge of the seeds asymmetrically placed, turned towards one side, so that the seed appears to be deeply excavated along one side of the ridge and merely broadly and shallowly concave on the other; local in Utah Co., Utah ... 49. *P. argillacea*
1 Leaves less dissected, only the lower (or none) of the sinuses reaching the midrib; corolla-lobes entire or nearly so; seeds deeply excavated on both sides of the ventral ridge.
3 Filaments included, or very shortly exserted (to less than 1 mm).
4 Corolla mostly 3–4.5 mm long; seeds mostly 2–2.5 mm long, the margins sharply differentiated from the body and more or less strongly corrugated; sp. chiefly of w. Texas (and adj. Chihuahua), N.M., and Ariz., extending w. to s. Nev. (Clark Co.) and adj. Calif. (San Bernardino Co.), and entering our range in Washington Co., Utah ... 48. *P. coerulea*
4 Corolla mostly 5–7 mm long; seeds mostly 2.7–3.5 mm long, the margins not sharply differentiated from the body and not corrugated; southwestern sp., entering our range in s. Nev. and sw. Utah ... 47. *P. anelsonii*
3 Filaments evidently exserted (to 2 mm or usually much more).
5 Flowers on evident, slender, densely spreading-hairy pedicels mostly 2–4 mm long (to 6 mm in fruit); malodorous sp. of the *Larrea* zone in Ariz., s. Nev., s. Calif., and n. Baja Calif., and to be sought along our s. border in Nev. ... *P. pedicellata* A. Gray
5 Flowers on short, stout pedicels up to about 1 (1.5) mm long, or virtually sessile.
6 Leaves glabrous or nearly so, except sometimes along the petiole and the proximal part of the rachis; barren clay slopes in wc. and sw. Colo. and extreme nw. N.M., and to be expected in se. Utah ... *P. splendens* Eastw.
6 Leaves evidently glandular or hairy or both.
7 Plants more or less strongly virgate, with an elongate, relatively narrow inflorescence typically consisting of many short, helicoid cymes crowded along the main axis, plants usually in barren clay soil, seldom in sandy or rocky soil.

8 Corolla broadly campanulate, flaring from near the base, generally wider than long. Sevier and San Pete cos., Utah ..... 44. *P. utahensis*

8 Corolla broadly tubular or tubular-campanulate, scarcely or not at all flaring up to the outcurved lobes, up to about as wide as long.

9 Leaves very strongly glandular, a large proportion of the hairs gland-tipped; leaves relatively broad, the middle cauline ones mostly 2–4 times as long as wide; extreme sw. Utah, extreme nw. Ariz., and extreme s. Nev. ..... 46. *P. palmeri*

9 Leaves less strongly glandular, only a small proportion of the hairs gland-tipped; leaves narrower, the middle cauline ones mostly (3) 4–8 times as long as wide, e. and s. of the high plateaus in Utah, and extending s. to Mohave and Coconino cos., Ariz. ..... 45. *P. constancei*

7 Plants not at all virgate, simple below the inflorescence (especially in smaller plants) or openly branched, the main stem ending in a short, broad cluster of helicoid cymes, the branches ending in similar but smaller clusters or in single cymes; plants usually growing in sandy or rocky soil, only seldom on barren clay.

10 Seeds not corrugated, or only slightly so along one side of the ventral ridge, although the margins are paler than the back and differentiated from it; leaves merely toothed, or round-lobed not more than about half-way to the midrib; Kane and s. San Juan cos., Utah, and thence southward and eastward ..... 41. *P. integrifolia*

10 Seeds evidently corrugated, at least along one side of the ventral ridge; leaves often but not always more deeply cleft than in the preceding sp.

11 Seeds corrugated only along one side of the ventral ridge, the margins of adjacent seeds firmly juxtaposed, concolorous with the back, not corrugated; stem evidently (though not very densely) spreading-hispid as well as viscid-puberulent or finely stipitate-glandular; sp. of the Mojave Desert and southwestward, in and immediately adjacent to the *Larrea* zone, entering our range in the valley of the Virgin River in Utah ..... 42. *P. ambigua*

11 Seeds corrugated on the margins as well as along one side of the ventral ridge, the margins differentiated from and paler than the back, tending to be curled under; stem evidently glandular and short-hairy, but not hispid; sp. of the Great Basin and Colorado Plateau, primarily in the sagebrush and juniper zones ..... 43. *P. crenulata*

1. Phacelia sericea (Graham) A. Gray

Eutoca sericea Graham, Edinburgh New Philos. J. 1830: 172; Curtis's Bot. Mag. 57: pl. 3003. 1 July 1830. *Eutoca pulchella* Lehm. Nov. Stirpium Pug. 2: 18. 1830. *Phacelia sericea* A. Gray, Amer. J. Sci. 64: 254. 1862. (*Drummond*, sandy debris of the Rocky Mts.; isotype at K!)

P. sericea var. *ciliosa* Rydb. Bull. Torrey Bot. Club 31: 636. 1904 [1905]. *P. ciliosa* Rydb. Bull. Torrey Bot. Club 33: 149. 1906. *P. sericea* subsp. *ciliosa* G. Gillett, Rhodora 62: 221. 1960. (*Osterhout 2619*, n. of Meeker, Rio Blanco Co., Colo.; holotype at NY!)

Silky phacelia.

Perennial, with several or many erect or ascending stems from a taproot and branched caudex, or in our area often single-stemmed from the crown of the taproot; plants spreading-hairy in the inflorescence, otherwise thinly strigose or rather loosely short-hairy to densely sericeous or loosely woolly, not evidently glandular; leaves pinnatifid, with entire or sometimes cleft segments, basally disposed, the basal and lower cauline ones well developed and persistent, the middle and upper ones more or less reduced and less petiolate; inflorescence a dense, terminal, usually elongate thyrse composed of many short, compact, helicoid cymes; corolla purple or dark blue, campanulate, mostly 5–7 mm long and wide, hairy inside and out, persistent and marcescent; filaments glabrous, long-exserted, (1.5) 2–3 times as long as the corolla; style 6–13 mm long, cleft to the middle or less; ovules mostly 20–40; seeds mostly 8–18, 1–2 mm long, pitted-reticulate, the alveolae in longitudinal rows separated by narrow ridges; $2n = 22$.

Open or wooded, often rocky places and middle and upper elev. in the mts., seldom as low as 1800 m; s. B.C. and Alta. to Wash., e. Oregon, ne Calif., c. Nev., s. Utah, and s. Colo. June–Aug.

The species consists of two ecogeographically segregated but wholly confluent varieties, as indicated below.

1 Small, usually densely hairy (more or less sericeous) plants of high elev. in the mts., often near or above timberline, 1–3 dm tall, with several or many stems and often with very numerous and tufted basal leaves on a branching caudex; leaf-segments usually relatively narrow and blunt; petioles seldom very strongly ciliate; the more northern and Rocky Mt., high-altitude var., the only form in Wash., B.C., Alta., and Mont., extending also into c. and ne. Idaho, and s. through the mts. of Wyo. to the mts. of Colo., also rarely in the La Sal Mts. of Utah, where var. *ciliosa* also occurs ..... var. *sericea*

1 Larger, less densely hairy (more strigose or hirsutulous, often thinly so) plants usually of middle elev. in the mts., or at higher elev. southward, (2) 3–6 (9) dm tall, often single-stemmed on a simple taproot, but often also with several stems from a branching caudex; leaf-segments averaging broader, and sometimes more acute; petioles tending to be evidently ciliate; the more southern and western var., the only one in Calif., Nev., Oregon, and most of Utah, extending also into wc., s., and e. Idaho, and into the mts. of Wyo. and Colo. ..... var. *ciliosa* Rydb.

2. Phacelia franklinii (R. Br.) A. Gray

Eutoca franklinii R. Br. in Franklin, Narr. Journey Shores Polar Sea, Bot. Appendix 765. 1823. *Phacelia franklinii* A. Gray, Manual Bot. ed. 2. 329. 1856. (*Richardson*, Churchill River, n. Sask.)

Annual or biennial, 1–10 dm tall, with a single, usually erect stem, or this surrounded by several lesser stems; herbage hirsute-puberulent (or the stem more spreading-hirsute) and somewhat viscid, many of the

APPENDIX C
FIELD SURVEY FORMS

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: phacelia minutissima Date of Observation: 7/20/96

Observer(s): DUANE ATWOOD Phone: (801) 825-0868

Address: 6027 W. 4600 S., Hooper, UT 84315

Location (be specific): South slope of the Silver City Range at the head of Bridge Creek below Quicksilver mountain. IN Aspen land below mule ear flat

County: Owyhee T 6 S R 3 W NESW SE 1/4 ___ 1/4 of ___ 1/4 of Sec. 1

T ___ R ___ ___ 1/4 of ___ 1/4 of Sec. ___

Elevations: 6360' to ___ Quad Name: Cinnabar Mtn ✓ 7.5' ___ 15'

Landowner/Manager: Apparently private

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 12 Actual ___ Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative ___ Flower ✓ Fruit ___ Dormant

Population age class structure: ___ % Seedlings ___ % Immature ✓ % Mature ___ % Senescent ___ Unknown

Population area: 10'x10' Assessment of population vigor: poor

Was population thoroughly surveyed or was it a cursory visit? thoroughly

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
A veratrum californicum site with a dense aspen / alder / willow overstory. Other understory species were veronica americana, plagiobothrys scouleri, Trifolium cy, Nav, Juncus urtica dioica, polygonum kelloggii & poa pratensis. Granitic soils on west to southwest @ 5% slope. Some sun light, moist area below spring

Current land use/visible disturbance/possible threats: Heavy livestock grazing & dense overstory. numerous small stands of veratrum, all impacted by livestock & many w/ dense overstory.

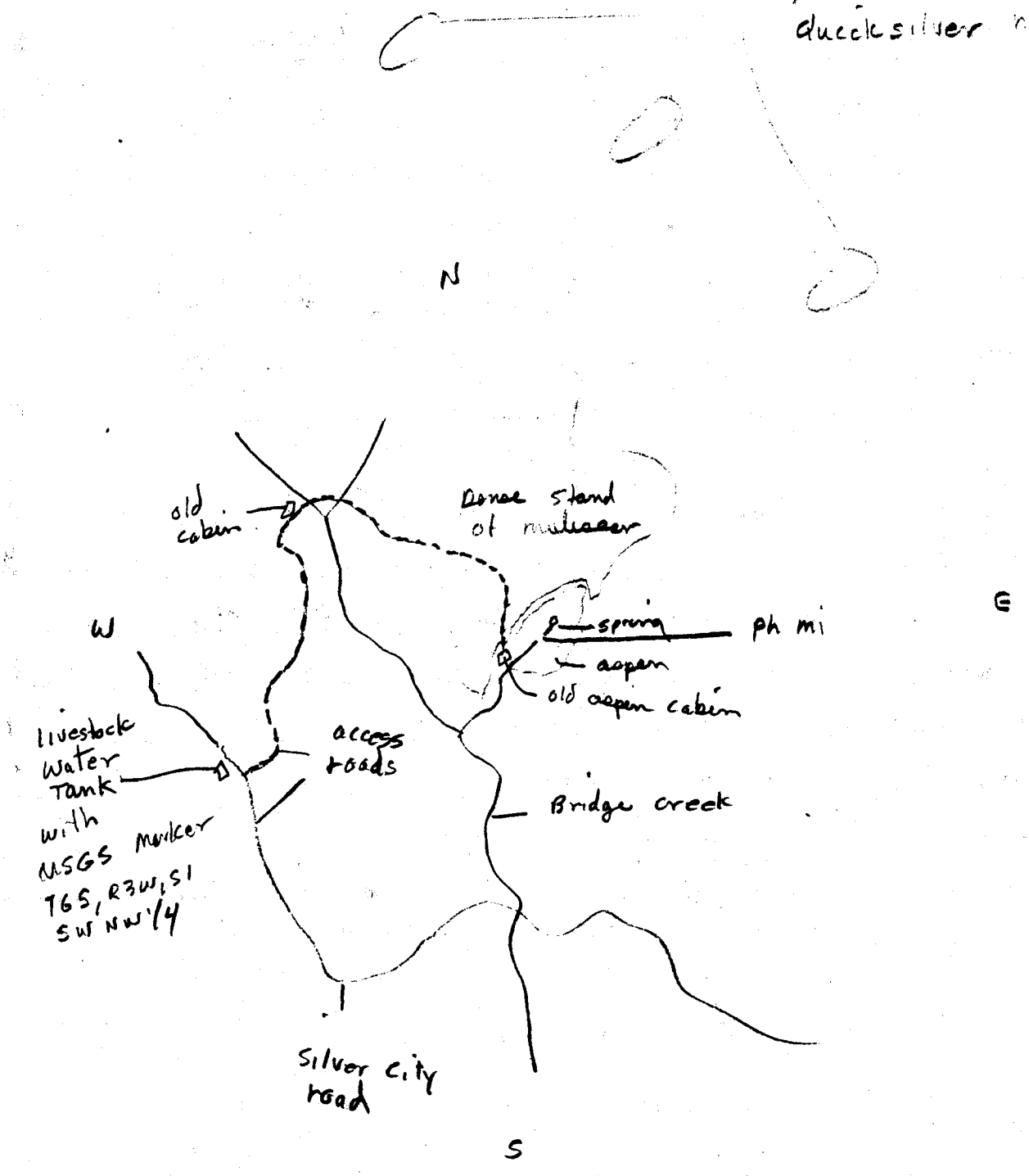
Overall Site Quality: ___ Excellent ___ Good ___ Fair ✓ Poor

How was identification made:

Collection #: 21009 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*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access roads
Bridge creek
Silver City road
S

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: phacelia minutissima Date of Observation: 7/20/96

Observer(s): DUANE Atwood Phone: (Boi) 825-0868

Address: —

Location (be specific): Right Fork Head waters of N. Boulder Cr on S. slope of the Silver City Range. N. side of road in open meadows.

County: Owyhee T 5S R 3W NW NESE 1/4 of 1/4 of Sec. 35
T ____ R ____ ____ 1/4 of ____ 1/4 of Sec. ____

Elevations: 6400' to ____ Quad Name: Cinnabar Mtn. ✓7.5' ___15'

Landowner/Manager: Private

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 55 Actual ____ Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ____ Vegetative ____ Flower ✓ Fruit ____ Dormant

Population age class structure: ____ %Seedlings ____ %Immature 100 %Mature ____ %Senescent ____ Unknown

Population area: 100 m sq Assessment of population vigor: poor

Was population thoroughly surveyed or was it a cursory visit? Fairly well - late fruit

Compared to your last visit (# of plants, area, vigor, age classes): ____

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
open meadow of Iris, Senecio integerrimus, Veratrum californicum, Polygonum kelloggii, Calamagrostis inexpansa, Mimulus glaucescens, Swertia caroni, Trifolium cyathiferum, Plagiobothrys scouleri, Zigadenus

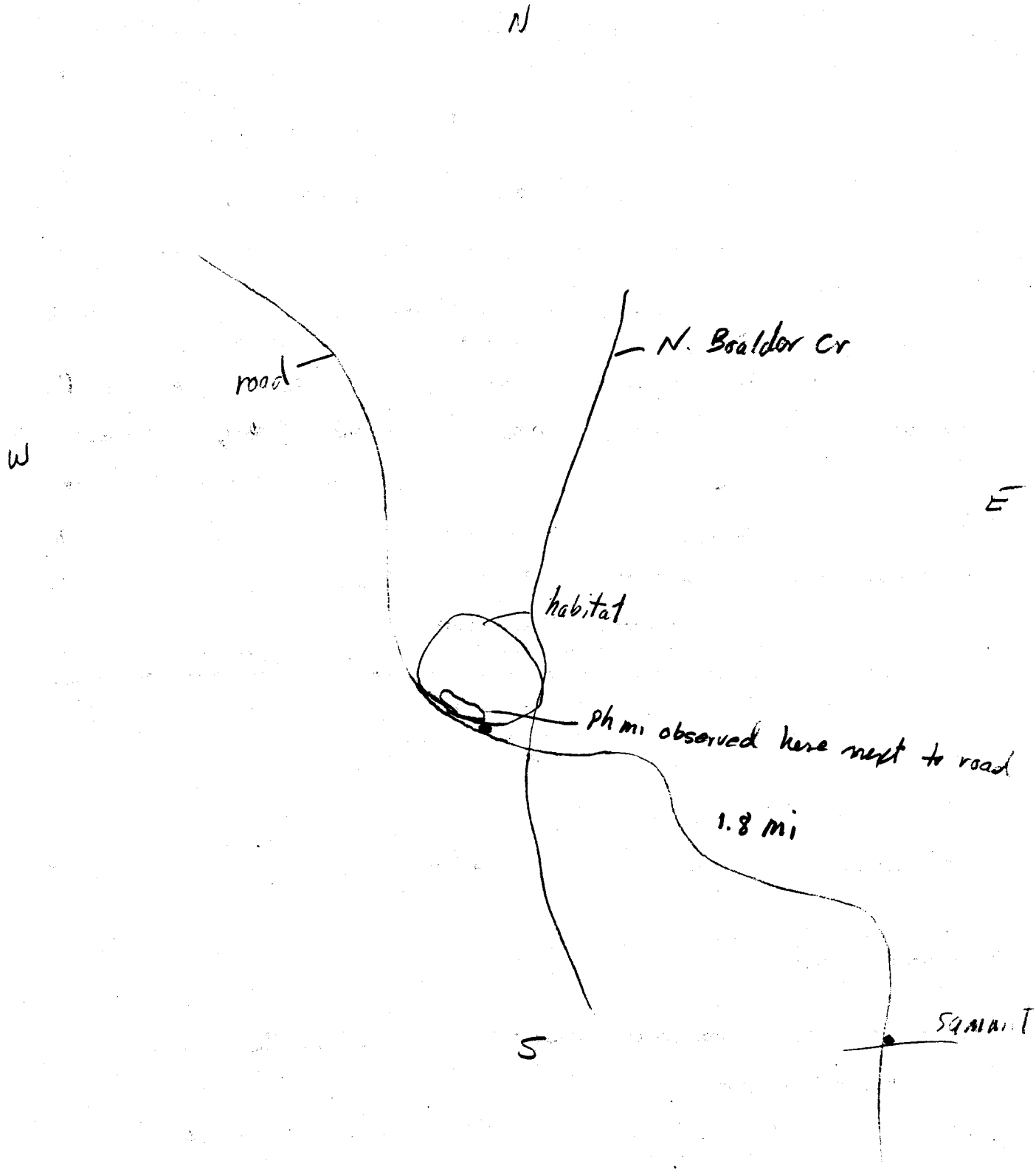
Current land use/visible disturbance/possible threats: Livestock grazing

Overall Site Quality: ___Excellent ___Good ___Fair ✓Poor
How was identification made:

Collection #: 21007 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


N
W
E
S
road
N. Boaldor Cr
habitat
Ph mi observed here next to road
1.8 mi
SUMMIT

3

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: Phacelia minutissima Date of Observation: 7/21/96

Observer(s): Duane Atwood Phone: (801) 825-0868

Address: 6027 W. 4600 S., Hooper, UT 84315

Location (be specific): [illegible], N of [illegible] road & W of [illegible] road up [illegible] Gulch in Aspen patch

County: Owyhee T 5S R 4W SE NW NW 1/4 of 1/4 of Sec. 11

T ___ R ___ ___ 1/4 of ___ 1/4 of Sec. ___

Elevations: 6860 to ___ Quad Name: DeLamar ✓ 7.5' ___ 15'

Landowner/Manager: private

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 200 Actual ___ Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative 5 Flower 95 Fruit ___ Dormant

Population age class structure: ___ %Seedlings ___ %Immature ✓ %Mature ___ %Senescent ___ Unknown

Population area: 75 x 50 yds Assessment of population vigor: good

Was population thoroughly surveyed or was it a cursory visit? Cursory (45 min.)

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):

Aspen understory + scattered fir outside area. Veratrum californicum, Polygonum kelloggii, Plagiobothrys scouleri, Achillea millefolium, Mimulus breweri, Collomia linearis

Current land use/visible disturbance/possible threats: Livestock grazing & mining

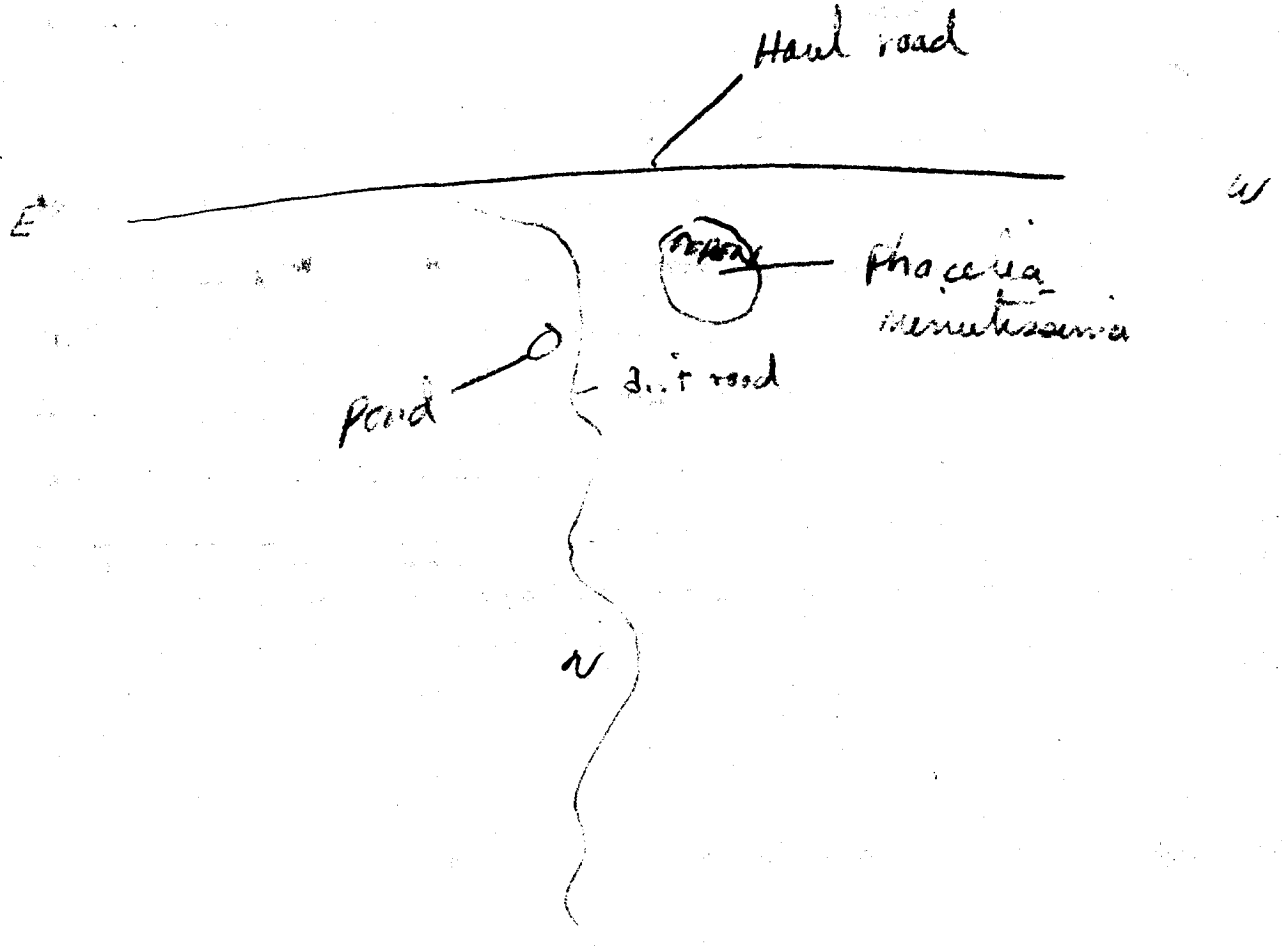
Overall Site Quality: ___ Excellent ✓ Good ✓ Fair ___ Poor

How was identification made:

Collection #: 21033 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


Haul road
E
W
Pharcia
Pond
Dirt road
N

4

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: phacelia minutissima Date of Observation: 7/21/96

Observer(s): Duane Atwood Phone: (801) 825-0868

Address: 6027 W. 4600 S., Hooper, UT 84315

Location (be specific): Head of Rich Gulch, thence .4 mi west on haul road. Above road cut on S. side. There are 3 veratrum stands on S. side of road. Look in the Trees not in the open VECR stands

County: owyhee T 5S R 4W NW 1/4 of SW 1/4 of SW Sec. 11
T____ R____ ___ 1/4 of ___ 1/4 of Sec.____

Elevations: 6230 to____ Quad Name: DeLamar ✓7.5' ___15'

Landowner/Manager: private

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 25 Actual ____ Estimated

What was counted (check one)? ✓Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative 20 Flower 20 Fruit ____ Dormant

Population age class structure: ___%Seedlings ___%Immature ✓%Mature ___%Senescent ___Unknown

Population area: 10x10 Assessment of population vigor: poor

Was population thoroughly surveyed or was it a cursory visit? thorough

Compared to your last visit (# of plants, area, vigor, age classes): ✓

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
Aspen/fir overstory with Veratrum, Achillea, Collomia linearis, Polygonum douglasii, Hydrophyllum, Taraxacum, Saxifraga, stellaria longipes, + Epilobium sp. Clay soil on hillside @ 5% slope. Shaded most of the day.

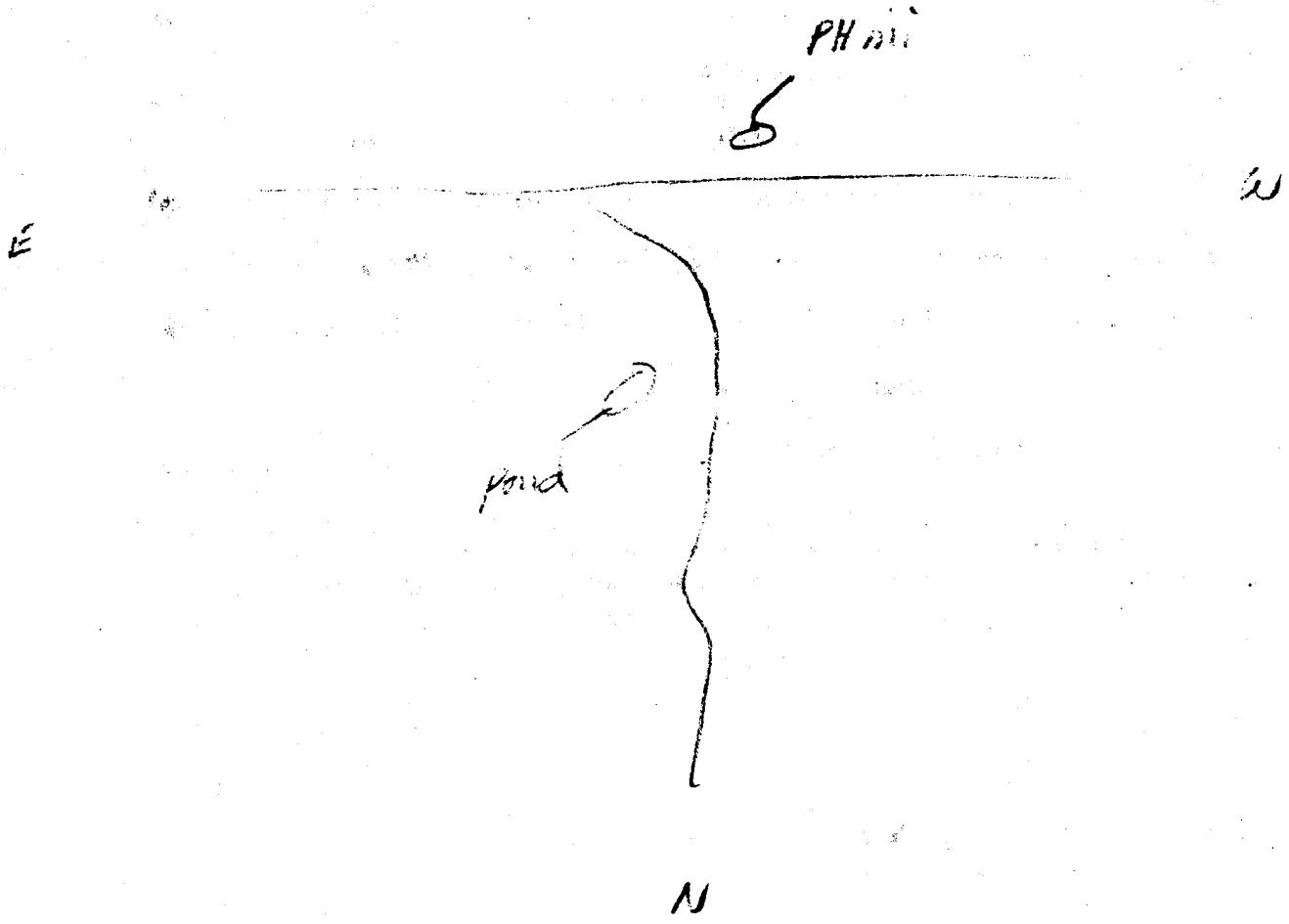
Current land use/visible disturbance/possible threats: Adjacent to [illegible] road from Florida mine to processing plant. also [illegible]

Overall Site Quality: ___Excellent ___Good ✓Fair ___Poor
How was identification made:

Collection #: 21032 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


PH mill
E
W
pond
N

gto 18-20
Roll 2

IDAHO RARE PLANT OBSERVATION REPORT

5

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: Phacelia minutissima Date of Observation: 7/21/96

Observer(s): DUANE Atwood Phone: (801) 825-0868

Address: 6027 W. 4600 S., Hooper, UT 84315

Location (be specific): Tributary springs in headwaters of Cow Creek ESE of Willingger Spring

26

County: Owyhee T 4S R 4W E 1/2 1/4 of SE 1/4 of Sec. 18
T ___ R ___ ___ 1/4 of ___ 1/4 of Sec. ___

Elevations: 6560 to 6720 Quad Name: DeLamar ✓7.5' ___15'

Landowner/Manager: BLM

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 90 + stopped Actual ___ Estimated

What was counted (check one)? ✓Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative 5 Flower 95 Fruit ___ Dormant

Population age class structure: ___%Seedlings ___%Immature ✓%Mature ___%Senescent ___Unknown

Population area: 3 ac + Assessment of population vigor: Has been heavily grazed & currently used

Was population thoroughly surveyed or was it a cursory visit? ___

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
upper site Forb/sedge/grass comm. seasonal wet. Veratrum, Trifolium Polemonium Kelloggii, Achellia millifolium, Madia glomerata, Carex microptera, Circium arvense, Poa pratensis, Collomia linearis, Hordeum brachyantherum; Lower area willow, Forb/sedge/grass comm.

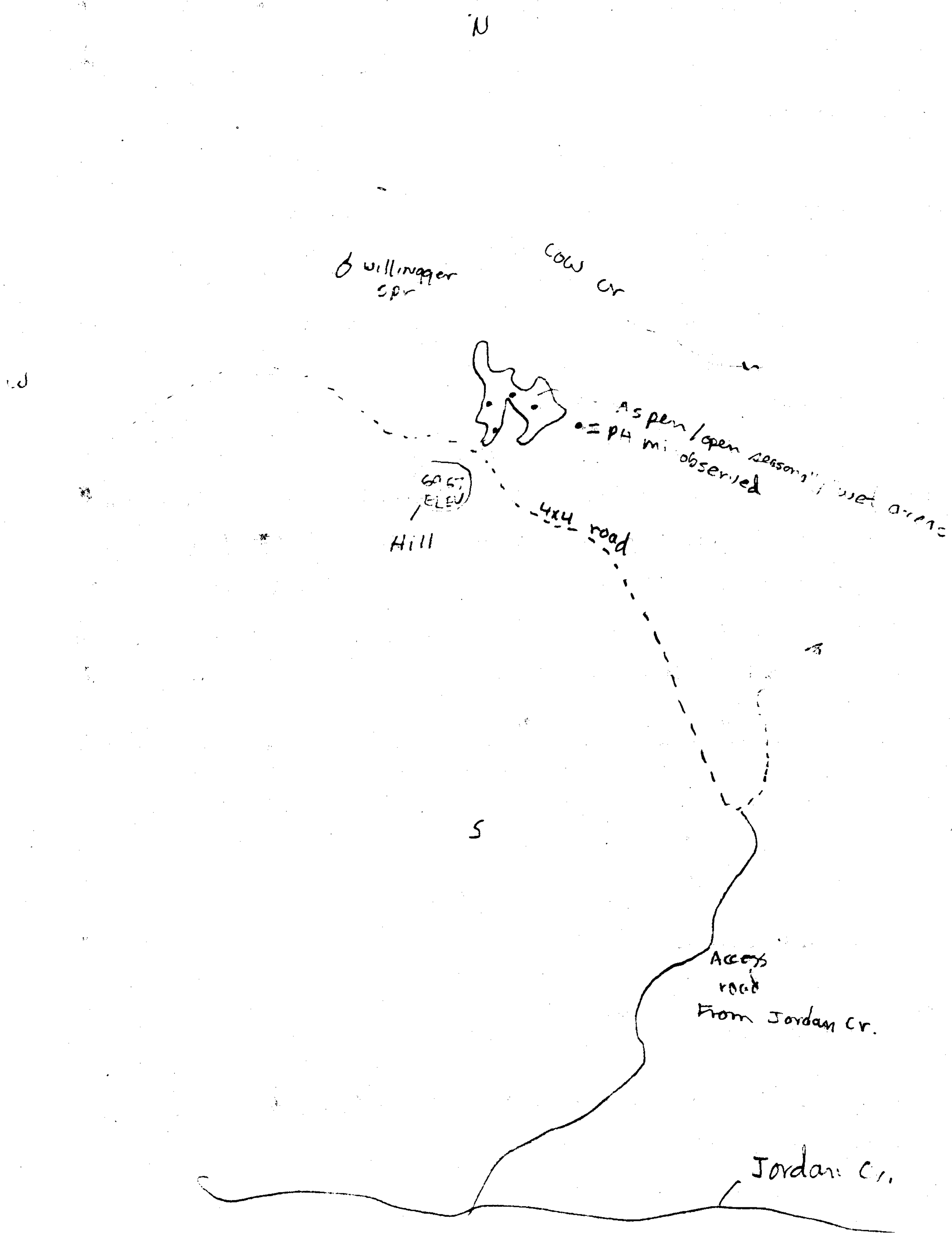
Current land use/visible disturbance/possible threats: Livestock grazing; Fresh ORV tracks Area probably staked for silver mining.

Overall Site Quality: ___Excellent ___Good ✓Fair ___Poor
How was identification made:

Collection #: 21034 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


N
willinger spr
cow cr
Aspen/open seasonal wet areas
• = PH mi observed
Hill
4x4 road
E
S
Access road From Jordan Cr.
Jordan Cr.

6

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: phacelia minutissima Date of Observation: 7/18/96

Observer(s): DUANE Atwood Phone: (801) 825-0868

Address: 602 W. 4600 S., Hooper, UT 84315

Location (be specific): South mountain in drainage ESE of Lookout accessed via Jordan Valley

County: owyhee T 8 S R 5W ___ 1/4 of ___ 1/4 of Sec. 15 W 1/2
T ___ R ___ ___ 1/4 of ___ 1/4 of Sec. ___

Elevations: 2300 M to ___ Quad Name: cliff ___7.5' ___15'

Landowner/Manager: BLM or private ?

Is this a new location? X Yes ___ No ___ Unknown

Total # of individuals in population: ___ Actual 600 + Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): 5 Vegetative 10 Flower 85 Fruit ___ Dormant

Population age class structure: ___ % Seedlings 5 % Immature 95 % Mature ___ % Senescent ___ Unknown

Population area: 30 SF Assessment of population vigor: ___

Was population thoroughly surveyed or was it a cursory visit? cursory for presence of species ca 45 min

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
Veratrum, aspen, chokecherry, alnus community with mixed complex of forb species. Rocky soil on SSE aspect @ 25% slope. Semi-moist to dry in edge of veratrum with open light availability.

Current land use/visible disturbance/possible threats: Livestock grazing, old mining activity.

Overall Site Quality: ___ Excellent ✓ Good ___ Fair ___ Poor
How was identification made: by D Atwood

Collection #: 20977 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*

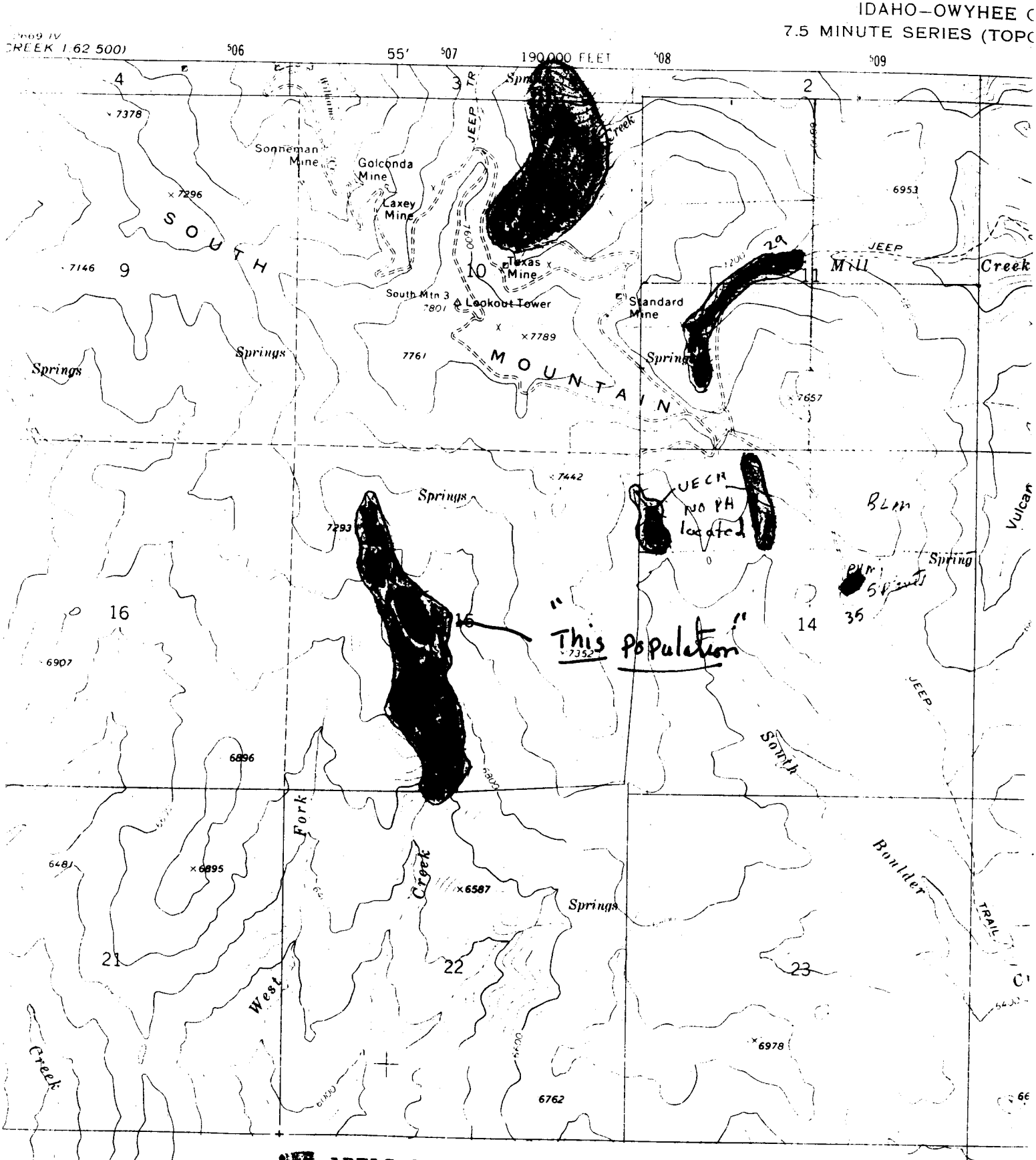

CLIFFS QUADRAN
IDAHO–OWYHEE C
7.5 MINUTE SERIES (TOPC
190,000 FEET
Sonneman Mine
Golconda Mine
Laxey Mine
Texas Mine
South Mtn 3
Lookout Tower
Standard Mine
Mill Creek
SOUTH MOUNTAIN
Springs
JEEP TR
UECR
NO PH
located
"This Population"
BLM
Vulcan
South Fork
West Fork
Boulder
TRAIL
Creek
AREAS SURVEYED FOR LEAST PHACELIA
WITH NEGATIVE RESULTS
POPULATIONS OF LEAST PHACELIA

Photo 4-6

IDAHO RARE PLANT OBSERVATION REPORT

#7

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: phacelia minutissima Date of Observation: 7/22/96

Observer(s): DUANE Atwood Phone: (801) 225-0862

Address: 6027 W. 4600 S, Hooper, UT 84315

Location (be specific): Drainage on the N. side of South Mtn Lookout

County: Owyhee T 8S R 5W ___ 1/4 of NE 1/4 of Sec. 10
T ___ R ___ ___ 1/4 of ___ 1/4 of Sec. ___

Elevations: 7200 ft to ___ Quad Name: cliffs ✓ 7.5' ___ 15'

Landowner/Manager: private

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: ___ Actual 3500 Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative ___ Flower ___ Fruit ___ Dormant IN shade 100% flower; IN open 95-100% fruit

Population age class structure: ___ %Seedlings ___ %Immature ✓ %Mature ___ %Senescent ___ Unknown

Population area: 1/4 ac of observed plants Assessment of population vigor: good

Was population thoroughly surveyed or was it a cursory visit? ___

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
Aspen/snowberry/sagebrush. plants mostly in open drier part of seed area. Sometimes under WECA. Weed complex of Perds

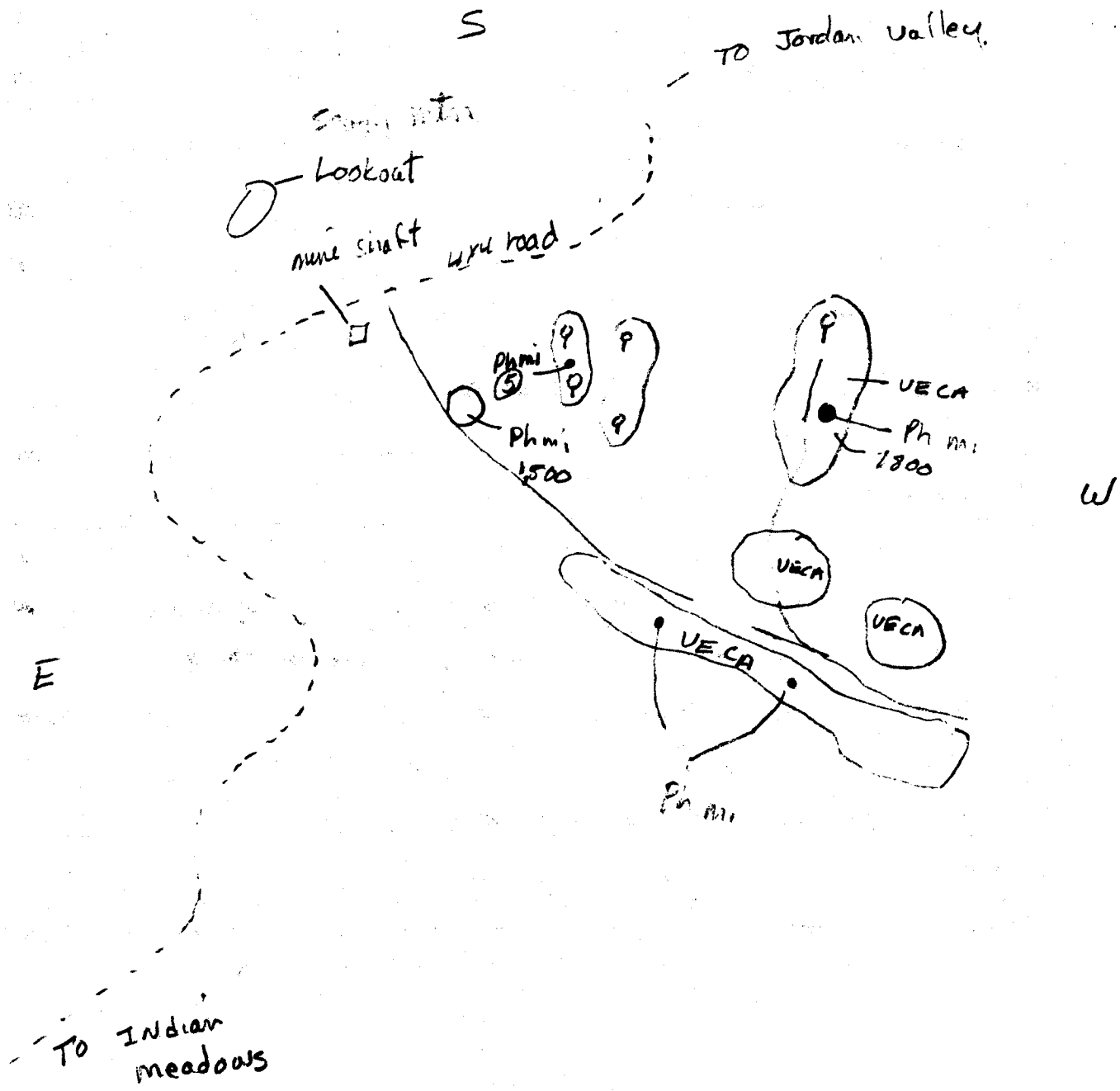
Current land use/visible disturbance/possible threats: Livestock grazing moderate, old mine

Overall Site Quality: ___ Excellent ___ Good ✓ Fair ___ Poor
How was identification made:

Collection #: 21036 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


S
TO Jordan Valley
Lookout
mine shaft
Phmi
5
Phmi
1500
UECA
Ph mi
1800
UECA
UECA
UECA
Ph mi
W
E
TO Indian
meadows
N

3

isto
7-9

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: Phacelia minutissima Date of Observation: 7/22/96

Observer(s): D. Atwood Phone: ( )

Address:

Location (be specific): NE side of South Mountain, below Lookout. 3 drainage [illegible] in the bottom below mine shaft & bldgs.

County: Owyhee T 8S R 5W SE 1/4 of NW 1/4 of Sec. 11
T 8S R 5W N1/2 1/4 of SW 1/4 of Sec. 11

Elevations: 2200'? to ____ Quad Name: Cliffs ✓ 7.5' __ 15'

Landowner/Manager: BLM

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: ______ Actual 5000 + Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or __ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative ___ Flower ___ Fruit ___ Dormant
100 fruit in open & 95% flower in shade

Population age class structure: ___ %Seedlings ___ %Immature ✓ %Mature ___ %Senescent ___ Unknown

Population area: 5+ ac Assessment of population vigor: good

Was population thoroughly surveyed or was it a cursory visit?

Compared to your last visit (# of plants, area, vigor, age classes):

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
Veratrum californicum and seasonaly wet areas adjacent to Veratrum dominated by forbs.

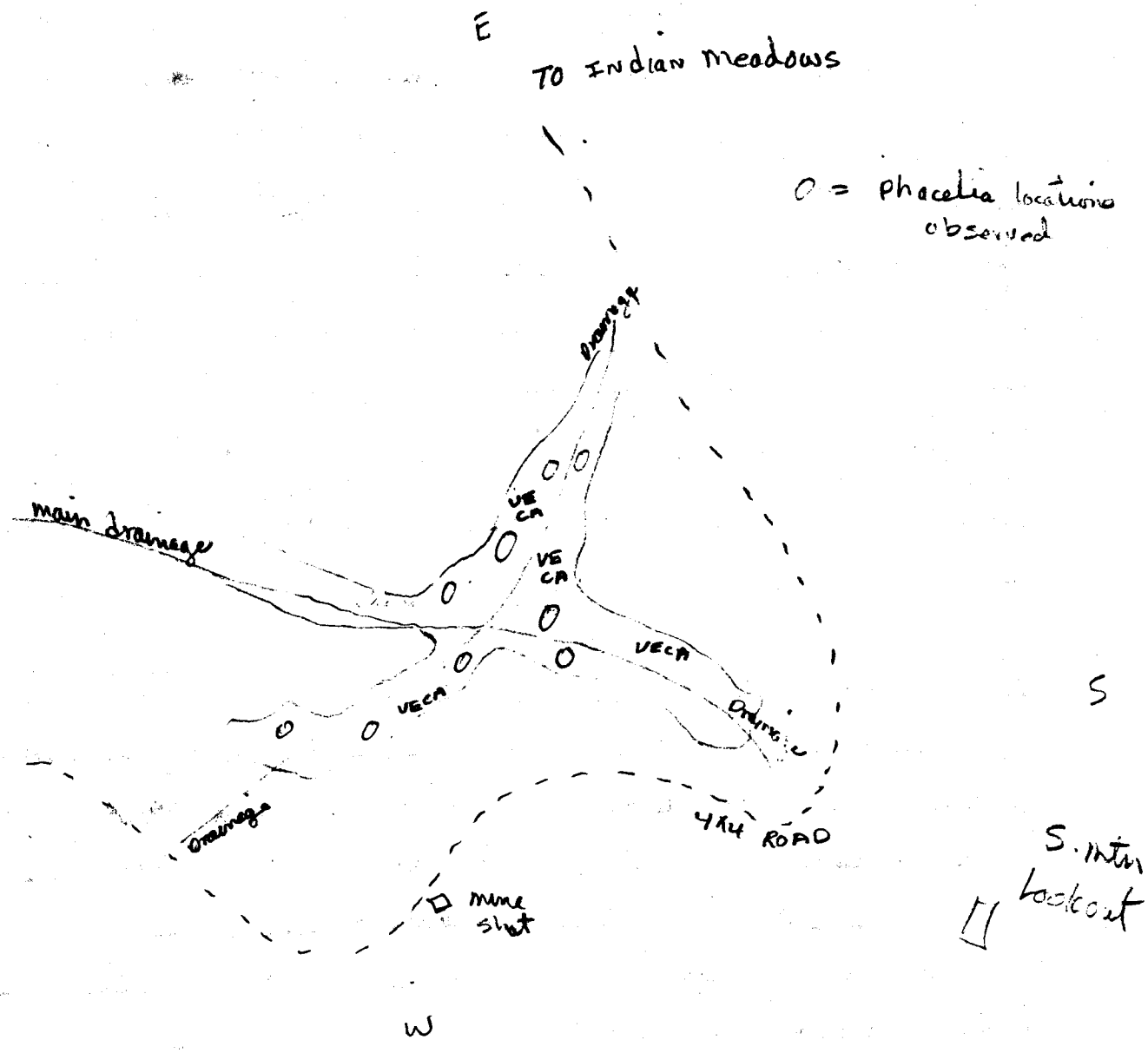
Current land use/visible disturbance/possible threats: Livestock grazing & future mining

Overall Site Quality: ___ Excellent ✓ Good ___ Fair ___ Poor
How was identification made:

Collection #: 21039 Herbarium where deposited: BRY

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


E
TO INDIAN MEADOWS
O = Phacelia locations observed
drainage
main drainage
VE CA
VE CA
VECA
VECA
drainage
4X4 ROAD
mine shaft
S
S. Mtn lookout
N
W

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: phacelia minutissima Date of Observation: 7/23/96

Observer(s): D. Atwood Phone: (801) 825-0868

Address: 6027 W. 4600 S., Hooper UT 84315

Location (be specific): 4 MI E of Indian Meadows road ... to Noon Creek Spr. along Indian Meadows road. plants observed just below where willows start in VECA.

County: Owyhee T 8S R 4W NW 1/4 of NW 1/4 of Sec. 34
T___ R___ ___ 1/4 of ___ 1/4 of Sec.___

Elevations: 6600 to ___ Quad Name: Indian Meadows ✓ 7.5' ___ 15'

Landowner/Manager: BLM Owyhee RA

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 31 Actual ___ Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative 10 Flower 90 Fruit ___ Dormant

Population age class structure: ___ %Seedlings ___ %Immature ✓ %Mature ___ %Senescent ___ Unknown

Population area: 1/3 ac Assessment of population vigor: ___

Was population thoroughly surveyed or was it a cursory visit? ___

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
Drainage with willow + Veratrum & low forb species, open site draining East @ 3%. To much ground cover to be good phacelia habitat

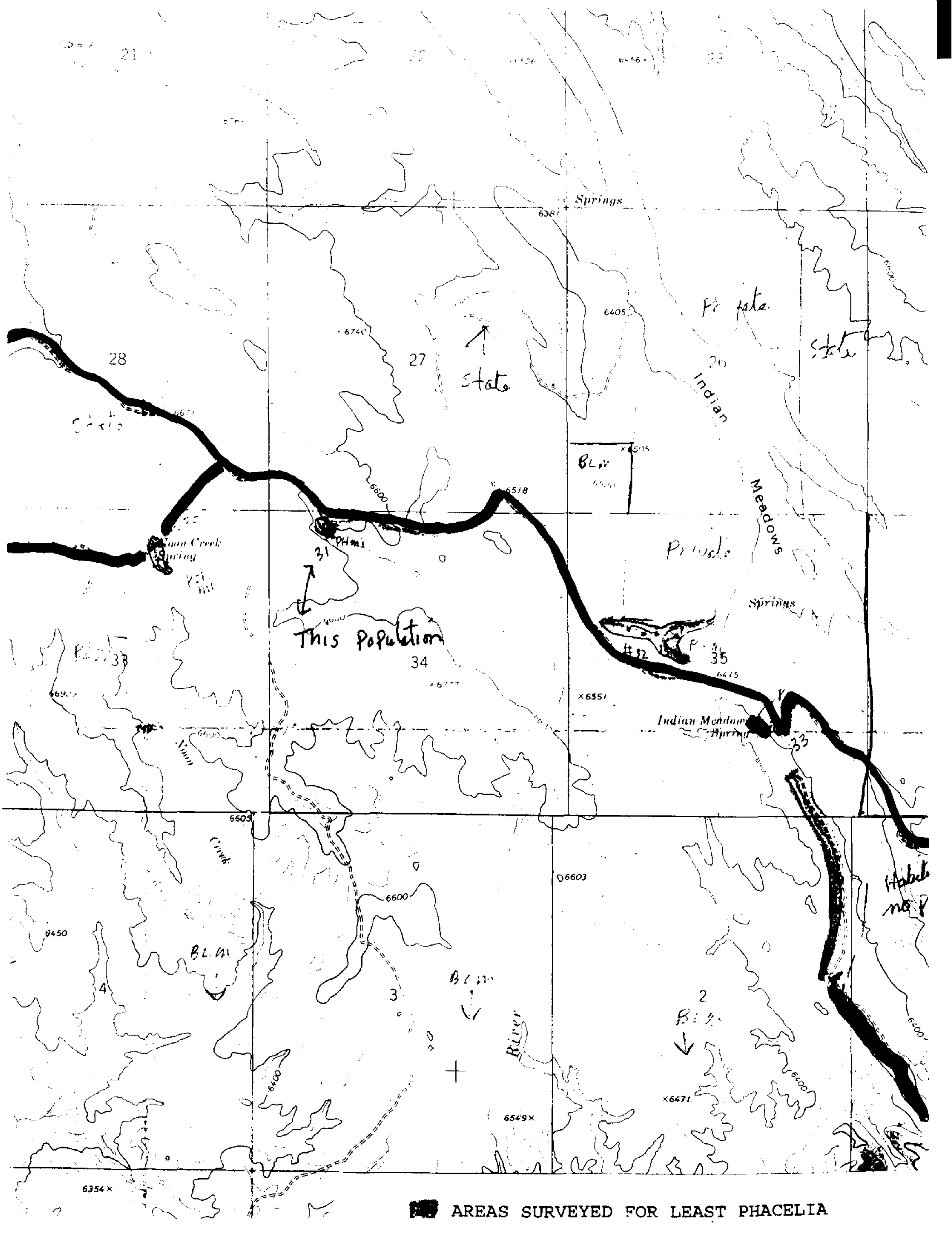
Current land use/visible disturbance/possible threats: Livestock grazing

Overall Site Quality: ___ Excellent ___ Good ✓ Fair ___ Poor for phacelia
How was identification made:

Collection #: NO Herbarium where deposited: ___

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*



AREAS SURVEYED FOR LEAST PHACELIA

#1

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Photo 15

Species: Phacelia minutissima Date of Observation: 7/23/96

Observer(s): D. Atwood Phone: (801) 825-0868

Address: 6027 W. 4600 S., Hooper, UT 84315

Location (be specific): open semi wet Forb/grass meadow N. of Indian meadows Spring. South end of Indian Springs

County: Owyhee T 8S R 4W SE 1/4 of NW 1/4 of Sec. 35
T ___ R ___ ___ 1/4 of ___ 1/4 of Sec. ___

Elevations: 6400 to ___ Quad Name: Indian Meadows ✓ 7.5' ___ 15'

Landowner/Manager: BLM

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 76 Actual ___ Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative ___ Flower ✓ Fruit ___ Dormant

Population age class structure: ___ %Seedlings ___ %Immature ✓ %Mature ___ %Senescent ___ Unknown

Population area: 8 ac Assessment of population vigor: OK

Was population thoroughly surveyed or was it a cursory visit? ___

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime): open semi wet forb/grass meadow. Deschampsia caespitosa, Senecio integ, Juncus bufonis, plagiobothrys scouleri, carex sp, madia glomerata, veratrum Californicum, veronica peregrinus, Navarretia breweri, Polygonum kelloggii

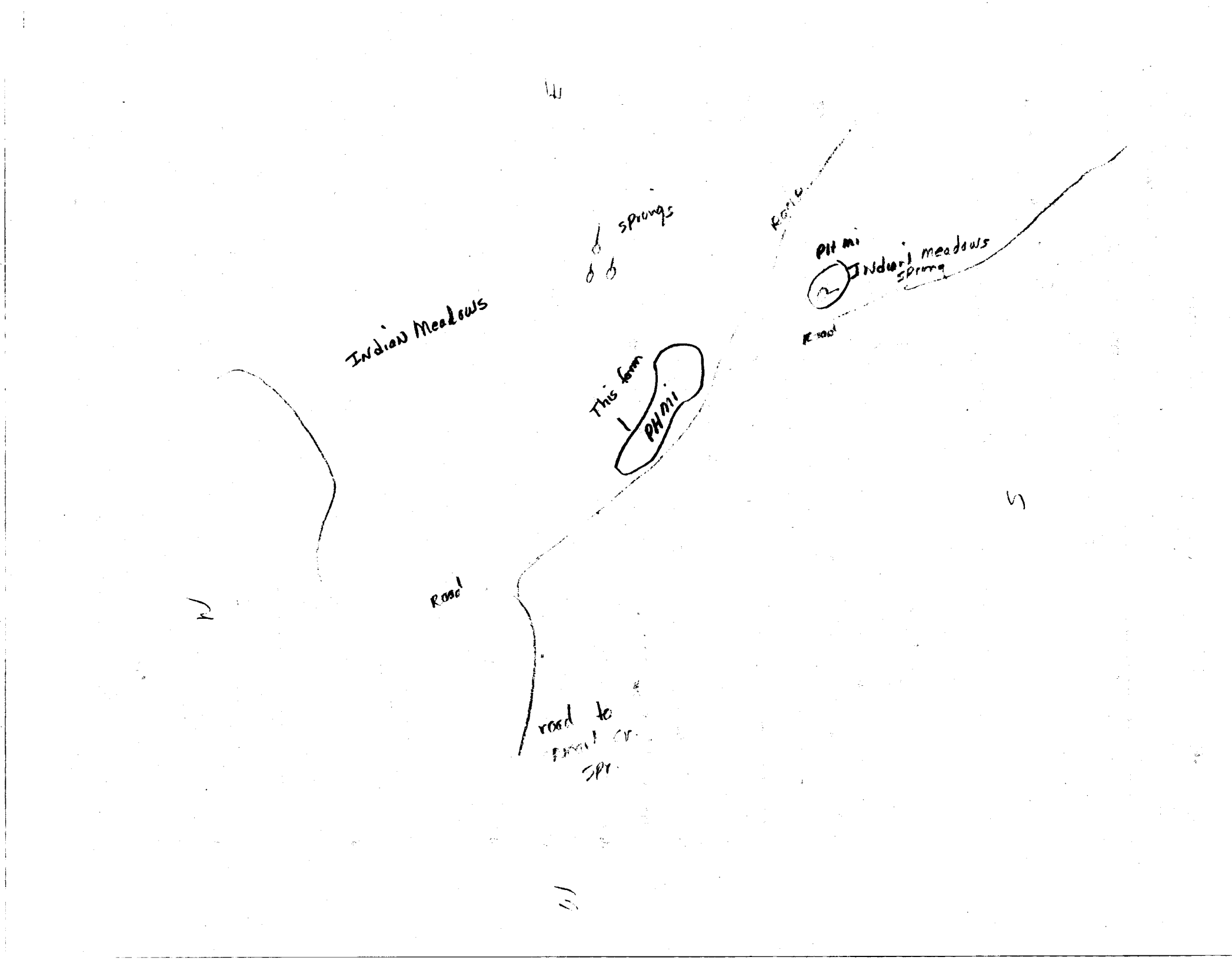
Current land use/visible disturbance/possible threats: Livestock grazing

Overall Site Quality: ___ Excellent ___ Good ✓ Fair ___ Poor
How was identification made:

Collection #: 21044 Herbarium where deposited: ___

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


springs
Indian Meadows
Indian meadows spring
This form
PHMI
Road
road to

12

IDAHO RARE PLANT OBSERVATION REPORT

Photo 16

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

Species: Phacelia minutissima Date of Observation: 7/23/96

Observer(s): D. Atwood Phone: (801) 825-0868

Address: 6027 W. 4600 S., Hooper, UT 84315

Location (be specific): Indian Meadows spring east of South mtn

County: Owyhee T 8S R 4W NW 1/4 of SE 1/4 of Sec. 35
T ____ R ____ ___ 1/4 of ___ 1/4 of Sec. ____

Elevations: 6400 to ____ Quad Name: Indian Meadows ___7.5' ___15'

Landowner/Manager: BLM

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 22 Actual ____ Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ____ Vegetative 5 Flower 95 Fruit ____ Dormant

Population age class structure: ____%Seedlings ____%Immature ✓ %Mature ____%Senescent ____Unknown

Population area: 40 x 40 yds Assessment of population vigor: poor

Was population thoroughly surveyed or was it a cursory visit? ____

Compared to your last visit (# of plants, area, vigor, age classes): ____

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
Veratrum / forb / grass spring comm. South exposure. 0-3% slope, dry to semi moist in open. phacelia under Veratrum

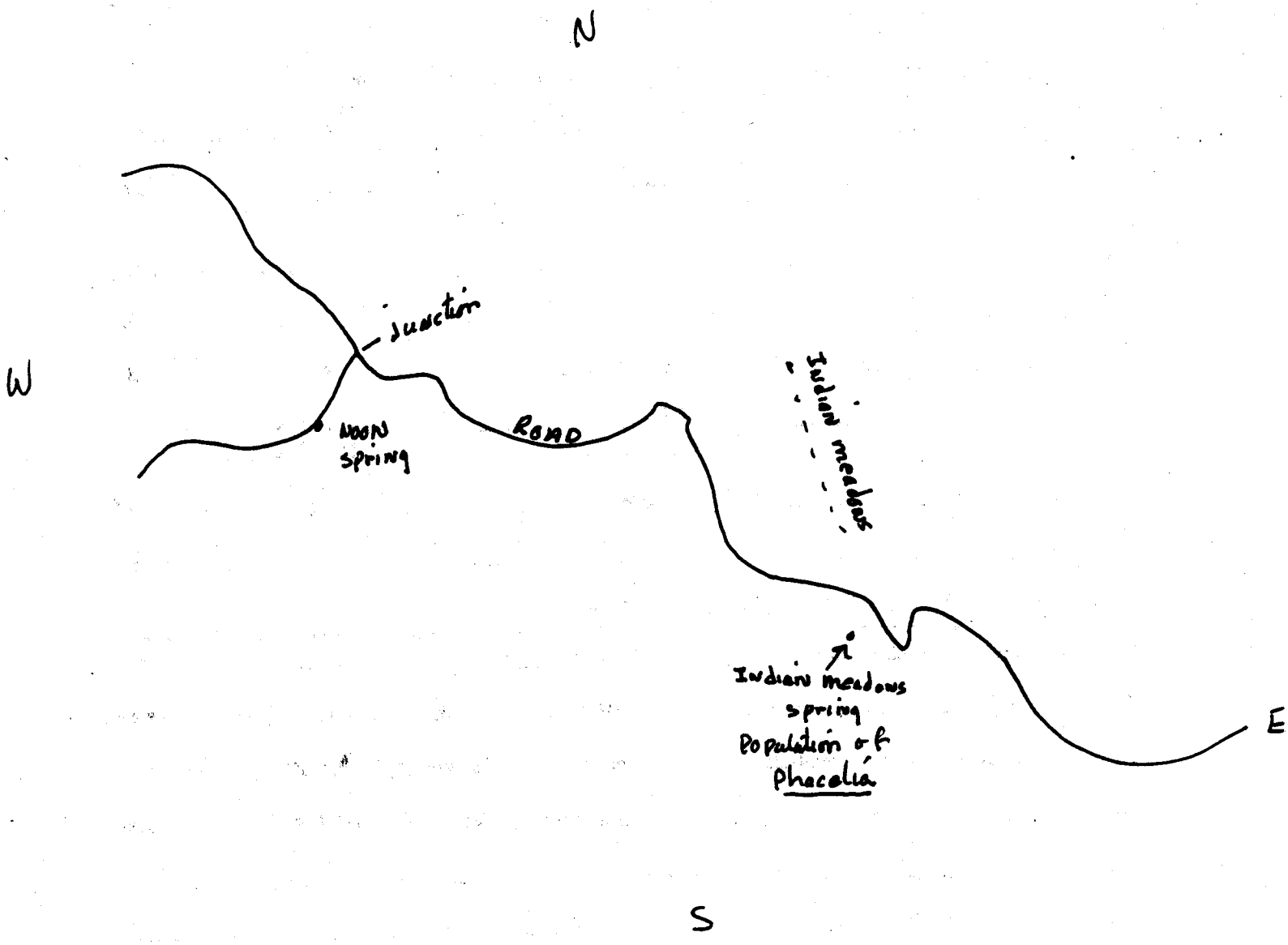
Current land use/visible disturbance/possible threats: Livestock grazing. Watering trough present concentrating livestock.

Overall Site Quality: ___Excellent ___Good ___Fair ✓ Poor
How was identification made:

Collection #: ND Herbarium where deposited: ____

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


N
W
junction
ROAD
MOON
spring
Indian meadows
Indian meadows
spring
Population of
Phacelia
E
S

IDAHO RARE PLANT OBSERVATION REPORT

Please enter all information available to you. Use the back for comments and/or a sketch map of the exact location of the rare plant population. *Attach a copy of the USGS map showing the precise location of the population.*

35 to 10

Species: Phacelia minutissima Date of Observation: 7/23/96

Observer(s): Duane Atwood Phone: (801) 825-0868

Address: 6827 W. 4600 S., Hooper, Utah 84315

Location (be specific): East of South mountain along jeep trail between Vulcan Creek and South Boulder Creek.

County: Owyhee T 8S R 5W SW 1/4 of NW 1/4 of Sec. 14
T ___ R ___ ___ 1/4 of ___ 1/4 of Sec. ___

Elevations: 7020 to ___ Quad Name: Cliffs ✓ 7.5' ___ 15'

Landowner/Manager: private

Is this a new location? ✓ Yes ___ No ___ Unknown

Total # of individuals in population: 50 Actual ___ Estimated

What was counted (check one)? ✓ Genets (genetically distinct individuals) or ___ Ramets (stems of a clonal plant)

Phenology (# individuals or % population): ___ Vegetative ✓ Flower ✓ Fruit ___ Dormant

Population age class structure: ___ % Seedlings ___ % Immature ✓ % Mature ___ % Senescent ___ Unknown

Population area: 1/3 ac Assessment of population vigor: ok

Was population thoroughly surveyed or was it a cursory visit? no, presence mostly

Compared to your last visit (# of plants, area, vigor, age classes): ___

Habitat description (communities, associated species, substrate/soil, aspect, slope, moisture regime, light regime):
Semi moist vernally wet Veratrum, grass, forb comm. with scattered aspen. open 5% slope.

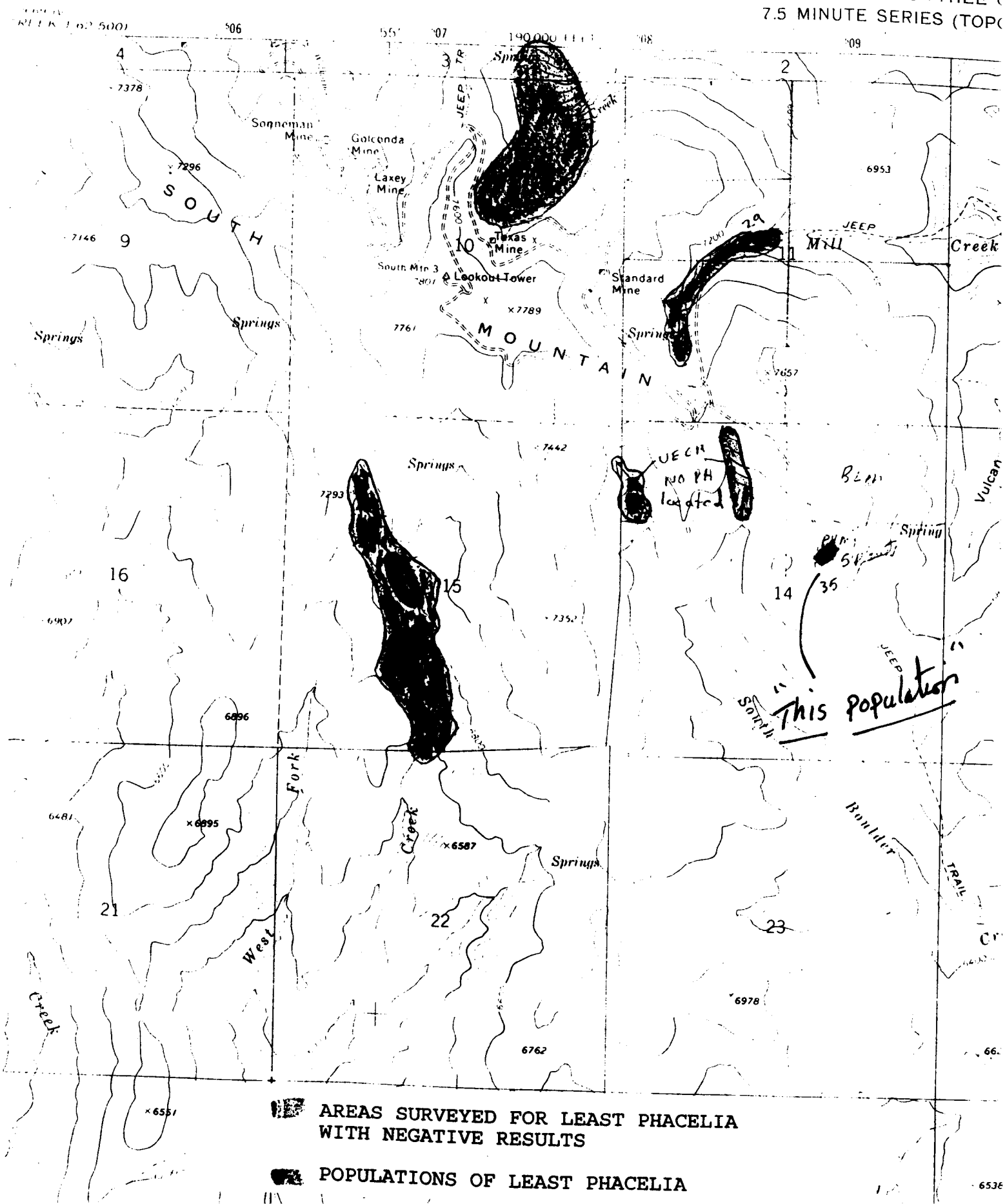
Current land use/visible disturbance/possible threats: livestock grazing

Overall Site Quality: ___ Excellent ✓ Good ___ Fair ___ Poor
How was identification made:

Collection #: NO Herbarium where deposited: ___

Other knowledgeable individuals:

Please return to: *Idaho Conservation Data Center, P.O. Box 25, Boise, ID 83707, (208) 334-3402*


CLIFFS QUADRAN
IDAHO-OWYHEE (
7.5 MINUTE SERIES (TOPO
Sonneman Mine
Golconda Mine
Laxey Mine
Texas Mine
South Mtn 3
Lookout Tower
Standard Mine
SOUTH MOUNTAIN
JEEP Creek
JEEP Mill Creek
Springs
UEC ck
NO PH
located
This Population
South Fork Boulder Creek
West Fork Boulder Creek
Vulcan
AREAS SURVEYED FOR LEAST PHACELIA WITH NEGATIVE RESULTS
POPULATIONS OF LEAST PHACELIA

APPENDIX D
PHOTOGRAPHS OF *PHACELIA MINUTISSIMA* AND ITS HABITAT

1. Phacelia minutissima population and habitat (#27) on south side of South Mountain below Lookout and spring in T8SR5WS15 W 1/2, BLM Owyhee RA. Cliffs Quad.

2. Close-up of Phacelia minutissima population and habitat (#27) on south side of South Mountain below Lookout and spring in T8SR5WS15 W 1/2, BLM Owyhee RA. Cliffs Quad.

3. Phacelia minutissima population and habitat (# 28) NW of South Mountain Lookout on N side of South Mountain T8SR5WS10 NE 1/4 BLM, Owyhee RA. Photograph looking SW. Cliffs Quad.

4. Phacelia minutissima population and habitat (# 29) NE of South Mountain Lookout on N side of South Mountain T8SR5WS11 W 1/2 SW 1/4; SENW, BLM Owyhee RA. Photograph looking East. Cliffs Quad.

5. Phacelia minutissima population and habitat (#29) NE of South Mtn Lookout on the S side of South Mtn, T8SR5WS11 west 1/2, BLM Owyhee RA. Photograph looking N. Cliffs Quad.

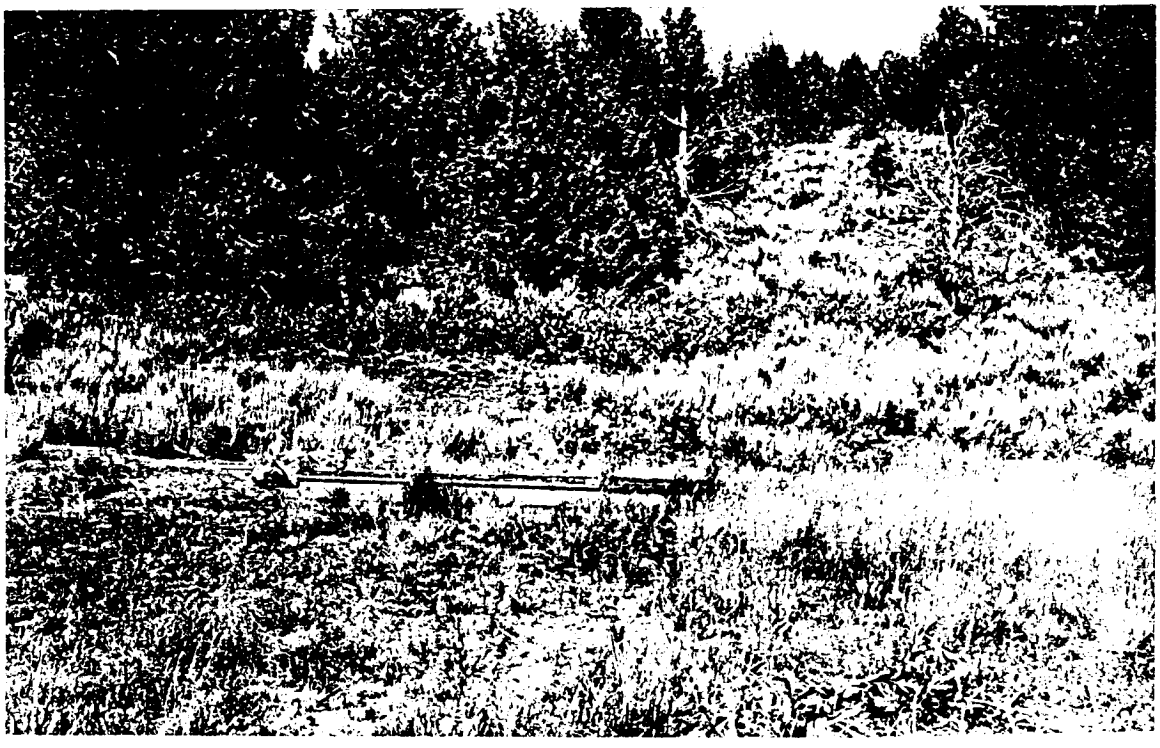
6. Phacelia minutissima population and habitat (#30) at Noon Spring west of Indian Meadows in T8SR4WS33 NWNE, BLM Owyhee RA. Indian Meadows Quad.

7. Phacelia minutissima population and habitat (#30) at Noon Spring west of Indian Meadows in T8SR4WS33 NWNE, BLM Owyhee RA. View from rocky point W of spring. Indian Meadows Quad.

8. Phacelia minutissima population and habitat (#31) between Indian Meadows and Noon Spring T8SR4WS34 NWNW, BLM Owyhee RA. Indian Meadows Quad.

9. Phacelia minutissima population and habitat 32 south end of Indian Meadows T8SR4WS35 S 1/2 NW 1/4, BLM Owyhee RA. Indian Meadows Quad.

10. Phacelia minutissima population and habitat 33 at Indian Meadows Spring T8SR4WS35 SE 1/2 NW 1/4, BLM Owyhee RA. Indian Meadows Quad.

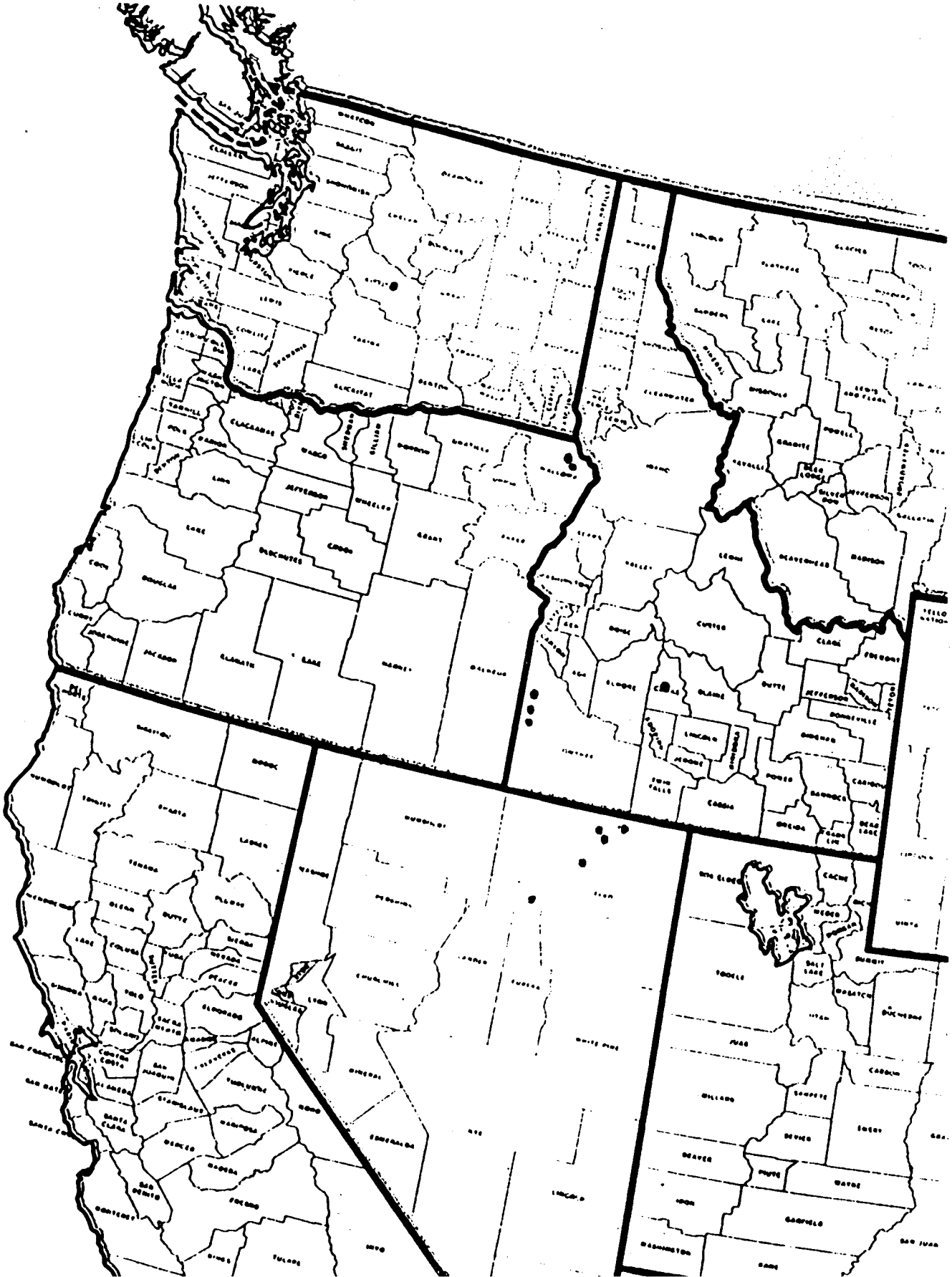


11. Phacelia minutissima potential habitat searched west of Indian Springs on lower part of Combination Ridge, BLM Owyhee RA. Wickiup Creek Quad.

12. Closeup of Ivesia baileyi below old Mining town of Flint in canyon along Flint Creek T6SR4WS11SW 1/4, BLM Owyhee RA. Flint Quad.

APPENDIX E
RANGEWIDE DISTRIBUTION MAP OF LEAST PHACELIA

• DISTRIBUTION OF LEAST PHACELIA



Bureau of Land Management
Idaho State Office
1387 S. Vinnell Way
Boise, Idaho 83709

BLM/ID/PT-97/008+1150