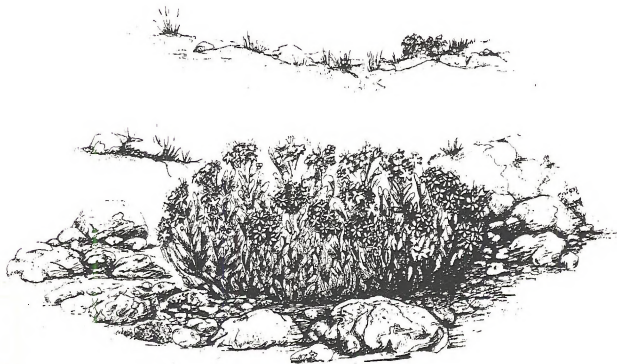


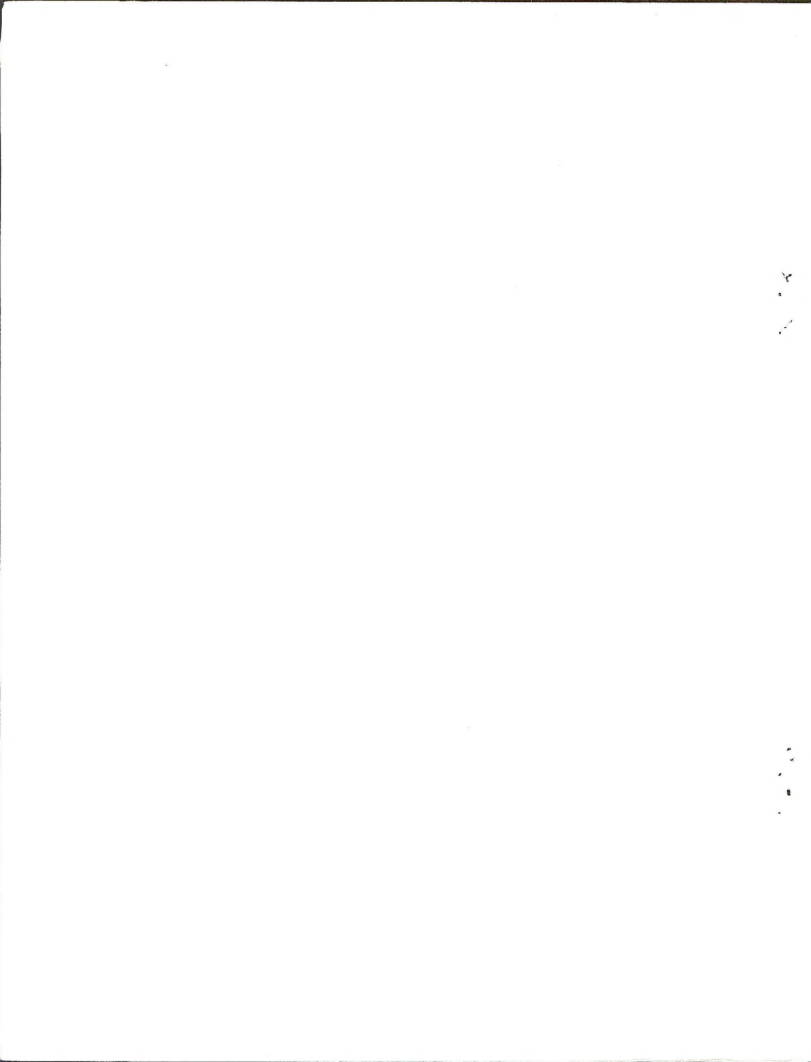


The Taxonomy and Preliminary Conservation Status of *Eriogonum* *Shockleyi* S. Wats. in Idaho

by
Robert K. Moseley
and
James L. Reveal



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THE TAXONOMY AND PRELIMINARY CONSERVATION STATUS OF

ERIOGONUM SHOCKLEYI S. WATS. IN IDAHO

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ABSTRACT

Eriogonum shockleyi S. Wats. is a rare species in Idaho, being disjunct from the main portion of its distribution in the Great Basin. Two varieties have been recognized in the state, the endemic var. *packardae* (Packard's buckwheat) and the typical var. *shockleyi* (Shockley's buckwheat). Since the endemic variety was first recognized in the mid-1970's, there has been considerable confusion as to the identity of populations in the state. This has hindered conservation planning for the two taxa. Our study objectives were to conduct a taxonomic assessment of *Eriogonum shockleyi* in Idaho to aid in identification and make a preliminary assessment of its conservation status in the state.

Taxonomic analysis revealed that two entities do exist in Idaho. We prepared descriptions for *E. shockleyi* and its varieties in Idaho and constructed a key to aid in identifying populations. We also discuss the biogeographic significance of the Idaho populations of *E. shockleyi* in the context of conservation planning. Emphasis was placed on determining the taxonomic status, but we used existing data to make preliminary assessments of the conservation status of the two varieties. Packard's buckwheat is known from 11 extant populations and is globally rare. Populations are small, localized and some are threatened. It deserves recognition at the federal level as a candidate taxon. Shockley's buckwheat is globally common and secure, but rare within Idaho. It is also known from 11 populations, but in general they tend to be larger than Packard's buckwheat and three occur in state parks or a national monument, where they are relatively well protected. Thorough rangewide/statewide field surveys are needed to determine the full extent of their distributions and abundance in Idaho and their true conservation status.

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- Appendix 2. Occurrence Records for *Eriogonum shockleyi* var. *packardae* from the Conservation Data Center data base.
- Appendix 3. Location of *Eriogonum shockleyi* var. *packardae* populations known to be extant.
- Appendix 4. Occurrence records for Idaho populations of *Eriogonum shockleyi* var. *shockleyi* from the Conservation Data Center data base.
- Appendix 5. Location of *Eriogonum shockleyi* var. *shockleyi* populations in Idaho.

PREFACE

Eriogonum shockleyi S. Wats. is a rare species in Idaho, being disjunct from the main portion of its distribution in the Great Basin. Two varieties have been recognized in the state, the endemic var. *packardae* (Packard's buckwheat) and the typical var. *shockleyi* (Shockley's buckwheat). Since the endemic variety was first recognized in the mid-1970's, there has been considerable confusion as to the identity of populations in the state. This has hindered conservation planning for the two taxa. To rectify this situation, the Lower Snake River District, BLM, and the Idaho Department of Fish and Game's Conservation Data Center (CDC) entered into a cooperative project to (1) conduct a taxonomic assessment of *Eriogonum shockleyi* in Idaho to aid in identification, and (2) make a preliminary assessment of its conservation status in the state.

The project study plan also called for determining the disposition of a population of *Eriogonum* from the summit of War Eagle Mountain, in the Silver City Range, that had been mentioned by Reveal (1989) as a possible new species. Searches by Ann DeBolt (pre-1994), Bob Moseley (in 1994), and Jim Reveal (in 1995) failed to locate the population. More work is needed on this entity.

Two sections comprise the summary of our work. Section 1 covers the taxonomy of *Eriogonum shockleyi* in Idaho and the identification of the two varieties. It is in the form of a manuscript that we plan to submit to *Great Basin Naturalist*. Section 2 is a preliminary assessment of the conservation status of the two varieties in Idaho, including a review of conservation designations, distribution, habitat, population biology, and recommendations to various agencies regarding their management and conservation.

As a follow-up to this project, I annotated all collections of *E. shockleyi* during late October and early November, 1995, at the following herbaria: Albertson College of Idaho (CIC), Snake River Plain Herbarium, Boise State University (SRP), Boise District BLM, Shoshone District BLM, and Idaho Power Company. I plan to annotate those at the University of Idaho Herbarium (ID) in the spring of 1996.

SECTION 1

TAXONOMY

This section contains a manuscript for submission to the peer-reviewed journal *Great Basin Naturalist*. The form and style differ somewhat from the rest of the report in order to conform to editorial guidelines of the journal. For instance, the tables and figures mentioned in the text are at the end of the section.

THE TAXONOMY OF *ERIOGONUM SHOCKLEYI* S. WATS.
(POLYGONACEAE) IN IDAHO

Robert K. Moseley¹ and James L. Reveal²

ABSTRACT.— *Eriogonum shockleyi* is widespread in the Intermountain Region, with disjunct populations in southern Idaho. Several of these disjunct populations have been described as var. *packardae*, but identification problems have hindered conservation efforts by land managers. We undertook this study to clarify the taxonomy of *E. shockleyi* in Idaho to aid in identification and conservation planning. Analysis of morphometric data using principal components analysis corroborated observations made in the field, that is, *E. shockleyi* is represented in Idaho by two infraspecific taxa, var. *shockleyi* and var. *packardae*. We provide descriptions of the species and varieties in Idaho and a key to the infraspecific taxa. We also discuss the biogeographic significance of the Idaho populations and make recommendations concerning their conservation.

Keywords: *Eriogonum shockleyi*, Idaho, Intermountain Region, taxonomy, rare flora, Polygonaceae.

Eriogonum shockleyi S. Wats. is widely distributed throughout the Intermountain Region of the western United States, where it occurs on barren rocky, clayey or sandy substrates in shrublands or pinyon-juniper communities (Reveal 1985). Idaho populations are disjunct from the main range to the south by approximately 100 km and at least some populations have differentiated enough from the type variety to be considered a unique taxon, described as var. *packardae* Reveal (Reveal 1989). In addition to *E. shockleyi*, volcanic and related lacustrine deposits along the Snake River in southwestern Idaho are habitat to other Great Basin disjuncts, including *Peteria thompsoniae* S. Wats., *Langloisia punctata* (Cov.) Goodd., *Blepharidachne kingii* (S. Wats.) Hackel, *Cleomella plocasperma* S. Wats., *Psathyrotes annua* (Nutt.) Gray and *Mentzelia torreyi* A. Gray. Similar to *E. shockleyi*, Idaho populations of the latter species have differentiated from their southern counterparts and comprise the endemic *M. torreyi* var. *acerosa* (M.E. Jones) Barneby.

Both varieties of *E. shockleyi* are considered rare in Idaho, with the endemic var. *packardae* apparently globally rare (Packard and Grimes 1981, Conservation Data Center 1994). Since the presence of the endemic variety was brought to the attention of botanists in the mid-1970's, there has been considerable difficulty identifying populations (DeBolt and Rosentreter 1988). This problem has confounded conservation efforts for these rare taxa by land managers. We undertook this study to clarify the taxonomy of *E. shockleyi* in Idaho to aid in conservation planning.

METHODS

Because flowering stem length is the most important morphological feature separating the two taxa (Reveal 1989), it was important to collect all samples at or just past anthesis, when the flowering stems had fully elongated. After monitoring selected populations through the late spring and early summer, Moseley made collections at 19 of the 25 known *E. shockleyi* populations in Idaho during 27-29 June 1995 (Table 1). Six populations were not sampled because of limited access or vague location information.

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In the herbarium, measurements, or characterizations of non-numeric features, were made on each collection for 32 morphological features of the leaves, inflorescences and flowers (Table 2; Appendix 1). Each sample consisted of at least five plants. A minimum of 20 measurements were made for each feature, using all plants in the sample. The mean of each numeric feature was used to analyze the morphological relationships between the 19 collections using principal components analysis (PCA). Non-numeric attributes did not vary among collections and, therefore, were not used in studying morphological relationships. The multivariate statistical package CANOCO (v. 3.12) was used for the PCA.

RESULTS

Morphometric Analysis

Figure 1 displays the ordination diagram of the 19 collections along the first two axes extracted by PCA. Plots are arranged in the ordination space based on differences in morphological attributes, with 94% of the variation accounted for by axis 1. Of all morphological attributes used in the analysis, four had the greatest effect on how collections are aligned along this dominant axis (reported as "fraction of variance," in parentheses): flowering stem length (0.99), leaf blade width (0.89), leaf blade length (0.78) and petiole length (0.75). The relationship of collections in the ordination space was affected little by the other attributes.

This analysis corroborates observations originally made by Reveal (1989), when few *E. shockleyi* populations were known in Idaho. That is, *E. shockleyi* is represented in Idaho by two infraspecific taxa, var. *shockleyi* and the narrow endemic var. *packardae*. Collections with positive values on axis 1 represent var. *shockleyi* by having longer flowering stems (mean = 14.2 mm) and larger leaves (Figure 1). With one exception, those with negative values have short stems (mean = 4.2 mm) and small leaves and correspond to var. *packardae*. The exception is the intermediate collection 2893. When measurements of this collection were averaged together it appears to be a morphological intermediate between the "packardae" and "shockleyi" groups. In the field, however, the population appears to be a mixture of both exclusively long-stemmed and exclusively short-stemmed individuals. This situation is discussed further below.

Taxonomy

Eriogonum shockleyi S. Wats. — Pulvinate-caespitose, mound-forming perennial, 0.5-6.2 dm across, 1-5 cm high, from a woody, much branched caudex, the branches clothed in macrescent leaf bases and terminated by rosettes; leaves in dense compact rosettes, the leaf blades 2-8 (10) mm long, 1-5 mm wide, obovate, oblanceolate, elliptic, or spatulate, tomentose on both surfaces, petiole 0-9 mm long, flowering stems scapose, 0-23 mm long, tomentose; inflorescences capitate and terminal; bracts tomentose, mostly scalelike, membranaceous, ternate, 0.5-2 mm long, occasionally 3-5 (8) mm long and thick, green; involucre congested, (2) 3 (4,5) per head, broadly campanulate, 2-6 mm long, tomentose, the (4) 5 (6) lanceolate teeth 1-4 (5) mm long, sessile or pedicels <0.5 mm, glabrous; flowers 3-10 (13) per involucre, pale yellow, occasionally suffused with red at the base, 3 mm long, densely tomentose, united from one quarter to two thirds of their length, the segments oblong; stamens exerted, the filaments 3-4 mm long, glabrous, the anthers yellow, 0.3-0.5 mm long, oval; achenes light brown, 2-3 mm long, densely tomentose, the subglobose base tapering to a short, 3-angled beak..

Eriogonum shockleyi is distributed throughout the Intermountain Region from east-central

California, east across Nevada and Utah, to western Colorado, and south to northern Arizona and New Mexico. It is disjunct in southern Idaho, with populations scattered along 135 km of the Snake River canyon and the lower valleys of several tributaries (Figure 2). All Idaho populations are highly localized, occupying barren habitats within sagebrush-steppe. *E. shockleyi* is represented in Idaho by two varieties, described below.

Eriogonum shockleyi S. Wats. var. *shockleyi*. — Shockley's buckwheat. [*E. villiflorum* A. Gray var. *canadidum* M.E. Jones; *E. acule* var. *shockleyi* (S. Wats.) M.E. Jones; *E. pulvinatum* Small; *E. shockleyi* subsp. *canadidum* (M.E. Jones) S. Stokes]. Plants densely to loosely pulvinate-caespitose, 0.5-6.2 dm across, 2-5 cm high; leaves with obovate, oblanceolate, elliptic, or spatulate blades, 3-8 (10) mm long, 2-5 mm wide, petiole (1) 3-9 mm long; flowering stems (6) 9-23 mm long (mean = 14.2 mm); flowers united one quarter to half of their length.

SPECIMENS EXAMINED. — USA, Idaho, Owyhee Co., T7S R5E S1, Horse Hill, *Moseley 2889* (ID, SRP), *Mancuso 1381* (ID); T7S R6E S19, Sugar Valley Badlands, *Moseley 2891* (ID, SRP), *Rosentreter 100, 131, 3134* (CIC, ID, Boise BLM Office); T7S R5E S20, Prominent Buttes, *Moseley 2892* (ID, SRP), *Rosentreter 137* (Boise BLM Office); T6S R5E S35, Lower Sugar Valley, *Moseley 2895* (ID, SRP), *DeBolt 828* (CIC, Boise BLM Office); T5S R6E S27, Bruneau Dunes, *Moseley 2897* (ID, SRP); T6S R8E S13, Lower Sailor Creek, *Moseley 2899* (ID, SRP), *DeBolt 1714* (Boise BLM Office); Elmore Co., T6S R9E S8, South of Schoffs Island, *Moseley 2898* (ID, SRP), *Fite s.n.* (Idaho Power Company); Twin Falls Co., T7S R13E S9, Fossil Gulch, *Moseley 2900* (ID, SRP), *Popovich 5080* (RM, ID, Shoshone BLM Office); Gooding Co., T6S R13E S35, Malad Gorge, *Moseley 2882* (ID, SRP), *Rosentreter 7920* (Boise BLM Office), *Cole s.n.* (Idaho Power Company), *Popovich 5081* (RM, ID, Shoshone BLM Office).

The var. *shockleyi* is primarily distinguished from the endemic var. *packardae* by having a much longer flowering stem, which is especially noticeable in the field where the inflorescences extend well above the cushion of rosetted leaves. In general, the leaves are larger in var. *shockleyi*, although this feature is variable and there is considerable overlap with var. *packardae*. When surveying an entire population in the field, however, the leaves of var. *shockleyi* are considerably wider, a characteristic that is not always obvious on herbarium specimens.

All *E. shockleyi* populations on the eastern end of its Idaho distribution are var. *shockleyi* (Figure 2). Populations of both taxa occur in the Bruneau River drainage and, in one instance, there appears to be a mixed population (see discussion below). Most populations of var. *shockleyi* occur on lacustrine deposits consisting of a cobbly desert pavement on the surface, over deep, sandy-loam sediments. Several of the eastern populations occur on gravelly deposits of calcrete lying on lacustrine sediments or basalt.

Eriogonum shockleyi S. Wats. var. *packardae* Reveal. — Packard's buckwheat. Plants densely compact, caespitose, 0.5-4 dm across, 1-4 cm high; leaves with elliptic blades, 2-5 (7) mm long, 1-3 mm wide, petiole 0-4 mm long, flowering stems 0-10 (11,13) mm long (mean = 4.1 mm); flowers united from half to two thirds of their length.

SPECIMENS EXAMINED. — USA, Idaho, Ada Co., T1S R1W S32, Halverson Lakes, type locality, *Reveal 3686* (US, BRY, NY, RSA, UC, UTC), *Moseley 2885* (ID, SRP); T1S R1W S28, East of Halverson Lakes, *Moseley 2884* (ID, SRP); T1S R1W S36, North of Priest Ranch, *Moseley 2883* (ID, SRP); Owyhee Co., T5S R1E S21, East of Castle Creek, *Moseley 2887* (ID, SRP); T7S R3E S4, Shoofly Oolitic Limestone, *Moseley 2888* (ID, SRP), *Grimes 1742* (CIC); T8S R6E S28, Deer Water-Hot Creek, *Moseley 2890* (ID, SRP), *DeBolt 1743* (Boise BLM Office); T7S R5E S8, Little Valley, *Moseley 2894* (ID, SRP); T6S R6E S18, Bruneau Rim, *Reveal 3852* (BRY, MICH, NY, US), *Moseley 2896* (ID, SRP); 10 miles south of Bruneau, Devil's Bathub, *Bright s.n.* (MIN); T5S R1E S20, Castle Creek Mines, *Moseley 2886* (ID, SRP), *DeBolt 1465* (CIC, Boise BLM Office);

T55 R1E S16, Castle Creek North, *DeBolt 1438* (Boise BLM Office); T75 R2E S14, Perjue Canyon, *DeBolt 508* (Boise BLM Office).

The var. *packardae* is distinguished from the typical variety by having a flowering stem that is very short. In the field the flowering stems appear to be absent, the inflorescences apparently positioned within or sitting directly on the tightly-matted cushion of leaves. The leaves of var. *packardae* are consistently short and narrow. The leaves of var. *shockleyi*, by comparison, are more variable but have larger average dimensions in a population. This combination of characters gives the cushions of var. *packardae* a tighter, more compact appearance in the field than var. *shockleyi*.

The var. *packardae* exclusively occupies the western end of *E. shockleyi*'s distribution in Idaho (Figure 2). As mentioned above, the taxa are allopatric in the Bruneau River drainage. At least one of the Bruneau populations [T75 R5E S31, Upper Sugar Valley, *Moseley 2893* (ID, SRP)] appeared to be a mixture of individuals of both varieties. This population occurs within 4-6 km of populations of both taxa (Figure 2). Substrates occupied by var. *packardae* include oolitic limestone outcrops, sandy loess over basalt, and cobbly desert pavement.

Key to the varieties. — Following is a key to the two varieties of *E. shockleyi* in Idaho, using both morphological measurements of herbarium specimens collected at anthesis and characterization of diagnostic features of the plant's habit from field observation:

1. Flowering stems at anthesis average less than 10 mm long, most less than 5 mm; flowering stems apparently absent in the field, the inflorescences sitting directly on or within the cushion; leaf blades elliptic, short and narrow, 2-5 mm long by 1-3 mm wide; petiole less than 4 mm long *E. shockleyi* var. *packardae*
- Flowering stems at anthesis greater than 10 mm long, the capitate inflorescences obviously extending above the cushion; leaves larger, the blades obovate, oblanceolate, elliptic, or spatulate, 3-10 mm long by 2-5 mm wide; petiole generally greater than 4 mm long *E. shockleyi* var. *shockleyi*

DISCUSSION

The short to nonexistent flowering stems of *E. shockleyi* var. *packardae* is a morphological extreme unique in *E. shockleyi*. The var. *packardae* also lies at the distributional extreme for *E. shockleyi*, being at the northwestern limit of the species range. Although published descriptions of var. *shockleyi* indicate that it is a morphologically variable taxon, especially the leaves (Welsh et al. 1987, Hickman 1993), specimens from the disjunct populations in Idaho are small in nearly all respects when compared to specimens from Great Basin populations. A specimen from a geographically intermediate position in northeastern Nevada [Elko Co., Salmon Falls Creek drainage, 7 miles southeast of Jackpot, *Erter 5052* (UC)], is also considerably smaller than those to the south and may indicate geographic and phylogenetic links with the Idaho populations ca. 100 km to the north. Other Great Basin taxa reach their northern limit in the lowland corridor of the Salmon Falls Creek valley, including *Astragalus newberryi* A. Gray var. *castoreus* M.E. Jones, *A. tetrapterus* A. Gray, *Townsendia scapigera* D.C. Eaton, and *Glyptopleura marginata* D.C. Eaton. Only the latter species extends as far north as the Snake River, where it occurs with *E. shockleyi*. The evolutionary relationships between var. *packardae* and the disjunct populations of var. *shockleyi*, as well as these disjunct populations with ones in the Great Basin, are worthy of further study using molecular phylogenetic techniques (Baldwin 1995).

We know of 11 extant populations of var. *packardae*, plus an additional three that have not

been relocated since their discovery 7-24 years ago. Although several populations are relatively dense, all are small in area and isolated from one another by as much as 24 km. Most extant populations have been disturbed or are threatened by off-road vehicle travel, irrigation pipeline construction, plowed fire breaks, mining and other activities directly impacting their habitat. In addition, the habitat of var. *packardae* lies within the sagebrush-steppe of the Snake River Plain, an ecosystem that has experienced drastic losses in area and ecological integrity and is considered endangered (Noss et al. 1995). These factors conspire to make this narrow endemic vulnerable to at least local extirpation. We recommend that var. *packardae* be considered a candidate for Federal listing under the Endangered Species Act. We also recommend that a conservative approach be taken with mixed populations and that they be considered var. *packardae* in conservation planning efforts. Future work on the population genetics of *E. shockleyi* in Idaho may clarify their relationship better.

Eleven populations of var. *shockleyi* are known from Idaho. Similar to the endemic taxon, all populations are localized and vulnerable. Because of their disjunct nature and possible genetic differentiation from central populations (Lesica and Allendorf 1995), they should be protected from inappropriate disturbances by public land managers. Now that their taxonomy and identification has been clarified, we recommend that intensive field inventories be conducted to determine the full extent of the distribution, abundance and conservation status of the two *E. shockleyi* taxa in Idaho.

ACKNOWLEDGEMENTS

We greatly appreciate the help of Ann DeBolt for providing funding for this study through the Lower Snake River District, Bureau of Land Management. The following people helped by providing access to their knowledge and specimens of *Eriogonum shockleyi*: Nancy Cole, Ann DeBolt, Barbara Ertter, Patricia Packard, Steve Popovich, and Carol Prentice. Bart Butterfield and Arline Bradshaw assisted with the graphics.

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TABLE 1. Collections of *Eriogonum shockleyi* from Idaho used in the taxonomic analysis. Collection numbers are those of Moseley.

Collection Number	County	Site Name	Legal Description
2882	Gooding	Malad Gorge	T6S R13E S35 NE4
2883	Ada	North of Priest Ranch	T1S R1W S36 SW4
2884	Ada	East of Halverson Lakes	T1S R1W S28 SE4
2885	Ada	Halverson Lakes	T1S R1W S32 NE4
2886	Owyhee	Castle Creek Mines	T5S R1E S20 NE4
2887	Owyhee	East of Castle Creek	T5S R1E S21 NE4
2888	Owyhee	Shoofly Oolitic Limestone	T7S R3E S2 NW4
2889	Owyhee	Horse Hill	T8S R5E S1 NE4
2890	Owyhee	Deer Water-Hot Creek	T9S R6E S28 SW4
2891	Owyhee	Sugar Valley Badlands	T7S R6E S19 NE4
2892	Owyhee	Prominent Buttes	T7S R5E S29 NW4
2893	Owyhee	Upper Sugar Valley	T7S R5E S32 SW4
2894	Owyhee	Little Valley	T7S R5E S8 NW4
2895	Owyhee	Lower Sugar Valley	T6S R5E S35 SE4
2896	Owyhee	Bruneau Rim	T6S R6E S18 SW4
2897	Owyhee	Bruneau Dunes	T6S R6E S27 NE4
2898	Elmore	South of Schoffs Island	T6S R9E S8 NE4
2899	Owyhee	Lower Sailor Creek	T6S R8E S13 NE4
2900	Twin Falls	Fossil Gulch	T7S R13E S9 SE4

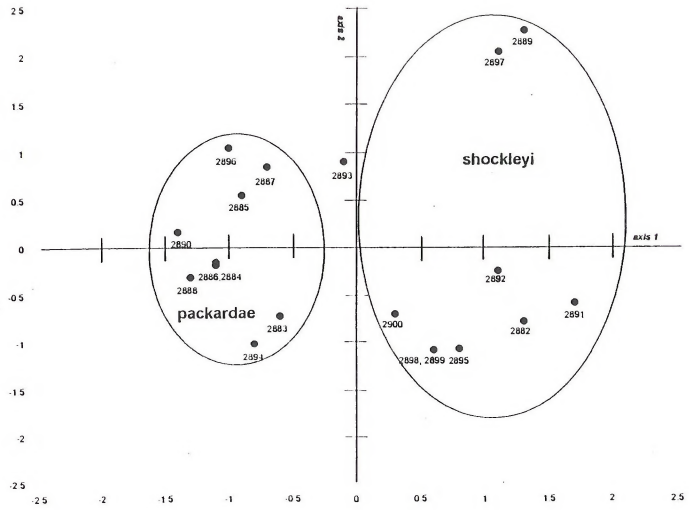
TABLE 2. Morphological features used in the taxonomic analysis of *Eriogonum shockleyi*. Features with numeric attributes that were used in the PCA are indicated with an asterisk.

<p><i>LEAF</i></p> <ul style="list-style-type: none"> *blade width (mm) *blade length (mm) *petiole length (mm) pubescence type <p><i>INFLORESCENCE</i></p> <ul style="list-style-type: none"> *flowering stem length (mm) bract texture *bract length (mm) pubescence type <p><i>INVOLUCRE</i></p> <ul style="list-style-type: none"> *number/head shape texture *length (mm) involucre pubescence type *teeth number *teeth length (mm) *pedicel length (mm) pedicel pubescence type 	<p><i>FLOWER</i></p> <ul style="list-style-type: none"> *number/involucre shape color *length (mm) pubescence type texture *length united (%) <p><i>STAMEN</i></p> <ul style="list-style-type: none"> disposition *filament length (mm) filament pubescence type anther color *anther length (mm) anther shape <p><i>ACHENE</i></p> <ul style="list-style-type: none"> color length (mm) pubescence type
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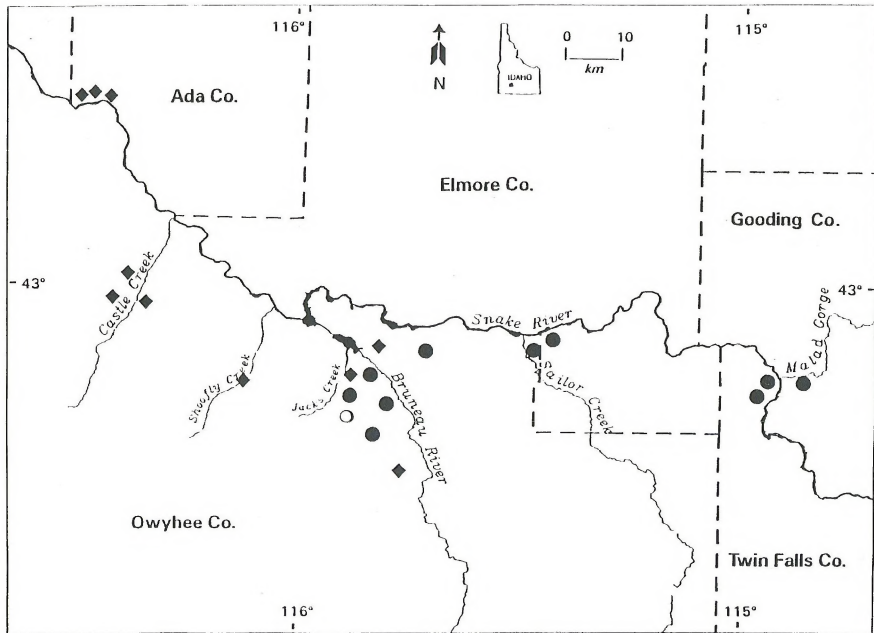
Fig. 1. PCA ordination diagram of 19 *Eriogonum shockleyi* collections from Idaho. Points are labeled with Moseley's collection numbers (Table 1).

Fig. 2. Distribution of *Eriogonum shockleyi* in Idaho. The var. *shockleyi* is indicated with a solid circle, var. *packardae* with a diamond, and the mixed population with an open circle.

Fig 1



1962



SECTION 2

CONSERVATION STATUS

Eriogonum shockleyi S. Wats. var. *packardae* Reveal (Packard's buckwheat)

LEGAL OR OTHER FORMAL STATUS

National:

U.S. Fish and Wildlife Service: Packard's buckwheat has no status under the Endangered Species Act (Conservation Data Center 1994).

Bureau of Land Management: Packard's buckwheat is currently an Idaho BLM Sensitive Species (Conservation Data Center 1994).

Other current formal status recommendations: Because it is a rare, narrow endemic, Packard's buckwheat has been given a global conservation rank of 1 (on a scale of 1 to 5) by the Association for Biodiversity Information (the International Association of Natural Heritage Programs and Conservation Data Centres) and The Nature Conservancy (Conservation Data Center 1994).

State: (Packard's buckwheat is endemic to Idaho.)

Idaho:

Idaho Native Plant Society: Packard's buckwheat is a Priority 2 species on the Idaho Native Plant Society list of the state's rare flora. The Priority 2 list includes taxa that are likely to become Priority 1 (state-endangered) within the foreseeable future, if factors contributing to their population decline or habitat degradation or loss continue (Idaho Native Plant Society 1995).

Conservation Data Center: Because Packard's buckwheat is endemic to Idaho, the state (S) conservation rank assigned by the Conservation Data Center (the Idaho node of the Association for Biodiversity Information) equals the global (G) rank of 1, discussed above (Conservation Data Center 1994).

Review of past status: In their review of this taxon (as *E. shockleyi* var. nov.) for the Rare and Endangered Plants Technical Committee of the Idaho Natural Areas Council, Packard and Grimes (1981a) recommended a federal Watch List status.

DISTRIBUTION

Global/Idaho distribution: Packard's buckwheat is endemic to the vicinity of the Snake River canyon, and several confluent tributaries, as it courses through the western Snake River Plain in Ada and Owyhee counties, Idaho. The Idaho Conservation Data Center (CDC) data base contains 14 occurrence records for this taxon (Appendix 2). An occurrence record is an information management convenience to track data regarding a population or several subpopulations in a localized area and is identified with a three-digit code (e.g., 012). The general distribution of Packard's buckwheat is mapped in Figure 2 of Section 1, and more precise locations appear in Appendix 3.

Packard's buckwheat is distributed as widely scattered populations from Halverson Lakes on the west, upstream (east) along the Snake River to the Bruneau River drainage, spanning a distance of approximately 58 air miles. The western populations occur on the north side of the river in Ada County, while the eastern populations are all on the south side of the river in Owyhee County. Populations in the Bruneau River drainage are contiguous with populations of *E. shockleyi* var. *shockleyi*.

Extant occurrences: Eleven populations of Packard's buckwheat have been visited since 1990 (most in 1995). Appendix 2 contains the occurrence records for all populations. These records contain detailed information on the location, population size, population area, habitat characteristics, occurrence documentation, and comments. Below is a summary of Packard's buckwheat populations that are known to be extant:

Occurrence Number	County	Site
002	Ada	East of Halverson Lakes
003	Ada	North of Priest Ranch
005	Owyhee	East Of Castle Creek
006	Owyhee	Shoofly Oolitic Limestone
007	Owyhee	Deer Water-Hot Creek
008	Owyhee	Upper Sugar Valley
009	Owyhee	Little Valley
010	Owyhee	Bruneau Rim
011	Owyhee	Castle Creek Mines
012	Ada	Halverson Lakes
013	Owyhee	Castle Creek North

Extirpated occurrences: No populations of Packard's buckwheat are known to be extirpated.

Unverified/undocumented reports: The following three occurrences have not been visited for several years (see occurrence records in Appendix 2):

Occurrence Number	County	Site	Last Observed
001	Ada	Swan Falls	1971
004	Owyhee	Indian Bathtub	1975
014	Owyhee	Perjue Canyon	1988

I tried to relocate all three populations in 1995, but to no avail. Ann DeBolt, BLM Botanist, has also tried to relocate 001.

A population of *E. shockleyi* (variety unverified) was reported north of C.J. Strike Wildlife Management Area in T5S R5E S14 (DeBolt and Rosentreter 1988). This report is now believed to be a mistake.

Synopsis of past and needed inventories: No thorough, systematic field inventory has been conducted for Packard's buckwheat. Our 1995 study was largely conducted to clarify the taxonomy of *E. shockleyi* in Idaho. All populations have been documented through opportunistic collections or during inventories as part of other studies. A thorough field investigation on the distribution and abundance of Packard's buckwheat is needed.

HABITAT

General habitat description: All populations of Packard's buckwheat occur within the sagebrush-steppe zone of the western Snake River Plain, an ecosystem that has been highly degraded over the past 130 years and is now considered endangered (Noss et al. 1995). Within this zone, it occurs in azonal microhabitats that have open vegetation and a low number of vascular species. These conditions are largely the result of unique substrates. Noe (1991) reports that Grand View, Idaho, more or less in the center of Packard's buckwheat range, receives an average of 7 inches of precipitation per year. The average annual temperature is 52°F. During the summer, the average temperature is 62°F and the average daily maximum is 87°F.

Geology and Soils: Substrates occupied by Packard's buckwheat include oolitic limestone outcrops, sandy loess over basalt, and lacustrine deposits consisting of a cobbly desert pavement on the surface over a deep sandy-loam substrate.

Associated species: The communities occupied by Packard's buckwheat are very open and have low cover of vascular species. Below are the species observed as widely scattered individuals at populations in 1995. In addition, several populations have high cover of microbiotic soil crust, especially the Ada County sites.

Shrubs - *Tetradymia glabrata*, *Ceratoides lanata*, *Chrysothamnus nauseosus*, *C. viscidiflorus*, *Artemisia tridentata* ssp. *wyomingensis*, *A. arbuscula*, *Salvia dorrii*, *Eriogonum microthecum*, *Gutierrezia sarotherae*, *Atriplex confertifolia*

Graminoids - *Oryzopsis hymenoides*, *Bromus tectorum*, *Stipa comata*, *Poa secunda*, *Sitanion hystrix*

Forbs - *Castilleja chromosa*, *Langloisia punctata*, *Astragalus lentiginosus*, *Salsola kali*, *Menzelia torreyi* var. *acerosa*, *Stanleya pinnata*, *Townsendia florifer*, *Enceltopsis nudicaulis*, *Brickellia microphylla*, *Penstemon acuminatus*, *Halogeton glomerata*, *Cryptantha* sp.,

Other rare plant species: The Federal candidate, *Astragalus mulfordiae*, occurs in the vicinity of Packard's buckwheat at the Castle Creek North (013) and Shoofly Creek (006) populations. In addition, the state-rare *Astragalus purshii* var. *ophiogenes*, and *Glyptopleura marginata* (Conservati Data Center 1994) occur at the three var. *packardae* populations in Castle Creek and the one in Shoofly Creek. These sites are all underlain with oolitic limestone.

POPULATION BIOLOGY

Phenology: Seed germination probably occurs early in the spring (or possibly in late fall). Flowering begins in late May and early June most years, but only a few flowers on the south-sides of the cushion flower this early. Plants are at peak anthesis during late June. Fruit maturation proceeds through July, with most probably dehiscent sometime in July or early August. There is wide variation in all these dates, possibly by as much as four weeks, depending on the temperature pattern during the spring.

Population size and condition: Appendix 2 contains the CDC data base records for the 14 occurrences of Packard's buckwheat. These occurrence records contain information on location, survey dates, occurrence rank, population and habitat data, population size, area occupied, and various comment fields related to protection, management, and occurrence documentation. Below is a summary of selected occurrence record fields related to population size and condition. The Occurrence Rank is a relative ranking between A (highest) and D (lowest) based on population size, structure, and habitat quality. An Occurrence Rank of H refers to the three historical collections that have not been revisited since they were discovered in the 1970's and 1980's. As stated previously, this study was not a thorough field inventory, so population numbers and areas, as well as the occurrence rank, are estimates that may change with additional surveys.

<u>Occurrence Number</u>	<u>Occurrence Rank</u>	<u>Number Individuals</u>	<u>Area (acres)</u>
001	H		
002	A	1500	0.25 ac
003	C	500	0.25 ac
004	H		
005	A	2000	1 ac
006	B	100	0.1 ac
007	C	500	0.1 ac
008	A	10,000+	10+ ac
009	B	1000	1 ac
010	C	1000	1 ac
011	B	300	??
012	C	150	0.1
013	B	200-500	10 ac
014	H		

Reproductive Biology: Packard's buckwheat reproduces by seed, but beyond this little is known about its reproductive biology.

Competition: It appears that Packard's buckwheat is not a good competitor. As stated previously, occupied habitats are very open, with considerable bare ground between plants.

Herbivory: I did not observe any herbivory on Packard's buckwheat plants in 1995.

Land ownership: Below is a table summarizing the ownership information for Packard's buckwheat sites (see also Appendix 2). The BLM manages all or a portion of ten of the 11 occurrences known to be extant. The BLM shares management of the remaining extant population with a private land owner.

Occurrence Number	Land Manager/Owner
001	???
002	BLM, Bruneau Resource Area
003	BLM, Bruneau Resource Area, and private
004	???, probably BLM, Bruneau Resource Area
005	BLM, Bruneau Resource Area
006	BLM, Bruneau Resource Area
007	BLM, Bruneau Resource Area
008	BLM, Bruneau Resource Area
009	BLM, Bruneau Resource Area
010	BLM, Jarbidge Resource Area
011	BLM, Owyhee Resource Area
012	BLM, Bruneau Resource Area
013	BLM, Owyhee Resource Area
014	???, probably BLM, Bruneau Resource Area

Land use: The primary land use of virtually all habitat occupied by Packard's buckwheat is livestock grazing, mostly cattle. No sites are protected to any extent, although the Shoofly Oolitic Limestone population (006) is in an area that has been recommended as an Area of Critical Environmental Concern (ACEC) to protect unique plant communities and rare plants (Amicangalo and Rosentreter 1982; Moseley 1987; as Mud Flat Oolite). Only five acres of the recommended 190-acre ACEC has been established. It is not known if the var. *packardae* population is within the established area. Below is a summary of land use and threats at each of the populations:

Occurrence Number	Land Use
001	???
002	apparently isolated from disturbance
003	impacted by irrigation pipeline development
004	???
005	undisturbed; mining a possible threat
006	undisturbed; mining a possible threat
007	random recreational (?) bulldozing may have destroyed habitat in past
008	undisturbed
009	undisturbed; adjacent to very disturbed land
010	plowed by firebreak along highway; used as parking area for overlook
011	roads traverses population; active mining in area
012	undisturbed; adjacent to very disturbed and weedy ground
013	grazed; mining a potential threat
014	???

ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

Threats to currently known populations: Based on the cursory inventory conducted in 1995, the greatest threat to the long-term viability of Packard's buckwheat may be mining of oolitic limestone. Occurrences affected by this activity are the three in Castle Creek (005, 011, and 013) and Shoofly Oolitic Limestone (006). Other direct disturbances to Packard's buckwheat habitat are also threatening, for example the fire-break that was plowed through the Bruneau Rim population (010). Indirect factors, such as the declining ecological condition of the sagebrush-steppe ecosystem on the Snake River Plain, is a general concern, but not to the degree that is for other rare species, such as *Lepidium papilliferum* (Moseley 1994). The weed invasions usually associated with this phenomena do not appear to directly affect habitats occupied by Packard's buckwheat. Livestock grazing of Packard's buckwheat habitat appears minimal, probably due to the paucity of forage.

Recommendations:

- o Preliminary data suggest that Packard's buckwheat is a rare, narrow endemic that occupies small and unique habitats. Population numbers are generally small and it is vulnerable to direct habitat disturbances. I recommend that the U.S. Fish and Wildlife Service consider this taxon as a C2 candidate (or equivalent) for listing under the Endangered Species Act.
- o The BLM should maintain Packard's buckwheat as a sensitive Special Status Species and that the Idaho Native Plant Society should move it from their state Priority 1 list to their list of recommended federal candidates. The global and state rank assigned by the CDC should remain at G1 and S1, respectively.
- o As discussed in Section 1, at least one population appears to be a mixture of individuals of the two varieties. It is possible that additional mixed populations will be discovered. For conservation planning, these populations should be treated as Packard's buckwheat, as we treated the Upper Sugar Valley population (008) in Section 1. This conservative approach is warranted until phylogenetic studies elucidate the inter- and intrapopulational relationships of mixed populations.
- o Recommendations to the Lower Snake River District, BLM:
 - > Conduct a thorough field inventory for Packard's buckwheat to better assess its distribution, abundance and conservation status. The conservation assessment contained herein is only preliminary and needs further refinement before a conservation strategy can be developed.

It is important that field surveys for both *E. shockleyi* taxa be conducted close to full anthesis, generally in late June or early July, and that the entire population be assessed. The few plants selected for a sample sometimes do not reflect the characteristics of the population as a whole and are often difficult to identify from a herbarium sheet, especially if it was collected before or long after anthesis.
 - > Preliminary data indicate that all populations should be protected from direct habitat disturbance.

ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

Threats to currently known populations: Based on the cursory inventory conducted in 1995, the greatest threat to the long-term viability of Packard's buckwheat may be mining of oolitic limestone. Occurrences affected by this activity are the three in Castle Creek (005, 011, and 013) and Shoofly Oolitic Limestone (006). Other direct disturbances to Packard's buckwheat habitat are also threatening, for example the fire-break that was plowed through the Bruneau Rim population (010). Indirect factors, such as the declining ecological condition of the sagebrush-steppe ecosystem on the Snake River Plain, is a general concern, but not to the degree that is for other rare species, such as *Lepidium papilliferum* (Moseley 1994). The weed invasions usually associated with this phenomena does not appear to directly affect habitats occupied by Packard's buckwheat. Livestock grazing of Packard's buckwheat habitat appears minimal, probably due to the paucity of forage.

Recommendations:

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- o The BLM should maintain Packard's buckwheat as a sensitive Special Status Species and that the Idaho Native Plant Society should move it from their state Priority 1 list to their list of recommended federal candidates. The global and state rank assigned by the CDC should remain at G1 and S1, respectively.
- o As discussed in Section 1, at least one population appears to be a mixture of individuals of the two varieties. It is possible that additional mixed populations will be discovered. For conservation planning, these populations should be treated as Packard's buckwheat, as we treated the Upper Sugar Valley population (008) in Section 1. This conservative approach is warranted until phylogenetic studies elucidate the inter- and intrapopulation relationships of mixed populations.
- o Recommendations to the Lower Snake River District, BLM:
 - > Conduct a thorough field inventory for Packard's buckwheat to better assess its distribution, abundance and conservation status. The conservation assessment contained herein is only preliminary and needs further refinement before a conservation strategy can be developed.

It is important that field surveys for both *E. shockleyi* taxa be conducted close to full anthesis, generally in late June or early July, and that the entire population be assessed. The few plants selected for a sample sometimes do not reflect the characteristics of the population as a whole and are often difficult to identify from a herbarium sheet, especially if it was collected before or long after anthesis.

- > Preliminary data indicate that all populations should be protected from direct habitat disturbance.

- > Relocate the three historical sightings and assess their current status.
- > Conduct intensive clearances of all proposed land development or land exchange projects that occur within the range of Packard's buckwheat outlined above.
- > Establish the remaining Shoofly Oolitic Limestone area as an ACEC as soon as possible.

Eriogonum shockleyi S. Wats. var. *shockleyi* (Shockley's buckwheat)

LEGAL OR OTHER FORMAL STATUS

National:

U.S. Fish and Wildlife Service: Shockley's buckwheat has no status under the Endangered Species Act (Conservation Data Center 1994).

Bureau of Land Management: Shockley's buckwheat is currently an Idaho BLM Sensitive Species (Conservation Data Center 1994).

Other current formal status recommendations: Both the species, *E.shockleyi*, and var. *shockleyi* are secure rangewide and have a global conservation rank of G5 (on a scale of 1 to 5) (Conservation Data Center 1994).

State: Shockley's buckwheat is apparently secure throughout most of its range, that being Colorado, Utah and Nevada. Peripheral populations in California are uncommon enough to warrant its entry onto the California Native Plant Society List 4, which includes plants having a limited distribution in the state. Peripheral or disjunct populations in New Mexico are also rare in that state (Nancy Cole, Idaho Power Co., Boise, ID, personal communication, October 1995). The conservation status of Shockley's buckwheat in Idaho is discussed below.

Idaho:

Idaho Native Plant Society: Shockley's buckwheat is Sensitive on the Idaho Native Plant Society list of the state's rare flora. The Sensitive list includes taxa with small or localized distributions in Idaho that presently do not meet the criteria for classification as Priority 1 or 2, but whose populations may be jeopardized without active management or removal of threats (Idaho Native Plant Society 1995).

Conservation Data Center: The state (S) conservation rank assigned by the Conservation Data Center for Shockley's buckwheat in Idaho is S2 (Conservation Data Center 1994).

Review of past status: In their review of this taxon for the Rare and Endangered Plants Technical Committee of the Idaho Natural Areas Council, Packard and Grimes (1981b) recommended State Watch List status.

DISTRIBUTION

Global distribution: Shockley's buckwheat is distributed throughout the Intermountain Region from east-central California, east across Nevada and Utah, to western Colorado, and south to northern Arizona and New Mexico. It is disjunct in southern Idaho along the Snake River canyon.

Idaho distribution: Shockley's buckwheat occurs along the Snake River Canyon in Owyhee, Elmore, Gooding, and Twin Falls counties. The (CDC) data base contains 11 occurrence records for this taxon (Appendix 4). The general distribution of Shockley's buckwheat is mapped in Figure 2 of Section 1, and more precise locations appear in Appendix 5.

In general, Shockley's buckwheat is distributed as widely scattered populations from Little Valley (lower Jacks Creek) in the Bruneau River drainage on the west, upstream (east) along the Snake River to the Hagerman Valley, spanning a distance of approximately 50 air miles. Only one population is known from the north side of the Snake River, that is occurrence 009 in Malad Gorge State Park. Populations in the Bruneau River drainage are contiguous with the eastern-most populations of Packard's buckwheat.

Extant occurrences: All 11 occurrences of Shockley's buckwheat in Idaho have been visited since 1994 (all but one in 1995). Appendix 4 contains the CDC occurrence records for all occurrences. These records contain detailed information on the location, population size, population area, habitat characteristics, occurrence documentation, and comments. Below is a summary of Shockley's buckwheat population in Idaho:

Occurrence Number	County	Site
001	Owyhee	Horse Hill
002	Owyhee	Sugar Valley Badlands
003	Owyhee	Prominent Buttes
004	Owyhee	Lower Sugar Valley
005	Owyhee	Bruneau Dunes
006	Elmore	South of Schoffs Island
007	Owyhee & Elmore	Lower Sailor Creek
008	Twin Falls	Fossil Gulch
009	Gooding	Malad Gorge
010	Twin Falls	Lower Salmon Falls Dam Transmission Line
011	Owyhee	East of Horse Hill

Extirpated occurrences: No populations of Shockley's buckwheat are known to be extirpated.

Unverified/undocumented reports: As discussed previously, a population of *E. shockleyi* (variety unverified) was erroneously reported north of C.J. Strike Wildlife Management Area in TSS R5E S14 (DeBolt and Rosentreter 1988).

Synopsis of past and needed inventories: No thorough, rangewide field inventory has been conducted for Shockley's buckwheat in Idaho. This 1995 study was largely conducted to clarify the taxonomy of *E. shockleyi* in Idaho. All populations to date have been documented through opportunistic collections or during inventories as part of other studies, such as those of Idaho Power Company along the Snake River between Buhl and King Hill (Cole 1995; Cole et al. 1995a; 1995b). A thorough field investigation of the distribution and abundance of Shockley's buckwheat in the state is needed.

HABITAT

General habitat description: All populations of Shockley's buckwheat occur within the sagebrush-steppe zone of the Snake River Plain, an ecosystem that has been highly degraded over the past 130

years and is now considered endangered (Noss et al. 1995). Similar to Packard's buckwheat, it occurs in azonal microhabitats that have open vegetation and a low number of vascular species. These conditions are largely the result of unique substrates. Climatic data reported for Packard's buckwheat applies to the range of Shockley's buckwheat as well.

Geology and Soils: Substrates occupied by Shockley's buckwheat in the Bruneau Valley area are lacustrine deposits consisting of a cobbly desert pavement on the surface over a deep sandy-loam substrate. The upstream populations all occur on thin, gravely calcium carbonate deposits (calcrete) overlying basalt.

Associated species: As with Packard's buckwheat, the communities occupied by Shockley's buckwheat are very open and have low cover of vascular species. Species observed as widely scattered individuals at populations in 1995 are as follows (see Appendix 4 for community and associated species information for each occurrence):

Shrubs - *Tetradymia glabrata*, *Chrysothamnus nauseosus*, *C. viscidiflorus*, *Artemisia tridentata* ssp. *wyomingensis*, *A. arbuscula*, *Eriogonum microthecum*, *Atriplex confertifolia*, *A. spinosa*.

Graminoids - *Oryzopsis hymenoides*, *Bromus tectorum*, *Poa secunda*, *Sitanion hystrix*, *Agropyron cristatum*.

Forbs - *Langloisia punctata*, *Salsola kali*, *Mentzelia torreyi* var. *acerosa*, *Stanley pinnata*, *Enceliopsis nudicaulis*, *Halogeton glomerata*, *Cryptantha* sp., *Astragalus malacus*, *Phlox hoodii*, *Machaeranthera canescens*, *Chaenactis macrantha*, *Comandra umbellata*, *Sisymbrium altissimum*, *Gilia leptomeria*

Other rare plant species: The state-rare *Penstemon janishiae* occurs with Shockley's buckwheat at Sugar Valley Badlands (002), albeit in differing habitats.

POPULATION BIOLOGY

Phenology: Seed germination probably occurs early in the spring (or possibly in late fall). Flowering phenology was observed to be the same as Packard's buckwheat, beginning in late May and early June most years, but peaking in late June. Fruit maturation proceeds through July, with most probably dehiscent sometime in July or early August. There is wide variation in all these dates, possibly by as much as four weeks, depending on the temperature pattern during the spring.

Population size and condition: Appendix 4 contains the CDC data base records for the 11 occurrences of Shockley's buckwheat in Idaho. These occurrence records contain information on location, survey dates, occurrence rank, population and habitat data, population size, area occupied, and various comment fields related to protection, management, and occurrence documentation. Below is a summary of selected occurrence record fields related to population size and condition. The Occurrence Rank is a relative ranking between A (highest) and D (lowest) based on population size, structure, and habitat quality. As stated previously, this study was not a thorough field inventory, so population numbers and areas, as well as the occurrence rank, are estimates that may change with additional surveys.

<u>Occurrence Number</u>	<u>Occurrence Rank</u>	<u>Number Individuals</u>	<u>Area (acres)</u>
001	A	5000+	100+ ac
002	A	2000	3 ac
003	A	500-1000	2 ac
004	A	5000+	2 ac
005	C	200	1 ac
006	C	1300	0.5 ac
007	C	100's	50 ac
008	B	2301	1 ac
009	A	2000	2 ac
010	B	369	2 ac
011	B	100+	1.5 ac

Reproductive Biology: Shockley's buckwheat reproduces by seed, but beyond this little is known about its reproductive biology.

Competition: It appears that Shockley's buckwheat is not a good competitor. As stated previously, the occupied habitats are very open, with considerable bare ground between plants. Shockley's buckwheat invaded a newly bulldozed roadbed that was blazed through the South of Schoffs Island population (006) sometime in the past.

Herbivory: I did not observe any herbivory on Shockley's buckwheat plants in 1995.

Land ownership: Below is a table summarizing the ownership information for Shockley's buckwheat sites (see also Appendix 4). The BLM manages eight occurrences, the Idaho Department of Parks and Recreation two, and the National Park Service one.

<u>Occurrence Number</u>	<u>Land Manager/Owner</u>
001	BLM, Bruneau Resource Area
002	BLM, Bruneau Resource Area
003	BLM, Bruneau Resource Area
004	BLM, Bruneau Resource Area
005	State of Idaho, Bruneau Dunes State Park
006	BLM, Jarbidge Resource Area
007	BLM, Jarbidge Resource Area
008	NPS, Hagerman Fossil Beds National Monument
009	State of Idaho, Malad Gorge State Park
010	BLM, Jarbidge Resource Area
011	BLM, Bruneau Resource Area

Land use: Three populations are relatively well protected. Two are managed by the Idaho Department of Parks and Recreation in Bruneau Dunes State Park (005) and Malad Gorge State Park

(009), and one is in Hagerman Fossil Beds National Monument managed by the National Park Service. The Sugar Valley Badlands population (002) is in an area of unique, relatively undisturbed vegetation that has been recommended as an ACEC (Caicco and Wellner 1983; Hilty and Moseley 1991). The primary land use of virtually all remaining populations of Shockley's buckwheat is livestock grazing, mostly cattle. Below is a summary of land use and potential threats at each of the populations:

Occurrence Number	Land Use
001	some ORV and livestock use, threatened by ORV races
002	undisturbed
003	minor livestock grazing
004	undisturbed
005	undisturbed but adjacent land very weedy and possibly impacting population
006	weedy and disturbed habitat; roads traverse population
007	undisturbed but adjacent land very weedy and possibly impacting population
008	undisturbed
009	undisturbed; recreation use nearby
010	undisturbed; adjacent to agriculture land
011	undisturbed; mining exploration in vicinity

ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

Threats to currently known populations: There are fewer populations of Shockley's buckwheat in Idaho than Packard's buckwheat, but they are generally larger in size. In addition, three are protected in State Parks or National Monuments, and one is in a proposed BLM ACEC. Similar to Packard's buckwheat, the greatest threat to the long-term viability of Shockley's buckwheat is direct habitat disturbance or destruction. Indirect factors, such as ecological degradation of habitat by invasive weeds, is a concern at several Shockley's buckwheat occurrences, but its habitat appears somewhat resistant. Livestock grazing of Shockley's buckwheat habitat appears minimal, probably due to the paucity of forage.

Recommendations:

- o Preliminary data suggest that Shockley's buckwheat is a rare and localized in Idaho, although globally common. More Shockley's buckwheat populations are larger and more are protected than Packard's buckwheat. The BLM should maintain Shockley's buckwheat as a sensitive Special Status Species. Due to its rarity, the Idaho Native Plant Society should move it from their state Sensitive list to their Priority 2 list, a status that better reflects its conservation concern in the state. The state rank assigned by the CDC should remain S2.

o Recommendations to the Lower Snake River District, BLM:

- > Conduct a thorough field inventory for Shockley's buckwheat to better assess its distribution, abundance and conservation status. This inventory can probably be done along with Packard's buckwheat. The conservation assessment contained herein is only preliminary and needs further refinement before a conservation strategy can be developed.

It is important that field surveys for both *E. shockleyi* taxa be conducted close to full anthesis, generally in late June or early July, and that the entire population be assessed. The few plants selected for a sample sometimes do not reflect the characteristics of the population as a whole and are often difficult to identify from a herbarium sheet, especially if it was collected before or long after anthesis.

- > Preliminary data indicate that all populations should be protected from direct habitat disturbance.
- > Conduct intensive clearances of all proposed land development or land exchange projects that occur within the range of Shockley's buckwheat.
- > Establish Sugar Valley Badlands area as an ACEC as soon as possible.

Recommendation to the National Park Service:

- > The population above Fossil Gulch (008) in Hagerman Fossil Beds National Monument should be protected from direct habitat disturbance.
- > Habitat in and around the Monument was thoroughly surveyed and mapped by Steve Popovich, Shoshone BLM Botanist, in 1995. No additional surveys are needed on the Monument.

o Recommendations to the Idaho Department of Parks and Recreation:

- > The population on the canyon rim in Bruneau Dunes State Park (005) is relatively isolated, but should be protected from direct habitat disturbances that will enhance further invasion of weeds from surround habitats.
- > The population in Malad Gorge State Park is close to the road and a vehicle pullout. Pedestrian disturbance appeared to be minimal, but should be monitored and discouraged if heavy use appears to be affecting the population.

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APPENDIX 1

Morphometric data from 19 *Eriogonum shockleyi* collections made by Moseley during 1995 (Moseley's collection number heads each column; all collections deposited at ID and SRP).

	2882	2883	2884	2885	2886
<i>LEAF</i>					
blade width (mm)	3.1 (0.3;3-4)	1.4 (0.3;1.5-2)	1.4 (0.3;1-2)	1.6 (0.4;1-2)	1.3 (0.3;1-2.5)
blade length (mm)	6.1 (0.8;5-7)	3.6 (0.7;2-5)	3.3 (0.8;2-5)	3.5 (0.7;2-4)	3.9 (0.4;3-5)
petiole length (mm)	4.2 (0.7;3-5)	2.1 (0.4;2-3)	1.7 (0.7;1-3)	2.6 (0.7;1-4)	1.3 (0.4;1-2)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
<i>INFLORESCENCE</i>					
flr stem length (mm)	16.4 (2.8;12-20)	6.6 (1.6;4-11)	3.8 (2.8;0-10)	4.2 (2.9;0-10)	3.6 (1.9;0-7)
bract texture	both	both	both	both	both
bract length (mm)	2.0(0.7;1-4)	1.3 (0.4;1-2)	1.1 (0.5;1-3)	1.6 (2.5;1-3)	1.6 (0.7;1-3)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
<i>INVOLUCRE</i>					
number/head	3.1 (0.2;3-4)	2.3 (0.4;2-3)	2.4 (0.5;2-3)	2.4 (0.5;2-3)	3.0 (0;3)
shape	b.c	b.c	b.c	b.c.	b.c.
texture	thick green	thick green	thick green	thick green	thick green
length (mm)	3.5 (1.0;3-5)	3.4 (0.5;3-4)	3.0 (0.5;2-4)	3.6 (0.5;2-3)	4.0 (0.2;3.5-4)
pubescence	d.t	d.t.	d.t.	d.t.	d.t.
number teeth	5.0 (0.2;4-5)	5.0 (0.3;4-6)	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)
teeth length (mm)	2.1 (0.5;1.5-4)	1.6 (0.4;1-2)	1.1 (0.2;1-1.5)	1.6 (1.5-2)	1.7 (0.4;1-2)
pedicel length (mm)	0.1	0.1	0.1	0.1	0.1
pedicel pub.	glabrous	glabrous	glabrous	glabrous	glabrous
<i>FLOWER</i>					
number/invol	5.3 (0.7;4-7)	6.0 (1.2;5-10)	5.8 (0.8;5-8)	6.4 (1.0;5-8)	6.0 (1.1;5-8)
shape	t-c	t-c	t-c	t-c	t-c
color	light yellow	light yellow	light yellow	light yellow	light yellow
length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	d.t	d.t.	d.t.	d.t.	d.t.
texture	dimorphic	dimorphic	dimorphic	dimorphic	dimorphic
length united (%)	0.33	0.5	0.5	0.5	0.5
<i>STAMEN</i>					
disposition	exerted	exerted	exerted	exerted	exerted
filament length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	glabrous	glabrous	glabrous	glabrous	glabrous
anther color	yellow	yellow	yellow	yellow	yellow
anther length (mm)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)
anther shape	oval	oval	oval	oval	oval
<i>ACHENE</i>					
color	immature	immature	immature	immature	light brown
length (mm)	immature	immature	immature	immature	2.0 (0;2)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.

	2887	2888	2889	2890	2891
<i>LEAF</i>					
blade width (mm)	2.1 (0.5;1.5-3)	1.4 (0.4;1-2)	3.5 (0.6;3-5)	1.5 (0.3;1-2)	3.9 (3.0;2-4)
blade length (mm)	4.1 (0.9;3-5)	3.0 (0.6;2-4)	7.6 (1.6;5-10)	3.8 (0.5;3-5)	6.6 (1.0;5-8)
petiole length (mm)	2.7 (1.1;1-4)	1.5 (1.8;1-2)	6.0 (1.5;3-9)	1.5 (0.5;1-2)	4.1 (1.0;3-6)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
<i>INFLORESCENCE</i>					
flr stem length (mm)	5.6 (3.7;1-11)	2.6 (2.0;0-8)	15.2 (4.0;9-21)	1.8 (1.2;0-5)	18.2 (3.4;13-23)
bract texture	both	both	both	both	both
bract length (mm)	1.9 (0.8;1-4)	1.5 (1.0;1-4)	2.4 (1.5;1-8)	1.1 (0.3;1-2)	2.5 (0.9;1-4)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
<i>INVOLUCRE</i>					
number/head	2.7 (0.5;2-3)	3.0 (0;3)	3.0 (0.3;2-4)	3.0 (0;3)	2.9 (0.7;2-5)
shape	b.c	b.c	b.c	b.c.	b.c.
texture	thick green	thick green	thick green	thick green	thick green
length (mm)	3.6 (0.5;3-4)	3.1 (0.3;3-4)	4.8 (0.7;4-6)	3.6 (0.5;3-4)	3.8 (0.4 (3-4)
pubescence	d.t	d.t.	d.t.	d.t.	d.t.
number teeth	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)
teeth length (mm)	2.4 (3.2;1-2)	1.3 (0.3;1-1.5)	2.8 (0.8;2-3.5)	1.5 (0.4;1-2)	2.5 (0.8;1-5)
pedicel length (mm)	0.1	0.1	0.1	0.1	0.1
pedicel pub.	glabrous	glabrous	glabrous	glabrous	glabrous
<i>FLOWER</i>					
number/invol	6.1 (1.0;5-8)	6.0 (0.8;5-7)	5.9 (2.1;3-13)	5.2 (1.0;4-8)	6.3 (1.1;5-9)
shape	t-c	t-c	t-c	t-c	t-c
color	light yellow	light yellow	light yellow	light yellow	light yellow
length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	d.t	d.t.	d.t.	d.t.	d.t.
texture	dimorphic	dimorphic	dimorphic	dimorphic	dimorphic
length united (%)	0.5	0.5	0.5	0.5	0.5
<i>STAMEN</i>					
disposition	exerted	exerted	exerted	exerted	exerted
filament length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	glabrous	glabrous	glabrous	glabrous	glabrous
anther color	yellow	yellow	yellow	yellow	yellow
anther length (mm)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)
anther shape	oval	oval	oval	oval	oval
<i>ACHENE</i>					
color	immature	immature	light brown	immature	light brown
length (mm)	immature	immature	3.0 (0;3)	immature	3.0 (0;3)
pubescence	d.t.	d.t	d.t.	d.t.	d.t.

	2892	2893	2894	2895	2896
<i>LEAF</i>					
blade width (mm)	3.0 (0.6;2-5-4)	2.2 (0.4; 1.5-3)	1.9 (0.3;1.5-2.5)	2.8 ((0.7;2-4)	1.9 (0.5;1-3)
blade length (mm)	5.8 (1.3;4-8)	4.9 (0.6;4-6)	3.4 (0.6;2-5)	4.6 (0.8;3-6)	4.7 (0.9;3-7)
petiole length (mm)	4.6 (1.1;3-7)	4.0 (1.4;2-6)	1.7 (0.7;1-3)	3.7 (0.9;2-5)	2.5 (0.8;1-4)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
<i>INFLORESCENCE</i>					
flr stem length (mm)	15.2 (2.1;12-19)	8.5 (4.3;1-16)	5.2 (3.1;1-13)	13.8 (2.5;9-17)	3.7 (1.5;1-7)
bract texture	both	both	both	both	both
bract length (mm)	1.2 (0.5;1-3)	1.4 (1.0;1-5)	1.2 (0.5;1-3)	1.8 (0.9;1-5)	1.2 (0.5;1-3)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
<i>INVOLUCRE</i>					
number/head	2.7 (0.5;2-3)	3.0 (0;3)	3.0 (0;3)	3.1 (0.2;3-4)	3.0 (0;3)
shape	b.c	b.c	b.c	b.c.	b.c.
texture	thick green	thick green	thick green	thick green	thick green
length (mm)	4.7 (0.6;4-6)	3.5 (0.5;3-4)	3.6 (0.9; 3-5)	5.0 (0;5)	3.6 (0.5;3-4)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
number teeth	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)
teeth length (mm)	2.0 (0.3;1.5-3)	1.8 (0.3;1.5-2)	1.7 (0.2; 1.5-2)	2.0 (0;2)	1.8 (0.2;1.5-2)
pedicel length (mm)	0.1	0.1	0.1	0.1	0.1
pedicel pub.	glabrous	glabrous	glabrous	glabrous	glabrous
<i>FLOWER</i>					
number/invol	5.7 (0.8;4-7)	5.8 (1.0;4-8)	5.4 (1.0; 3-8)	5.4 (1.2;3-8)	5.6 (0.9;4-7)
shape	t-c	t-c	t-c	t-c	t-c
color	light yellow	light yellow	light yellow	light yellow	light yellow
length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.
texture	dimorphic	dimorphic	dimorphic	dimorphic	dimorphic
length united (%)	0.5	0.66	0.66	0.5	0.5
<i>STAMEN</i>					
disposition	exserted	exserted	exserted	exserted	exserted
filament length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	glabrous	glabrous	glabrous	glabrous	glabrous
anther color	yellow	yellow	yellow	yellow	yellow
anther length (mm)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)
anther shape	oval	oval	oval	oval	oval
<i>ACHENE</i>					
color	immature	light brown	light brown	light brown	light brown
length (mm)	immature	2.0 (0;2.0)	2.5 (0;2.5)	3.0 (0;3)	2.0 (0;2)
pubescence	d.t.	d.t.	d.t.	d.t.	d.t.

	2897	2898	2899	2900
<i>LEAF</i>				
blade width (mm)	2.9 (0.6;2-4)	2.4 (0.5;2-3)	2.4 (0.5;2-3)	2.6 (0.6;2-4)
blade length (mm)	5.7 (0.7;4-7)	5.0 (0.6;4-6)	5.4 (0.7;4-7)	5.3 (0.9;4-7)
petiole length (mm)	5.7 (1.5;3-8)	3.1 (0.9;1-5)	4.3 (1.0;3-6)	3.4 (0.9;2-5)
pubescence	d.t.	d.t.	d.t.	d.t.
<i>INFLORESCENCE</i>				
flr stem length (mm)	14.7 (2.2;12-18)	12.8 (3.2;9-22)	12.0 (2.0;10-16)	11 (2.3;6-14)
bract texture	both	both	both	both
bract length (mm)	1.7 (0.8;1-3)	1.4 (0.7;1-4)	1.8 (0.7;1-3)	1.8 (0.8;1-3)
pubescence	d.t.	d.t.	d.t.	d.t.
<i>INVOLUCRE</i>				
number/head	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
shape	b.c	b.c	b.c	b.c.
texture	thick green	thick green	thick green	thick green
length (mm)	4.1 (0.5;3-5)	4.3 (0.4;4-5)	3.8 (0.7;3-5)	4.0 (0.5;3-5)
pubescence	d.t.	d.t.	d.t.	d.t.
number teeth	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)	5.0 (0;5)
teeth length (mm)	4.3 (0.6;3-5)	1.8 (0.3;1.5-2)	1.6 (0.3;1-2)	1.5 (0;1.5)
pedicel length (mm)	0.1	0.1	0.1	0.1
pedicel pub.	glabrous	glabrous	glabrous	glabrous
<i>FLOWER</i>				
number/invol	6.4 (0.9;5-8)	5.9 (1.6;5-10)	4.8 (1.2;2-7)	4.2 (0.4;4-5)
shape	t-c	t-c	t-c	t-c
color	light yellow	light yellow	light yellow	light yellow
length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	d.t.	d.t.	d.t.	d.t.
texture	dimorphic	dimorphic	dimorphic	dimorphic
length united (%)	0.25	0.5	0.5	0.5
<i>STAMEN</i>				
disposition	exerted	exerted	exerted	exerted
filament length (mm)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)	3.0 (0;3)
pubescence	glabrous	glabrous	glabrous	glabrous
anther color	yellow	yellow	yellow	yellow
anther length (mm)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)	0.5 (0;0.5)
anther shape	oval	oval	oval	oval
<i>ACHENE</i>				
color	immature	immature	immature	immature
length (mm)	immature	immature	immature	immature
pubescence	d.t.	d.t.	d.t.	d.t.

APPENDIX 2

Occurrence Records for *Eriogonum shockleyi* var. *packardae* from the
Conservation Data Center data base.

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 001

Survey Site Name: SWAN FALLS

County: Ada

USGS quadrangle: WILD HORSE BUTTE

Latitude: 43 14 37 N Longitude: 116 22 13 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
002S001E 17 BO or vicinity

Location:

"Rimrock above Swan Falls T2S R1E." Presumably on the E side of the Snake River canyon.

Survey Date: 1995-06-27

Last Observed: 1971-07

First Observed: 1971-07

EORANK:

EORANK Comments:

Population Data:

1971: No data. Collected by M. Wolffe. 1995: Bob Moseley, Idaho CDC, could not relocate the population. The rimrock was searched for ca 2 miles above Swan Falls on the E side of the canyon. Ann DeBolt, Boise District BLM, has also searched in the same area without success.

Habitat Description:

Rimrock.

Minimum Elevation: 2980 feet

Maximum Elevation: feet

Size:

Ownership Comments:

Lower Snake River District BLM, Bruneau RA.

Protection Comments:

Within Black Butte/Guffey Butte Archaeological ACEC and the Snake River Birds of Prey Natural Area.

Specimens: M. Wolffe GDS-38 (CIC).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 002

Survey Site Name: E OF HALVERSON LAKES

County: Ada

USGS quadrangle: INITIAL POINT

Latitude: 43 18 07 N Longitude: 116 27 12 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
001S001W 28 BO E2SE4SE4

Location:

On the northern rim of the Snake River canyon, ca 1.5 air miles E
of the eastern Halverson Lake. Ca 6 air miles SE of Melba.

Survey Date: 1995-06-27

Last Observed: 1995-06-27

First Observed: 1980'S

EORANK: A

EORANK Comments: Good habitat, large population.

Population Data:

1995: Ca 1500 genets in flower. All size classes represented in
the population. Observation on a cursory survey by Bob Moseley,
Idaho CDC.

Habitat Description:

Shallow loess over gently S-sloping basalt substrate. Open
community with high microbiotic crust cover on open patches.
Within *Artemisia tridentata wyomingensis* community. Associated
vascular species include *Chrysothamnus nauseosus*, *C.*
viscidiflorus, *Oryzopsis hymenoides*, *Bromus tectorum*, *Langloisia*
punctata, and *Castilleja chromosa*.

Minimum Elevation: 2760 feet

Maximum Elevation: feet

Size: 0.25 AC

Ownership Comments:

Lower Snake River District BLM, Bruneau RA.

Protection Comments:

Site is currently isolated from disturbance. Within the Black
Butte/Guffey Butte Archaeological ACEC and the Snake River Birds
of Prey Natural Area.

Specimens: Moseley 2884 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 003

Survey Site Name: N OF PRIEST RANCH

County: Ada

USGS quadrangle: INITIAL POINT

Latitude: 43 17 36 N Longitude: 116 24 58 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
001S001W	35	BO	SE4NE4, NE4NE4SE4
001S001W	36	BO	W2NW4SW4, SW4SW4NW4

Location:

N rim of the Snake River canyon, ca 1 air mile N of Priest Ranch.
Ca 3 miles NW (downstream) from Swan Falls Dam and ca 3 miles E
(upstream) from Halverson Lakes. Ca 6 miles S of Initial Point.

Survey Date: 1995-06-27
Last Observed: 1995-06-27
First Observed: 1980'S

EORANK: C

EORANK Comments: Small and disturbed.

Population Data:

1995: Ca 500 genets in flower scattered for 0.25 mile in 8 small
populations. All size classes represented in the population.
Observation on a cursory survey by Bob Moseley, Idaho CDC.

Habitat Description:

Sandy loam loess, ca 8 inches deep, over gently rolling basalt
substrate near the rim of the canyon. Open areas within sagebrush
plain. Occupied sites are largely devoid of vascular plants,
although some widely scattered associates include *Ceratoides*
lanata, *Bromus tectorum*, *Oryzopsis hymenoides*, and *Tetradymia*
glabrata. Well developed microbiotic crust.

Minimum Elevation: 2800 feet
Maximum Elevation: feet
Size: 0.25 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA. Private land is adjacent.

Protection Comments:

The western end of the population is impacted by irrigation
pipeline development.

Specimens: Moseley 2883 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 004

Survey Site Name: INDIAN BATHTUB

Country: Owyhee

USGS quadrangle: HOT SPRING

Latitude: 42 45 50 N Longitude: 115 44 12 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
008S006E 03 BO or vicinity

Location:
10 miles S of Bruneau near "Devil's Bath tub." Devil's Bath tub
presumably refers to Indian Bath tub.

Survey Date: 1995-06-28
Last Observed: 1975-06-09
First Observed: 1975-06-09

EORANK:
EORANK Comments:

Population Data:
1975: No data. Collected by Bright. 1995: Bob Moseley, Idaho CDC,
was unable to relocate the population.

Habitat Description:
No information available.

Minimum Elevation: 2775 feet
Maximum Elevation: feet
Size:

Land Owner/Manager:
BRUNEAU RA

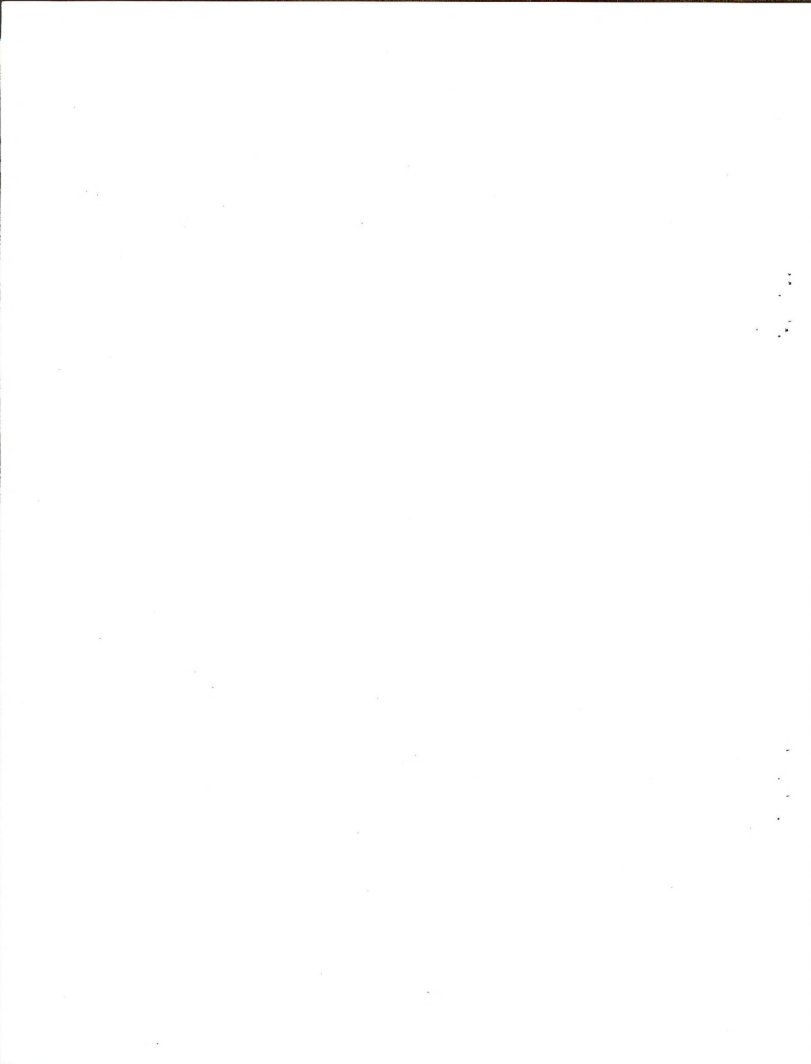
Ownership Comments:
Boise District BLM, Bruneau RA, and/or private land.

Comments:

Protection Comments:

Management Comments:

Specimens: Bright s.n. (MIN).



ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 005

Survey Site Name: E OF CASTLE CREEK

County: Owyhee

USGS quadrangle: ROUGH MOUNTAIN NE

Latitude: 42 58 22 N Longitude: 116 20 27 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
005S001E 21 BO N2SE4, S2NE4

Location:

E side of lower Castle Creek valley on extensive oolitic limestone bluff system. Ca 3.5 air miles S of Foremans Reservoir and ca 12.5 miles W of Grand View.

Survey Date: 1995-06-27

Last Observed: 1995-06-27

First Observed: 1991-05-13

EORANK: A

EORANK Comments:

Population Data:

1991: Several thousand vegetative plants over several acres. Observation by Ann DeBolt, Boise District BLM. 1995: Ca 2000+ genets in flower. All size classes represented in the population. Population may be more extensive than mapped. Observation on a cursory survey by Bob Moseley, Idaho CDC.

Habitat Description:

Very shallow soil over oolitic limestone bedrock. Gentle N and W slopes. Open community with much exposed bedrock. A few widely scattered associates include *Gutierrezia sarothrae*, *Chrysothamnus viscidiflorus*, *Salvia dorrii*, *Sitanion hystrix*, *Enceliopsis nudicaulis*, *Menziesia torreyi* *acerosa*, and *Poa secunda*.

Minimum Elevation: 2820 feet

Maximum Elevation: 2900 feet

Size: 2 + AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA. Private land is adjacent.

Protection Comments: 1991: Mining is a possible threat - claim is present now. 1995: Site is largely undisturbed.

Specimens: Moseley 2887 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*

PACKARD'S BUCKWHEAT

Occurrence Number: 006

Survey Site Name: SHOOFLY OOLITIC LIMESTONE

County: Owyhee

USGS quadrangle: CHALK HILLS

Latitude: 42 50 38 N Longitude: 116 06 22 W

TOWNRANGE: SECTION:
007S003E 04

MERIDIAN: TRSNOTE:
BO center W2

Location:

Shoofly Oolitic Limestone - N side of Mud Flat Road on oolitic limestone bluff above lower Shoofly Creek. Ca 10 miles S of Grand View.

Survey Date: 1995-06-27

Last Observed: 1995-06-27

First Observed: 1980

EORANK: B

EORANK Comments: Small population but largely undisturbed.

Population Data:

1980: Collected by Grimes. 1986: 51-100 vegetative plants of normal vigor. Observation by Steve Caicco, Idaho NHP. 1995: Ca 100 genets in flower. cursory survey by Bob Moseley, Idaho CDC, noting that a more thorough inventory is needed.

Habitat Description:

Moderately deep sandy soil over oolitic limestone bedrock. Very open community with few widely scattered associates, including *Brickellia microphylla*, *Mentzelia torreyi acerosa*, *Penstemon acuminatus*, *Stanleya pinnata*, and *Terradytmia glabrata*.

Minimum Elevation: 3000 feet

Maximum Elevation: feet

Size: 0.1 AC

Ownership Comments:

Lower Snake River District BLM, Bruneau RA. Adjacent to private land.

Protection Comments:

Area is largely undisturbed. Site is at least partially within the proposed addition to the Mud Flat Oolite RNA/ACEC.

Specimens: Grimes 1742 (CIC); Moseley 2888 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 007

Survey Site Name: DEER WATER - HOT CREEK

County: Owyhee

USGS quadrangle: BROKEN WAGON FLAT

Latitude: 42 42 07 N Longitude: 115 45 50 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
008S006E 28 BO NW4SW4, S2SW4NW4

Location:

Between Hot Creek and CCC Road. 0.75 mile NE of Deer Water and ca 3.75 miles NNE of Broken Wagon Flat Reservoir. Ca 13 miles S of Bruneau.

Survey Date: 1995-06-28
Last Observed: 1995-06-28
First Observed: 1993-07-12

EO RANK: C EO RANK Comments: Small population.

Population Data:

1993: Ca several hundred genets, 25% vegetative and 75% in flower. Population age class structure is 5% seedlings, 10% immature, 75% mature, and 10% senescent. Population vigor assessed as moderate. Area thoroughly surveyed by Ann DeBolt, Boise District BLM. 1995: Ca 500 genets in flower. All size classes represented in the population. Other populations may be in the vicinity. Observation on a cursory survey by Bob Moseley, Idaho CDC.

Habitat Description:

Cobbly desert pavement over deep sandy loam lacustrine deposits. Gentle slope to the E. Open community surrounded by *Artemisia tridentata wyomingensis* community. Widely scattered associates include *Halogeton glomeratus*, *Bromus tectorum*, *Tetradymia glabrata*, *Chrysothamnus nauseosus*, *C. viscidiflorus*, and *Artemisia arbuscula*.

Minimum Elevation: 3300 feet Maximum Elevation: 3360 feet Size: 5 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA.

Protection Comments: Some old bulldozing for gravel removal in a small portion of the tract may have destroyed some habitat. The area is grazed.

Specimens: Ann DeBolt 1743 (Boise BLM); Moseley 2890 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 008

Survey Site Name: UPPER SUGAR VALLEY

County: Owyhee

USGS quadrangle: LITTLE VALLEY

Latitude: 42 46 13 N Longitude: 115 53 09 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
007S005E	31	BO	NE4NW4SE4, NW4NE4SE4
007S005E	32	BO	S2, SE4SE4NW4, SW4SW4NE4

Location:

Mesa between State Route 51 and upper Sugar Valley. Ca 0.5 to 1.5 miles E of the highway. Ca 9 air miles SW of Bruneau. Ca 3.5 air miles WNW of Horse Hill.

Survey Date: 1995-06-28 Last Observed: 1995-06-28 First Observed: 1993-04-01

EO RANK: A EO RANK Comments: Large and undisturbed.

Population Data: 1993: Ca 5000+ dormant genets. Population age class structure is 15% immature, 70% mature, and 15% senescent. Population vigor assessed as high. Observation on a cursory visit by Ann DeBolt, Boise District BLM. 1995: Ca 10,000+ genets in flower. All size classes represented in the population. Observation on a cursory survey by Bob Moseley, Idaho CDC, noting that a more thorough inventory is needed. This is a mixed population; some individuals key to *E. shockleyi shockleyi*, while others key to *E. shockleyi packardae*. This occurrence is conservatively being treated as *E. shockleyi packardae* until genetic information elucidates the true identity.

Habitat Description: Level cobbly desert pavement over deep sandy loam lacustrine deposits. Very open community, mostly no associates, but occasional, widely scattered *Chrysothamnus viscidiflorus*, *Langloisia punctata*, *Artemisia tridentata wyomingensis*, *Eriogonum microthecum*, *Astragalus malcus*, *Atriplex confertifolia*, and *Artemisia spinescens*.

Minimum Elevation: 2900 feet Maximum Elevation: 3150 feet Size: 10 + AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA.

Protection Comments: Area is undisturbed. Grazing is very minimal. ORVs are the most potential growing threat.

Specimens: Moseley 2893 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*

PACKARD'S BUCKWHEAT

Occurrence Number: 009

Survey Site Name: LITTLE VALLEY

County: Owyhee

USGS quadrangle: LITTLE VALLEY

Latitude: 42 50 05 N Longitude: 115 52 46 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
007S005E 08 BO NE4, N2NW4SE4

Location:

Lower slopes on the E side of Little Valley, opposite of the mouth of Halfway Gulch. Ca 0.5 mile E of State Route 51 and ca 5 miles SW of Bruneau.

Survey Date: 1995-06-29

Last Observed: 1995-06-29

First Observed: 1993-06-28

EORANK: B

EORANK Comments: Small population adjacent to disturbed ground.

Population Data:

1993: Ca 2000 genets, 20% vegetative and 80% in flower.
Population age class structure is 20% immature and 80% mature.
Population vigor assessed as good. Observation on a cursory visit by John Doremus, Boise District BLM. 1995: Ca 1000 genets in flower. All size classes represented in the population.
Observation on a cursory survey by Bob Moseley, Idaho CDC, noting that a more thorough inventory of the area is needed.

Habitat Description:

Cobbly desert pavement over deep sandy loam lacustrine deposits.
Nearly level site. Open community with *Artemisia arbuscula*,
Stanleya pinnata, *Enceltopsis nudicaulis*, *Atriplex confertifolia*,
and *Chrysothamnus viscidiflorus*.

Minimum Elevation: 2700 feet

Maximum Elevation: 2725 feet

Size: 1 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA. Adjacent to private land.

Protection Comments: Area is largely undisturbed, but adjacent to disturbed ground.

Specimens:

Moseley 2894 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 010

Survey Site Name: BRUNEAU VALLEY RIM

County: Owyhee

USGS quadrangle: BRUNEAU

Latitude: 42 53 58 N Longitude: 115 47 31 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
006S006E	18	BO	SE4NW4SW4

Location:

Canyon rim overlooking the Bruneau Valley, ca 50 yards W of State
Route 51/78. Ca 1.5 road miles N of Bruneau.

Survey Date: 1995-06-29

Last Observed: 1995-06-29

First Observed: 1955-06-15

EORANK: C

EORANK Comments: Small, local, and disturbed.

Population Data:

1955: Collected by Baker. 1975: Collected by Reveal. 1995: Ca
1000 genets in flower. All size classes represented in the
population. Observation on a cursory survey of the area by Bob
Moseley, Idaho CDC, noting that a thorough inventory is needed
along the valley rim.

Habitat Description:

Level cobbly desert pavement over deep sandy loam lacustrine
deposits. Open community with scattered *Chrysothamnus*
viscidiflorus, *C. nauseosus*, *Enceliopsis nudicaulis*, *Tetradymia*
glabrata, and *Bromus tectorum*.

Minimum Elevation: 2950 feet

Maximum Elevation: feet

Size: 1 AC

Ownership Comments: Lower Snake River District BLM, Jarbidge RA.

Protection Comments:

Part of the area was plowed as a fire break along the highway.
There is also a parking area for the overlook.

Specimens: Moseley 2896 (ID, SRP); Reveal 3852 (BRY, MICH, NY, US); W. Baker 12995 (ID??).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*

PACKARD'S BUCKWHEAT

Occurrence Number: 011

Survey Site Name: CASTLE CREEK MINES

County: Owyhee

USGS quadrangle: ROUGH MOUNTAIN NE

Latitude: 42 58 47 N Longitude: 116 21 35 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
005S001E	20	BO	NW4NE4

Location:

Lower Castle Creek valley, W side of the valley near oolite mine.
Ca 13.5 air miles W of Grand View and ca 3.2 air miles SSW of
Foremans Reservoir.

Survey Date: 1995-06-27

Last Observed: 1995-06-27

First Observed: 1990-08-01

EORANK: B

EORANK Comments: Disturbed to some degree.

Population Data:

1990: Between 300 and 500 plants in fruit. Observation by Ann
DeBolt, Boise District BLM. 1995: Ca 300 genets in flower. All
size classes represented in the population. Observation on a
cursory survey by Bob Moseley, Idaho CDC, noting that the
population needs thorough mapping.

Habitat Description:

Very shallow sandy soil over oolitic limestone bedrock. Gentle
slope to the S at ca 15 degrees. Very open community with much
exposed bedrock. *Atriplex confertifolia*-*Oryzopsis hymenoides*
habitat. Few, widely scattered associates include *Stipa comata*,
Mentzelia torreyi acerosa, *Enceliopsis nudicaulis*, *Eriogonum*
microthecum, *Stanleya pinnata*, *Townsendia florifer*, and
Astragalus kentrophyta jessiae.

Minimum Elevation: 2880 feet Maximum Elevation: 2900 feet

Size: 20 AC

Ownership Comments: Lower Snake River District BLM, Owyhee RA.

Protection Comments: Rooding and mining are possible threats. Some grazing occurs in
the area.

Specimens: Moseley 2886 (ID, SRP)

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 012

Survey Site Name: HALVERSON LAKES

County: Ada

USGS quadrangle: INITIAL POINT

Latitude: 43 17 48 N Longitude: 116 28 53 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
001S001W 32 BO center NE4NE4, SW4NW4NE4

Location:

On the N rim of the Snake River canyon above the eastern Halverson Lake. 2 populations: one above E Halverson Lake, the other ca 0.25 mile E along the rim. Ca 5.5 air miles SE of Melba.

Survey Date: 1995-06-27

Last Observed: 1995-06-27

First Observed: 1974-07-07

EORANK: C

EORANK Comments:

Population Data:

1974: Collected by Reveal. 1995: 150 genets at 2 populations. Plants in flower. All size (age?) classes represented in the population. Observation on a cursory survey by Bob Moseley, Idaho CDC.

Habitat Description:

Shallow loess over level basalt bedrock. Open patches with much bare soil. High microbiotic crust cover. Within a disturbed *Artemisia tridentata wyomingensis* community. Associated with *Bromus tectorum*, *Astragalus lentiginosus*, *Salsola kali*, and *Chrysothamnus viscidiflorus*.

Minimum Elevation: 2620 feet Maximum Elevation: feet Size: 0.1 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA.

Protection Comments:

Adjacent communities have been extensively disturbed by overgrazing and subsequent cheatgrass invasion. Buckwheat patches are isolated from current recreational impacts in the area. Within the Black Butte/Guffey Butte Archaeological ACEC and the Snake River Birds of Prey Natural Area.

Specimens: Moseley 2885 (ID, SRP); Reveal 3686 (US, BRY, NY, UC, UTC, and others).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*
PACKARD'S BUCKWHEAT
Occurrence Number: 013

Survey Site Name: CASTLE CREEK NORTH

County: Owyhee

USGS quadrangle: ROUGH MOUNTAIN NE

Latitude: 42 59 30 N Longitude: 116 20 40 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
005S001E 16 BO center N2

Location:

W side of lower Castle Creek. Ca 2.3 air miles S of Foremans
Reservoir and ca 13 air miles W of Grand View.

Survey Date:

Last Observed: 1990-04-25

First Observed: 1990-04-25

EORANK: B

EORANK Comments:

Population Data:

1990: Ca 200-500 vegetative individuals. Observation by Ann
DeBolt, Boise District BLM.

Habitat Description:

Cliffs and ledges on soils of decomposed oolitic limestone.
Artriplex confertifolia - *Oryzopsis hymenoides* habitat. Associated
with *Oryzopsis hymenoides*, *Enceliopsis nudicaulis*, and *Menziesia*
torreyi acerosa.

Minimum Elevation: 2780 feet

Maximum Elevation: feet

Size: 10 AC

Ownership Comments: Lower Snake River District BLM, Owyhee RA

Comments:

In reviewing DeBolt's collection, Bob Moseley, Idaho CDC, notes
that the flowering stems are missing on the specimen (too early).
The identification was made on leaf size (blades < 5 mm long by 3
mm wide). Confirmation of this identification should be made with
plants at full anthesis.

Protection Comments: Area is grazed. Threatened by mining.

Specimens: Ann DeBolt 1438 (Boise BLM).

ERIOGONUM SHOCKLEYI VAR *PACKARDAE*

PACKARD'S BUCKWHEAT

Occurrence Number: 014

Survey Site Name: PERJUE CANYON

County: Owyhee

USGS quadrangle: PERJUE CANYON

Latitude: 42 48 53 N Longitude: 116 10 43 W

TOWNRANGE: SECTION:
007S002E 14

MERIDIAN: TRSNOTE:
BO center of section

Location:

N side of Mud Flat Road, just W of the mouth of Perjue Canyon. Ca
12 air miles SSW of Grand View.

Survey Date:

Last Observed: 1988-04-27

First Observed: 1988-04-27

EORANK:

EORANK Comments:

Population Data:

1988: Collected by Ann DeBolt, Boise District BLM.

Habitat Description:

On sparsely vegetated sedimentary soils with *Salvia dorrii* and
Eriogonum caespitosum.

Minimum Elevation: 3400 feet

Maximum Elevation: feet

Size:

Ownership Comments:

Lower Snake River District BLM, Bruneau RA.

Comments:

In reviewing DeBolt's collection, Bob Moseley, Idaho CDC, notes
that the flowering stems are missing on the specimen (too early).
The identification was made on leaf size (blades < 5 mm long by 3
mm wide). Confirmation of this identification should be made with
plants at full anthesis.

Specimens:

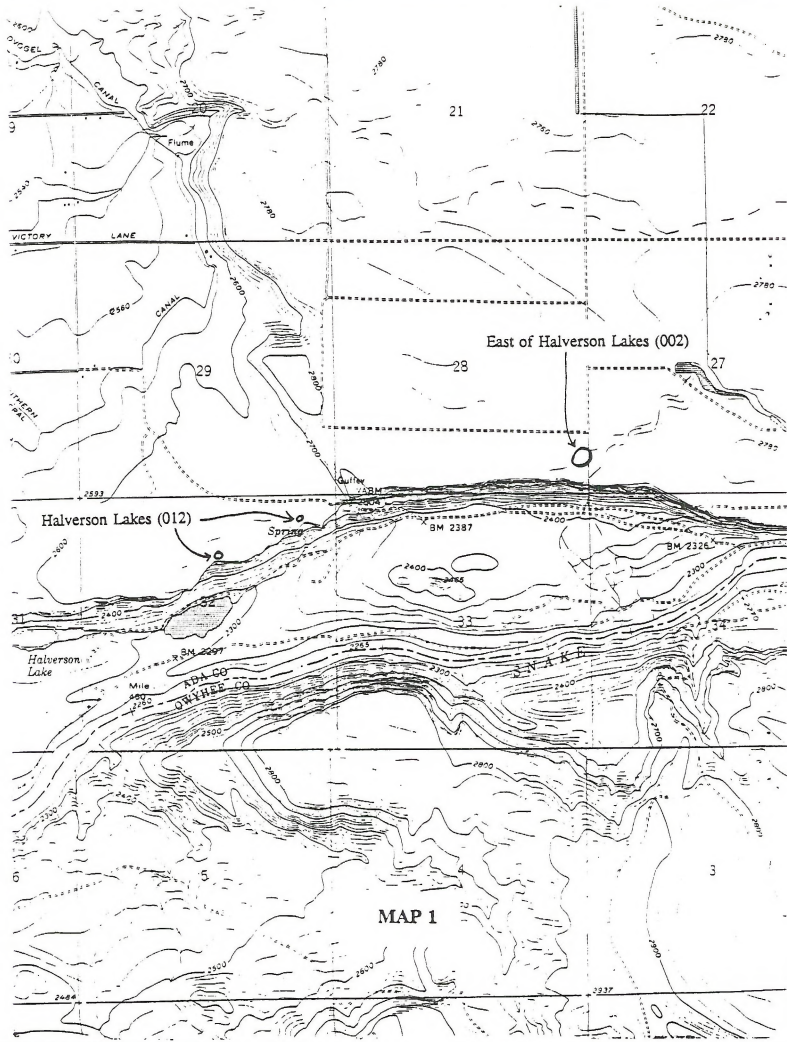
Ann Debolt 908 (Boise BLM).

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL
P.O. BOX 25047
DENVER, CO 80225

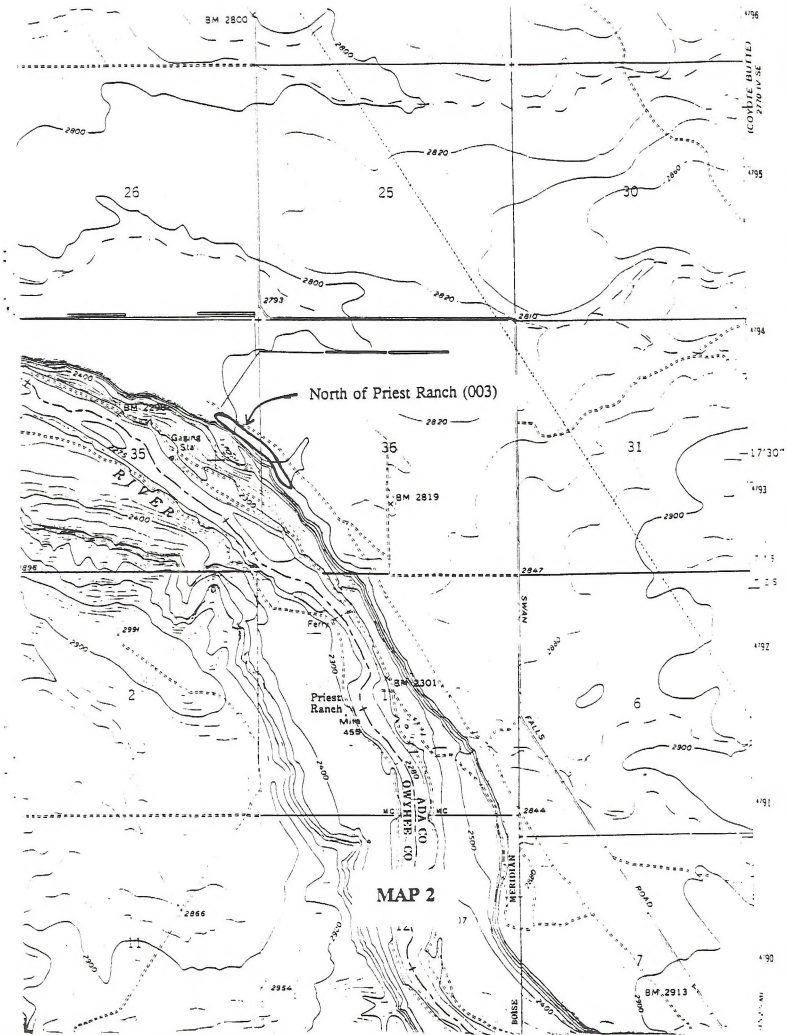
APPENDIX 3

Location of *Eriogonum shockleyi* var. *packardae* populations known to be extant
(excludes the three historical occurrences, 001, 004, and 014).

- Map 1. Halverson Lakes (012) and East of Halverson Lakes (002) occurrences. Portion of the 1971 Initial Point 7.5' quad.
- Map 2. North of Priest Ranch (003) occurrence. Portion of the 1971 Initial Point 7.5' quad.
- Map 3. East of Castle Creek (005), Castle Creek Mines (011), and Castle Creek North (013) occurrences. Portion of the 1972 Rough Mountain NE 7.5' quad.
- Map 4. Shoofly Oolitic Limestone (006) occurrence. Portion of the 1992 Chalk Hills 7.5' quad.
- Map 5. Deer Water-Hot Creek (007) occurrence. Portion of the 1980 Broken Wagon Flat 7.5' quad.
- Map 6. Upper Sugar Valley (008) occurrences. Portion of the 1979 Little Valley 7.5' quad.
- Map 7. Little Valley (009) occurrence. Portion of the 1979 Little Valley 7.5' quad.
- Map 8. Bruneau Rim (010) occurrence. Portion of the 1978 Bruneau 7.5' quad.

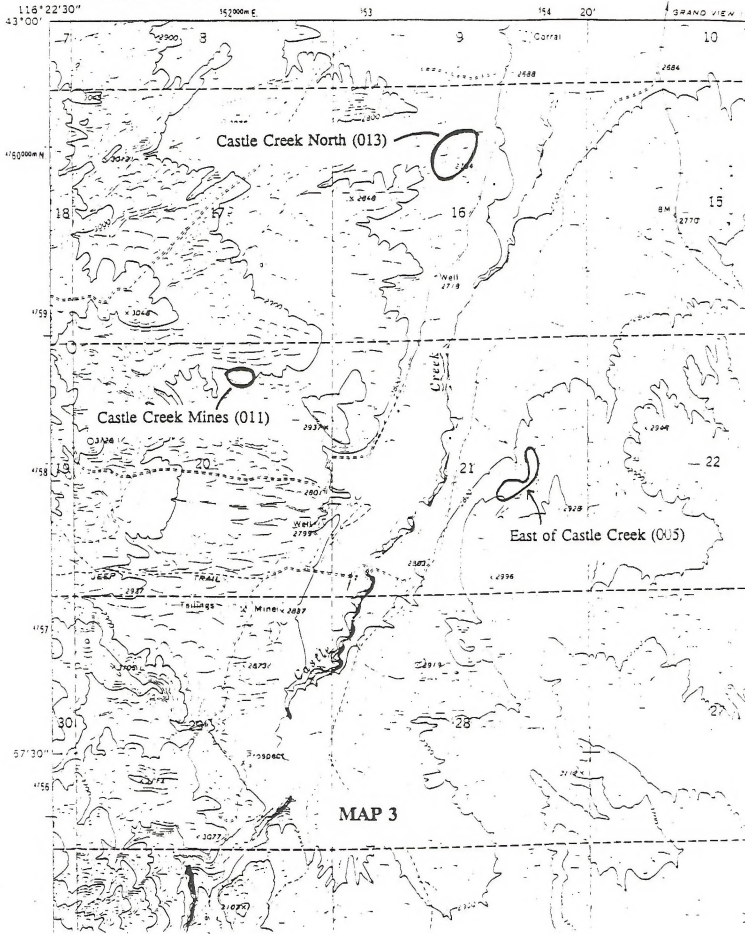


MAP 1

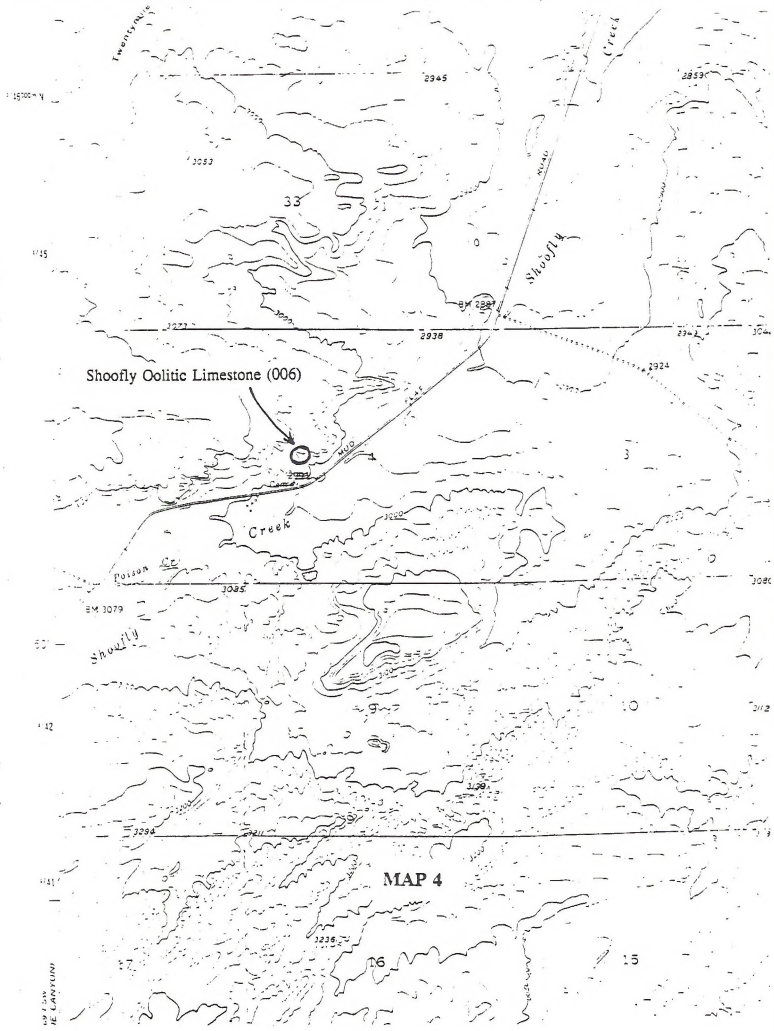


1:50,000
SCALE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



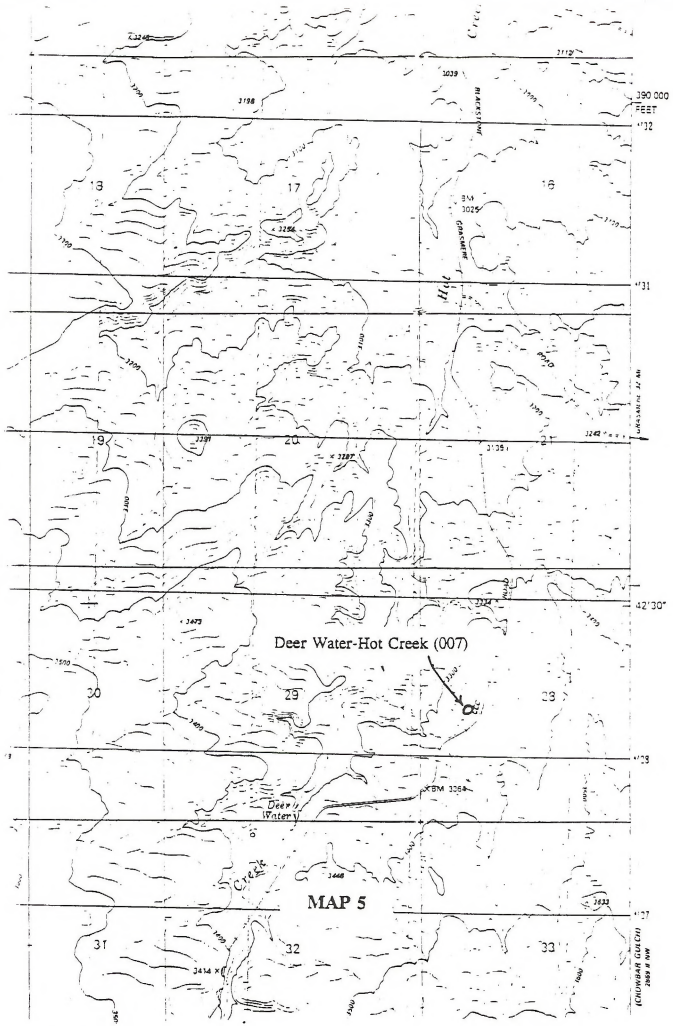
MAP 3



Shoofly Oolitic Limestone (006)

MAP 4

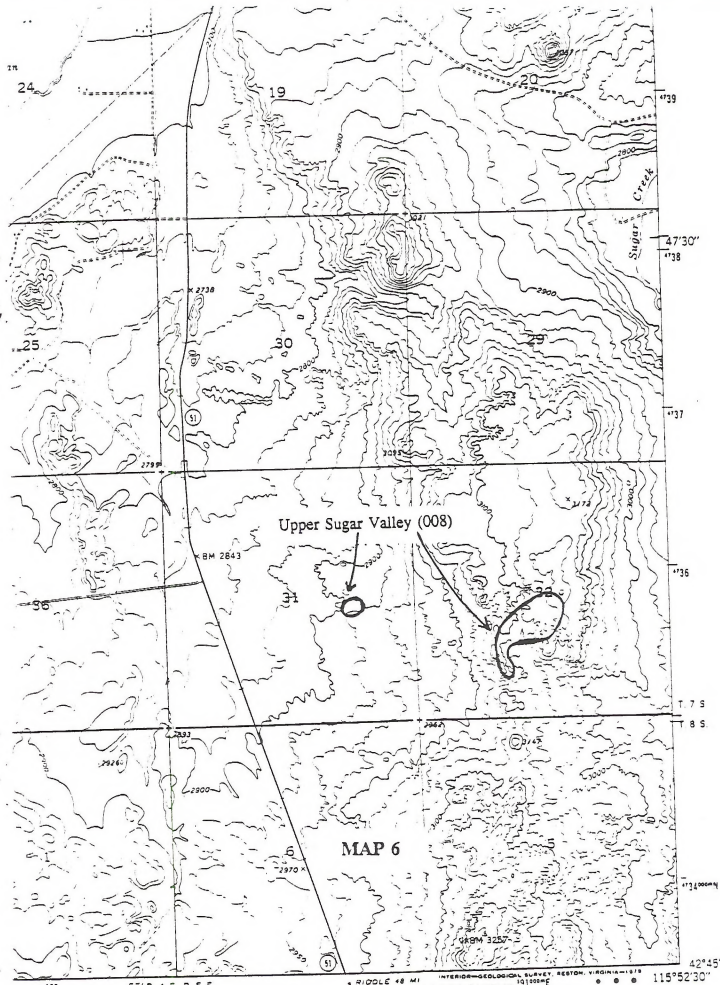
MAP 7, 2000
BY CAROLANN



Deer Water-Hot Creek (007)

MAP 5

(COLUMBIAN GLUCHE)
2000 FT NW



Upper Sugar Valley (008)

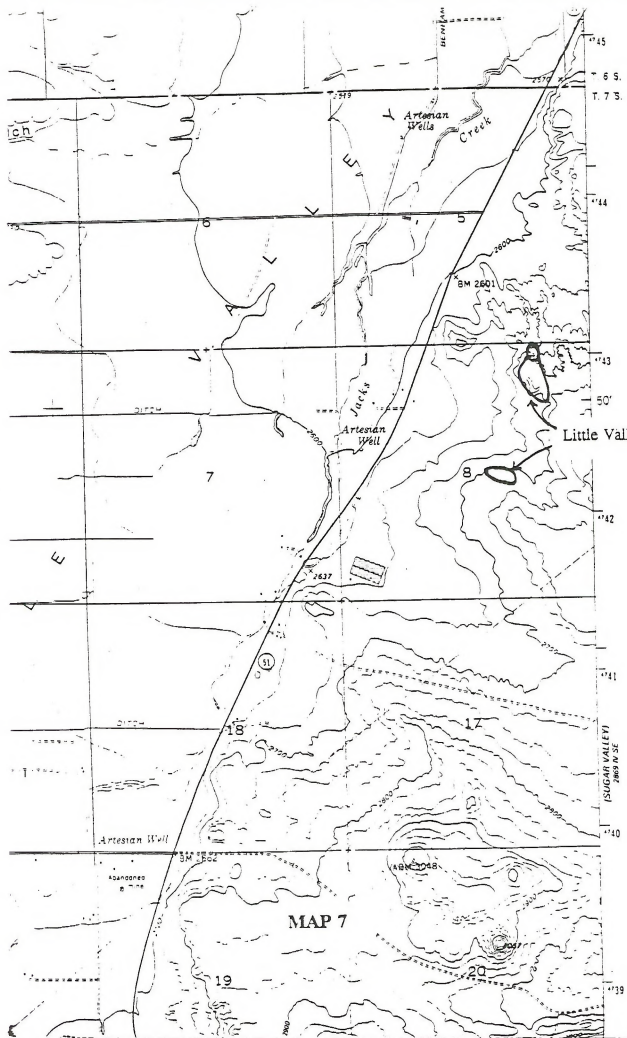
MAP 6

MIDDLE 48 MI INTERIOR-GEOLOGICAL SURVEY SECTION VIRGINIA-1918
 MOUNTAIN CITY (NEVADA) 78 MI. 1918-1942

ROAD CLASSIFICATION

Primary highway, all weather. Light-duty road, all weather.
 hard surface ----- improved surface -----

1940-1942 SECTION
 MAP 6



ch

HEWMAN

Artesian Wells
Creek

LE

T. 7 S.
45
44

BM 2601

Jack's
Artesian Well

Little Valley (009)

43
50'

7

42

E

41

51

40

Artesian Well

39

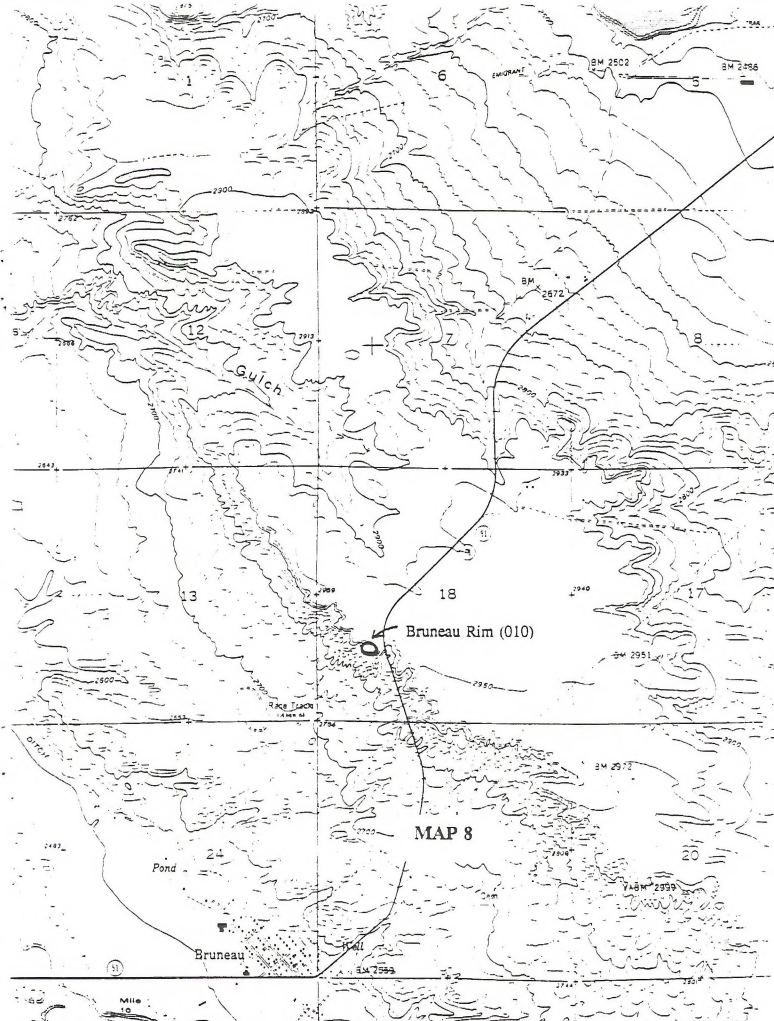
(SUGAR VALLEY)
2809 N 3E

Abandoned
B. Mine

MAP 7

19

20



APPENDIX 4

Occurrence records for Idaho populations of *Eriogonum shockleyi* var. *shockleyi*
from the Conservation Data Center data base.

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 001

Survey Site Name: HORSE HILL

County: Owyhee

USGS quadrangle: SUGAR VALLEY, BROKEN WAGON FLAT

Latitude: 42 45 28 N Longitude: 115 49 00 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
007S005E	35	BO	SW4SE4SE4
008S005E	01	BO	W2
008S005E	02	BO	E2
008S005E	12	BO	W2

Location: On summit plateau of Horse Hill. Between Sugar Creek and Hot Creek. Ca 8 air miles S of Bruneau.

Survey Date: 1995-06-28

Last Observed: 1995-06-28

First Observed: 1993-04-01

EORANK: A

EORANK Comments: Large size and mostly undisturbed.

Population Data: 1993: 5000 or more dormant genets. Population age class structure is 15% immature, 70% mature, and 15% senescent. Population vigor assessed as high. Observation on a cursory visit by Ann DeBolt, Boise District BLM. 1995-05-29: Ca 1000-5000 genets, 85% vegetative and 15% in flower. Various size (age?) classes represented. Population vigor assessed as excellent. Area through point 3594 thoroughly surveyed by Michael Mancuso, Idaho CDC. 1995-06-28: Many thousands of genets in flower. All size classes represented. Observation on a cursory survey by Bob Moseley, Idaho CDC, and Barbara Ertter, UC-Berkeley.

Habitat Description: Cobbly desert pavement over deep sandy loam lacustrine deposits. Mostly level ridgetop, but also gentle N and S slopes. Open *Artemisia arbuscula* dominated community with *Stenion hystrix*, *Chrysothamnus nauseosus*, *Bromus tectorum*, *Asragalus malacus*, *Tetradymia glabrata*, *Asragalus nudisiliquis*, *Cryptantha spp.*, *Poa secunda*, *Atriplex confertifolia*, and *Artemisia spinescens*.

Minimum Elevation: 3400 feet

Maximum Elevation: 3600 feet

Size: 150 + AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA.

Comments: Population may extend farther south along the Horse Hill ridgeline.

Protection Comments: Some ORV use and livestock trails, but the population seems little affected. Motorcycle racing is proposed for the hill.

Specimens: Moseley 2889 (ID, SRP); Mancuso 1381 (ID).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 002

Survey Site Name: SUGAR VALLEY BADLANDS

County: Owyhee

USGS quadrangle: SUGAR VALLEY

Latitude: 42 48 25 N Longitude: 115 46 37 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
007S006E	17	BO	SW4SW4
007S006E	18	BO	SE4SE4
007S006E	19	BO	NE4NE4
007S006E	20	BO	NW4NW4

Location:

Sugar Valley Badlands. Mesa W of the Bruneau Valley, between the Bruneau River and Hot Creek Road up the W side of the valley. Ca 5 air miles S of Bruneau.

Survey Date: 1995-06-28

Last Observed: 1995-06-28

First Observed: 1978-05-25

EORANK: A

EORANK Comments:

Population Data:

1978-1983: No data. Collected by Rosentreter and Wellner. 1995: Ca 2000+ genets in flower. All size classes represented in population. Observation on a cursory survey by Bob Moseley, Idaho CDC, and Barbara Ertter, UC-Berkeley.

Habitat Description:

Cobbly desert pavement over deep sandy loam lacustrine deposits. Mostly level. Open community with *Enceliopsis nudicaulis*, *Halogeton glomeratus*, *Eriogonum microthecum*, *Chrysothamnus viscidiflorus*, and *Langloisia punctata*.

Minimum Elevation: 2750 feet

Maximum Elevation: 2800 feet

Size: 3 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA.

Protection Comments: Within Sugar Valley Badlands proposed RNA, but possibly threatened by ORV use.

Specimens: Moseley 2391 (ID, SRP); Rosentreter 100 (CIC) - verified by Reveal; Rosentreter 131 (WS, CIC, Boise BLM) - collection label gives R5E instead of R6E; Rosentreter 3134 (CIC, ID, Boise BLM); Wellner 2863 (ID).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 003

Survey Site Name: PROMINENT BUTTES

County: Owyhee

USGS quadrangle: LITTLE VALLEY

Latitude: 42 48 03 N Longitude: 115 53 03 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
007S005E 20 BO SW4NE4

Location:

Prominent buttes between Little Valley and Sugar Valley. N of an unimproved road between the two valleys that heads E from State Route 51 from the junction with Shoofly Road. Ca 1.25 miles E of the highway. Ca 6 air miles SW of Bruneau.

Survey Date: 1995-06-28

Last Observed: 1995-06-28

First Observed: 1978-06-07

EO RANK: A

EO RANK Comments:

Population Data:

1978: Collected by Roger Rosentreter, Idaho State BLM.
1995-05-18: Ca 500-1000+ vegetative genets. Population vigor assessed as good. Only the area in the vicinity of point 3057 was surveyed by Michael Mancuso, Idaho CDC. Additional habitat is scattered in the area. 1995-06-28: Ca 1000 genets in flower. All size classes represented in the population. Observation on a cursory survey by Bob Moseley, Idaho CDC, and Barbara Ertter, UC-Berkeley.

Habitat Description:

Cobbly desert pavement over deep sandy loam lacustrine deposits. Flat ridgecrests and benches. Open community dominated by *Artemisia arbuscula* with *Enceliopsis nudicaulis*, *Chrysothamnus viscidiflorus*, and *Eriogonum microthecum*.

Minimum Elevation: 2900 feet

Maximum Elevation: feet

Size: 2 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA.

Protection Comments: Some grazing occurs periodically in the area, but the population is mostly safe from threats.

Specimens: Rosentreter 137 (Boise BLM); Moseley 2892 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 004

Survey Site Name: LOWER SUGAR VALLEY

County: Owyhee

USGS quadrangle: SUGAR VALLEY

Latitude: 42 51 07 N Longitude: 115 49 25 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
006S005E 35 BO SW4SE4

Location:

Between lower Sugar Valley and the Bruneau Valley. Ca 2 air miles
SSW of Bruneau.

Survey Date: 1995-06-29

Last Observed: 1995-06-29

First Observed: 1987-08-18

EORANK: A

EORANK Comments:

Population Data:

1987: Very large population. Probably 5,000+ plants over parts of
2 sections. Observation by Ann DeBolt, Boise District BLM. 1995:
Large population in flower. All age classes represented.
Observation on a cursory survey by Bob Moseley, Idaho CDC.

Habitat Description:

Level cobbly desert pavement over deep sandy loam lacustrine
deposits. Very open community with *Artemisia arbuscula*,
Tetradymia glabrata, *Atriplex confertifolia*, *Chrysothamnus*
viscidiflorus, *Halogeton glomeratus*, *Artemisia tridentata*
wyomingensis, and *Oryzopsis hymenoides*.

Minimum Elevation: 2700 feet

Maximum Elevation: feet

Size: 2 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA. Private land is
adjacent.

Comments: The area needs to be thoroughly surveyed to determine the extent
of the population.

Protection Comments: Area is largely undisturbed.

Specimens: Moseley 2895 (ID, SRP); Ann DeBolt 828 (CIC, Boise BLM).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 005

Survey Site Name: BRUNEAU DUNES

County: Owyhee

USGS quadrangle: SAND DUNES
HOT SPRING

Latitude: 42 52 32 N Longitude: 115 43 20 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
006S006E	27	BO	S2NE4

Location:

Rim of Eagle Cove overlooking Bruneau Dunes. SW corner of Bruneau Dunes State Park. Ca 2.5 air miles S of the park headquarters. Ca 4 air miles E of Bruneau.

Survey Date: 1995-06-29
Last Observed: 1995-06-29
First Observed: PRE 1986

EORANK: C

EORANK Comments: Small population in degraded habitat.

Population Data:

1993: Ca 90 genets in several small isolated populations. Plants 70% dormant and 30% in fruit. Population age class structure is 90% mature and 10% senescent. Observation on a cursory visit by Jim Klott, Boise District BLM, Jarbidge RA. 1995: Ca 200 genets in flower. Observation on a cursory survey by Bob Moseley, Idaho CDC.

Habitat Description:

Calcareous, cobbly desert pavement over deep sandy loam lacustrine deposits. Slopes 0-15%. Open community with *Artemisia arbuscula*, *Bromus tectorum*, *Salsola kali*, and *Tetradymia glabrata*.

Minimum Elevation: 2900 feet
Size: 1 AC OR LESS

Land Owner/Manager: BRUNEAU DUNES STATE PARK

Protection Comments: Within Bruneau Dunes State Park. The surrounding vegetation is very weedy. Continued invasion by annual weeds and grasses and wildfire are possible threats.

Specimens: Moseley 2897 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 006

Survey Site Name: S OF SCHOFFS ISLAND

County: Elmore

USGS quadrangle: HAMMETT

Latitude: 42 55 03 N Longitude: 115 24 22 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
006S009E 08 BO NE4

Location:

Ca 1.5 miles SSE of Schoffs Island (Snake River) and E of Sand Point ACEC. Accessible via unimproved road.

Survey Date: 1995-06-29

Last Observed: 1995-06-29

First Observed: 1988

EORANK: C

EORANK Comments: Weedy, disturbed habitat.

Population Data:

1989: No data. Observation by J. Clark and D. Danzer, Boise District BLM. 1991: Ca 1300 genets, 300 ramets; plants are of normal vigor, 2% in leaf, 90% in flower, 2% dead (6% unknown); 8% of the plants are immature, 90% are mature, 2% are senescent. Population is patchy all around the rim of the gulch; grows extensively on faded spur roads. Observation by Nancy Cole, Idaho Power Company. 1995: Collected by Bob Moseley, Idaho CDC.

Habitat Description:

Dry (xeric); upper slope and crest; E, S, W, NW, SE, and SW aspects; 0-10% slope; open light; *Artemisia tridentata*/*Atriplex spinosa*/*Agropyron cristatum* community; on white, lacustrine soil; associated with *Artemisia tridentata wyomingensis*, *Atriplex spinosa*, *Agropyron cristatum*, *Chaenactis douglasii*, *Eriogonum microthecum*, *Astragalus* spp., *Phlox* spp., *Oenothera claviformis*, *Bromus tectorum*, *Menzelia albicaulis*, *Comandra umbellata*, and *Machaeranthera canescens*.

Minimum Elevation: 3050 feet

Maximum Elevation: 3080 feet

Size: 100 SQ YD

Ownership Comments: Lower Snake River District BLM, Jarbidge RA.

Protection Comments: Disturbances: agriculture - grows in roads and next to potato fields. Threatened by agricultural practices (alteration of moisture availability, herbicide spraying).

Specimens: Moseley 2898 (ID, SRP); Fite s.n. (Idaho Power Company).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 007

Survey Site Name: LOWER SAILOR CREEK

Country: Owyhee

USGS quadrangle: HAMMETT

Latitude: 42 54 24 N Longitude: 115 26 42 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
006S008E	13	BO	N2, NE4NE4SE4
006S009E	18	BO	W2NW4SW4, SW4SW4NW4

Location:

Rim of draw ca 1 air mile E of Lower Sailor Creek. Ca 1.25 to 1.6 air miles S of the Snake River. Ca 2.5 air miles SSE of Hammett. Just S of Sand Point ACEC.

Survey Date: 1995-06-29

Last Observed: 1995-06-29

First Observed: 1991-05-23

EO RANK: C

Population Data: 1991: 100's of vegetative genets. Observation by Jim Clark, Boise District BLM. 1993: Ca 500+ to several thousand genets, 10-20% vegetative and 80-90% in flower. Population age class structure is 35% immature and 65% mature. Observation on a cursory visit by Jim Klott and Ann DeBolt, Boise District BLM. 1995: Cursory visit and collection by Bob Moseley, Idaho CDC.

Habitat Description: Exposed white calcareous lacustrine deposits on rim of draw. Gravelly sandy loam soils, no cobbles. Open community with *Bromus tectorum*, *Gilia leptomeria*, *Chrysothamnus viscidiflorus*, *Sisymbrium altissimum*, *Oryzopsis hymenoides*, *Agropyron cristatum*, *Sitanion hystrix*, *Mentzelia albicaulis*, *Langloisia punctata*, and *Phlox hoodii*.

Minimum Elevation: 3050 feet

Maximum Elevation: 3100 feet

Size: 50 AC

Ownership Comments: Lower Snake River District BLM, Jarbidge RA.

Comments: DeBolt's photos on file at Lower Snake River District BLM.

Protection Comments: Area is grazed but cows don't seem to trample through the sites too much. An adjacent area burned several years ago. Plants are largely undisturbed by occurring in a matrix of cheatgrass.

Management Comments: 1991: BLM monitoring plots to be established.

Specimens: Ann DeBolt 1714 (Boise BLM); Moseley 2899 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 008

Survey Site Name: FOSSIL GULCH

County: Twin Falls
USGS quadrangle: HAGERMAN

Latitude: 42 50 00 N Longitude: 114 55 17 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
007S013E	09	BO	W2SE4, E2SE4SW4
007S013E	10	BO	N2N2SW4, SW4SE4NW4

Location: W rim of the Snake River canyon above Hagerman Valley. Ca 2 air miles WNW of Hagerman. Extending NE from near the top of Fossil Gulch to the boundary of Hagerman Fossil Beds National Monument.

Survey Date: 1995-06-29 Last Observed: 1995-06-29 First Observed: 1995-06-02

EORANK: B

Population Data: 1995-06-02: 2,301 genets, 90% vegetative and 10% in flower. Population vigor assessed as good. Entire Monument thoroughly surveyed by Steve Popovich and Sharon Weiss, Upper Snake River Districts BLM. 1995-06-29: Plants in flower. All age classes represented in the population. Area surveyed by Bob Moseley, Idaho CDC.

Habitat Description: 0-2% slope on rim flats. E and S aspects. narrow band of exposed calcrete bedrock on canyon rim. Shallow sandy-loam/caliche layer of soil over basalt. Full sun. In little-disturbed areas of an open community with a few widely scattered associates including *Hordeum jubatum*, *Artemisia tridentata wyomingensis*, *Poa sandbergii*, *Stanleya pinnata*, *Chrysothamnus* spp., *Halogeton glomeratus*, *Bromus tectorum*, *Poa secunda*, *Agropyron cristatum*, and *Mentzelia torreyi acerosa*.

Minimum Elevation: 3375 feet Maximum Elevation: 3400 feet Size: 1 AC

Ownership Comments: National Park Service (Hagerman Fossil Beds N.M.).

Protection comments: Rim edge habitat occupied by plants is largely undisturbed, but alteration of habitat by drifting soil deposition and irrigation of adjacent agricultural fields is a fairly imminent threat. Several hundred yards of former potential habitat along the rim has been altered and will not support plants.

Specimens: Popovich and Weiss 5080 (ID, RM, Shoshone BLM, Hagerman Fossil Beds NM) - determined by Moseley 10/95; Moseley 2900 (ID, SRP); Carol Prentice 942801 (CIC, Hagerman Fossil Beds NM).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 009

Survey Site Name: MALAD GORGE

County: Gooding

USGS quadrangle: HAGERMAN
TUTTLE

Latitude: 42 51 40 N Longitude: 114 52 40 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
006S013E 35 BO N2

Location:

Malad Gorge State Park, ca 3 miles N of Hagerman. S rim of the canyon between U.S. Route 30 and I-84.

Survey Date: 1995-09-29 Last Observed: 1995-06-29 First Observed: 1990-07-24

EORANK: A

Population Data:

1991: Ca 2000 genets, 1001-10,000 ramets; plants are in leaf and of normal vigor. Observation by Nancy Cole, Idaho Power Company.
1993: Ca 2000-3000 genets, 20% vegetative and 80% in flower.
Population age class structure is 98% mature and 2% seedlings.
Area thoroughly surveyed by Roger Rosentreter, Idaho State BLM, and Ann DeBolt, Boise District BLM. 1995: Collected by Bob Moseley, Idaho CDC.

Habitat Description:

Dry (xeric); 0-10% slope on canyon rim. Open light. Gravelly calcareous soil, moderately deep, over basalt bedrock. Windswept canyon rim habitat. Open community with *Oryzopsis hymenoides*, *Bromus tectorum*, *Chrysothamnus nauseosus*, *Grayia spinosa*, and heavy soil lichen cover.

Minimum Elevation: 3225 feet Maximum Elevation: feet Size: 2 AC

Land Owner/Manager: MALAD GORGE STATE PARK

Comments: Photos may be on file at Idaho Power Company.

Protection Comments: Within Malad Gorge State Park. Largely undisturbed area. Possible threats include animal trails, pedestrians, and a nearby road.

Specimens: Cole s.n. (Idaho Power Company); Rosentreter 7920 (Boise BLM); Popovich 5081 (Shoshone BLM); Moseley 2882 (ID, SRP).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*
SHOCKLEY'S BUCKWHEAT
Occurrence Number: 010

Survey Site Name: LOWER SALMON FALLS DAM TRANSMISSION LINE

County: Twin Falls

USGS quadrangle: HAGERMAN

Latitude: 42 50 42 N Longitude: 114 54 50 W

TOWNRANGE: SECTION: MERIDIAN: TRSNOTE:
007S013E 03 BO E2

Location:

W rim of the Snake River canyon above (W of) Lower Salmon Falls Dam. Ca 2 air miles NNW of Hagerman.

Survey Date: 1994-05-24 Last Observed: 1994-05-24

First Observed: 1994-05-24

EORANK: B

EORANK Comments: Site quality and viability are good, but a large amount of invasive including crested wheatgrass are present.

Population Data:

1994: 369 genets. Distribution is clumped, individuals form large "mats." Plants vegetative and ca 25% beginning to bloom.

Population age class structure is 5% seedlings, 10% immature, 75% mature, and 10% senescent. Population is vigorous. Observation by Nancy Cole, Idaho Power Company.

Habitat Description:

Dry (xeric). Open, flat canyon rim. Loose soils with covering of caliche/calcified rocks. *Artemisia tridentata* uplands community.

Associated species include *Artemisia tridentata*, *Stanleya pinnata*, *Chrysothamnus viscidiflorus*, and *Salsola kali*.

Minimum Elevation: 3375 feet Size: 100 SQ YD - 2 AC

Ownership Comments: Lower Snake River District BLM, Jarbidge RA.

Comments: Ca 2 acres of potential habitat in the immediate area. Photos on file at Idaho Power Company.

Protection Comments: Plants are undisturbed. Surrounding habitat influenced by agriculture - good amount of invasive and crested wheatgrass seeding. Erosion of loose soils supporting the population is a possible threat.

Specimens: Cole HLH88 (Idaho Power Company).

ERIOGONUM SHOCKLEYI VAR *SHOCKLEYI*

SHOCKLEY'S BUCKWHEAT

Occurrence Number: 011

Survey Site Name: E OF HORSE HILL

County: Owyhee

USGS quadrangle: SUGAR VALLEY

Latitude: 42 45 15 N Longitude: 115 46 47 W

TOWNRANGE:	SECTION:	MERIDIAN:	TRSNOTE:
008S006E	05	BO	SE4SW4
008S006E	08	BO	NW4NE4NW4

Location:

Ca 1.7 air miles E of Horse Hill. Ca 4.1 air miles SW of Hot Spring. 1.25 miles W of Hot Creek and Blackstone-Grasmere Road.

Survey Date:

Last Observed: 1995-06-09

First Observed: 1995-06-09

EORANK: B

Population Data:

1995: Ca 100+ genets, 95% vegetative and 5% in flower. Population age class structure is 10% seedlings and 90% mature. Population vigor assessed as good. Observation on a cursory visit by Nancy Taylor-Grant, Lower Snake River District BLM.

Habitat Description:

Growing in wash (drainage) bottoms up to the uplands in smooth gravel. Associated species include *Artemisia tridentata wyomingensis*, *Chrysothamnus sp.*, *Poa sandbergii*, and *Sitanion hystrix*.

Minimum Elevation: 3175 feet

Maximum Elevation: 3225 feet

Size: 1.5 AC

Ownership Comments: Lower Snake River District BLM, Bruneau RA.

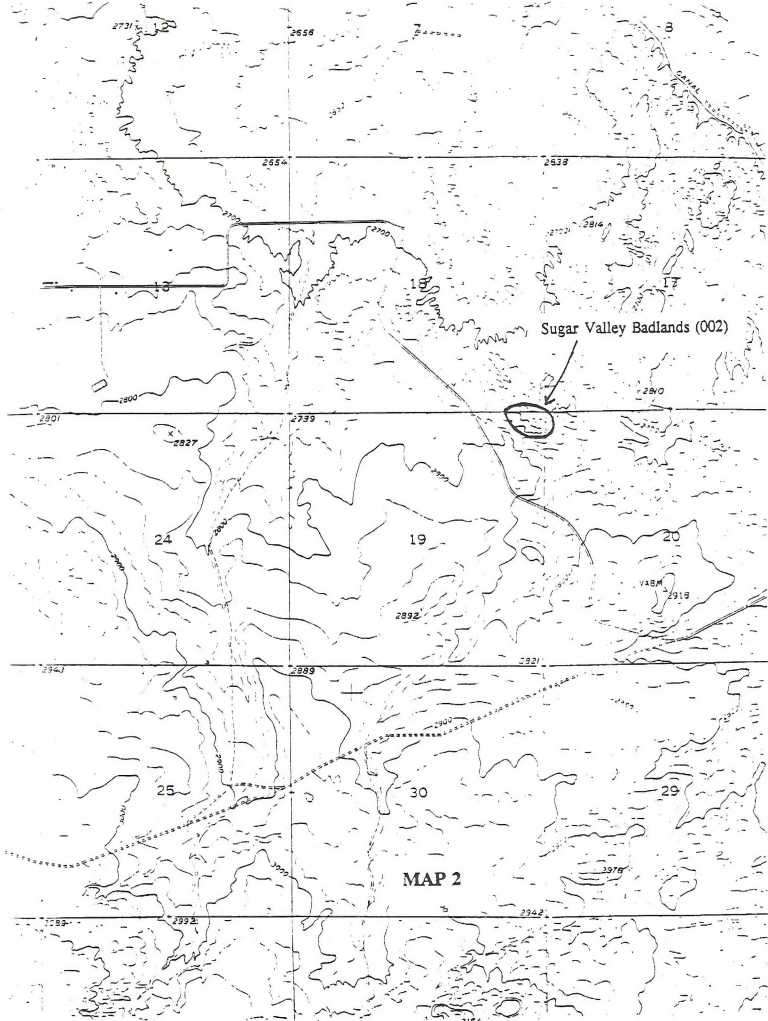
Protection Comments: Land in the surrounding vicinity is used for mining.

Specimens:

APPENDIX 5

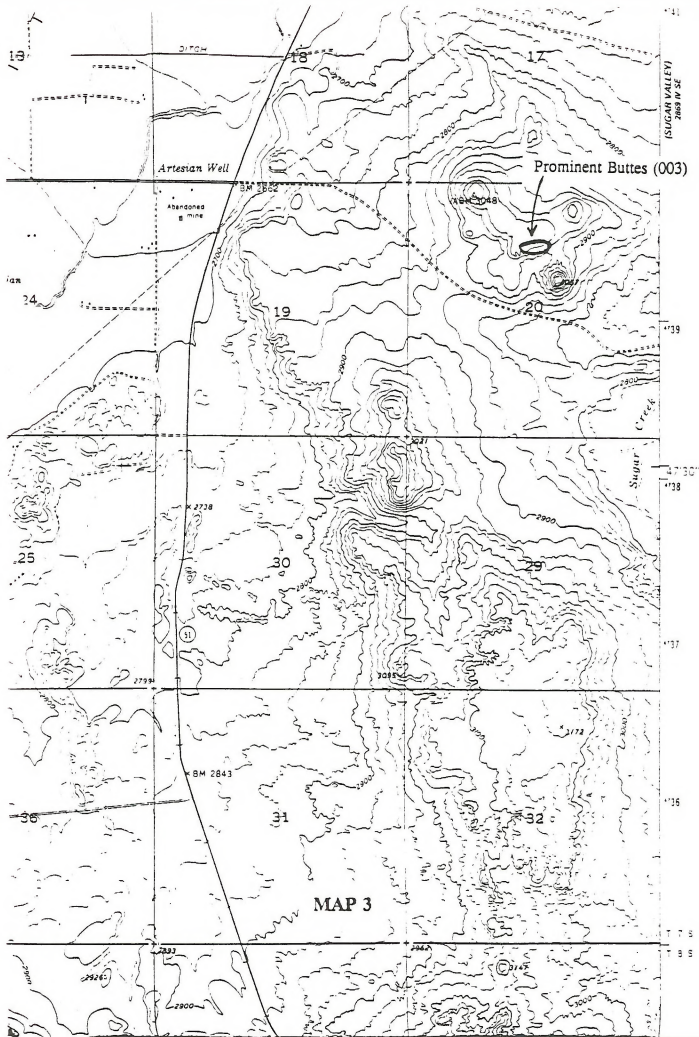
Location of *Eriogonum shockleyi* var. *shockleyi* populations in Idaho.

- Map 1. Horse Hill (001) and East of Horse Hill (011) occurrences. Portion of the 1978 Sugar Valley 7.5' quad.
- Map 2. Sugar Valley Badlands (002) occurrence. Portion of the 1978 Sugar Valley 7.5' quad.
- Map 3. Prominent Buttes (003) occurrence. Portion of the 1979 Little Valley 7.5' quad.
- Map 4. Lower Sugar Valley (004) occurrence. Portion of the 1978 Sugar Valley 7.5' quad.
- Map 5. Bruneau Dunes (005) occurrence. Portion of the 1992 Bruneau Dunes and Hot Creek 7.5' quads.
- Map 6. South of Schoffs Island (006) occurrence. Portion of the 1992 Hammert 7.5' quad.
- Map 7. Lower Sailor Creek (007) occurrence. Portion of the 1992 Hammert 7.5' quad.
- Map 8. Fossil Gulch (008) and Lower Salmon Falls Dam Transmission Line (010). Portion of the 1978 Hagerman 7.5' quad.
- Map 9. Malad Gorge (009) occurrence. Portions of the 1978 Hagerman and Tuttle 7.5' quad.



Sugar Valley Badlands (002)

MAP 2



MAP 3



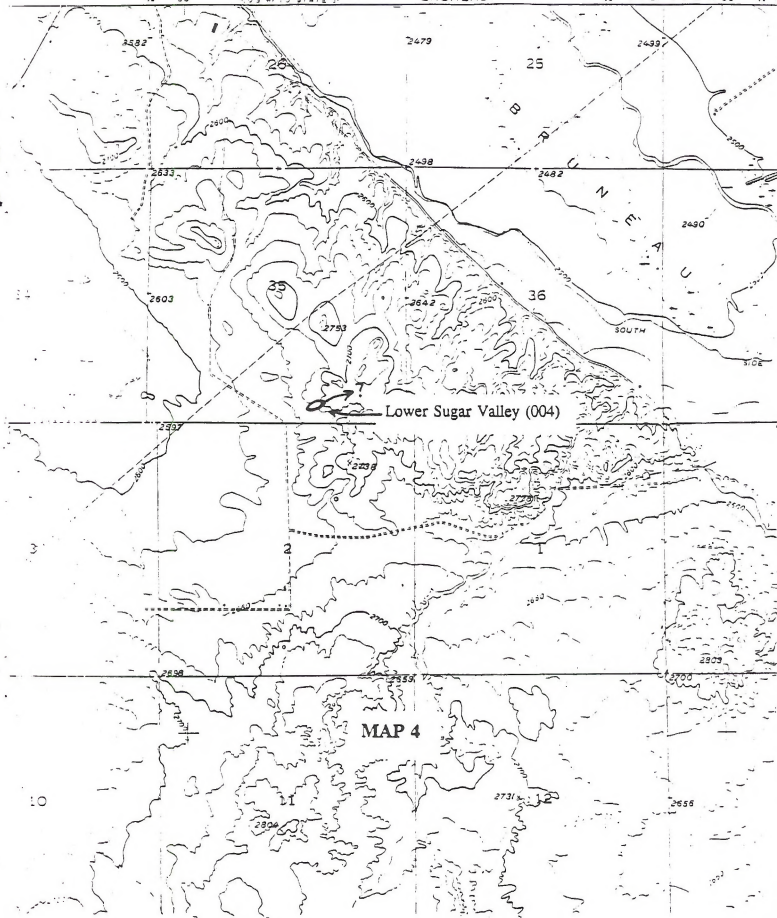
BRUNEAU 21

195 50'

25 MI TO STAGE 51

2869 IV NE
(BRUNEAU)

198 R S E. R S E. 47'30" 199



2800 V ME
(APUNIAU)

DEPARTM
GEC

115°45'

42°52'30"

477000 M

4746

T. 6 S.

T. 7 S.

UNIVERSITY OF THE SOUTH PACIFIC

47431

50'

4742

2863

2857

27

26

28

27

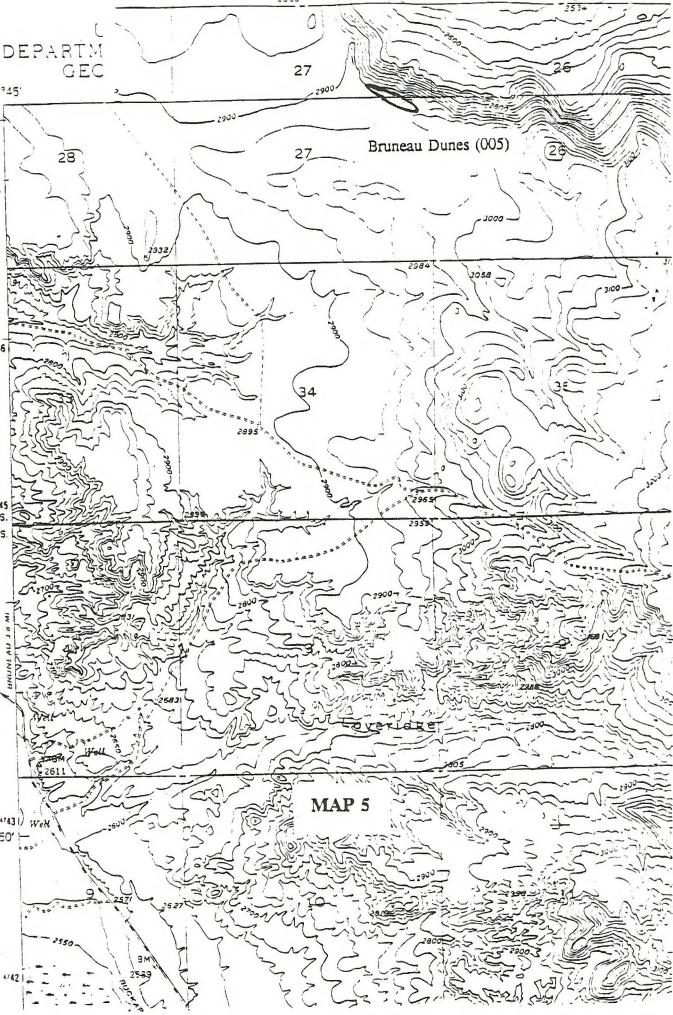
26

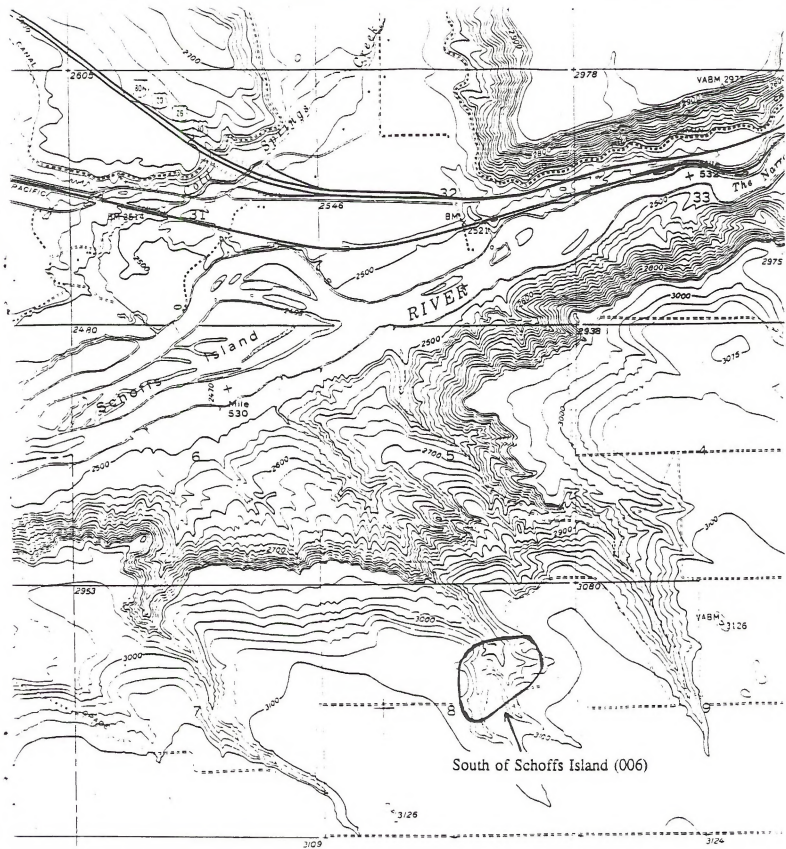
Bruneau Dunes (005)

34

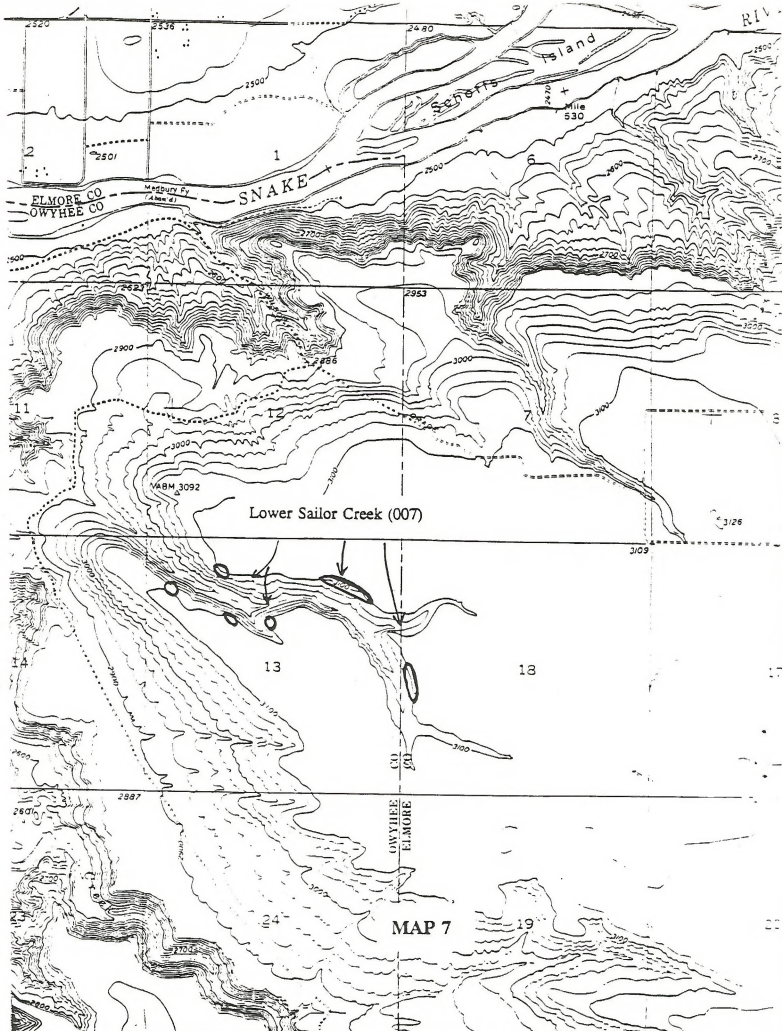
35

MAP 5





MAP 6

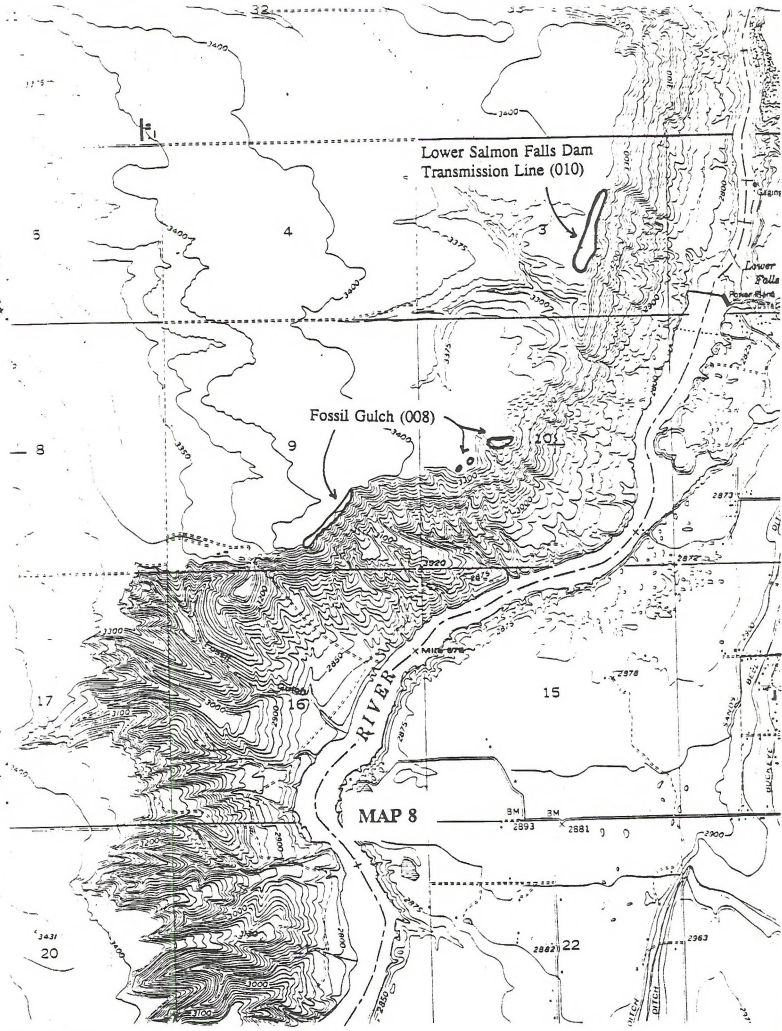


32

Lower Salmon Falls Dam
Transmission Line (010)

Fossil Gulch (008)

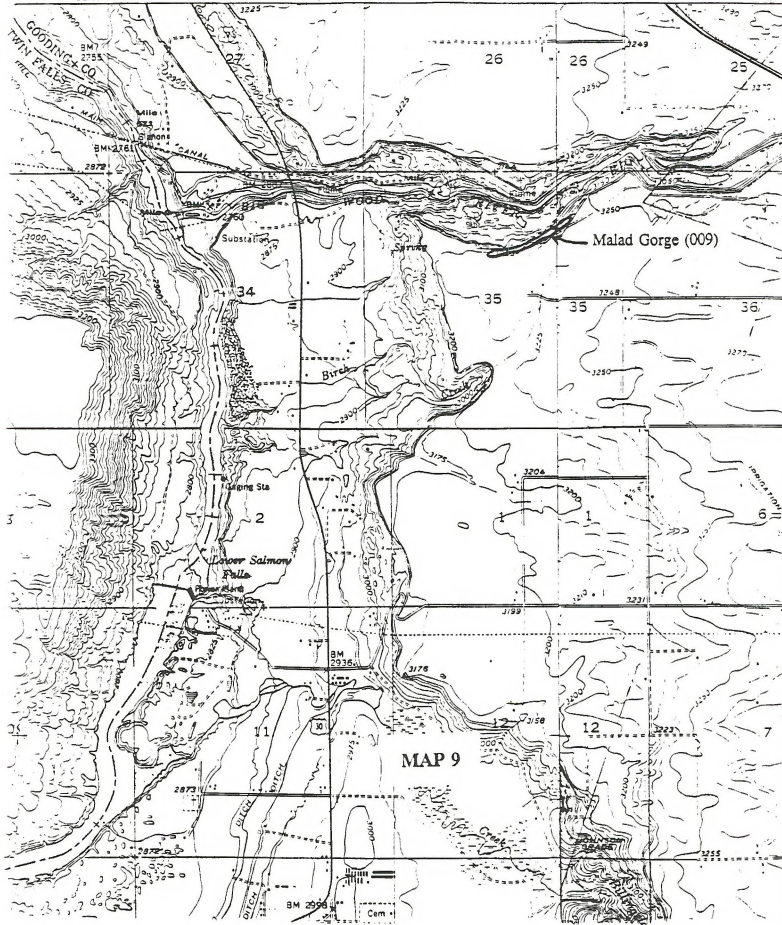
MAP 8



4211478
HAGERMAN QUADRANGLE
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The Taxonomy and preliminary
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100



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Idaho State Office
3380 Americana Terrace
Boise, Idaho 83706

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