COO-2307-11

ENDANGERED PLANT SPECIES

OF THE

NEVADA TEST SITE, ASH MEADOWS, AND CENTRAL-SOUTHERN NEVADA

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DISCLAIMER

NOTICE

CONTENTS

INTRODUCTION

A total of 15 vascular plant taxa, currently appearing on the "Endangered Species list", occur in southern Nye County, Nevada, and/or adjacent Inyo County, California. Their distributions, as known to date from the region indicated in Figure 1, are recorded in Beatley (Vascular plants of the Nevada Test Site and central-southern Nevada: Ecologic and geographic distributions. TID 26881. Energy Research & Development Admin. 1976. 316 p.). The distributions are based primarily on plant collections made from 1959 through 1975 by the author and her associates, on Contract AT(04-1) Gen 12, between the Division of Biology and Medicine, Atomic Energy Commission, Washington, and the University of California; one new locality was added for one species in 1976 on Contract E(29-1)-1183, between the Nevada Operations Office of the Energy Research & Development Admin., Las Vegas, and EG&G, Santa Barbara Division, Goleta, California. For an area its size, the Nevada Test Site part of the region is one of the most heavily botanized areas in western United States and its plants and their distributions among the best known in the country.

It is the purpose of this report to record in detail the locations of the plant collections upon which the distributions are based, and other information relevant to their status as Endangered Species, and to recommend the areas to be designated "critical habitats". For most taxa, these collections are the basis for their proposal as Endangered Species in the Smithsonian Institution's "Report on endangered and threatened plant species of the United States", as published in the Federal Register, July 1, 1975, and their inclusion in "Endangered and threatened species - plants", Federal Register, June 16, 1976. Included here is an additional species (Grindelia fraxino-pratensis), as equally endangered as all other of the strict endemics of the spring areas in northern Ash Meadows. One other species, Phacelia parishii, recommended to be added to the list (Beatley, ibid, p. 74) is now here considered to be neither Endangered nor Threatened, and the matters relevant to its status are recorded in the Appendix.

Most of the species are restricted to two areas: The Nevada Test Site (and vicinity) and Ash Meadows to the south; for 13 of the 16 taxa, the type locality is in one or the other area. In both areas, the species are endangered by "factor 1" of Sec. 4a of the Endangered Species Act (the present or threatened destruction, modification, or curtailment of its habitat or range) and "factor 4" (the inadequacy of existing mechanisms); in addition, in Ash Meadows, "factor 2" (overutilization for commercial, sporting, scientific, or educational purposes) is relevant to the Endangered status of six of the species.

It is not an objective of this report to describe or define the nature of the threats to the taxa occurring in the various areas of the Nevada Test Site, since this is a Federal reservation where compliance with the National Environmental Policy Act of 1969 and Endangered Species Act of 1973 are mandatory under the law. The privately owned tracts of Ash Meadows, however, where all species are very critically endangered at the present time, are considered to the extent of a recommendation, made herein, for the immediate preservation, by whatever means, of at least the 40-acre tract known as the

"Collins Ranch", south of Devils Hole of the Death Valley National Monument, where most of the Ash Meadows Endangered (and Threatened) Species are known yet to occur. In the Appendix is a nearly complete list of plant species known from this tract and adjacent tracts of the Devils Hole area remaining in northern Ash Meadows.

The photographs, taken by the author in July 1976 except as otherwise noted, and descriptive captions for species on the Nevada Test Site are here reproduced, as a matter of public record, essentially unchanged from the materials submitted in August 1976 to the Nevada Operations Office of the Energy Research & Development Admin., and prepared on Contract E(11-1)-2307 between the Division of Biomedical and Environmental Research, Energy Research & Development Admin., Washington, and the University of Cincinnati. The distribution maps for these species and description of the areas of their "critical habitats" are essentially the same information as was recorded on a single large composite map (on a topographic map base) for the Test Site species, also submitted to the Nevada Operations Office in August 1976.

Herbaria where the collections are deposited are indicated by their code name appearing in "Index Herbariorum" (P. K. Holmgren and W. Keuken. Oosthoek, Scheltema & Holkema. Utrecht, Netherlands. 6th Ed. 1974). Collection numbers are the Nevada Test Site herbarium (NTS) accession numbers (which serve also as the author's collection number), or as otherwise indicated. "*NTS" refers to that segment of the Nevada Test Site herbarium which will be deposited at the U. S. National Herbarium, Washington. Recorded on the maps are the locations of the collections cited (or shown in the photographs); records indicated by black squares are those made in 1976 on the EG&G contract, which, except for one species (Phacelia beatleyae), are from the previously documented sites of their occurrence on the Nevada Test Site.

This report has been prepared for the records of the Energy Research & Development Admin., for the Office of Endangered Species of the Fish and Wildlife Service, Department of the Interior, and for the information of other agencies, organizations, or individuals concerned with the preservation of plant and animal species and their "critical habitats" in the United States, as set forth in the Endangered Species Act of 1973.

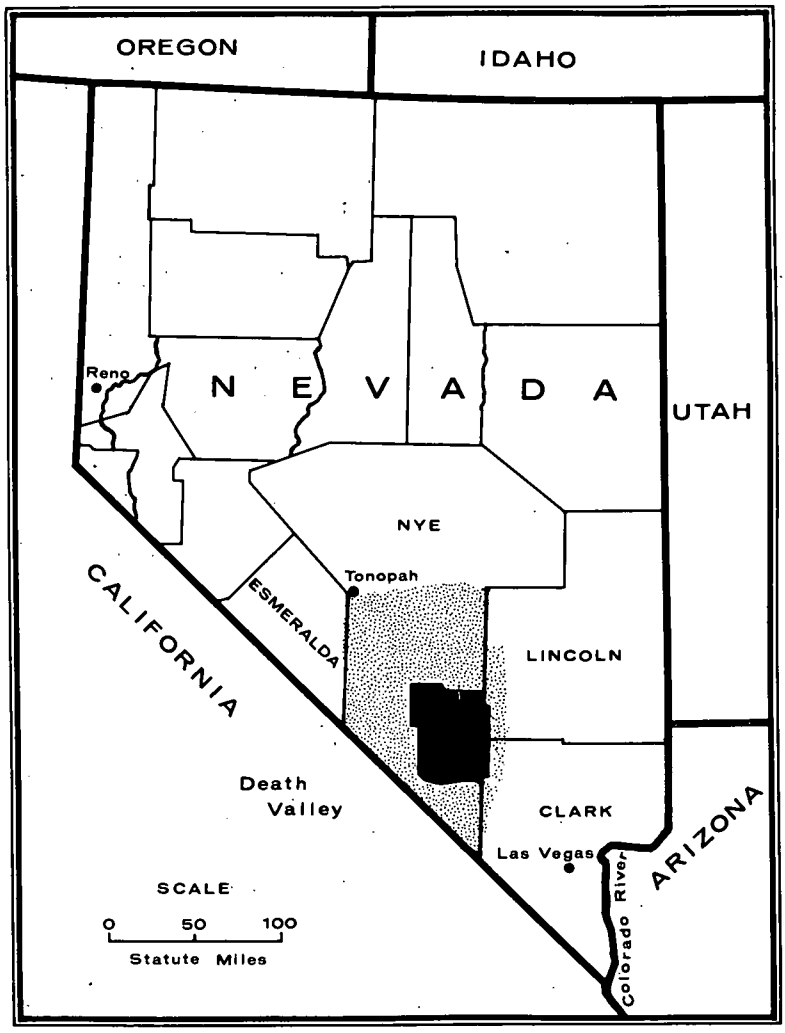


Fig. 1. Area of Nevada covered by this report. Area shown in black is the Nevada Test Site and vicinity.

ENDANGERED PLANT SPECIES

ARCTOMECON MERRIAMII Coville

Figs. 2, 3

Coville, Frederick V. Proc. Biol. Soc. Wash. 7: 66. 1892.

TYPE (US): Merriam & Bailey 1890, 1 May 1891. A few miles W of Vegas Ranch, Las Vegas Valley, Lincoln (now Clark) Co., Nevada; 750 m.

Also on the Death Valley Expedition: Coville 432 (US), 9 March 1891, from same locality as the type. The type locality was described by Clokey (Flora of the Charleston Mountains, Clark County, Nevada. Univ. Calif. Press, 1951. p. 92) as "level, and the soil is a mixture of limestone gravel and sediment deposited in an old lake bed", and the species as occurring on a saddle and gravelly slope on limestone hills, in the Larrea belt, at 1400 m, S of Indian Springs (Clokey 8238).

COLLECTIONS: Nye County, Nevada, except as noted.

2172 - Wells, 15 Nov 1961. Red Mtn, west Spotted Range. (NTS)

3210 - Rhoads & Kania, 13 August 1964. Desert Range, Clark Co.; 4000 ft. (NTS)

3921 - Bostick & Lewis, 5 April 1966. Mercury Ridge, west Spotted Range, Mercury Valley drainage. (NTS)

4721 - Bostick, 24 April 1967. SW end of Ranger Mtns, se. Frenchman Flat drainage; 3800 ft. (*NTS)

4733 - Bostick, 24 April 1967. Bank of large wash between Mercury Ridge and Ranger Mtns, se. Frenchman Flat drainage; 3500 ft. (*NTS, RENO)

5280 - Beatley, 12 August 1967. Occasional or local in canyons E of Pistol Range below Mercury Ridge, west Spotted Range, Mercury Valley drainage, in Atriplex confertifolia vegetation; 4200 ft. (NTS)

5540 - Beatley, 21 April 1968. Local in limestone canyons below Mercury Ridge, west Spotted Range, n. Mercury Valley drainage, in Atriplex confertifolia vegetation; 4200 ft. (DS, *NTS, RENO)

6502 - Beatley, 19 August 1968. Occasional, bank of major wash 2.5 mi N of Rt 95, dirt road leaving hwy 4 mi W of NRDS turnoff, S side of Specter Range, n. Amargosa Valley drainage, in Larrea-Ambrosia vegetation; 3400 ft. (NTS)

6635 - Beatley, 18 August 1968. Rather common, slopes of SW end of Spotted Range, road N of Rt 95 2 mi E of old Mercury turnoff, e. Mercury Valley drainage, in Atriplex-Ephedra torreyana vegetation; 4200 ft. (NTS)

7380 - Beatley, 1 Oct 1968. Several plants on sandy floor of large excavation, SW end of Spotted Range, e. Mercury Valley, in Atriplex vegetation; 4000 ft. (NTS)

7392 - Reveal & Holmgren 1917, 24 August 1968. Spotted Range, 5 airline mi N of Rt 95, 6 airline mi ESE of Mercury, on limestone ridges, NW Indian Springs Valley, Clark Co., in Atriplex vegetation; basal rosettes only; 4800 ft. (NTS)

7711 - Beatley, 13 April 1969. Locally common, black limestone talus, lower S face of W end of Spotted Range, 2 mi E of old Mercury turnoff from Rt 95, e. Mercury Valley drainage, in Atriplex vegetation; 4400 ft. (*NTS)

8028 - Beatley, 24 April 1969. Clumps of seedlings occasional where species common, S slope of W Spotted Range, above quarry road leaving Rt 95 2 mi E of old Mercury turnoff, e. Mercury Valley drainage, in Atriplex vegetation; 4000-4500 ft. (*NTS)

8131 - Beatley, 28 April 1969. Several plants on bare gravel terrace wall, below cent. Specter Range, 2.5 mi N of Rt 95, E of road leaving hwy 1.5 mi W of Point of Rocks, e. Amargosa Valley drainage, Larrea-Ambrosia adjacent; 3300 ft. (*NTS, NY, RENO, RSA)

8992 - Beatley, 16 June 1969. Uncommon, S face of e. Specter Range, canyon near Pt. of Rocks, N of Rt 95, e. Amargosa Valley drainage, in Larrea-Ambrosia-Atriplex vegetation; 3200 ft. (*NTS)

9914 - Beatley, 3 Jan 1970. Occasional on bajadas below limestone mtns SW of Spring Mtns; coll. from Ash Meadows Rd S of abandoned (Collins) ranch below Devils Hole, in Atriplex vegetation; 2300 ft. (NTS)

10058 - Beatley, 16 April 1970. Local population on white saline soil, E of Fairbanks Spg, along road NW of Longstreet Spg, n. Ash Meadows, in Atriplex-Haplopappus acradenius vegetation; 2300 ft. (*NTS, RSA, UNLV)

10493 - Beatley & Reveal, 10 May 1970. Several plants on disturbed roadside area N of Mercury townsite, below Red Mtn-Mercury Ridge, S of Gate 200, n. Mercury Valley drainage, in disturbed Larrea-Atriplex; 3800 ft. (*NTS, RSA, UNLV)

12165 - Beatley & Reveal, 23 April 1971. Common on loose-talus slopes, near base of limestone mtn, E side of Stewart Valley near N end of Mesquite area, in Larrea-Ambrosia-Atriplex vegetation; 2600 ft. (DS, *NTS, RENO, RSA, UNLV)

12273 - Beatley & Reveal, 27 April 1971. Occasional plants, fl. peak, rolling uplands SE of Rogers Spg, Sec. 14, R50E, T17S, n. Ash Meadows, in Atriplex vegetation; 2300 ft. (*NTS, RSA)

12645 - Beatley, 4 June 1971. Occasional plants on unconsolidated limestone terraces along major wash, old road to Indian Springs below S end of Ranger Mtns, se. Frenchman Flat drainage, in Larrea-Ambrosia; 3800 ft. (*NTS)

13259 - Beatley, 21 Sept 1971. Several plants in triangle at jnct of Ash Meadows Rd and road W to Spring Meadows Farm, n. Ash Meadows; clay soils, disturbed Atriplex-Haplopappus; 2200 ft. (NTS)

CRITICAL HABITAT:

This is a species of the slopes of the limestone mountain ranges in southern Nevada -- in the Test Site area, the S slope of the Specter Range, throughout the Spotted Range, and Ranger Mtns -- occurring as usually small, scattered local populations. It also occurs as occasional plants on disturbed soils in the same areas, including banks of washes and on the bajadas of the Ash Meadows area. Because it is fairly widely distributed within the region of the limestone ranges in this part of Nevada, it is not Endangered on the basis of an endangered habitat, but because it is a unique and highly sought-after desert perennial plant, it requires rigorous protection, and seems a valid Endangered Species. The 22 collections cited above reflect only its known distribution and not abundance of the plants in central-southern Nevada.

Collections from within the boundaries of the Nevada Test Site are those from the Red Mtn-Mercury Ridge area of the west Spotted Range. In all of the known areas of its occurrence, including the limestone mountain ranges and northern Ash Meadows, some of the Threatened Species occur with it (Haplopappus brickellioides, Gilia ripleyi, Agave utahensis var. eborispina, Perityle intricata, Salvia funerea, Enceliopsis nudicaulis var. corrugata), as well as many other rare species of the Death Valley region.

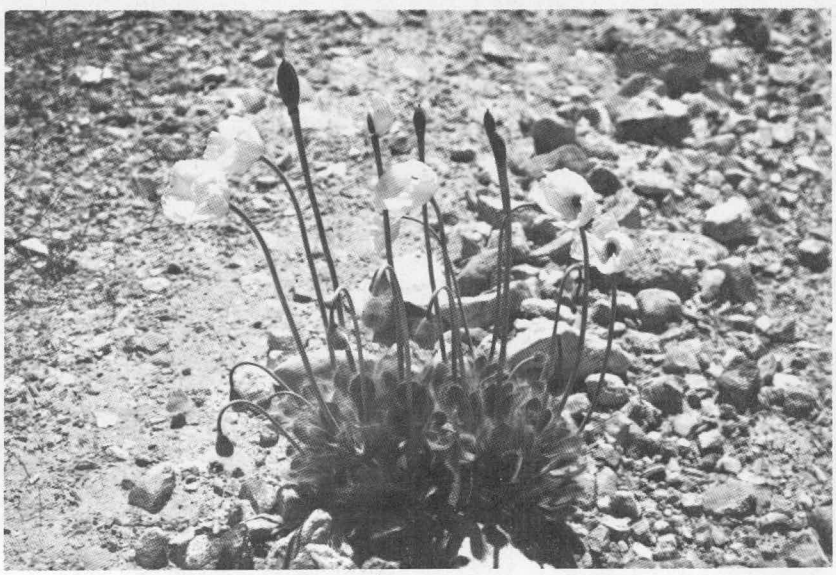


Fig. 2. Arctomecon merriamii, below Red Mountain-Mercury Ridge of west Spotted Range, northern Mercury Valley, Nevada Test Site. Photo 1 May 1970, by James L. Reveal.

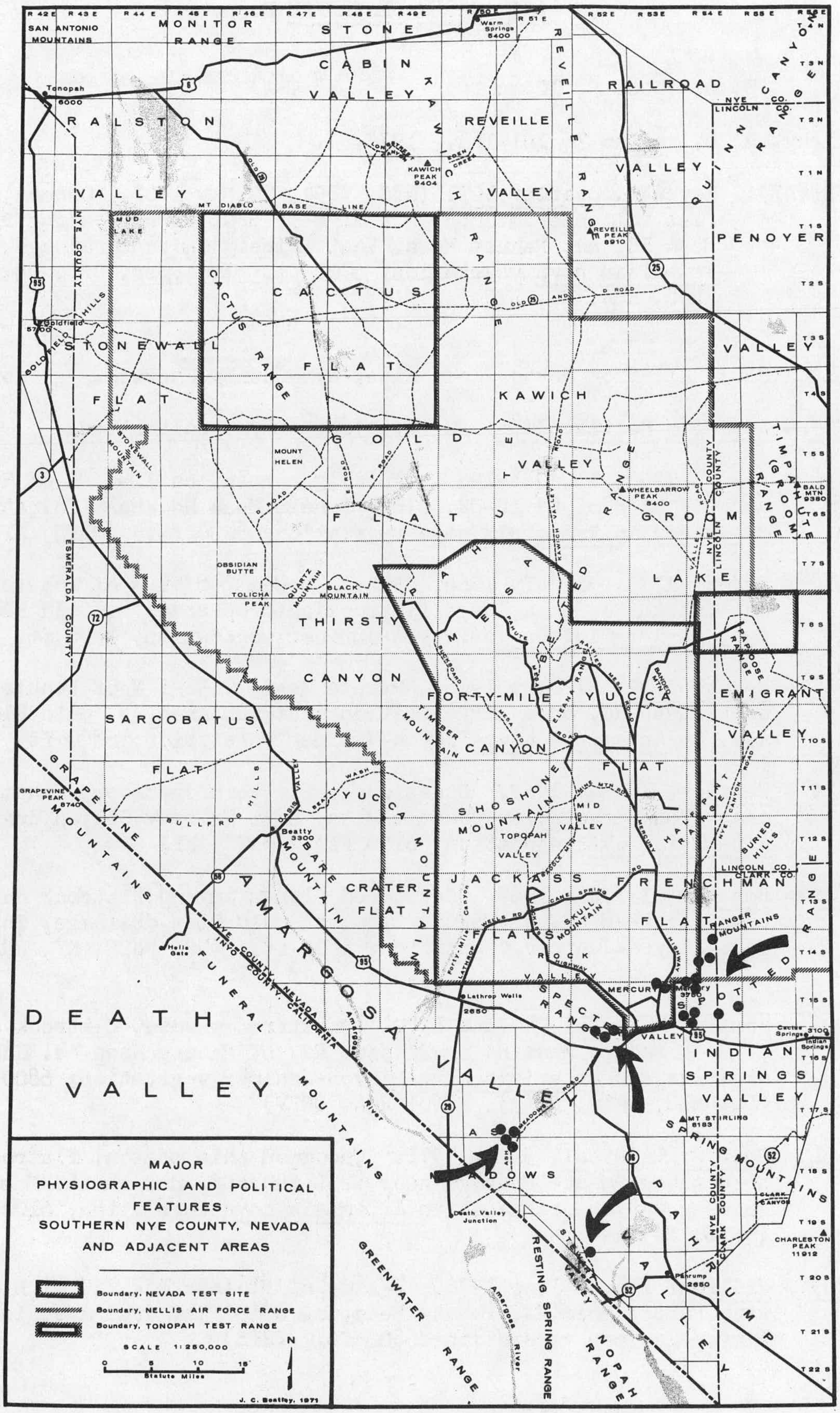


Fig. 3. Areas of collections of Arctomecon merriamii, southern Nye and western Clark counties, Nevada

ASTRAGALUS BEATLEYAE Barneby

Figs. 4, 5, 6, 7, 8, 9, 10

Barneby, R. C. Aliso 7: 161-163. 1970.

TYPE (NY): Reveal & Beatley 1071 (NTS 5725), 20 May 1968. Common on low, flat volcanic outcrop, 0.2 mi E of U20L turnoff along Pahute Mesa Rd, nw. Pahute Mesa, East Thirsty Canyon drainage, in Artemisia nova vegetation; 6200 ft. Isotypes, BRY, DS, *NTS(2), RENO, RSA, US, UTC.

COLLECTIONS: All from Nevada Test Site, Nye County, Nevada.

5725 - Reveal & Beatley 1071, 20 May 1968. (Type collection)

6296 - Reveal 1240, 11 June 1968. Locally common, ca 1 mi SE of Rd 19-03 and 0.2 mi W of Rd 18-02, along Pahute Mesa Rd, East Thirsty Canyon drainage, in Artemisia nova vegetation; 6200 ft. (*NTS, NY)

6940 - Reveal 1733, 31 July 1968. Pahute Mesa, 2.8 mi N of Pahute Mesa Rd on Plateau Rd, on a large flatrock outcrop area, s. Gold Flat drainage, in Artemisia nova-Pinyon-Juniper vegetation; 6800 ft. (*NTS)

6942 - Reveal 1730, 31 July 1968. Pahute Mesa, 2.5 mi N of Pahute Mesa Rd on Plateau Rd, on a large flatrock outcrop area, s. Gold Flat drainage, in Artemisia nova-Pinyon-Juniper vegetation; 6800 ft. (*NTS, NY)

8519 - Beatley, 20 May 1969. Occasional, flatrock outcrops, Pahute Mesa Rd near U20L turnoff, nw. Pahute Mesa, East Thirsty Canyon drainage, in Artemisia nova vegetation; 6100 ft. (*NTS, NY)

8920 - Beatley, 13 June 1969. Scattered plants around flatrock outcrops along Plateau Rd, n. Pahute Mesa, s. Gold Flat drainage, in Artemisia nova-Pinyon-Juniper vegetation; 6800 ft. (DS, *NTS, NY, RSA, UNLV, UTC)

10907 - Beatley & Reveal, 4 June 1970. Scattered plants, flatrock area 2.8 mi N of Pahute Mesa Rd on Plateau Rd, n. Pahute Mesa, s. Gold Flat drainage, in Artemisia nova-Pinyon-Juniper vegetation; 6800 ft. (DS, NTS, *NTS, NY(3), RENO, RSA, UNLV)

12464 - Beatley & Reveal, 3 May 1971. Uncommon this season, flatrock outcrop area along Pahute Mesa Rd near U20L turnoff, nw. Pahute Mesa, East Thirsty Canyon drainage, in Artemisia nova vegetation; 6100 ft. (*NTS, NY)

16009 - Williams 174, 9 June 1976. E side of Plateau Rd, 2.5 mi N of jnct with Pahute Mesa Rd, Pahute Mesa, s. Gold Flat drainage, in Artemisia-Pinyon-Juniper vegetation; 6800 ft. (NTS)

16010 - Williams 205, 26 June 1976. On ridge E of U19g on volcanic flatrock, Pahute Mesa, s. Gold Flat drainage, in Artemisia-Pinyon-Juniper vegetation; 6800 ft. (NTS)

16011 - Williams 235, 16 July 1976. NE side of Pahute Mesa Rd, 1.5 mi E of U20L, nw. Pahute Mesa, East Thirsty Canyon drainage, in Artemisia nova vegetation; scattered plants in volcanic flatrock areas; 6100 ft. (NTS)

CRITICAL HABITAT:

This species is to be expected elsewhere around volcanic flatrock areas of Pahute Mesa on the Nevada Test Site. It is a perennial herb, which has been present to some extent each of the years of observation in the two general areas of Pahute Mesa from which it is known, but its numbers have been variable on these sites from year to year. A widely distributed Astragalus species which it resembles (A. calycosus var. calycosus) occurs close by, but the two appear not to occur strictly together, i. e., they do not occur on precisely the same local site.

The species is unknown beyond Pahute Mesa, and it is unlikely to occur in mountains of the region where the substrates are associated with slopes rather than the nearly flat terrain of a mesa surface. Both areas of its known occurrence are considered to be critically endangered since both are bisected by roads, one the principal throughfare on Pahute Mesa, and the other road intensively affected by test activities in the near vicinity; in both, any off-road vehicle use is destructive to the plants and the habitat. Much of northern Pahute Mesa should be considered the "critical habitat" for this species.

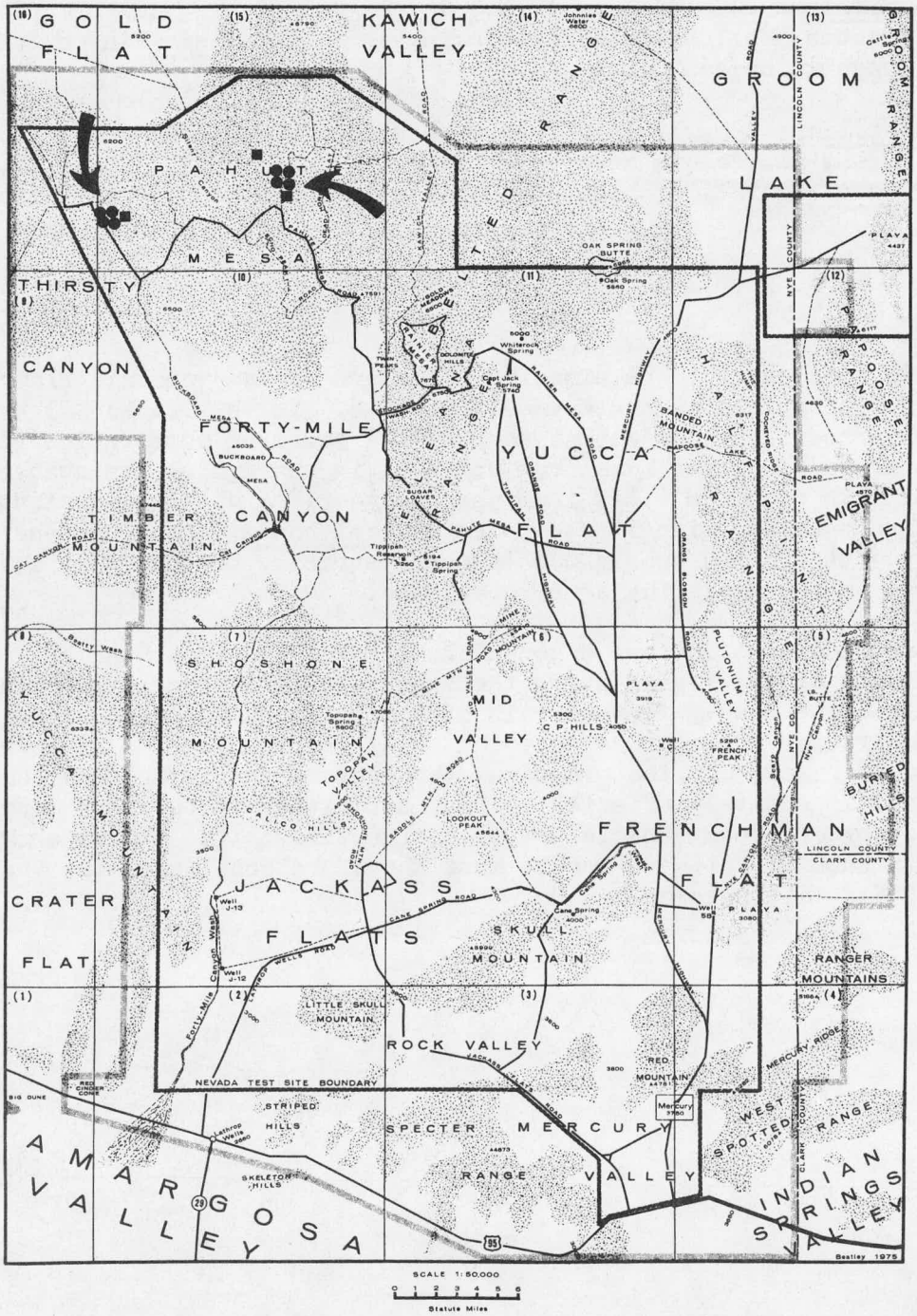
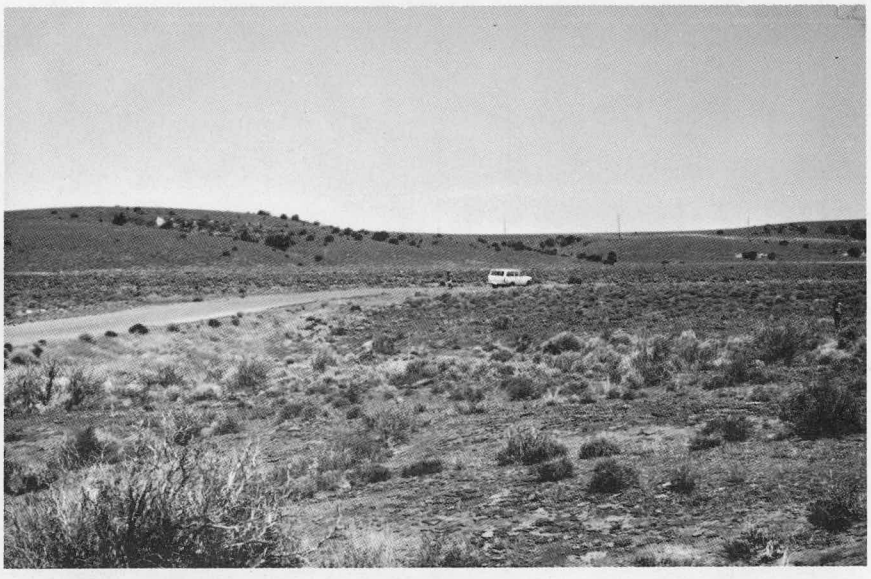


Fig. 4. Areas of known occurrence (and collections) of Astragalus beatleyae, n. Pahute Mesa, Nevada Test Site, Nye County, Nevada. The species is known only from these two areas.



Figs. 5 and 6. Site of type collection of Astragalus beatleyae, near former junction of 20-02 Road with Pahute Mesa Road, northwestern Pahute Mesa. A rerouting of Pahute Mesa Road in recent years destroyed a known part of the habitat here. Plants are more or less scattered over this local area of shallow soils and Artemisia nova vegetation.

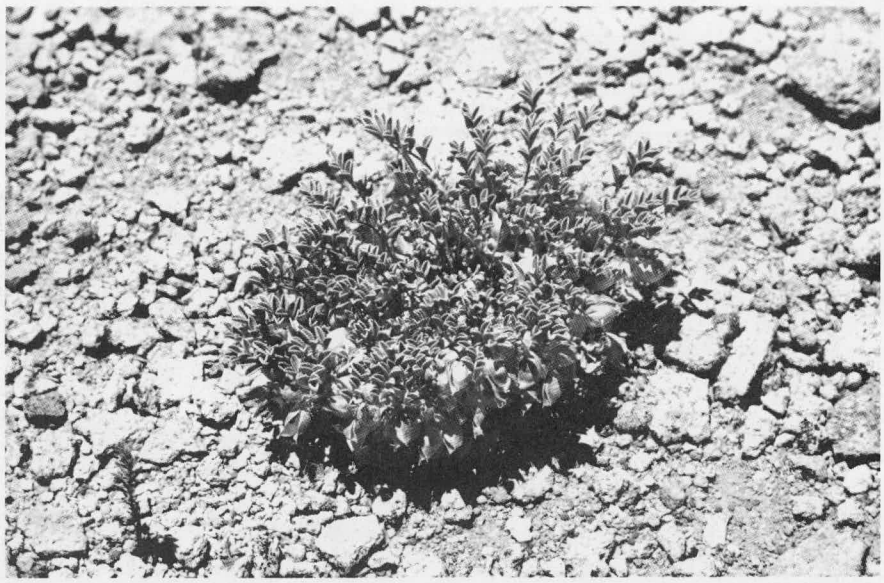


Fig. 7. Plant of Astragalus beatleyae, around 4 inches in diameter.

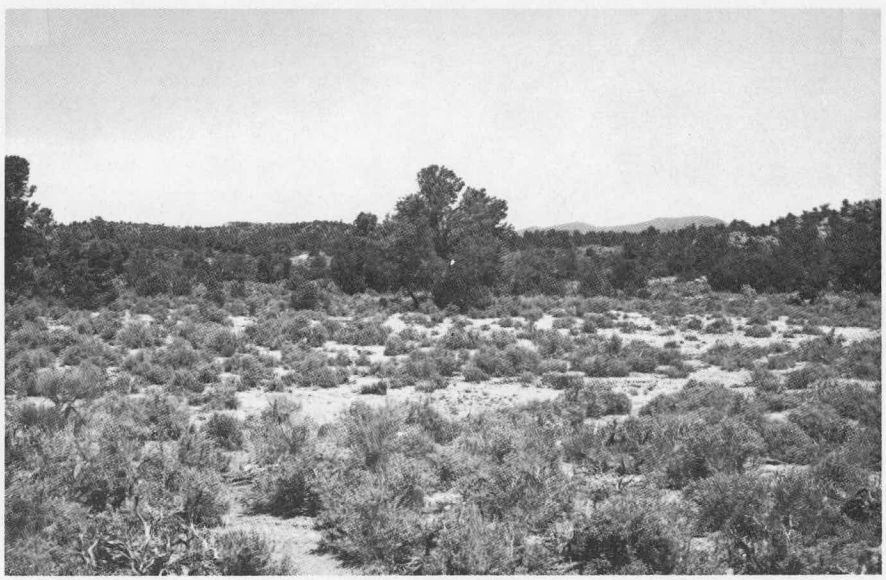


Fig. 8. Site of larger population (of the two known) along Plateau Road around 2.5 mi north of Pahute Mesa Road. Road bisects this local population. Soils are shallow and vegetation is Artemisia nova-Pinyon-Juniper. It is probable that this species occurs locally elsewhere on Pahute Mesa, where there is similar vegetation and soils. Both areas of its known occurrence on Pahute Mesa are recommended to be designated "critical habitats".

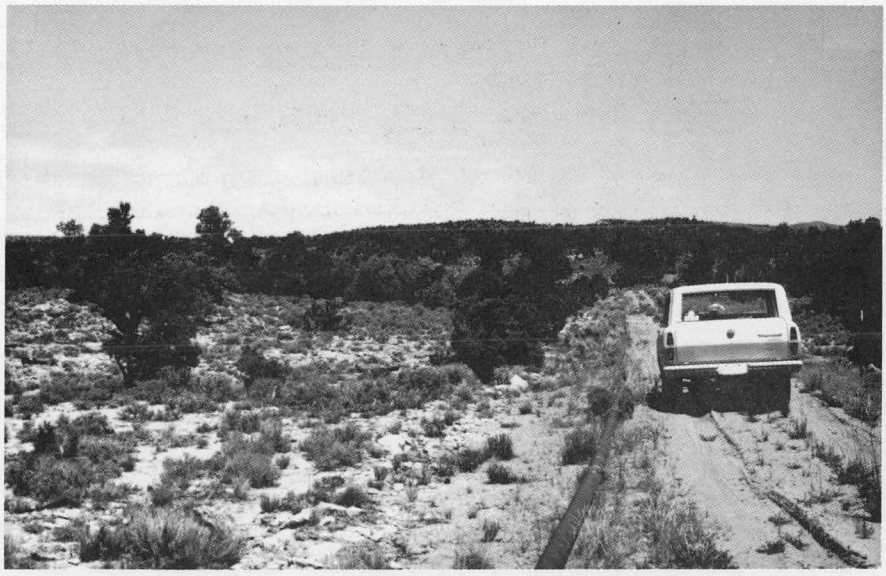


Fig. 9. Plateau Road, Pahute Mesa, at site of Astragalus beatleyae. Road, pipeline, and accompanying disturbed soils and vegetation bisect this population, one of two known for the species.

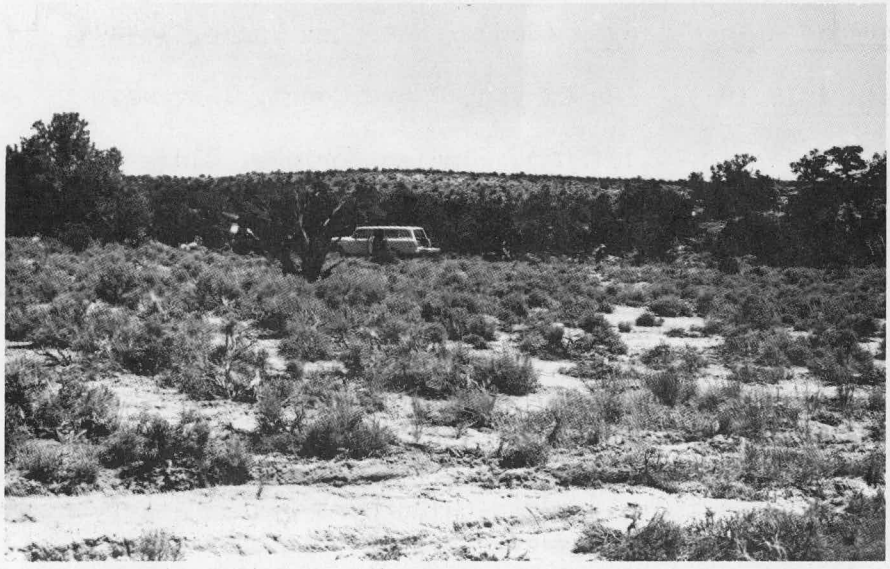


Fig. 10. Recent tire tracks off Plateau Road and on the site of the Astragalus beatleyae population.

ASTRAGALUS NYENSIS Barneby

Figs. 11, 12, 13

Barneby, R. C. A. nuttallianus DC. var. piliferus Barneby. Leafl. West. Bot. 5: 110. 1942.
A. nyensis Barneby. Leafl. West. Bot. 7: 195. 1954.

TYPE (CAS): Ripley & Barneby 3430, 14 May 1941. Alkaline gravelly slope in the foothills of the Spotted Range, Nye Co., alt. 3200 ft. "This interesting little plant was observed very locally on the white alkaline-gravel hills which fall away northward from the Spotted Range towards Frenchman Flat. It grew with Phacelia parishii A. Gray, Cymopterus ripleyi var. saniculoides Barneby, and Polygala subspinosa S. Wats., and seemed to form part of the curious arid-saline flora dominant in this locality."

"Calcareous gravel knolls, stiff clay slopes and flats, usually with Larrea, 2050-4500 ft, rare and local, known only from scattered locations in S. Nye and Clark Cos., Nevada ..." (R. C. Barneby. Leguminosae of Nevada, Part 1 - Astragalus and Oxytropis. Contr. Toward a Flora of Nevada, No. 38, p. 77. 1956)

KNOWN COLLECTIONS:

Ripley & Barneby 3430, 14 May 1941. (Type collection)

Eastwood & Howell 8966 (CAS). Near Las Vegas, Nevada.

Train 1719 (NA). Lee Canyon, Clark County, Nevada.

M. E. Jones (s. n.) (POM). Indian Springs, Clark County, Nevada, May 1906.

M. E. Jones (s. n.). Moapa, e. Clark County, Nevada (cited in R. C. Barneby. Mem. N. Y. Bot. Gard. 13: 1041. 1964).

CRITICAL HABITAT:

This species has not be recollected in s. Frenchman Flat, the type locality for the species. The site of the Ripley & Barneby collection, shown in Figs. 12 and 13, is now occupied by a gravel quarry operation. The species is probably not, however, extinct in this area below the limestone Spotted Range, and is perhaps a species germinating under unusual conditions, such as winter rainfall. It resembles one of the common small annual Astragali of the region (A. acutirostris) which is restricted to volcanic areas. It was specifically looked for in s. Frenchman Flat only one spring (1971), and will probably be found again in this area. In the meantime, the undisturbed knolls in the vicinity of the quarry should be considered the "critical habitat" for this very rare species.

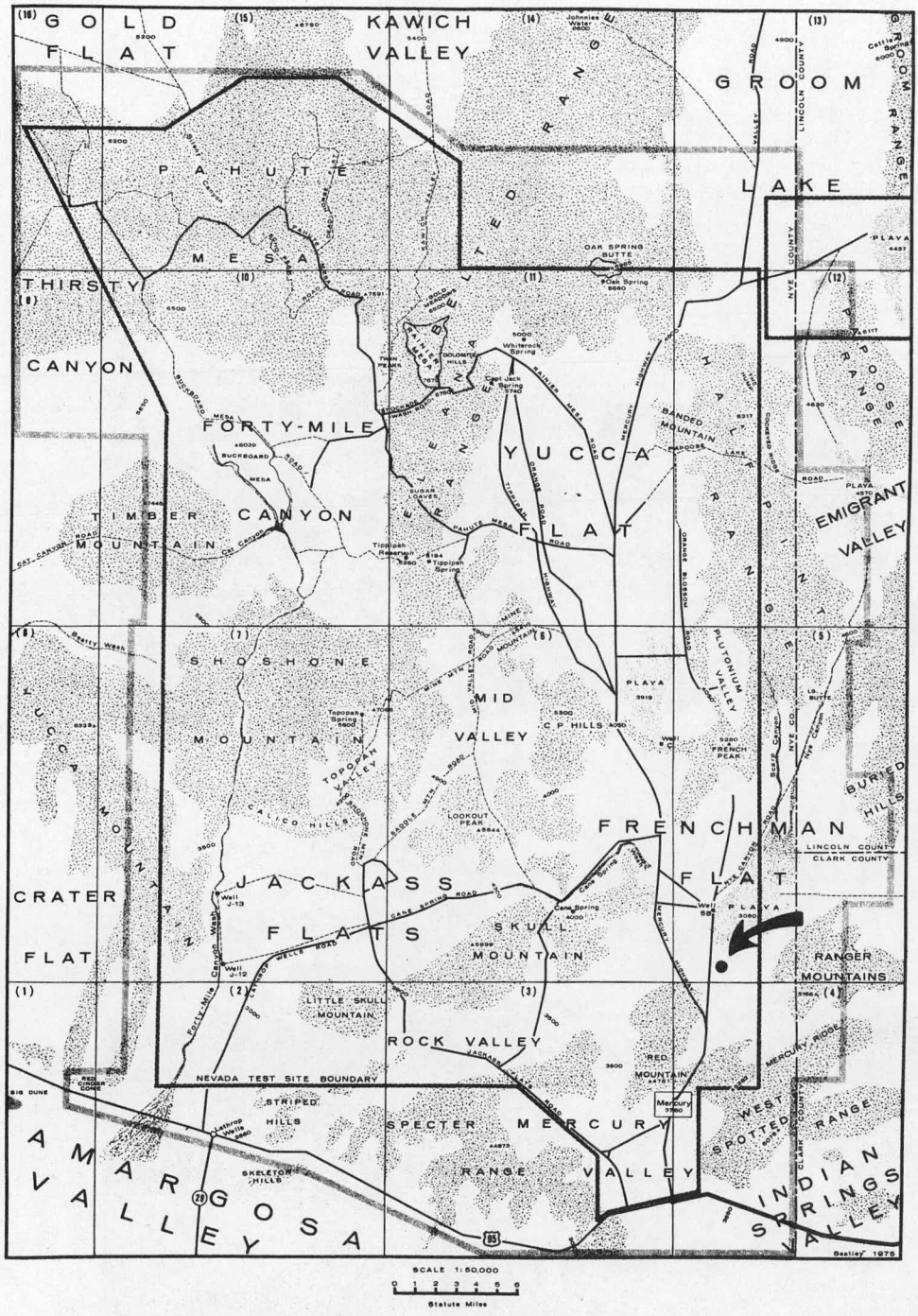
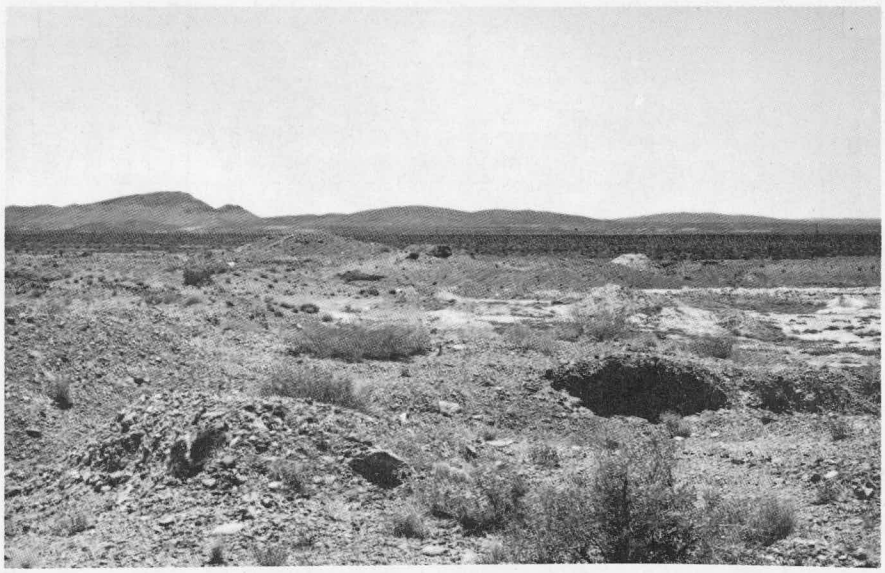


Fig. 11. Area of the Ripley & Barneby type collection of Astragalus nyensis, May 1941, Frenchman Flat, Nevada Test Site, Nye County, Nevada



Figs. 12 and 13. Gravel knoll area in southern Frenchman Flat, on which the type collection was made in 1941. Since the 1950's the site has been thoroughly disturbed by a gravel quarry operation (center of which is to the right of the photos), and Astragalus nyensis has not been found in the vicinity during the past 17 years of collecting in the area. Photos looking northwest toward Skull Mountain.

ASTRAGALUS PHOENIX Barneby

Figs. 14, 15, 16

Barneby, R. C. Madroño 20: 395-398. 1970

TYPE (NY): Cronquist 10657, 21 April 1966. On barren, alkaline, white clay slopes overlooking a dry wash at E end of Ash Meadows, Sec. 1 or 2, T18S, R50E; 2300 ft. Isotypes, BRY, RSA, UTC.

COLLECTIONS: All from Ash Meadows, e. Amargosa Valley, Nye County, Nevada.

6129 - Reveal 1429, 30 June 1968. In alkaline soils, Sec. 13, T18S, R50E, in Atriplex vegetation; plants forming rounded hummocks, not fl.; 2210 ft. (*NTS, NY)

6130 - Reveal 1434, 30 June 1968. On alkaline soils S of Point of Rocks Spg, E of Jackrabbit Spg, Sec. 18, T18S, R51E, in Atriplex vegetation; 2280 ft. (*NTS, NY(3))

8550 - Beatley, 21 May 1969. Common, heavy soils, within 1 mi N of Ash Meadows Rancho, central Ash Meadows, near Ash Meadows Rd, in Atriplex confertifolia vegetation; 2200 ft. (DS, *NTS, NY(2), RENO, RSA, UNLV)

10030 - Beatley, 15 April 1970. Locally common, Ash Meadows Rd ca 1-1¼ mi N of Rancho; plants forming low mounds; in Atriplex-Haplopappus acradenius vegetation; 2200 ft. (DS, *NTS, NY, RENO, RSA, UNLV)

10438 - P. & A. Munz, J. L. & A. Reveal, Beatley, 8 May 1970. Common, uplands between Point of Rocks Spg and Jackrabbit Spg, ne. Ash Meadows, in Atriplex confertifolia vegetation; 2200 ft. (DS, *NTS, NY, RENO)

12279 - Beatley & Reveal, 27 April 1971. Locally common, rolling hills SE of Rogers Spg, Sec. 14, R50E, T17S, in Atriplex confertifolia vegetation; 2300 ft. (DS, *NTS, NY, RENO, RSA, UNLV)

13250 - Beatley, 21 Sept 1971. Uncommon, cyns SW of "Collins Ranch" cabin, W of Ash Meadows Rd, 0.6 mi S of Devils Hole, n. Ash Meadows, in Atriplex-Haplopappus vegetation; coll. from caespitose plant 2 ft in diam., not fl.; 2300 ft. (*NTS)

OTHER COLLECTIONS: (Cited in Barneby, ibid, 1970)

- Purpus 6034 (POM), middle of summer, 1898. Ash Meadows.

- Roos & Roos 6143 (NY), 13 June 1954. With Enceliopsis nudicaulis and Distichlis stricta on dry hard, alkaline flats, Ash Meadows between Big Spring and Point of Rocks; 2280 ft.

CRITICAL HABITAT:

Known from a few scattered localities (principally 3 sites) on the uplands of the spring areas of northern and eastern Ash Meadows, this strict endemic of Ash Meadows is critically endangered by the Spring Meadows Farm operation and trampling by horses on open range. All sites collectively constitute the "critical habitat" of this species.

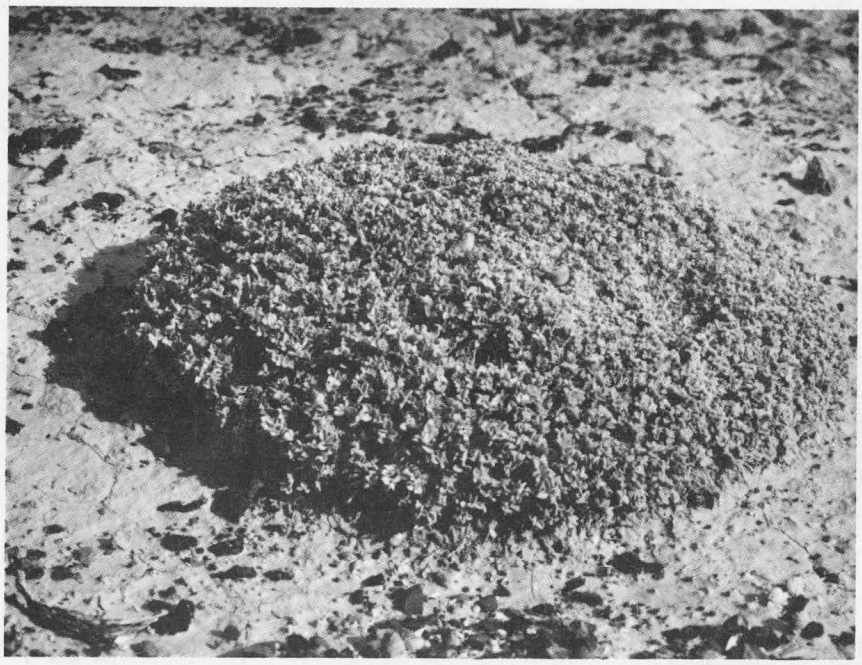


Fig. 14. Caespitose plant of Astragalus phoenix, ca 1 ft in diameter. Photo July 1976, on dissected uplands of "Collins Ranch" south of Devils Hole, northern Ash Meadows, Nye County, Nevada.

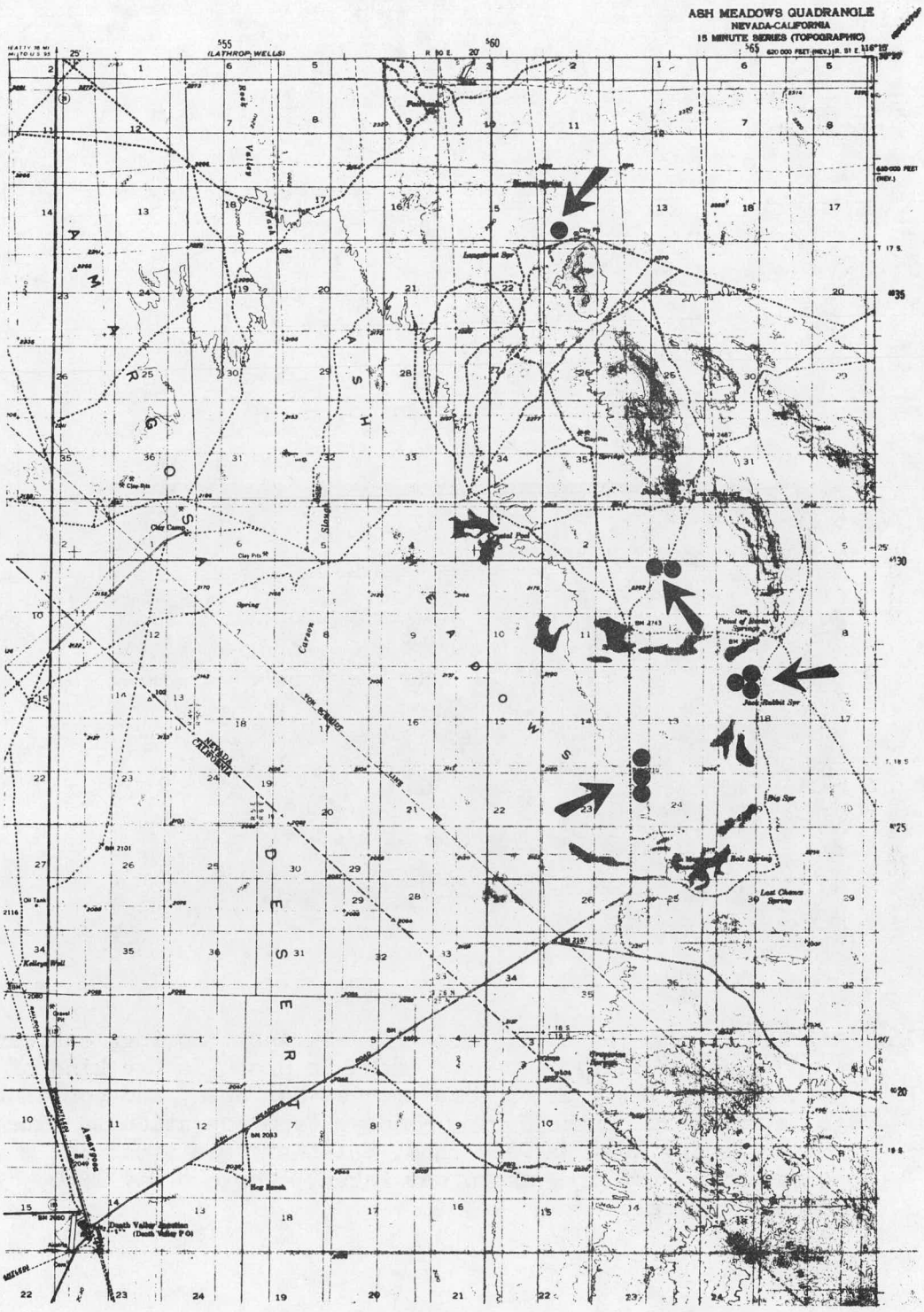


Fig. 15. Known areas of occurrence of Astragalus phoenix, uplands of spring areas of northern and eastern Ash Meadows, Nye County, Nevada.

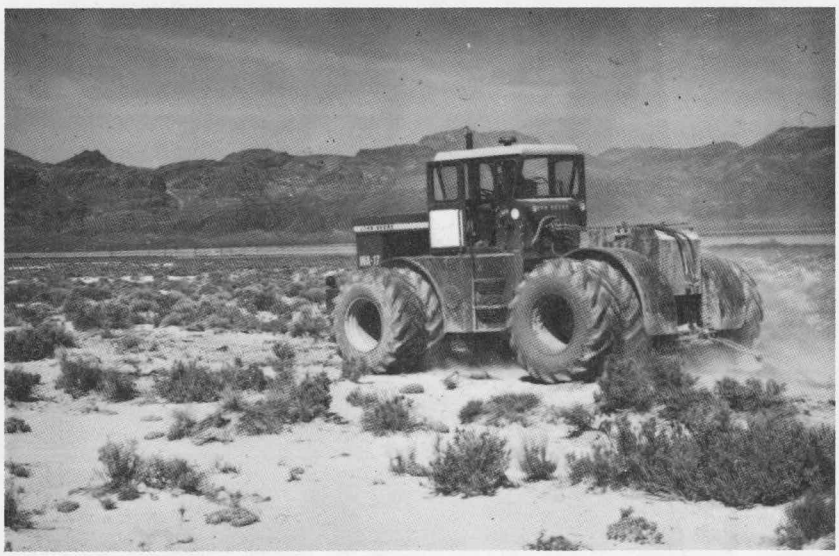


Fig. 16. Astragalus phoenix site, north of Jackrabbit Spring, eastern Ash Meadows, Nye County, Nevada. Shown in photo is the kind of critical danger to which this species has been, and continues to be, exposed by the Spring Meadows Farm operations. Site is not on Spring Meadows Farm land, but their equipment was moving across it at the time photo was taken. Photo 8 May 1970, by James L. Reveal.

CAMISSONIA MEGALANTHA (Munz) Raven

Figs. 17, 18, 19, 20, 21

Oenothera heterochroma S. Wats. var. megalantha Munz. Philip A. Munz, Leafl. West. Bot. 3: 52. 1941.
Oenothera megalantha (Munz) Raven. Peter H. Raven, Univ. Calif. Publ. Bot. 34: 111. 1962.
Camissonia megalantha (Munz) Raven. Peter H. Raven, Brittonia 16: 282. 1964.

TYPE (POM): Train 2358, 24 August 1938. Volcanic alkali soil, Cane Springs, Skull Mountains, Nye County, Nevada; elev. 4000 ft. Isotypes, ARIZ, CAS, DS.

COLLECTIONS: All from Nevada Test Site, Nye County, Nevada.

392 - Beatley, 13 June 1962. Cane Spring, in Atriplex canescens, W Frenchman Flat; 4000 ft. (NTS)

393 - Beatley & Kubo, 27 Oct 1961. Cane Spring, in Atriplex canescens, W Frenchman Flat; 4000 ft. (NTS(3 pts))

394 - Beatley, 16 Oct 1961. Cane Spring, in Atriplex canescens, W Frenchman Flat; 4000 ft. (NTS)

395 - Shields, 23 Oct 1959. Cane Spring, Frenchman Flat; 4000 ft. (NTS)

396 - Beatley, 30 May 1959. Cane Spring, in Atriplex canescens, W Frenchman Flat; 4000 ft. (NTS)

397 - Beatley, 14 Sept 1960. Cane Spring, in Atriplex canescens, W Frenchman Flat; 4000 ft. (NTS)

3511 - Beatley, 2 Oct 1965. Cane Spring, in Atriplex canescens, W Frenchman Flat; 4000 ft. 1965 population estimated 2000-3000 plants, avg. ht. 12-15 in., occasional ones 3 ft, rarely 4 ft, many 6-10 in.; on many local sites throughout the seepage area. (DS, NTS, *NTS(2), RENO, UNLV)

3946 - Beatley, 27 Sept 1966. Seepage slope, Cane Spring, W Frenchman Flat, in Atriplex canescens; 4000 ft. Population of 198 plants this year; mostly 1-4 ft tall, some 6 ft tall. (CAS(2), DS, *NTS(4 pts), NY, RENO, UNLV)

5119 - Beatley & Rasp, 11 Sept 1967. Cane Spring seepage slope, W Frenchman Flat, in Atriplex canescens; 4000 ft. 1967 population consisting of 43 plants, 21 within exclosure, 22 in scattered locations outside; plants mostly 2-5 ft tall. (DS, *NTS)

5591 - (Seedlings) Beatley, Dainty, Goodall, & Whittaker, 11 May 1968. Cane Spring area, W Frenchman Flat, in Atriplex canescens; 4000 ft. Seedlings scarce this year. (NTS)

5611 - Beatley, 7 May 1968. Seedlings and last year's stalks rather common on whitish soils below and SW of French Peak, n. Frenchman Flat, in Atriplex confertifolia; 4200 ft. (NTS)

6758 - Reveal & Beatley 2139, 16 Sept 1968. Seepage slope, Cane Spring, W Frenchman Flat, in Atriplex canescens; 4000 ft. 1968 population ca 350 plants, from a few inches to 5 ft tall, most commonly 2-3 ft; corollas lavender. (DS(32), *NTS(2 pts))

7025 - Reveal & Beatley 2146, 16 Sept 1968. Scattered (ca 25 plants seen), light-colored volcanic soils below (SW of) French Peak and NE of Puddle Peak, in Atriplex confertifolia; 4200 ft. (DS(4), *NTS)

8253 - (Seedlings) Beatley, 4 May 1969. Seedlings common in lower cyns below French Peak, n. Frenchman Flat, buff-colored bedrock and talus, in Atriplex hymenelytra; 4000 ft. (NTS)

9701 - Beatley, 21 Sept 1969. Abundant this year, commonly of intermediate size (1-1.5 m tall), seepage slopes above and below Cane Spring, base of N face of Skull Mtn, W Frenchman Flat, in Atriplex canescens; 4000 ft. Plants highly viscid, petals deep lavender. (*NTS, NY, RENO, RSA(7), UNLV, UTC)

9702 - Beatley, 21 Sept 1969. Common, cyns below French Peak, coll. from disturbed light tuff talus near explosives dump at end of French Peak Rd, SW of French Peak, NE Frenchman Flat, in Atriplex confertifolia; 4400 ft. Fls. deep lavender, plants highly viscid. (DS, *NTS, NY, RENO, RSA(13), UNLV, UTC)

12851 - Beatley, 23 June 1971. Common on lower cyn walls and washes of steep S face of French Peak mtn, light-brown volcanic gravels, in Atriplex hymenelytra; 4000 ft. Fls. lavender-pink, petals 5-10 mm long; many plants in early fl., most still vegetative; plants extremely viscid. (DS, MO, *NTS, NY, RENO, RSA(2), UNLV)

13220 - Beatley, 6 Sept 1971. Ca 250-300 plants, about equally distributed above and below exclosure, with no plants this year in exclosure, seepage slope vicinity Cane Spring, W Frenchman Flat, in Atriplex canescens; 4000 ft. Population was zero in 1970. (MO, *NTS)

16013 - Williams 244, 17 August 1976. Very abundant in sandy soils between shrubs with open exposure adjacent to Cane Spg, W Frenchman Flat; 4000 ft. (NTS)

TAXONOMIC CONSIDERATIONS:

As indicated above, this taxon has a history of first being recognized (1941) as a variety of Oenothera heterochroma by Philip A. Munz, who described the Percy Train collection, and later (1962) accorded the status of species by Peter H. Raven after seeing the populations in the field at Cane Spring, and still later making the transfer to the genus Camissonia (1964). The taxon is closely related to Camissonia (Oenothera) heterochroma, described by Sereno Watson in 1882 (Proc. Amer. Acad. 17: 373) from an 1881 collection by W. H. Shockley from the Candelaria area of Mineral County, Nevada (type, GH).

In Raven's 1962 systematic treatment, in addition to elevating megalantha to species status, he accepted the distinguishing of var. monoensis by Munz (Aliso 2: 84. 1949) from typical heterochroma, but in his 1969 monograph (A revision of the genus Camissonia (Onagraceae). Contr. U. S. Nat. Herb. Vol. 37, Pt. 5, p. 232) he recombined the typical and monoensis phases into a single taxon, C. heterochroma, while still recognizing C. megalantha as a species. At the time of the monograph only one collection of heterochroma (from east Forty-Mile Canyon on the Test Site) had been made in the region covered by Figure 1; subsequently many other collections were made, giving a much more detailed record of the occurrence and genetic variation of members of this complex in this region, an understanding of which appears critical to an evaluation of the taxa of the whole complex.

The taxonomic problem is a complex one, especially if herbarium specimens must be the principal or sole basis for judgments. Although Raven is inclined now toward considering all populations as belonging to a single polymorphic species (personal communications, December 1976), he has delegated to the author further studies and taxonomic judgments of the whole complex. These will be based on her field understandings and collections in the region, and the collections by others within the known range of the potential entities involved. Pending the author's critical review of all materials, tentatively three taxonomic entities are again recognized:

(1) The megalantha phase, known only from near Cane Spring on the bajada below the north face of central Skull Mountain, west Frenchman Flat, and the large populations from canyons and especially along washes of French Peak mountain at the south end of the Halfpint Range in northern Frenchman Flat; both areas are at the northern edge of the Mojave Desert on the Nevada Test Site, and occur from 4000 to 4500 ft. elevation. A Utah collection is excluded because it was from a disturbed roadside, where species from other regions commonly occur as transients. These populations are distinguishable from the other phases by the generally taller plants (height to 2+ m, but varying with the season), stouter stems and branches, larger and thicker leaves, and especially the conspicuous glandular-pubescence and viscidness of the plants and the large, always lavender, showy petals (most commonly 1 cm long), long hypanthium (ca 7 mm) and sepals (5-6 mm). Although occasional small plants may begin to flower in early summer, these populations are autumn-flowering (September-October). The populations are associated with Atriplex confertifolia, A. canescens, or A. hymenelytra vegetation.

(2) The heterochroma phase, also restricted to the Mojave Desert, includes populations below the south face of Skull Mountain on the Test Site, southward from Oasis Valley to Ash Meadows, and lower elevations in Inyo County, California. It occurs especially in Larrea vegetation. Plants are relatively small, with slender stems and smaller leaves, are usually not notably glandular-pubescent or strongly viscid; petals are less (usually much less) than 5 mm long, vary from deep lavender to almost white, and the hypanthium and sepals are only a few millimeters long. The plants are early summer-flowering (mostly June), and are associated with bases of low cliffs or other upland sites from 2200 to 4500 ft.

(3) The monoensis phase is the phase of the Great Basin Desert areas of the region, occurring in Atriplex canescens, Artemisia, and Artemisia-Pinyon-Juniper, from 5000 to 7000 ft in central-southern Nevada. Stems are

essentially glabrous and often glaucous, the plants are small as in the heterochroma phase, the petals are only a few millimeters long, and flowering peak is in July. This is the widely distributed phase of the region.

In the transition desert of eastern Yucca Flat (Area 7), a persistent population at 4200 ft combines the smooth, glaucous, and more slender stems of monoensis with the relatively large corollas (to 10 mm) and the September flowering habit of megalantha. Thirsty Canyon populations west of the Test Site, at 4500 ft, combine the characters of heterochroma and monoensis; and the Skull Mountain collections of heterochroma variously reflect the influence of the nearby megalantha populations. It is expected that the taxonomic problems within the whole complex will be resolvable when the populations in southern Nevada, occurring within the corridor of transition between the Mojave and Great Basin deserts, are viewed with respect to overlapping ranges of outcrossing taxa in an area of great variability in lithology, soils, and climates.

Whether the taxon is Camissonia megalantha or a variety of C. heterochroma is immaterial to its status as an Endangered Species, and until the critical review is completed and the conclusions made available in the literature, it remains C. megalantha for purposes of citation as an Endangered Species on the Nevada Test Site.

CRITICAL HABITAT:

Camissonia megalantha is associated with soils derived from light-colored volcanic rocks. It is restricted to otherwise bare soil surfaces, i. e., in the open between shrubs. In the French Peak area it occurs most commonly along the canyon washes, and at Cane Spring in or nearby the seepage area marked by the stand of Atriplex canescens. A fence exclosure was erected in 1962 -- through the efforts of Dr. H. D. Bruner and Mr. L. J. Deal of the Division of Biology and Medicine, AEC -- around a portion of the excavation in the spring area where plants had been the most abundant to that time. This was an effort to protect the species from trampling and picking of the showy flowers by the then frequent visitors to Cane Spring, but it resulted in the rapid invasion of the bare soil areas by other plant species, and today C. megalantha occurs primarily on sites outside the exclosure where the soil surface remains bare.

The "critical habitat" is where the two population segments occur: (1) In the vicinity of Cane Spring, near the base of the north side of central Skull Mountain, in west Frenchman Flat, and (2) canyons of the south and west sides of French Peak (Massachusetts) mtn, in northern Frenchman Flat.

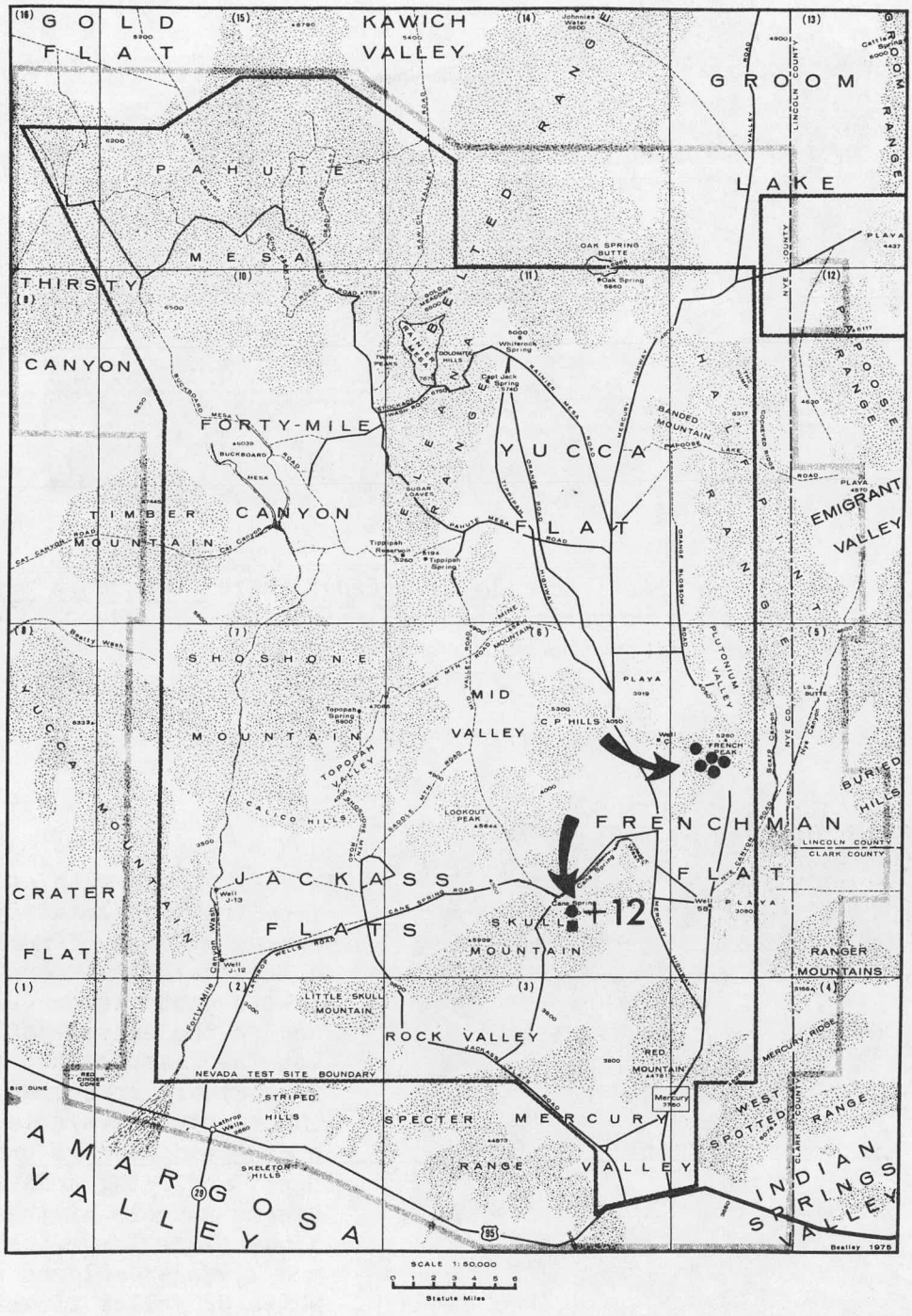


Fig. 17. Areas of known occurrence (and collections) of Camissonia megalantha, at Cane Spring and in canyons below French Peak, Frenchman Flat, Nevada Test Site, Nye County, Nevada

Fig. 18. Cane Spring area (vicinity of trees), where Camissonia megalantha populations have varied seasonally from none to around 3000 plants over a 14-year period of documentation.

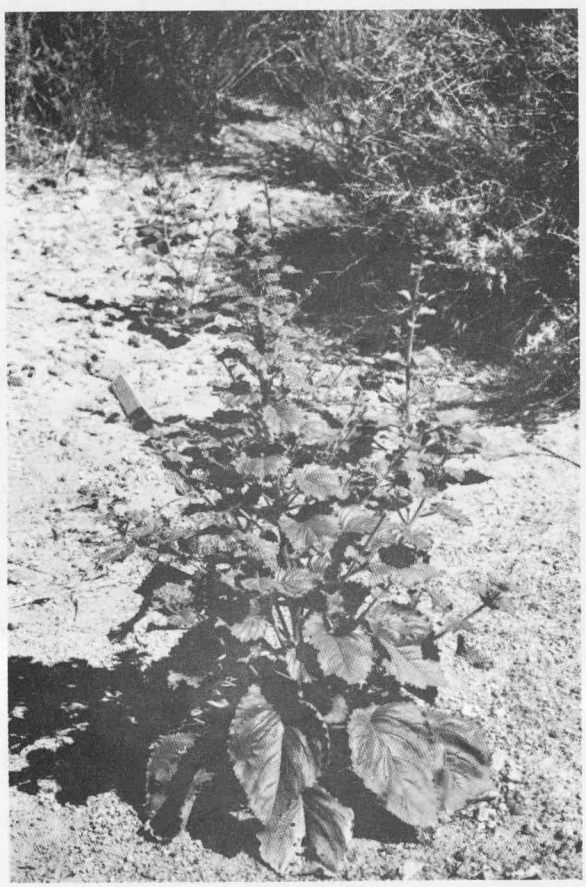


Fig. 19. Known with certainty from the type locality at Cane Spring at base of north slope of central Skull Mountain (where photo taken July 1976), and in the canyons of the mountain mass below French Peak in northern Frenchman Flat. The species germinates in the spring and flowers primarily in Sept. and Oct., unlike other desert annuals of the region. Flowers are large, conspicuous, and lavender-colored unlike the white or yellow flowers of most other Evening-Primroses.

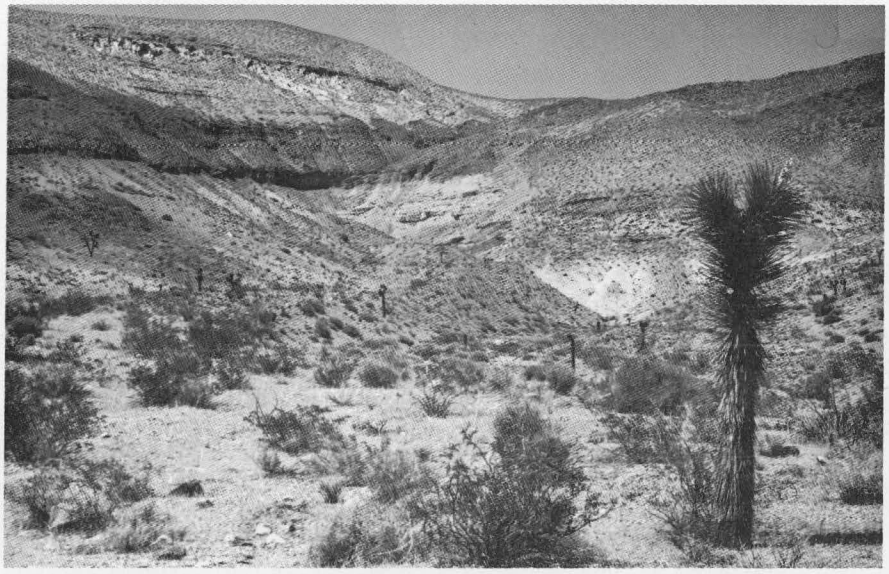


Fig. 20. Volcanic mountains capped by French Peak, in a number of canyons of which there are various size populations of Camissonia megalantha and Phacelia beatleyae. Photo looking north toward south face of mountains. The whole mountain area is recommended to become a "critical habitat", because of these two species and a number of others that are very rare and/or Threatened (including Astragalus funereus). Atriplex hymenelytra (Desert Holly) reaches its northern limits in the lower canyons here.

Fig. 21. Barricade below east face of the volcanic mountain mass below French Peak, indicating nature of present land use along this road. At the end of the road, on the highly disturbed site of an ammunition dump, was the largest population of Camissonia megalantha known prior to 1976.

CENTAURIUM NAMOPHILUM Reveal, Broome & Beatley

Figs. 22, 23

Reveal, James L., C. Rose Broome, and Janice C. Beatley. Bull. Torr. Botan. Club 100: 353-356. 1973.

TYPE (US): Beatley & Reveal 13447, 25 July 1972. Moist soil near spring, "Collins Ranch", 0.6 mi S of Devils Hole, Ash Meadows Rd, n. Ash Meadows, SW¼ Sec. 1, T18S, R50E, Amargosa Valley drainage, Distichlis meadow in Ash-Screwbean; 2300 ft. Isotypes, ARIZ, BRY, CAS, COLO, DUKE, GH, K, MICH, MO, *NTS(3), NY, OKL, P, RM, RSA, SMU, TEX, UC, UTC, WTU, and (13) to be distributed from US.

COLLECTIONS: All from Ash Meadows, Nye County, Nevada

3330 - Beatley, 22 July 1965. Scattered at edge of sedge meadow, e. Ash Meadows; 2300 ft. (DS, *NTS)

6057 - Reveal 1422, 30 June 1968. Small seepage area, 1 mi SW of Devils Hole, Sec. 1, T18S, R50E, in Carex-Juncus; 2300 ft. (DS(12), *NTS, NY, RENO, UTC)

6919 - Reveal 1623, 21 July 1968. Springs SE of Longstreet Spg, Sec. 23, T17S, R50E, in Carex-Juncus; 2340 ft. (*NTS)

7304 - Reveal 1959, 29 August 1968. Big Spring, Sec. 19, T18S, R51E, in Haplopappus-Distichlis; 2240 ft. (*NTS)

9328 - Beatley, 14 July 1969. Common along banks of stream through spring-fed area NW of Devils Hole, Sec. 35, R50E, T17S, in Ash-Screwbean-Baccharis; 2200 ft. (*NTS, NY, RSA)

11336 - Beatley, 8 July 1970. W of abandoned (Collins) ranch S of Devils Hole, Ash Meadows Rd, in Distichlis-Haplopappus acradenius; 2300 ft. (DS, *NTS, RENO, RSA)

11741 - Beatley, 14 Sept 1970. Common, all as small plants, heavy soils on uplands E of first ranch (Collins) S of Devils Hole, Ash Meadows Rd, n. Ash Meadows, in Atriplex; 2300 ft. (DS, *NTS(2), NY, RENO, RSA, UNLV, US)

11905 - Beatley, 8 October 1970. Occasional plants still in full fl., uplands vicinity of first ranch (Collins) S of Devils Hole, Ash Meadows Rd, n. Ash Meadows, in Atriplex-Haplopappus; 2300 ft. (*NTS, RENO, RSA)

13271 - Beatley, 22 Sept 1971. Common, salt-encrusted soils, 0.2 mi S of Big Spring, e. Ash Meadows, in Atriplex-Distichlis; 2200 ft. (*NTS, US)

13447 - Beatley & Reveal, 25 July 1972 (Type collection)

13448 - Beatley & Anderson, 3 Oct 1972. "Collins Ranch", 0.6 mi S of Devils Hole, Ash Meadows Rd, ne. Ash Meadows, in Ash-Screwbean; common on light-colored, heavy-textured soils below spring, occasional fls., plants in fr.; 2300 ft. (DUKE(3), *NTS)

OTHER COLLECTIONS:

- Coville & Funston 275, 7 Feb 1891. Bistings Springs Valley, Inyo County, Calif. (US)

- Parish 10035, 17 May 1915. Furnace Creek, Death Valley, Inyo Co., Calif. (UC)

- Roos & Roos 4927, 7 August 1950. Tecopa, Inyo Co., Calif. (RSA, UC)

CRITICAL HABITAT:

This species, restricted to moist to wet soils in spring areas of northern and eastern Ash Meadows, is critically endangered by the Spring Meadows Farm operations, which have destroyed most of the habitat in Ash Meadows in the past 8 years.

Fig. 22. Centaurium namophilum, near stream from spring, "Collins Ranch", 0.6 mi S of Devils Hole, northeastern Ash Meadows. Photo July 1976.

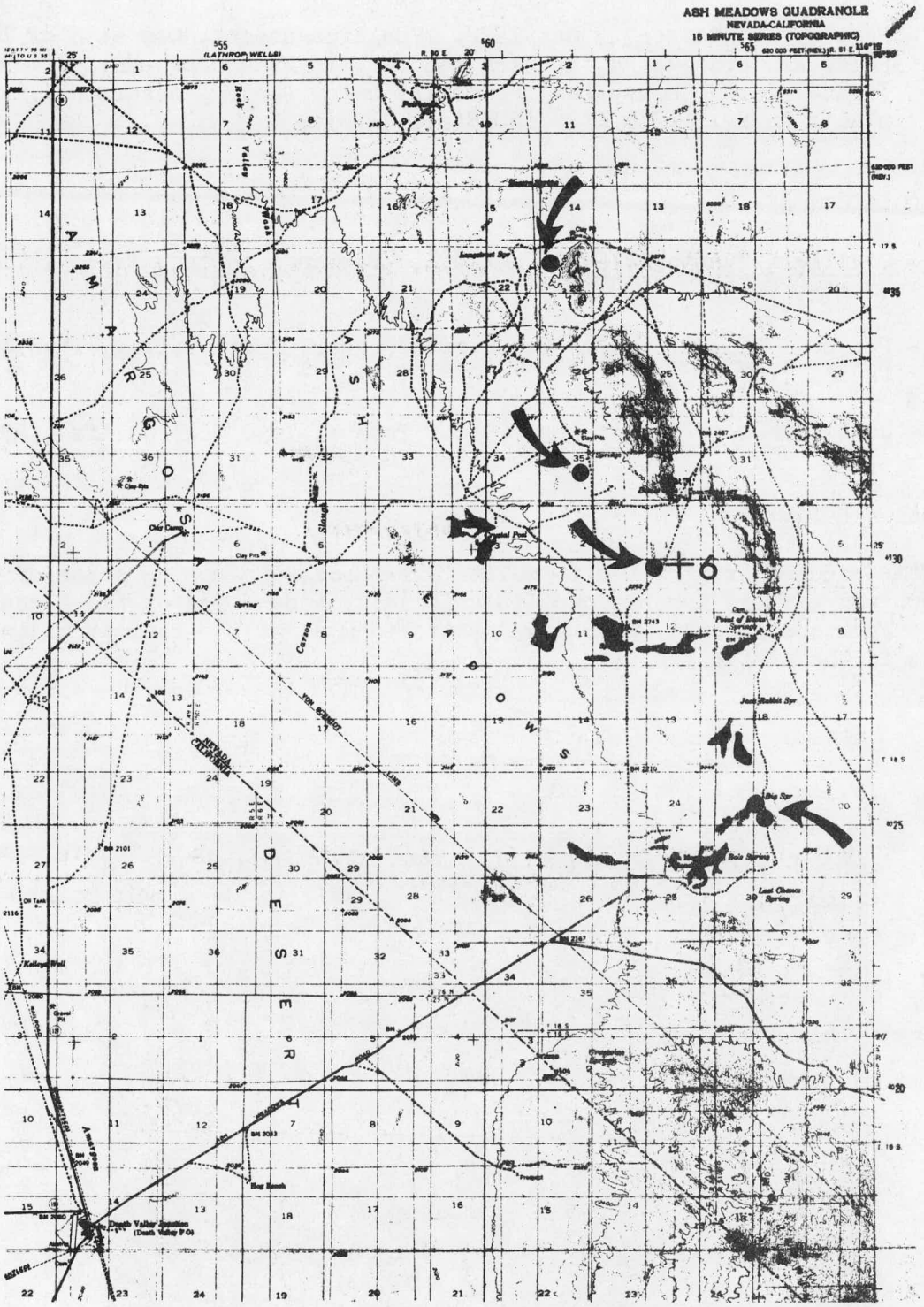


Fig. 23. Known sites of occurrence of Centaurium namophilum in spring areas of northern and eastern Ash Meadows, Nye County, Nevada

FRASERA PAHUTENSIS Reveal

Figs. 24, 25, 26, 27, 28, 29, 30

Reveal, James L. Bull. Torr. Botan. Club 98: 107-108. 1971.

TYPE (US): Beatley & Reveal 10898, 4 June 1970. Common, around 1 mi E of Pahute Mesa Rd, on Rd 19-01, at headwaters of Lamb's Canyon, S rim of Pahute Mesa, s. Kawich Valley drainage, in Artemisia-Pinyon-Juniper vegetation; 7300 ft. Isotypes, DS, *NTS, NY, RENO, UTC, and (17) out of US.

COLLECTIONS: All from Nevada Test Site, Nye County, Nevada.

10600 - Beatley, 19 May 1970. Common back of S rim of Pahute Mesa, ca ½ mi E of Pahute Mesa Rd on abandoned Rd 19-01 to Back Rainier Mesa Rd, s. Kawich Valley drainage, Artemisia-Pinyon-Juniper vegetation; in early fl.; 7200 ft. (DS, *NTS, RENO, RSA)

10700 - Beatley & Reveal, 30 May 1970. Common near S rim of Pahute Mesa, Rd 19-01 ca 1 mi E of Pahute Mesa Rd, s. Kawich Valley drainage, in Artemisia-Pinyon-Juniper; 7200 ft. (*NTS, (9) out of US)

10898 - Beatley & Reveal, 4 June 1970. (Type collection)

11320 - Beatley, 7 July 1970. From same population as colls. of 19 May, 30 May, and 4 June 1970; 7200-7300 ft. Inflorescences, where present, mostly deer-grazed. (NTS, *NTS, RENO, RSA, UNLV)

- Reveal, Beatley & Fisher 4578, 7 July 1976. S rim of Pahute Mesa near 19-01 Rd, 3.6 mi E of Pahute Mesa Rd, on low flat area in Artemisia-Pinyon-Juniper; 7300 ft. (NY, US, UTC, and (3) out of US)

- Reveal, Beatley & Fisher 4579, 7 July 1976. S rim of Pahute Mesa near 19-01 Rd, 4.5 mi E of Pahute Mesa Rd, on a low ridge of volcanic rocks, in Artemisia-Pinyon-Juniper; 7200 ft. (NY, US, UTC, and (4) out of US)

16014 - Williams 229, 12 July 1976. Along dirt road to H&N Vulture marker, 2.0 mi from jnct with Rd 19-01, SE edge of Pahute Mesa, s. Kawich Valley drainage, in Artemisia-Pinyon-Juniper; 7200 ft. (NTS, and (1))

16015 - Williams 177, 9 June 1976. Off NE side of Rd 19-01, 1.3 mi E of jnct with Pahute Mesa Rd near SE rim of Pahute Mesa, s. Kawich Valley drainage, in Artemisia-Pinyon-Juniper; 7200 ft. (NTS)

CRITICAL HABITAT:

This recently described species is known only from the southeast rim area of Pahute Mesa, Nevada Test Site, where it occurs over perhaps a hundred or more acres, in varying densities from site to site, and often with large and dense populations of Trifolium andersonii ssp. beatleyae, also an Endangered Species. The entire area is the "critical habitat".

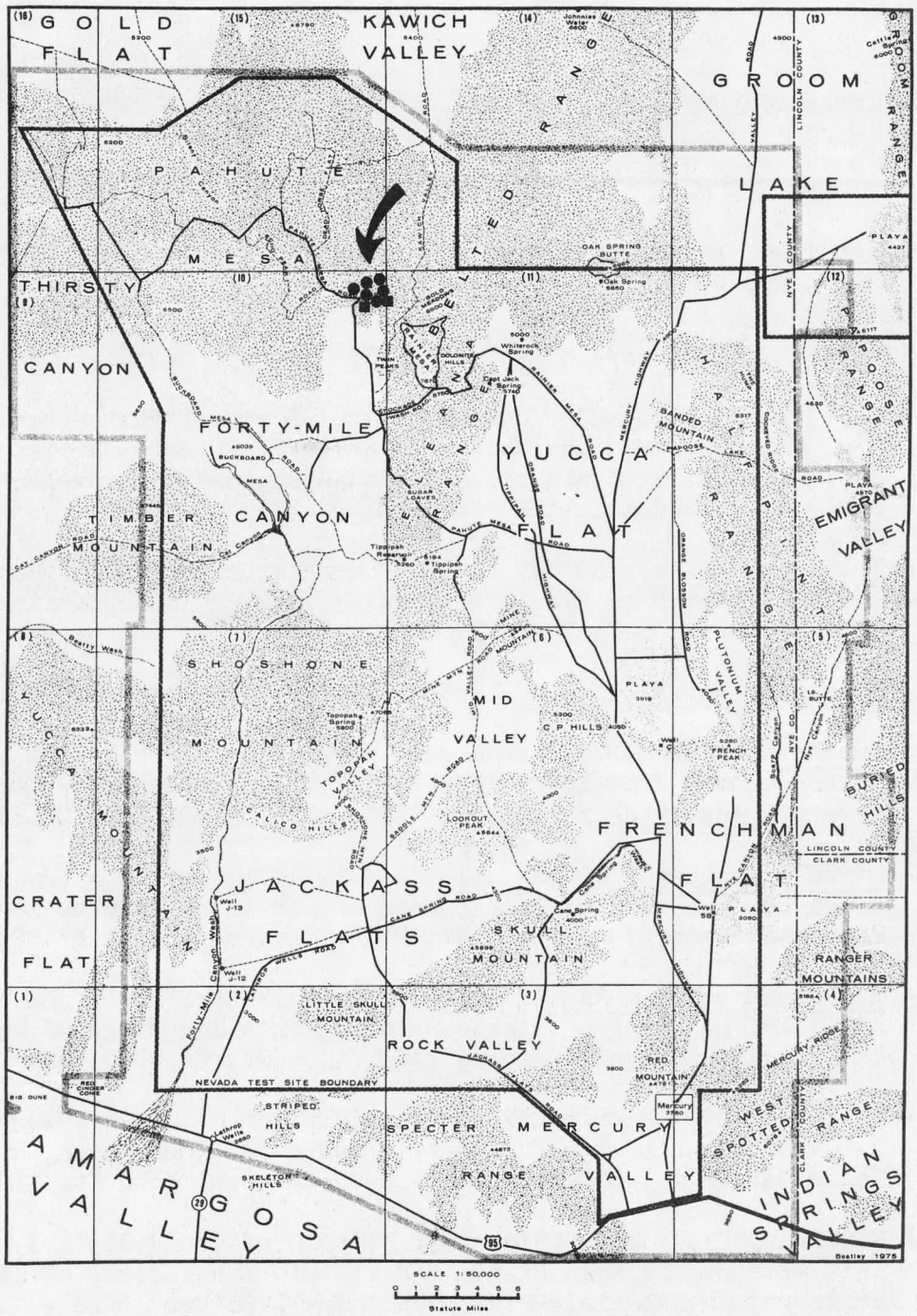


Fig. 24. Area of occurrence (and all collections) of Frasera pahutensis, near and back of southeast rim of Pahute Mesa, Nevada Test Site, Nye County, Nevada

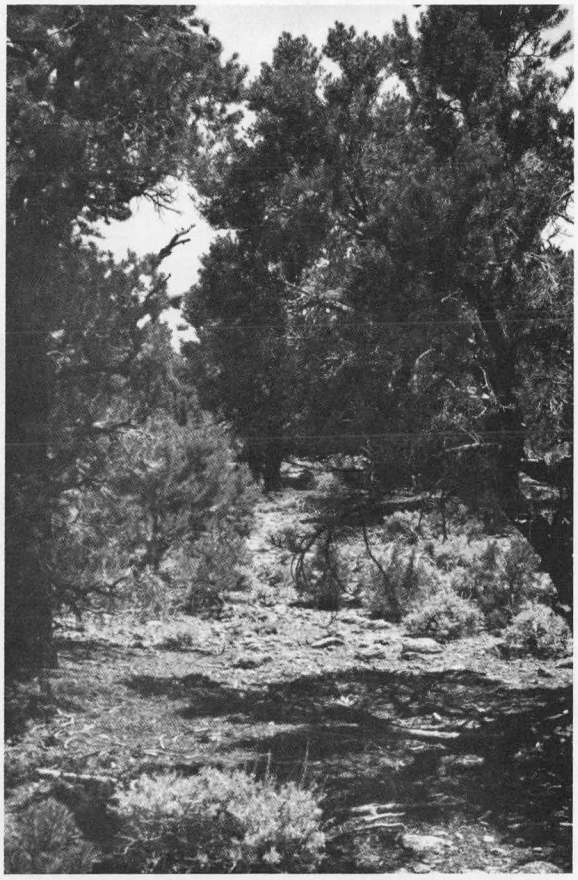


Fig. 25 (right). Site of type collection of Frasera pahutensis, near southeast rim of Pahute Mesa, along Rd 19-01. Plants occur over many acres to the east. Species is known only from this area.

Fig. 26 (below). Plants (vegetative) of Frasera pahutensis at site of type collection.

Fig. 27. Southeast rim of Pahute Mesa, looking east from near Rd 19-01 area of "critical habitat" of Frasera pahutensis and Trifolium andersonii ssp. beatleyae.

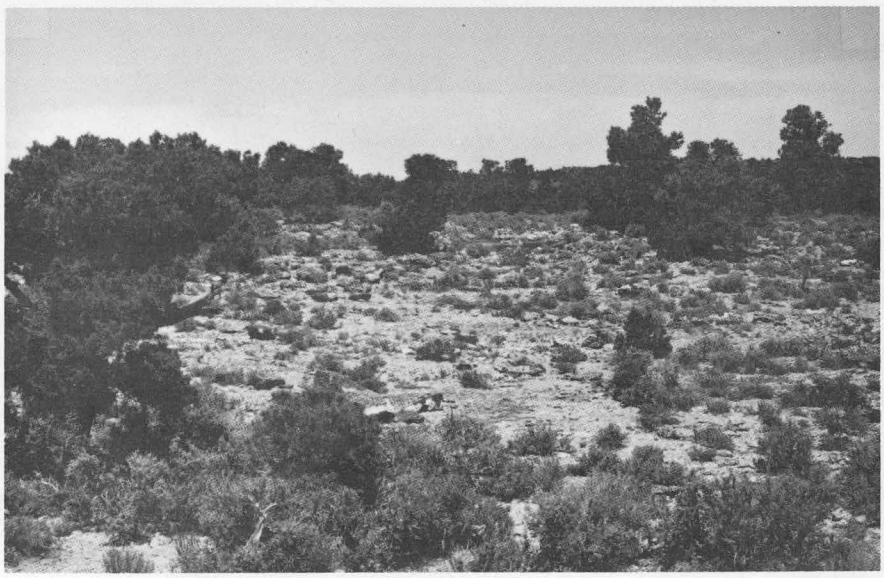


Fig. 28. Typical site of Frasera pahutensis, within the "critical habitat" of the southeast rim of Pahute Mesa.

Figs. 29 and 30. "Critical habitat" of Frasera pahutensis and Trifolium andersonii ssp. beatleyae, through which a new road was bulldozed this past spring (1976), destroying the Pinyon Pine trees and other vegetation along its route. This road, which leads to "Sandia No. 12", is around 2 mi long, and the first half-mile northeast from 19-01 Rd is through the "heart" of the Frasera and Trifolium populations of highest density. Such destruction -- in this case, for a road likely to be only occasionally, if ever, used again -- will not again be permissible when the acreage back of the southeast rim of Pahute Mesa is designated a "critical habitat".

GALIUM HILENDIAE Demp. & Ehrend.
ssp. KINGSTONENSE (Demp.) Demp. & Ehrend.

Figs. 31, 32

Galium munzii Hilend & Howell var. kingstonense Demp. Lauramay T. Dempster, Brittonia 10: 190-192. 1958.
Galium hilendiae Demp. & Ehrend. ssp. kingstonense (Demp.) Demp. & Ehrend. Lauramay T. Dempster and Friedrich Ehrendorfer, Brittonia 17: 311. 1965.

TYPE (UC): Alexander & Kellogg 2358a, middle June, 1941. SW of Tecopa Pass (i. e., the pass just N of Kingston Peak), Kingston Range, e. San Bernardino Co., Calif. Isotypes, CAS, GH, WTU.

Additional collections cited (UC): Alexander & Kellogg 2358, spur of canyon SE of Tecopa Pass; Dempster, Bacigalupi & Robbins, 1018, rocky gully S of the pass 4 mi due N of Kingston Peak.

In the 1965 publication, Dempster describes its distribution and habitat as "Kingston Mts., San Bernardino-Inyo Cos., Calif. Among granite boulders and cobbles of ravines and gullies, north slopes, 5500-6500 ft; with pinyon pine" (p. 312).

COLLECTIONS: Nevada Test Site, Nye County, Nevada.

4683 - Bostick, 20 July 1967. Under Rhus on loose scree high up on cliff at head of Butte Wash, NE Yucca Flat below Oak Spring Butte of S end of Belted Range, in Artemisia-Pinyon-Juniper; 5600 ft. (*NTS(2) both annotated by L. T. Dempster 1968, NY, UC, UTC; and as G. munzii, DS(2), RENO)

16012 - Williams & Rhoads 248, 8 Sept 1976. On steep talus slopes, 0.2 mi N of Tub Spring at SE base of Oak Spring Butte, S end of Belted Range, in Artemisia-Pinyon; 5300 ft. (NTS, and (3)). To be confirmed by L. T. Dempster.

CRITICAL HABITAT:

This subspecies is known only from the Kingston Range in eastern San Bernardino County, Calif., and -- ca 100 mi almost due N of the Kingston Range -- along the cliffs below Oak Spring Butte of the Belted Range on the Nevada Test Site. It was cited in the Dept. of Interior's "Threatened or Endangered Fauna or Flora", Federal Register, July 1, 1975, as an Endangered Species in California (p. 27836). Although our 1967 Test Site specimens had been reviewed and annotated by the monographer in 1968, and the duplicates distributed by 1968, the subspecies was omitted from the list of Endangered Species for the State of Nevada, and hence was also omitted from the discussion of Endangered and Threatened Species on the Test Site in Beatley (Vascular plants of the Nevada Test Site and central-southern Nevada. ERDA. 1976. p. 74-76). In the "Endangered and Threatened Species - Plants", Federal Register, June 16, 1976, it appears in the family Rubiaceae as Endangered in its entire range (p. 24562).

All of the massive volcanic cliffs and cliff faces of Oak Spring Butte, and the cliff bases, cliff tops, and washes nearby, at the south end of the Belted Range in northern Yucca Flat, are the "critical habitat" of this subspecies on the Nevada Test Site.

Fig. 31. Galium hilendiae ssp. kingstonense occurs on or at the base of these massive white volcanic cliffs below Oak Spring Butte, at the south end of the Belted Range, northern Yucca Flat. It is known elsewhere only in the Kingston Range, eastern San Bernardino Co., Calif., ca 100 mi to the south.

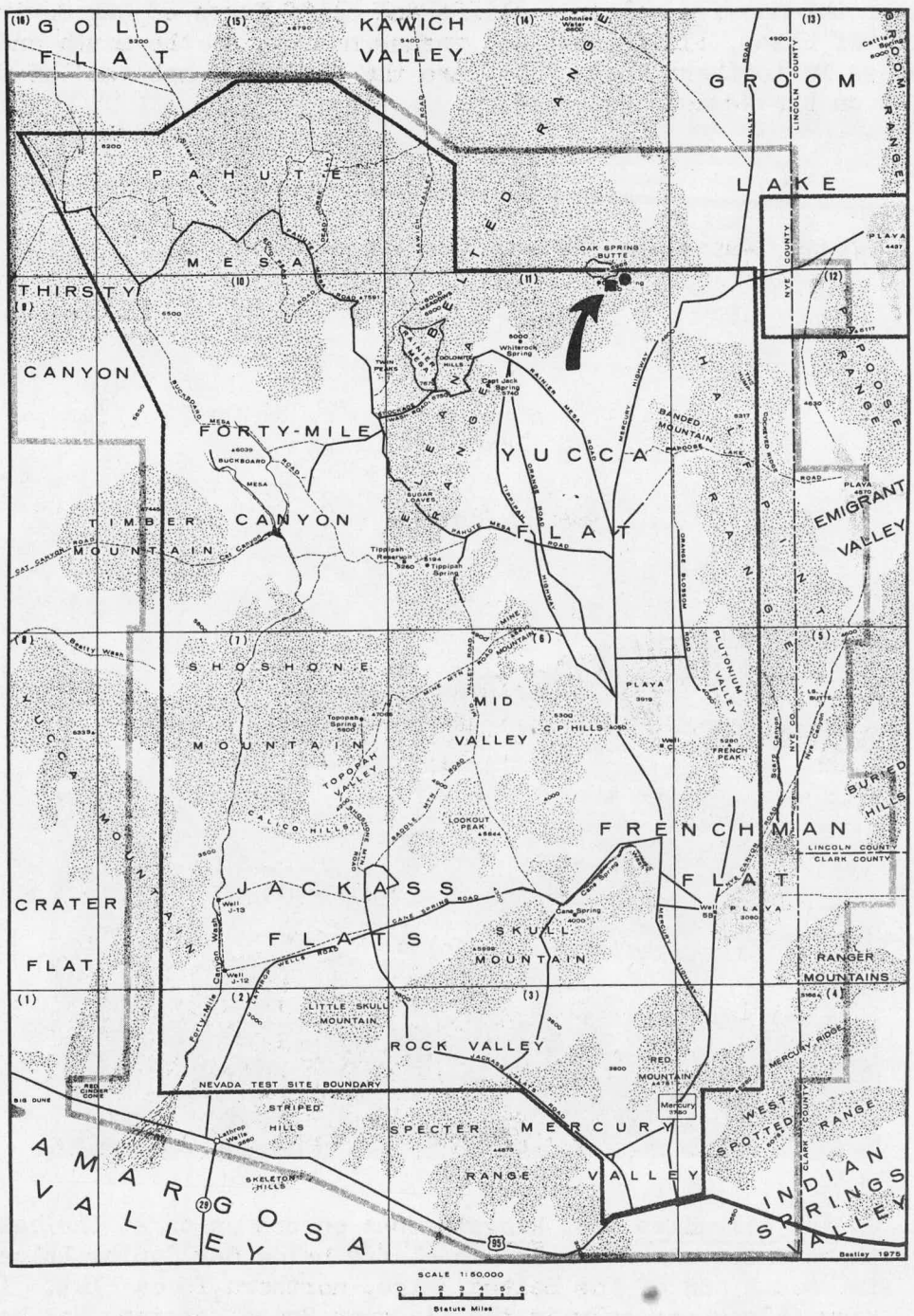


Fig. 32. Area of occurrence (and collections) of Galium hilendiae ssp. kingstonense, cliffs below southeastern Oak Spring Butte, n. Yucca Flat at s. end of Belted Range, Nevada Test Site, Nye County, Nevada

GRINDELIA FRAXINO-PRATENSIS Reveal & Beatley

Figs. 33, 34

Reveal, James L. and Janice C. Beatley. Bull. Torr. Botan. Club 98: 332-335. 1971

TYPE (US): Reveal & Holmgren 1887, 21 August 1968. Ash Meadows, in Distichlis meadow along Ash Meadows Rd between Devils Hole and Ash Meadows Lodge, 0.8 airline mi NW of Lodge, SE½ Sec. 23, T18S, R50E; 2160 ft. Isotypes, *NTS, (34) out of US.

COLLECTIONS: All from Ash Meadows, Nye County, Nevada, or near Nye County, Nevada/Inyo County, Calif., boundary.

3310 - Beatley, 22 July 1965. E. Ash Meadows, along Ash Meadows Rd N of Ranch; 2200 ft. (*NTS, RSA, US)

6061 - Reveal 1431, 30 June 1968. N of a large Carex-Juncus meadow along Ash Meadows Rd, Sec. 23, T18S, R50E; 2190 ft. (NTS, (4) from US)

6453 - Reveal 1536, 13 July 1968. 0.2 mi W of Spring Meadows Farm, NW of Crystal Pool, Sec. 4, T18S, R50E, in Atriplex; 2160 ft. (NTS, (6) from US)

6790 - Reveal & Holmgren 1887, 21 August 1968. (Type collection)

6968 - Reveal 2107, 15 Sept 1968. Large alkaline flat W of Ash Meadows Rd, NW of Ash Meadows Lodge, Sec. 14, T18S, R50E, in Haplopappus-Chrysothamnus; 2180 ft. (*NTS, (10) from US)

7224 - Beatley, 20 Oct 1968. Abundant locally in Distichlis meadow along Ash Meadows Rd, on saturated soil adjacent to standing water, 0.5 mi N of Lodge turnoff; plants mostly ca 1 m tall; 2200 ft. (*NTS, (8) from US)

9005 - Beatley, 17 June 1969. Locally common, wet sites N of Ranch, Ash Meadows Rd, cent.-e. Ash Meadows, in Distichlis; 2200 ft. (*NTS, NY)

9322 - Beatley, 14 July 1969. Common, wet meadow at edge of Ash-Baccharis, large spring-fed area NW of Devils Hole, Sec. 35, R50E, T17S. (*NTS)

9771 - Beatley, 11 Oct 1969. Common weed of wet Distichlis meadows and disturbed clay soils, Spring Meadows Farm (former Carson Slough area), w. Ash Meadows; coll. from Ash Meadows Rd to Rt 29, along new road near E boundary of Farm; 2200 ft. (*NTS, (4) from NY)

11820 - Beatley, 8 Oct 1970. Abundant, as a weed chiefly of wet soils of e. Ash Meadows, Ash Meadows Rd, 1-2 mi N of Ranch turnoff, in Atriplex; 2200 ft. (*NTS, (18) from US)

11897 - Beatley, 8 Oct 1970. Common in open meadows and woodland borders of large spring area W of School Spg and Devils Hole, n. Ash Meadows, in Ash-Baccharis; 2300 ft. (*NTS, (7) from US)

12513 - Reveal 2295, 5 May 1971. Carson Slough area, near Calif.-Nevada boundary, Inyo Co., Calif., Sec. 30, T26N, R6E, in Prosopis; 2080 ft. (*NTS, US)

13154 - Beatley, 1 Sept 1971. Common on whitish clay soils, especially in depressions, Ash Meadows Rd 1-2 mi N of Ranch, e. Ash Meadows, in Distichlis; 2200 ft. (DS, *NTS, NY, RENO, RSA, UNLV)

13242 - Beatley, 21 Sept 1971. Uncommon, cyns SW of "Collins Ranch" cabin, W of Ash Meadows Rd, 0.6 mi S of Devils Hole, n. Ash Meadows, in Atriplex-Haplopappus; 2300 ft. (*NTS)

CRITICAL HABITAT:

This species, a strict endemic to Ash Meadows, was placed on the Federal Register Threatened Species lists, but it is at least as Endangered as the other endemics of the spring areas of northern and eastern Ash Meadows, where its habitat has been nearly destroyed. Where there were the largest populations in past years (the site of the type collection, from which over half the collections cited above were also made) -- along Ash Meadows Rd N of Ash Meadows Lodge (Rancho) -- it was scarcely present in July 1976, because the site had been essentially destroyed. It is critical that this species be protected as an Endangered Species, if it is to survive.

Fig. 33. Flower heads of Grindelia fraxino-pratensis. Rays are orange-yellow. Photo August 1968, by James L. Reveal.

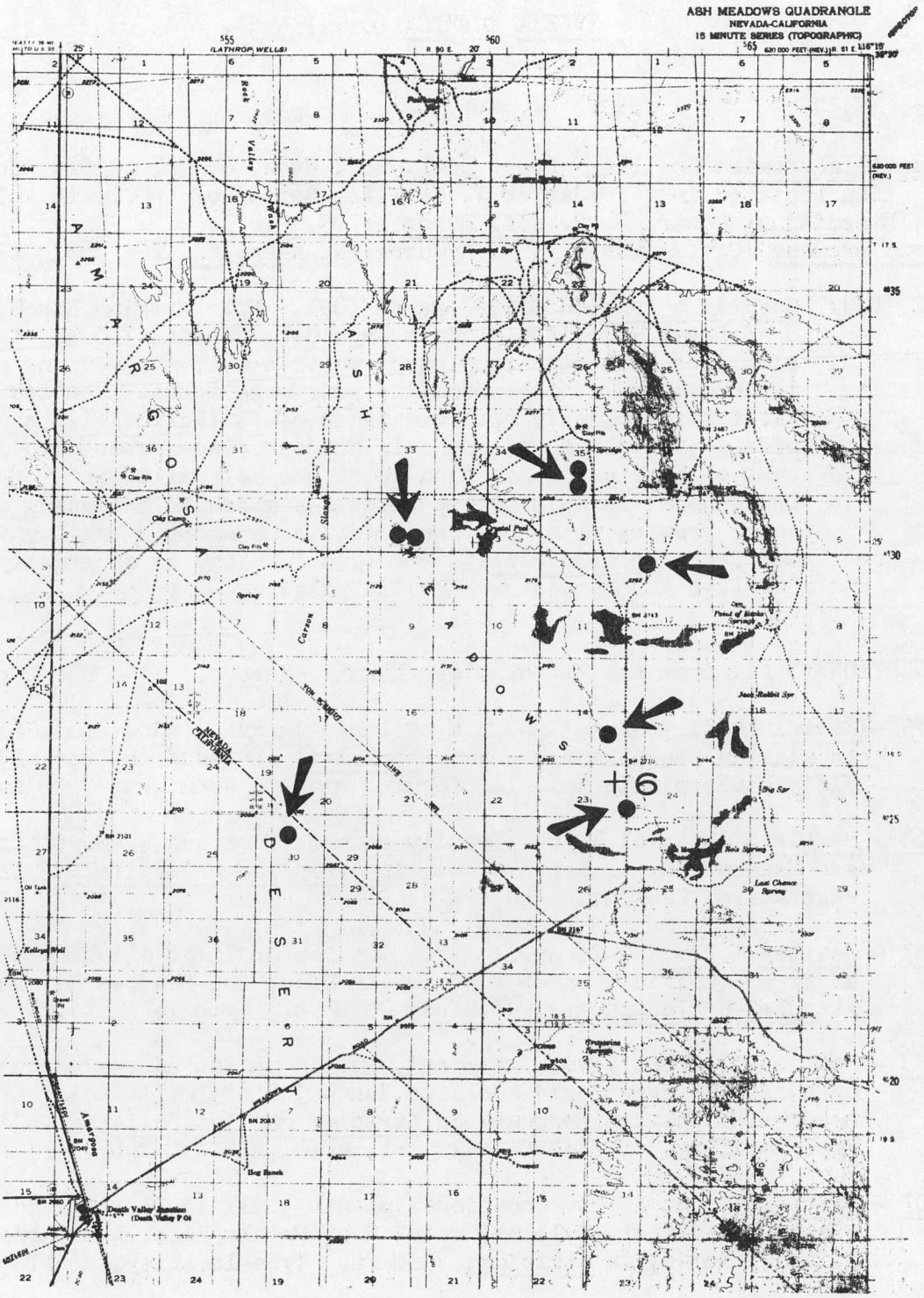


Fig. 34. Sites of collections of Grindelia fraxino-pratensis, near springs of northern and eastern Ash Meadows, Nye County, Nevada, and southwestern Ash Meadows, Inyo County, California.

IVESIA EREMICA (Cov.) Rydb.

Figs. 35, 36

Potentilla eremica Coville. Proc. Biol. Soc. Wash. 6: 76. 1892. Description repeated in: Frederick V. Coville, Botany of the Death Valley Expedition, Contr. U. S. Nat. Herb. 4: 95. 1893.
Ivesia eremica (Cov.) Rydb. P. A. Rydberg, N. Amer. Fl. 22: 286. 1908.

TYPE (US): Coville & Funston 366, 2 March 1891. Near Watkins Ranch, ca 1 km S of Devil Hole, Ash Meadows, Nye Co., Nevada; 740 m. "This plant was collected in winter, so that only the remains of the inflorescence of the preceding year were found. The leaves at first sight closely resemble those of P. (Potentilla) santolinoides. The plant was found in but one place, about two miles east of Watkins' ranch (and about one-half mile south of the Devil Hole) in an alkaline limestone marsh on a sloping gravelly mesa, growing with Spartina gracilis, Anemopsis californica, and Schoenus nigricans." The type locality is apparently the "Collins Ranch" south of Devils Hole.

COLLECTIONS: All from Ash Meadows, Nye County, Nevada.

6175 - Reveal 1432, 30 June 1968. N of large Juncus meadow along road in an alkaline seepage area, with Atriplex, Ash Meadows, Sec. 23, T18S, R50E; plants not fl., forming rounded hummocks; 2190 ft. (*NTS)

9968 - Beatley, 12 April 1970. Locally common, N of Ash Meadows Ranch, Ash Meadows Rd, e. Ash Meadows, in Atriplex confertifolia; all plants vegetative; 2200 ft. (DS, *NTS, RENO)

10141 - Beatley & Reveal, 25 April 1970. Common on light alkaline soils E of first (Collins) ranch S of Devils Hole, Ash Meadows Rd, in Atriplex-Haplopappus acradenius; 2300 ft. Type locality. (*NTS)

11673 - Beatley, 14 Sept 1970. Abundant, mostly as low convex mounds, uplands E of first (old "Collins Ranch") S of Devils Hole, Ash Meadows Rd, n. Ash Meadows, in Atriplex confertifolia; fl.; 2300 ft. Type locality. (DS, NTS, *NTS, NY, RENO, RSA(7), UNLV, (2) from US)

11907 - Beatley, 8 Oct 1970. Occasional plants still in fl., uplands in vicinity of first (Collins) ranch S of Devils Hole, Ash Meadows Rd, n. Ash Meadows, in Atriplex; 2300 ft. Type locality. (*NTS, RENO, RSA)

13155 - Beatley, 1 Sept 1971. Locally common, white clay soils ca 1.5 mi N of Ash Meadows Ranch, Ash Meadows Rd, e. Ash Meadows, in Distichlis; 2200 ft. (*NTS, NY, RSA, UNLV)

CRITICAL HABITAT:

This species is a strict endemic of the clay uplands of northern and eastern Ash Meadows, occurring either in the spring areas or on the uplands of a restricted area. It is known from but two sites, and most of the habitat has been destroyed by the Spring Meadows Farm operation; where the species remains (especially the type locality), it is subjected year-round to extremely heavy trampling and grazing by livestock on open range.

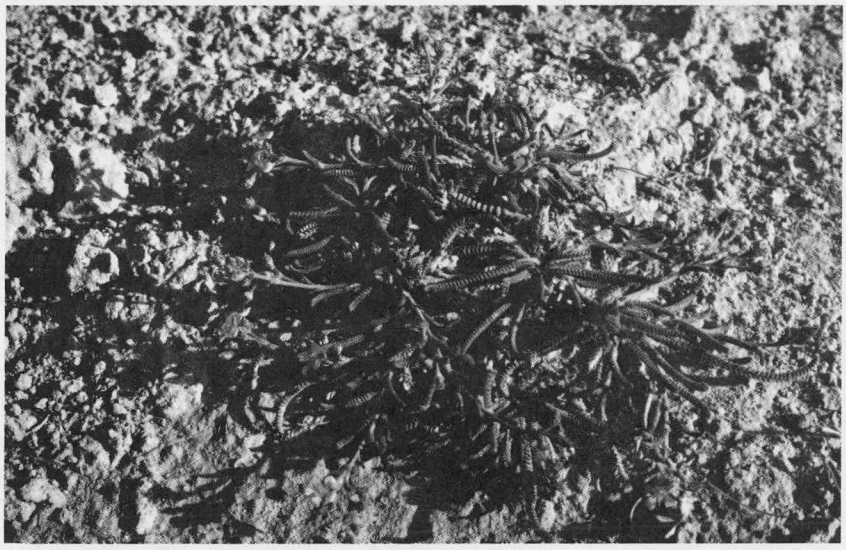


Fig. 35. Plant of Ivesia eremica, with scattered inflorescences in late July 1976; species usually flowers in September-October. Photo at "Collins Ranch", east side of Ash Meadows Rd, south of Devils Hole, northern Ash Meadows.

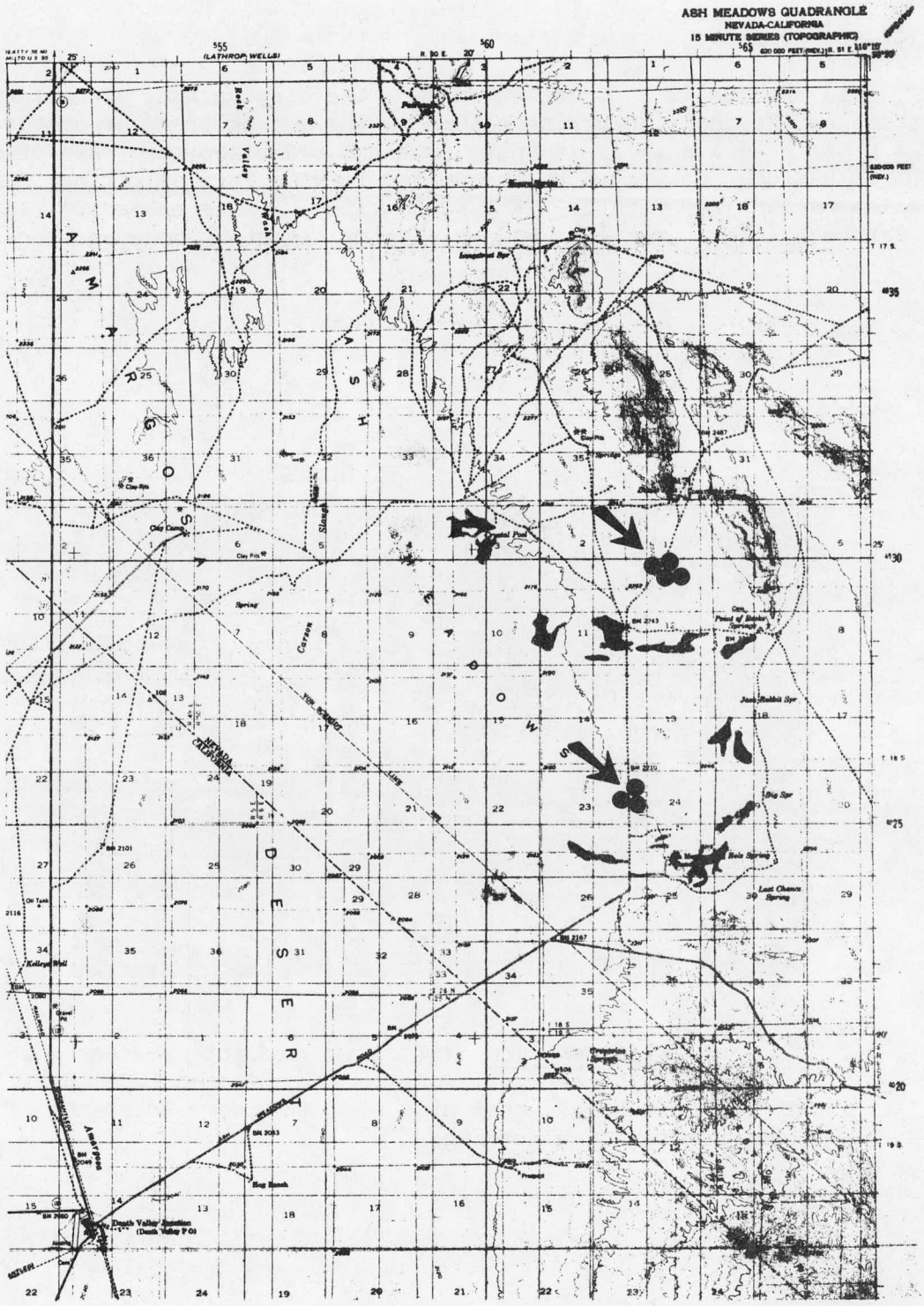


Fig. 36. Known sites of occurrence of Ivesia eremica, strict endemic of northern and eastern Ash Meadows, Nye County, Nevada.

LATHYRUS HITCHCOCKIANUS Barneby & Reveal

Figs. 37, 38

Barneby, Rupert C. and James L. Reveal. Aliso 7: 361-364. 1971.

TYPE (NY): Reveal 2202, 4 May 1970. Central Bullfrog Hills, common in wash 0.5 mi up road toward Sawtooth Mtn from Bullfrog-Gold Bar Rd, at base of volcanic point, Sec. 6, T12S, R46E, in Artemisia-Grayia vegetation; 4500 ft. Isotypes, DS, *NTS, RENO, RSA, UNLV, US, (27) out of NY.

COLLECTIONS: All from Nye County, Nevada.

4586 - Bostick, 24 May 1967. Canyon bottom in Yucca Mtn, ½ mi below Beatty Wash saddle, NW Jackass Flats drainage, in Artemisia-Pinyon-Juniper; 5200 ft. (DS(2), *NTS(2), RENO)

10393 - Reveal 2202, 4 May 1970. (Type collection)

12186 - Beatley & Reveal, 24 April 1971. Common along wash below and SW of Sawtooth Mtn, cent. Bullfrog Hills, NW of Beatty, Sec. 6, T12S, R46E, n. Amargosa Valley drainage, in Artemisia-Grayia (type locality); 4500 ft. (DS, NTS, *NTS, NY(11), RENO, RSA, UNLV, US(2))

12188 - Beatley & Reveal, 24 April 1971. Common along wash, Bullfrog Hills N of Gold Bar mining area (and on upper bajadas N side of Bullfrog Hills N of Sawtooth Mtn), s. Sarcobatus Flat drainage, in Artemisia tridentata vegetation; 4600 ft. (DS, NTS, *NTS, NY(11), RENO, RSA, UNLV, US(2))

OTHER COLLECTIONS:

- Coville & Funston 1760, 9 June 1891. Wood Canyon, Grapevine Mtns., Inyo Co., Calif. (NY, US)

CRITICAL HABITAT:

This species, only recently described but known as an undescribed species from the Grapevine Mtn collection in 1891, has not been collected within the Nevada Test Site boundaries, but is known from approximately 1½ mi west of the boundary in the Air Force buffer zone. Largest populations known are in the Bullfrog Hills to the west, and it is predictable that it will be found elsewhere in the Yucca Mtn-Shoshone Mtn areas within the Test Site boundaries. For the present, that area of the valley tributary to northwest Jackass Flats, from which the Bostick collection came, the type locality on the south-facing slope of the central Bullfrog Hills below Sawtooth Mtn in the northern Amargosa Valley drainage, and the extensive areas on the north slope of the central Bullfrog Hills in the southern Sarcobatus Flat drainage, all should be considered the "critical habitat" for this species;

these are the only known areas of occurrence of this narrowly endemic species, outside of the site of the original collection on the California side of the nearby Grapevine Mtns.

Fig. 37. Lathyrus hitchcockianus, at type locality below Sawtooth Mtn, central Bullfrog Hills, Nye County, Nevada. Photo 4 May 1971, by James L. Reveal.

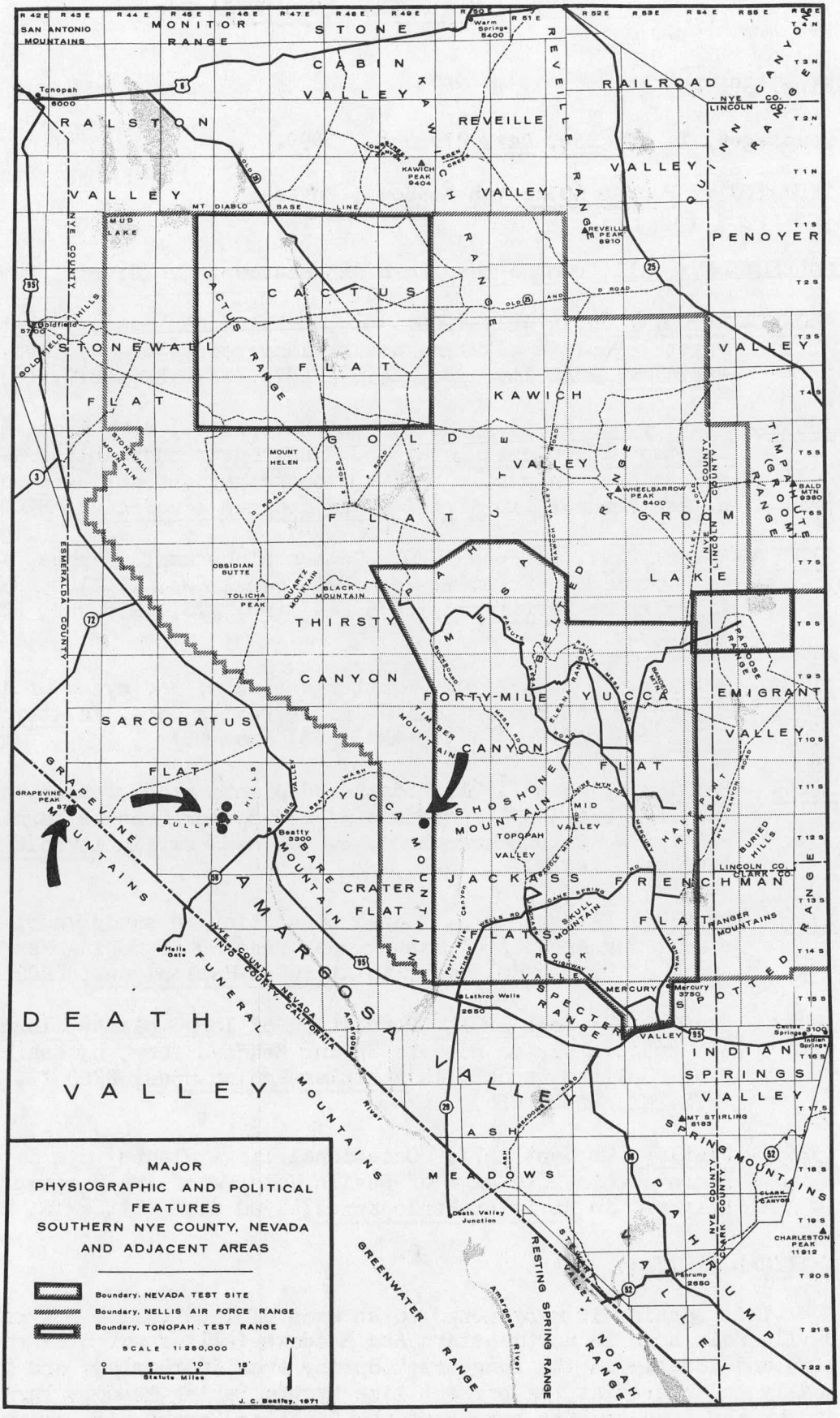


Fig. 38. Areas of occurrence (and all known collections) of Lathyrus hitchcockianus, s. Nye County, Nevada, and Inyo County, California

MENTZELIA LEUCOPHYLLA Bdg.

Figs. 39, 40, 41

Brandegee, T. S. Bot. Gaz. 27: 448. 1899.

TYPE (UC): Purpus 6032, Ash Meadows, Nevada.

COLLECTIONS: All from northeastern Ash Meadows, Nye County, Nevada.

6084 - Reveal 1484, 4 July 1968. 0.4 mi NW of Ash Meadows Rd toward Crystal Pool in alkaline soils along road, Sec. 2, T18S, R50E, in Atriplex; 2240 ft. (DS, LA(4), *NTS, NY, RENO, UTC, (6) from US)

10059 - Beatley, 16 April 1970. Occasional plants, with Arctomecon, Cryptantha confertiflora, and Enceliopsis nudicaulis, NW of Longstreet Spg, on gently rolling topography and saline sandy soils, n. Ash Meadows, in Atriplex-Haplopappus acradenius; 2300 ft. (NTS)

11085 - Reveal 2247, 11 June 1970. Common along small washes, Ash Meadows, ca 0.6 mi SSE of Devils Hole Nat. Mon., Sec. 1, T18S, R50E, in Atriplex confertifolia; 2275 ft. (DS, NTS, *NTS, NY, RENO, RSA(11), UNLV, US)

11690 - Beatley, 14 Sept 1970. Scattered plants, 2nd cyn W of Ash Meadows Rd, below 1st ranch (Collins) S of Devils Hole, in Atriplex confertifolia; 2300 ft. (LA(3), *NTS, (3) from US)

13255 - Beatley, 21 Sept 1971. Scattered plants along washes, crossing E-W road between Ash Meadows Rd and Spring Meadows Farm Hdqtrs, ca ½ mi W of Ash Meadows Rd, n. Ash Meadows, in Atriplex-Haplopappus; 2200 ft. (*NTS)

13256 - Beatley, 21 Sept 1971. Local population in sandy wash, S of Longstreet Spg area, E of easternmost fencing of Spring Meadows Farm and W of Devils Hole mtn, in Atriplex-Haplopappus; 2200 ft. (NTS)

13257 - Beatley, 21 Sept 1971. Population of large plants along wash near Ash Meadows Rd, on road to Spring Meadows farm, n. Ash Meadows, due S of "Collins Ranch", in Atriplex-Haplopappus; 2200 ft. (DS, LA, *NTS, NY, RENO, RSA)

13258 - Beatley, 21 Sept 1971. Occasional large plants, cyn SW of "Collins Ranch" cabin, 0.6 mi S of Devils Hole, W of Ash Meadows Rd, n. Ash Meadows, in Atriplex-Haplopappus; 2300 ft. (LA, *NTS, RENO, RSA)

CRITICAL HABITAT:

This species is restricted to an area of less than 1 sq. mi. of the Devils Hole area in northeastern Ash Meadows (all of which is the type locality) and locally in the Longstreet Spring area (formerly), and is very critically endangered at the present time by the Spring Meadows Farm operation, and by the free-ranging horses of the "Collins Ranch" area south of Devils Hole.

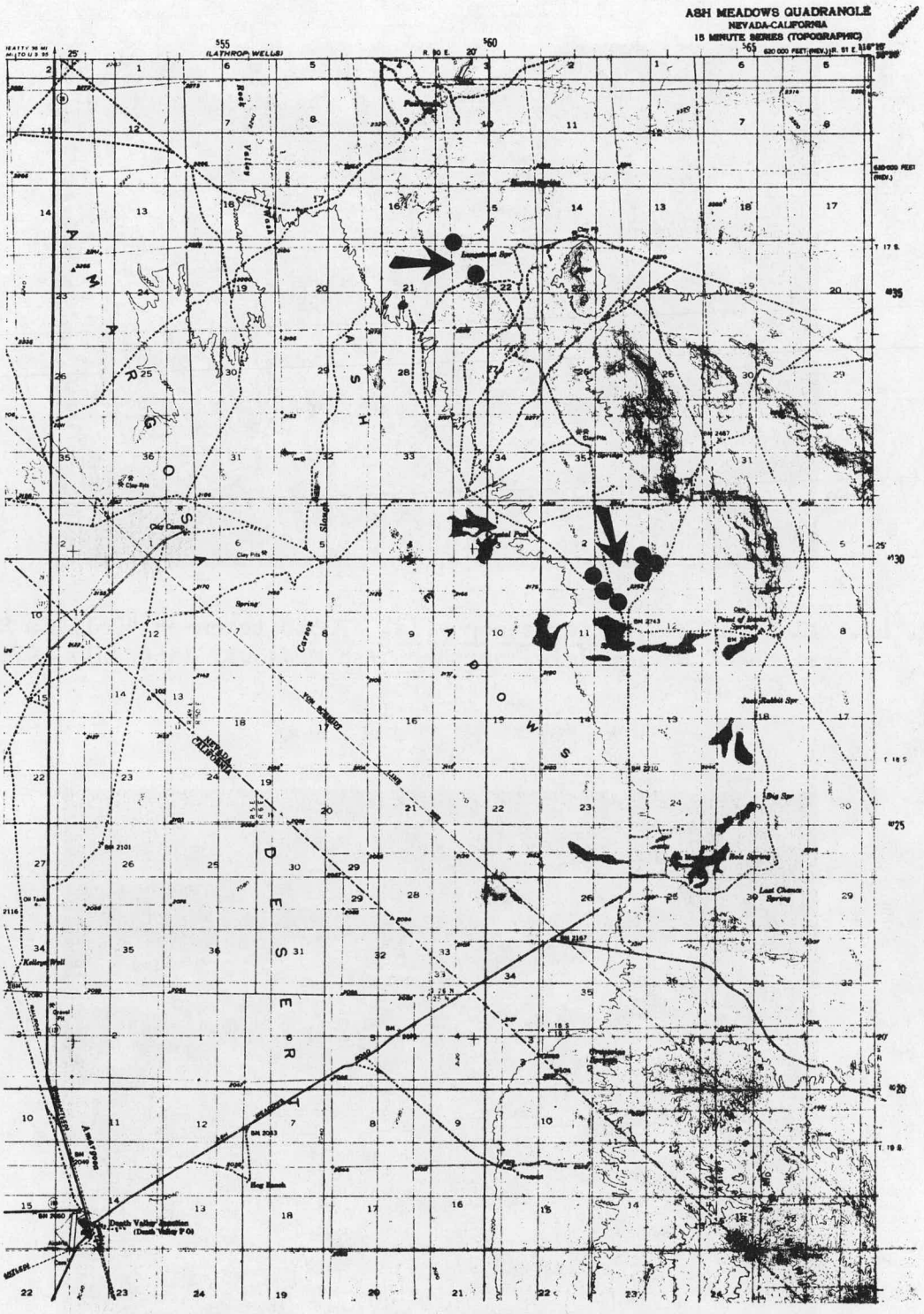


Fig. 39. Areas of known occurrence of Mentzelia leucophylla, all highly disturbed and critically endangered, northern Ash Meadows, Nye County, Nevada

Fig. 40. Plant of Mentzelia leucophylla. Photo taken on "Collins Ranch", south of Devils Hole, northern Ash Meadows, late July 1976.

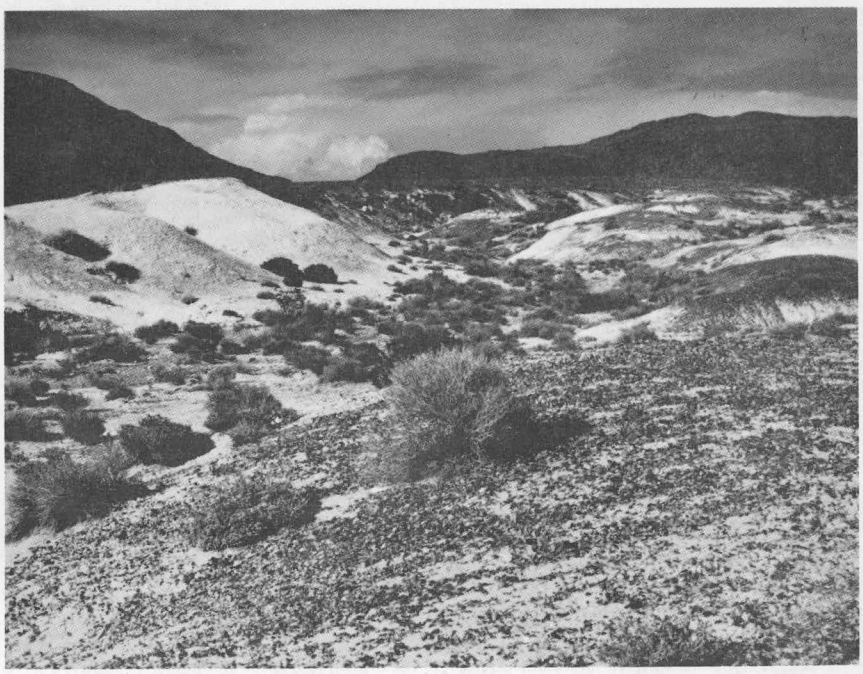


Fig. 41. One of the north-south canyons on southwestern part of "Collins Ranch", which are the "critical habitat" of Mentzelia leucophylla. Photo late July 1976.

NITROPHILA MOHAVENSIS Munz & Roos

Figs. 42, 43

TYPE (RSA): Roos & Roos 6140, 13 June 1954. Inyo Co., Calif., sw. Ash Meadows, 3 mi E of Death Valley Junction along road to Ash Meadows; 2050 ft. Isotypes, CAS, COLO, DS, GH, K, MO, NY, RM, UC, US, WTU.

COLLECTIONS: Inyo Co., Calif., all from type locality.

6823 - Reveal 2114, 15 Sept 1968. Carson Slough, large alkaline mud flats along Ash Meadows Rd, 1.6 mi W of State line, 3 mi NE of Death Valley Junction, Sec. 5, T25N, R6E, in Distichlis; 2050 ft. (DS(8), *NTS, NY, RENO, UTC)

10436 - P. & A. Munz, J. L. & A. Reveal, & Beatley, 8 May 1970. Common, salt flats (S end of Carson Slough), road to Ash Meadows from Death Valley Junction, in Distichlis; early fl.; 2050 ft. (DS, *NTS, RENO, UNLV)

12520 - Reveal 2291, 5 May 1971. Ash Meadows, road between Death Valley Junction and Ash Meadows, Sec. 5, T25N, R6E; common, in Atriplex-Distichlis; 2050 ft. (DS, *NTS(3), NY, RSA(3), RENO, UNLV, US)

13368 - Beatley, 6 May 1972. Common, salt-encrusted soils of Carson Slough, Ash Meadows Rd E of Death Valley Junction, near Inyo/Nye Co. line, in Distichlis; 2100 ft. (*NTS, NY, RENO, RSA)

OTHER COLLECTIONS: All from same site as above, and as cited in Munz & Roos, ibid, 1955.

- Roos & Roos 6036, 1 Nov 1953. (RSA)
- Roos & Roos 6079, 7 May 1954. (CAS, RSA)
- J. Roos 6194, 18 July 1954. (CAS, DS, COLO, GH, K, MO, NY, RSA, RM, UC, US, WTU)
- Roos & Roos 6234, 14 Sept 1954. (RSA)

CRITICAL HABITAT:

The alkaline flats at the extreme south end of Carson Slough in southwestern Ash Meadows, in Inyo County, Calif., but almost at the Nye County, Nevada, line, is the only known population of this species. It has been looked for intensively to the north, on the Nevada side of the boundary, but appears not to be present in the Slough area to the north. The "critical habitat" is therefore clearly defined.

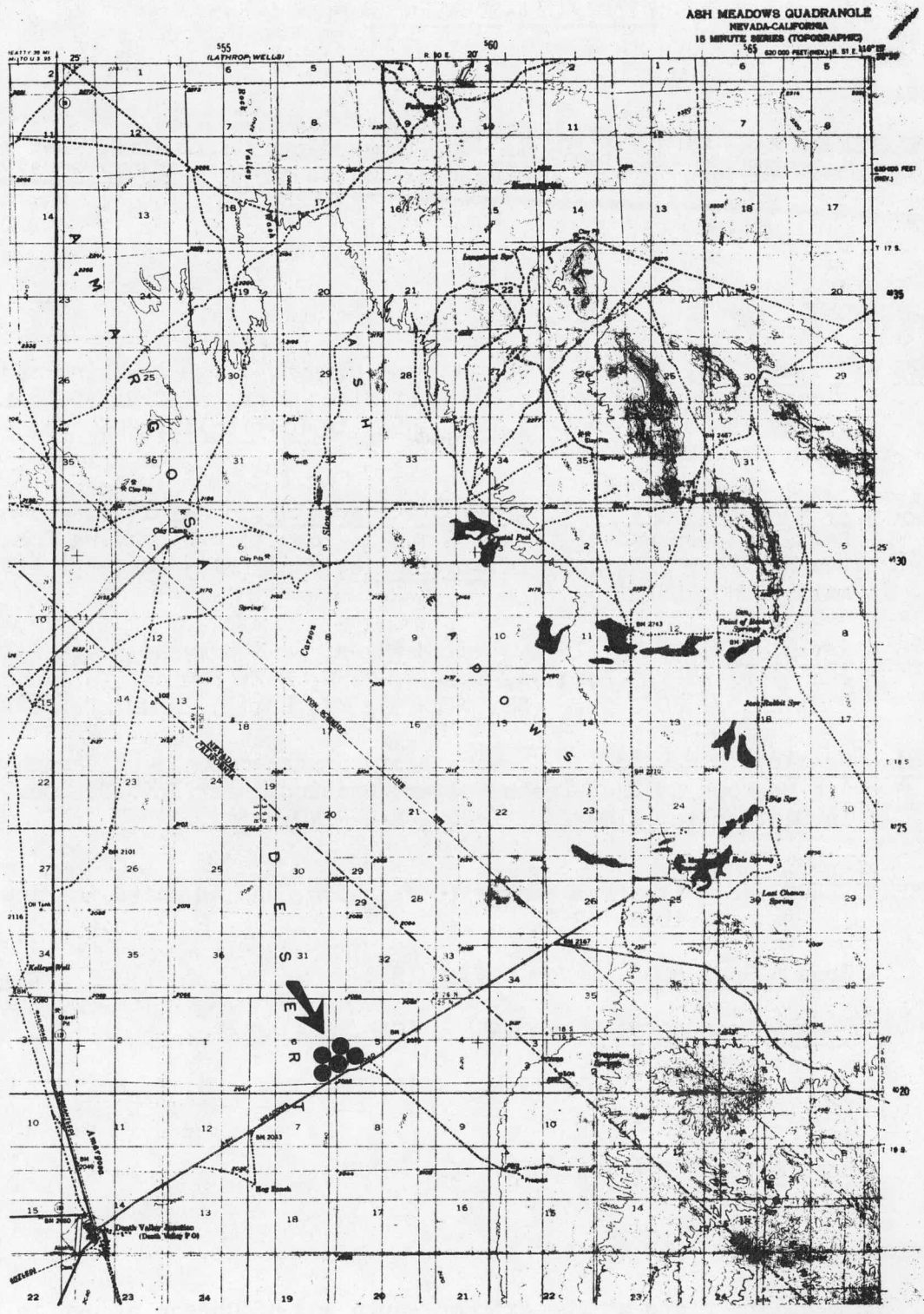


Fig. 42. Site of only known occurrence of Nitrophila mohavensis, south end of Carson Slough, southwestern Ash Meadows, Inyo County, California

Fig. 43. Nitrophila mohavensis, known only from southwestern Ash Meadows, Inyo County, Calif., near Nye County, Nevada, line

PENSTEMON PAHUTENSIS N. Holmgr.

Figs. 44, 45, 46, 47

Holmgren, Noel H. Aliso 7: 351-356. 1971.

TYPE (NY): Reveal 1206, 10 June 1968. Common, Back Rainier Mesa Rd, 5.3 mi from CP 17 and Pahute Mesa Rd, ca 1 mi SW of Gold Meadows turnoff, in Artemisia-Pinyon-Juniper vegetation; 7150 ft. Isotypes, DS, JEPS, *NTS, NY(7), RENO, RSA, UTC.

COLLECTIONS: All from the Nevada Test Site (except 13128), Nye County, Nevada, and Artemisia-Pinyon-Juniper vegetation.

481 - Beatley & Hawthorne, 24 June 1962. Below S rim of Rainier Mesa. (JEPS(3), NTS)

482 - Wells, 16 June 1961. N. Pahute Mesa. (NTS)

483 - Gibbons, 1 June 1959. Eleana Range below S rim of Rainier Mesa. (NTS)

485 - (winter rosette) Beatley, 27 Feb 1959. E face of Rainier Mesa. (NTS)

487 - (winter rosette) Beatley, 26 Jan 1959. E. Rainier Mesa. (NTS)

1760 - Beatley, 17 June 1963. W slope of Rainier Mesa, occasional this year, e. Forty-Mile Cyn drainage; 6500 ft. (JEPS, *NTS)

2738 - Beatley, Carl & Rhoads, 9 June 1964. Valley W of Rainier Mesa, fairly common, in early fl., e. Forty-Mile Cyn drainage; 7000 ft. (*NTS, RENO, RSA)

2749 - Beatley, 10 July 1964. Near S rim of Pahute Mesa, s. Gold Flat drainage; 7300 ft. (JEPS, *NTS)

2752 - Beatley, 10 July 1964. Columbine Cyn, South Silent Canyon drainage to s. Gold Flat, n. Pahute Mesa; 6400 ft. (NTS)

2891 - Beatley, 10 July 1964. W slope of Rainier Mesa, ne. Forty-Mile Cyn drainage; 7000 ft. (NTS)

2922 - Beatley, 10 July 1964. Cent. Rainier Mesa, Yucca Flat/Forty-Mile Cyn drainage; 7500 ft. (JEPS, NTS)

2976 - Beatley & Carl, 25 June 1964. Echo Mtn area, s. Pahute Mesa, s. Gold Flat drainage; 6500 ft. (*NTS, RENO)

2984 - Beatley & Carl, 25 June 1964. Common, s. Pahute Mesa, s. Gold Flat drainage; 7000 ft. (JEPS, *NTS)

3458 - Beatley, 30 June 1965. S. Pahute Mesa, s. Gold Flat drainage; 6500 ft. (DS, *NTS, RENO)

3459 - Beatley, 30 June 1965. S-facing slope below Pahute Mesa, n. Forty-Mile Cyn drainage; 6800 ft. (DS, *NTS, RENO, UNLV)

3460 - Beatley, 30 June 1965. Common, and at fl. peak, s. Pahute Mesa, s. Gold Flat drainage; 7000 ft. (DS, NTS, RENO)

3658 - Beatley, 17 June 1966. S. Pahute Mesa, near Pahute Mesa Rd and Echo Mtn turnoff, s. Gold Flat drainage; 6800 ft. (DS, JEPS, *NTS, RENO)

3732 - Beatley, 19 June 1966. Occasional this season on Rainier Mesa; coll. from cent. Rainier Mesa, NW Yucca Flat drainage; 7500 ft. (JEPS, *NTS, RENO)

4657 - Beatley, 22 July 1967. Common in vegetation of s. Pahute Mesa; Deadhorse Flat Rd 0.3 mi E of jnct with Pahute Mesa Rd, s. Gold Flat drainage; most plants in fruit; 7000 ft. (NTS)

5042 - Bostick, 18 July 1967. Disturbed site, S rim of Pahute Mesa, s. Pahute Mesa, s. Gold Flat drainage; 7000 ft. (JEPS, NTS)

5078 - Bostick, 28 June 1967. Head of Tongue Wash, near saddle on Stockade Wash Rd, n. Eleana Range. (JEPS(3), *NTS)

5367 - Bostick, 12 July 1967. Occasional, rocky hillsides, generally under Pinyon, E end of Pahute Mesa, Kawich Valley drainage; 7000 ft. (JEPS(2), NTS)

5764 - Beatley, 5 June 1968. At fl. peak, near Yucca/Forty-Mile Cyn divide, Stockade Wash Rd. below S end of Rainier Mesa, Eleana Range; 6800 ft. (JEPS, *NTS, NY)

5781 - Reveal 1206, 10 June 1968. (Type collection)

6014 - Beatley, 27 June 1968. Cable access road from Pahute CP to Echo Peak, n. Forty-Mile Cyn drainage; 6800 ft. (NTS)

7066 - Reveal 1305, 16 June 1968. Common, w. Gold Meadows, below N side Rainier Mesa, s. Kawich Valley drainage; 6700 ft. (*NTS, NY, RENO, UTC)

8942 - Beatley, 13 June 1969. Common on s. Pahute Mesa; coll. from near Echo Peak Rd turnoff from Pahute Mesa Rd, s. Gold Flat drainage; 7000 ft. (DS, JEPS, *NTS, NY(7), RENO, RSA, UTC)

10713 - Beatley & Reveal, 30 May 1970. Occasional to common, S rim of Pahute Mesa, road E from Pahute Mesa Rd to Back Rainier Mesa Rd (Rd 19-01), s. Gold Flat drainage; in bud only; 7200 ft. (NTS)

10912 - Beatley & Reveal, 4 June 1970. Common, near S rim of Pahute Mesa; early fl.; 7200 ft. (*NTS, NY)

12792 - Beatley, 11 June 1971. Common on steep loose-sand and -gravel white tuff, Stockade Wash Rd below Holmes Rd jnct, Eleana Range, NW Yucca Flat drainage; 6800 ft. (DS, *NTS, NY, RENO, RSA, UNLV, (2) from US)

13128 - Beatley & Smith, 26 July 1971. Scattered plants along canyon bottom, canyon with "Ruins" on NE side of Stonewall Mtn, Stonewall Flat drainage, Nye Co., Nevada; 6300-6800 ft. (*NTS, NY, RENO)

13401 - Beatley, Mispagel, & Vollmer, 4 June 1972. Occasional small populations along cyn leading to Motorola Site, s. Shoshone Mtn, w. Mid Valley/n. Topopah Valley drainage; 5800-6800 ft. (DS, *NTS, NY(3), RENO, RSA, (1) from US)

15742 - Beatley, 19 June 1975. Common, at fl. peak, steep-walled cyn W of Back Rainier Mesa Rd and SE of Pahute Mesa rim, ne. Forty-Mile Cyn drainage; 6600 ft. (*NTS(2))

16026 - Williams 187, 10 June 1976. E side Deadhorse Flat Rd, 0.1 mi SE of U19r turnoff, 0.4 mi NE of its intersection with Pahute Mesa Rd, e. Pahute Mesa, s. Kawich Valley drainage; common on steep W-facing slope on volcanic soils; 6950 ft. (NTS, and (1))

16027 - Williams 215, 29 June 1976. E side of Holmes Rd, 2.7 mi from jnct with Stockade Wash Rd, s. Rainier Mesa, ne. Forty-Mile Cyn drainage; scattered among volcanic boulders in area of moderate disturbance; 7450 ft. (NTS)

16038 - Williams 157, 27 May 1976. N side Stockade Wash Rd, at intersection with Holmes Rd, below SE edge of Rainier Mesa, n. Eleana Range, ne. Forty-Mile Cyn drainage; scattered in shallow, gravelly soil on open level area with moderate disturbance; 6720 ft. (NTS)

16039 - Williams 192, 15 June 1976. Off N shoulder of dirt road bypassing Shoshone Receiver Sta., joining rd between Receiver and Transmitter, 3.5 km from the roads' jnct, n. Jackass Flats drainage; 6600 ft. (NTS)

16040 - Williams 222, 2 July 1976. Same as 16039; in loose, gravelly soil with open exposure. (NTS)

OTHER COLLECTIONS:

- Alexander & Kellogg 2467. Stonewall Mtn, Nye Co., Nevada. (GH, UC)

CRITICAL HABITAT:

Although there is a large number of collections of this species, its geographic range is in fact narrowly circumscribed and probably correlated with a particular kind or kinds of volcanic rocks. It is known from the following areas: (1) The center of distribution, and area of greatest abundance, extends from the north end of the Eleana Range (from which the Stockade Wash collections have come), across the south slope of Rainier Mesa, north across Rainier Mesa (including the west and east slopes and the valley to the west), north into Gold Meadows, and northwest to the south

one-third to one-half of Pahute Mesa (including canyons of the vicinity, the Echo Peak area, and the south face of this Mesa). This has long been recognized by the author as a distinctive floristic area, within which occur a large number of species that are rare in this region (e. g., Arabis dispar, Arabis shockleyi, Petradoria discoidea, Keckiella rothrockii, Lithospermum ruderale, and the Endangered Trifolium andersonii ssp. beatleyae), or strictly endemic to this area (Frasera pahutensis); (2) Shoshone Mtn, where it is an uncommon species; and (3) Stonewall Mtn to the northwest beyond the Test Site, also where it appears to be local in its distribution.

All of these areas constitute the "critical habitat" of this species. If the southern one-third of Pahute Mesa, the northern part of Rainier Mesa, and the intervening canyons and valley floors between the two mesas (especially western Gold Meadows and southern Kawich Valley below the east rim of Pahute) were to be declared a "critical habitat", the habitat would also include the principal populations of Trifolium andersonii ssp. beatleyae, all known populations of Frasera pahutensis, Haplopappus watsonii (a very rare western United States species), Cymopterus purpurascens, Lomatium foeniculaceum ssp. fimbriatum, Lupinus aridus, Fritillaria atropurpurea, and many other rare species in Nevada.

Likewise, the northern Eleana Range, where there is such great (and conspicuous) geologic diversity, would constitute a second area for preservation, including the dolomite hills (especially the one south and above Tunnel E) and the volcanics of this area -- for here, not only is P. pahutensis common on some kinds of rock outcrops, and the Trifolium rather widespread in the area around Capt. Jack Spring, but a number of other species are known from central-southern Nevada only in this area below the south rim of Rainier Mesa and overlooking northwestern Yucca Flat.

Both of these areas are more or less disturbed now by road construction, and mining and test activities and their massive installations (essentially all vegetation on the top of Rainier Mesa has now been destroyed), and it is unfortunate that these areas were not biologically investigated before the machinery for destruction was set into motion 20 years ago. These two areas (and Rainier Mesa) constituted one of the most scenic areas of its size in the State of Nevada.

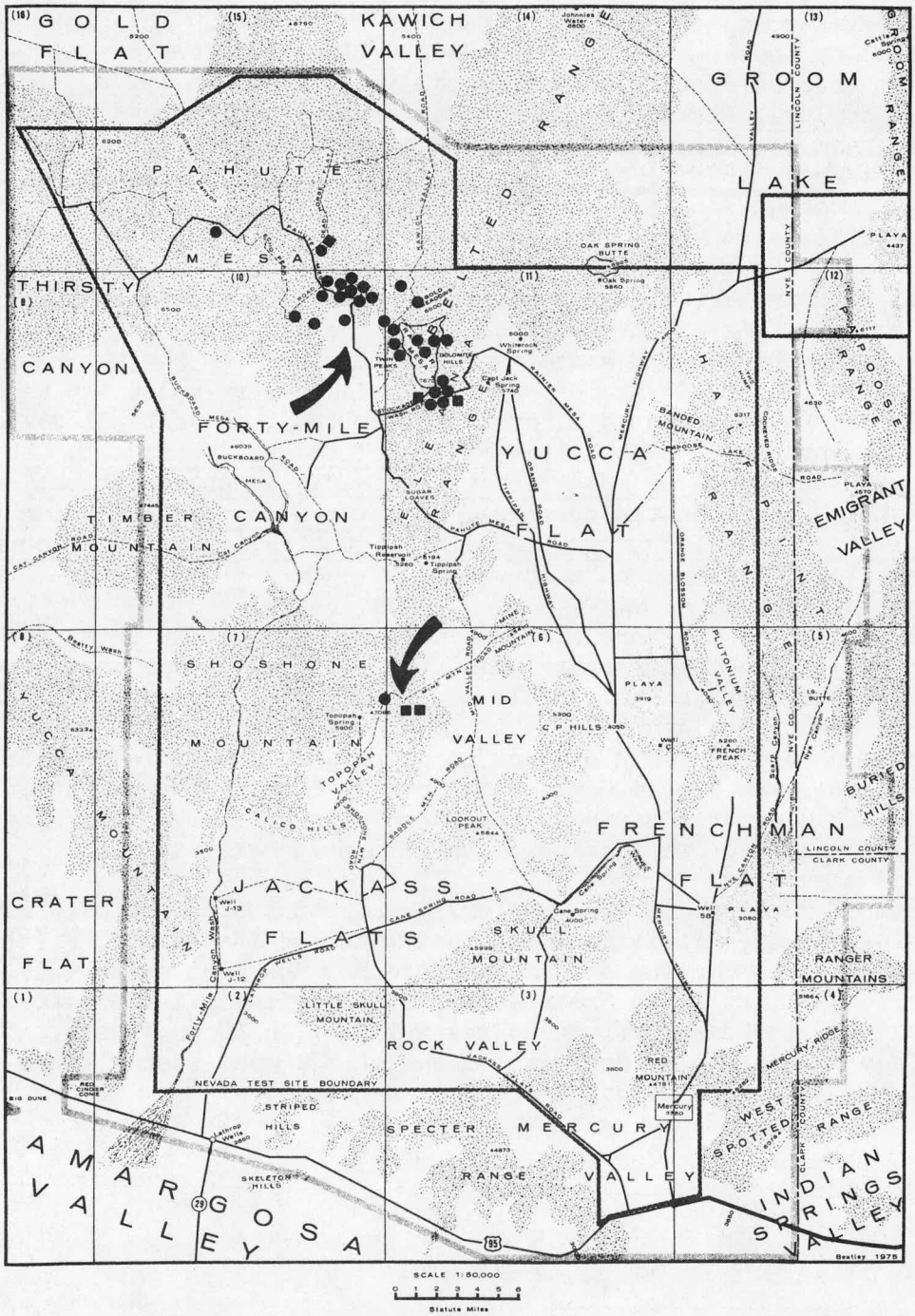


Fig. 44. Areas of occurrence (and collections) of Penstemon pahutensis on the Nevada Test Site (northern Eleana Range, Rainier Mesa, Pahute Mesa, and vicinity, and Shoshone Mountain), Nye County, Nevada

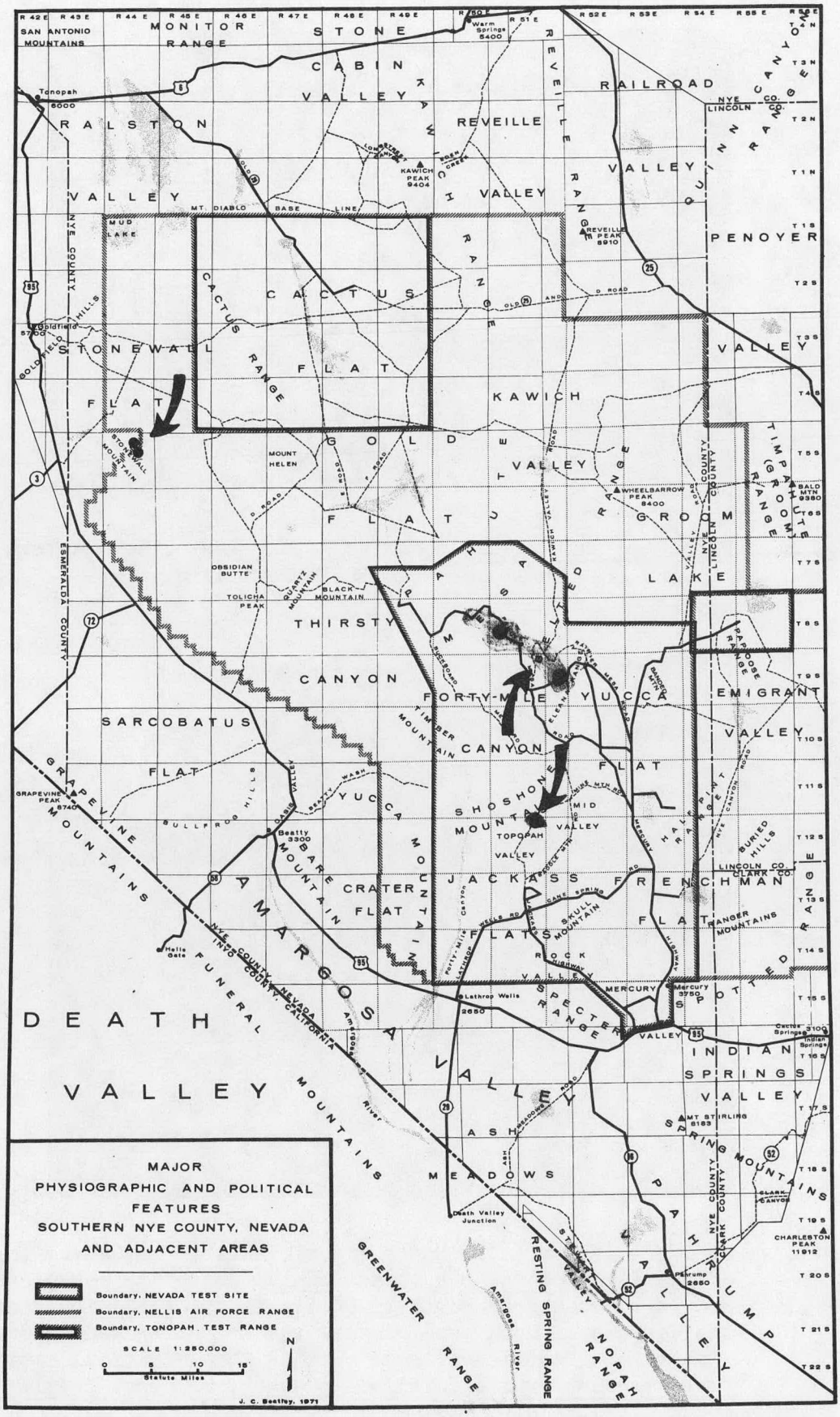


Fig. 45. The three areas of known occurrence (and collections) of Penstemon pahutensis, Nye County, Nevada

Fig. 46. Penstemon pahutensis, northern Rainier Mesa, Nevada Test Site. Flowers are blue-lavender. Photo June 1972.

Fig. 47. Boulder-cliff area at south rim of Pahute Mesa, where the population of Penstemon pahutensis is especially large and conspicuous. Species occurs elsewhere on southern Pahute Mesa, on Rainier Mesa, and in the canyons of both mesa slopes, and is rather widely distributed within this restricted area. Within this "critical habitat", Frasera pahutensis and Trifolium andersonii ssp. beatleyae also occur. Photo July 1975.

PHACELIA BEATLEYAE Reveal & Constance

Figs. 48, 49, 50, 51

Reveal, James L. and Lincoln Constance. Brittonia 24: 199-201. 1972.

TYPE (US): Beatley & Reveal 12358, 29 April 1971. Small local populations on loose talus and along washes of canyons of S face of French Peak mtn, where bedrock is light-brown tuff, n. Frenchman Flat, in Atriplex hymenelytra vegetation; 4000-4500 ft. Isotypes, NTS, *NTS, UC, (29) from US.

COLLECTIONS: All from Nevada Test Site, Nye County, Nevada, except 12395.

5585 - Beatley, 7 May 1968. Nearly confined to chocolate-colored soils, along washes below and SW of French Peak, n. Frenchman Flat, in Atriplex confertifolia vegetation; 4200 ft. (BRY, CAS, NTS, *NTS, NY, RENO, UC, UTC)

8243 - Beatley, 4 May 1969. Abundant in canyons of lower slopes of S face of French Peak mtn, N of Area 5 camp, n. Frenchman Flat, in Atriplex hymenelytra vegetation; 4000 ft. (DS, *NTS, NY, RENO, RSA(4), UNLV, UTC)

8467 - Beatley, 17 May 1969. Common along washes and loose talus, light-brown volcanic rocks, S face of French Peak mtn, n. Frenchman Flat, in Atriplex hymenelytra vegetation; 4000-4500 ft. (DS, *NTS, NY, RENO, RSA(6), UNLV, UTC)

12358 - Beatley & Reveal, 29 April 1971. (Type collection)

12395 - Beatley & Reveal, 1 May 1971. One plant on white gravel talus, near top of large white hill N of Papoose Lake Rd, W of Papoose Lake, in Halfpint Range, with scattered Coleogyne and Juniper over bare rock outcrops, w. Emigrant Valley drainage, Lincoln Co., Nevada, E of Test Site boundary; 5800 ft. (*NTS)

12850 - Beatley, 23 June 1971. Washes below French Peak; same coll. area as Nos. 5585, 8243, 8467, and 12358; 4000-4200 ft. (*NTS, (4) from US)

16019 - Williams 125, 22 May 1976. On loose volcanic tuff slopes, W face of s.-most extension of French Peak mtn, n. Frenchman Flat, in Atriplex hymenelytra; 4200 ft. (NTS)

16020 - Williams 126, 21 May 1976. W face of s.-most extension of Skull Mtn, 0.9 mi NE of Jackass Flats Hwy, n. Rock Valley, in Atriplex-Larrea-Ambrosia vegetation; locally scattered on chocolate-colored volcanic tuff; 4300 ft. (NTS)

16021 - Williams 139, 25 May 1976. Wash on W face of SW end of Skull Mtn, 0.9 mi NE of Jackass Hwy, n. Rock Valley, in Atriplex-Larrea-Ambrosia; occasional on very loose, light-brown volcanic tuff of a steep W-facing slope; 4300 ft. (NTS)

16022 - Williams 147, 26 May 1976. W face of the S end of French Peak mtn, in loose, light-colored volcanic tuff, n. Frenchman Flat, in Atriplex hymenelytra; 4200 ft. (NTS)

16023 - Williams 148, 26 May 1976. Scattered plants on loose volcanic tuff of a steep W-facing wash on the SW end of Skull Mtn, n. Rock Valley, in Atriplex-Larrea-Ambrosia vegetation; 4300 ft. (NTS)

16024 - Williams & Castetter 211, 21 June 1976. In a narrow cyn W of Scarp Cyn wash, 2.9 km NE of French Peak, 0.6 km E of Test Site boundary, n. Frenchman Flat, in Larrea-Atriplex; scattered stalks of last year's plants on light-colored tuff outcrops, 2 plants of current season; 4000 ft. (NTS)

CRITICAL HABITAT:

The "critical habitat" is clearly defined as (1) the canyons of the south face of French Peak (Massachusetts) mtn, where Camissonia megalantha also occurs, and (2) the S face of the W end of Skull Mtn, in Rock Valley east of the pass along Jackass Hwy. It is probable that this species occurs elsewhere in the canyons along the south face of Skull Mtn, i. e., where the bedrock with which it is associated outcrops on the Rock Valley side of the mountain.

Fig. 48. Southwest end of Skull Mountain in the Rock Valley drainage, near saddle into Jackass Flats, where Phacelia beatleyae is known from collections in the spring of 1976. Photo looking northeast from Jackass Highway. The volcanic tuff bedrock here is locally like that which occurs massively on the south slope below French Peak in northern Frenchman Flat where the principal populations of this species occur.

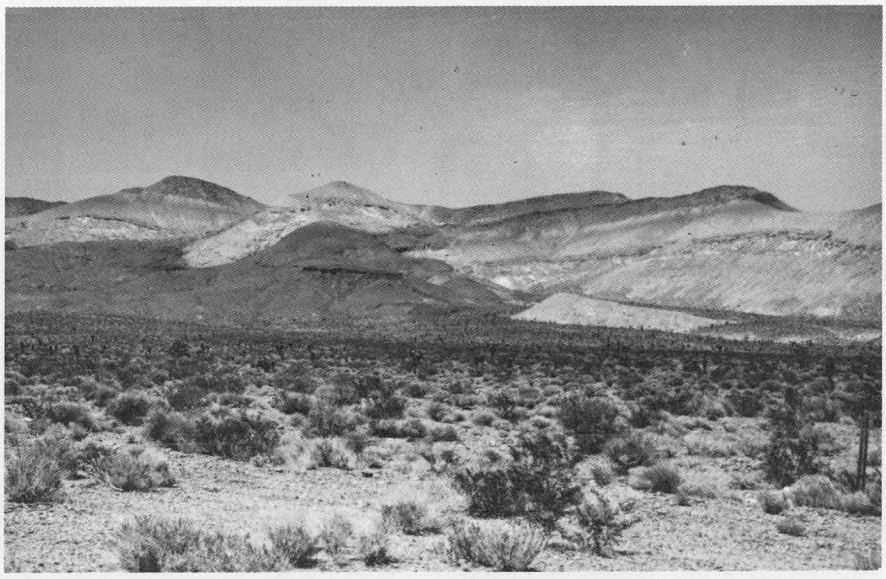


Fig. 49. Mountain mass of French Peak area (looking from south to north) in northern Frenchman Flat, the "critical habitat" for Phacelia beatleyae and Camissonia megalantha. The principal populations of Phacelia beatleyae occur in the lower canyons, associated with a particular kind of volcanic rock, which also outcrops at the west end of Skull Mountain in Rock Valley where there is much the same plant assemblage (including Phacelia beatleyae) (Fig. 48). Known elsewhere from one plant in west Emigrant Valley.

Fig. 50. Canyon of type (and other) collections of Phacelia beatleyae, below French Peak, northern Frenchman Flat, Nevada Test Site.

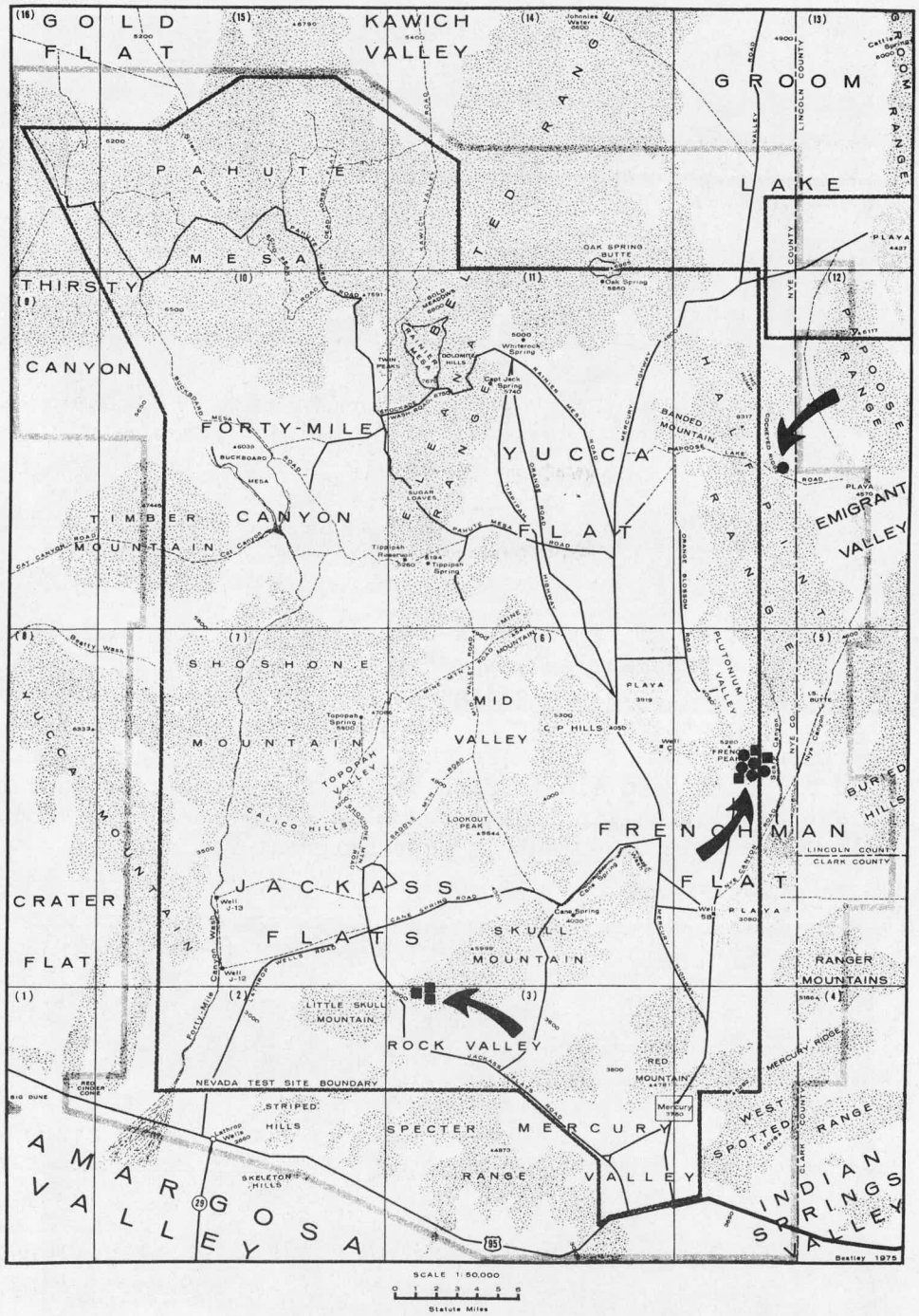


Fig. 51. The three areas of known occurrence (and all collections) of Phacelia beatleyae, on or near the Nevada Test Site, Nye County, Nevada

TRIFOLIUM ANDERSONII A. Gray ssp. BEATLEYAE Gillett

Figs. 52, 53, 54, 55, 56

Gillett, John M. Can. J. Bot. 50: 1975-2007. 1972.

TYPE (DAO): Cronquist & Beatley 8897, 23 April 1961. Topopah Spg, S side of Shoshone Mtn, Nevada Test Site, at lower limits of Artemisia-Pinyon-Juniper; 5800 ft. Isotypes, NY, UC, UTC.

COLLECTIONS: All from Nye County, Nevada.

113 - Beatley & Rickard, 25 April 1959. Moist soil at Topopah Spg, n. Topopah Valley, at lower limits of Artemisia-Pinyon-Juniper; roots under rocks; 5800 ft. (DOA, NTS)

114 - Cronquist & Beatley, 23 April 1961. Topopah Spg, S side of Shoshone Mtn, n. Topopah Valley, at lower limits of Artemisia-Pinyon-Juniper; 5800 ft. Isotypes (processed separately at NTS), DS, *NTS.

2627 - Beatley & Carl, 3 June 1964. S rim of Pahute Mesa, Rd 19-01; abundant around flatrock outcrops in Artemisia-Pinyon-Juniper, s. Kawich Valley drainage; 7300 ft. (DS(3), *NTS)

5189 - Beatley & Bostick, 5 June 1967. S rim of Pahute Mesa, Rd 19-01 (same population as 2627), around flatrock outcrops in Artemisia-Pinyon-Juniper; 7300 ft. (DS(9), *NTS, RENO)

5190 - Bostick, 22 May 1967. Along wash and cliffs, Topopah Spg, n. Topopah Valley, in Artemisia-Pinyon-Juniper; same population as Nos. 113 and 114 (type locality); 5800 ft. (DS(3), *NTS)

5191 - Bostick, 25 May 1967. Scree-covered ridge, 1 mi SE of U12g portal, Eleana Range below Rainier Mesa, NW Yucca Flat drainage, in Artemisia-Pinyon-Juniper; 6200 ft. (DS(2), *NTS, RENO)

5192 - Beatley, 17 May 1967. Abundant locally, rocky slope above Repeater Site barricade, N slope of S end of Shoshone Mtn, NW Mid Valley drainage, in burned Artemisia-Pinyon-Juniper (DS(7), *NTS, RENO)

5193 - Bostick, 18 July 1967. Base of cliff, S rim of Pahute Mesa, 1 mi S of Echo Peak, n. Forty-Mile Cyn drainage, in Artemisia-Pinyon-Juniper; 7300 ft. (DS(4), NTS)

6140 - Reveal 1366, 20 June 1968. Around white volcanic outcrops, White Blotch Spg, W of N end of Groom (Timpahute) Range, s. Penoyer Valley, in Artemisia-Pinyon-Juniper; plants in late fl.; 5900 ft. (NTS)

8720 - Beatley, 30 May 1969. Common along ledges and in white gravel wash below White Blotch Spg, W of N end of Groom (Timpahute) Range, n. Groom Lake/s. Penoyer Valley, in Artemisia; 6000 ft. (DOA(10), *NTS)

10609 - Beatley, 19 May 1970. Common back of S rim of Pahute Mesa, ca 1 mi E of Pahute Mesa Rd, on abandoned Rd 19-01 to Back Rainier Mesa Rd, s. Kawich Valley drainage, in Artemisia-Pinyon-Juniper; 7200 ft. (DOA, *NTS, NY, RENO, RSA)

10706 - Beatley & Reveal, 30 May 1970. Common back of S rim of Pahute Mesa, abandoned Rd 19-01 from Pahute Mesa Rd E to Back Rainier Mesa Rd, s. Kawich Valley drainage, in Artemisia-Pinyon-Juniper; coll. 1 mi E of Pahute Mesa Rd; 7300 ft. (DOA(3), *NTS)

10707 - Beatley & Reveal, 30 May 1970. Same as 10706, coll. from 2.5 mi E of Pahute Mesa Rd, on flatrock area; 7200 ft. (DOA(6), DS, *NTS, NY, RENO, RSA, UNLV)

12713 - Beatley, 7 June 1971. Abundant along washes and on talus slopes, white and pink volcanic bedrock, ESE of SE rim of Rainier Mesa, Eleana Range between Stockade Wash and Capt. Jack Spg, NW Yucca Flat drainage, in Artemisia nova-Pinyon-Juniper vegetation; 5800-6000 ft. (DOA, DS, *NTS, NY, RENO, RSA, UNLV)

16016 - Williams 112, 13 May 1976. In sparsely vegetated volcanic tuff hills, 0.6 mi E of Stockade Wash Rd across entrance to U12g, n. Eleana Range, NW Yucca Flat drainage, in Pinyon-Juniper vegetation; 6000 ft. (NTS)

16017 - Williams 154, 27 May 1976. On light-colored volcanic tuff hills, E side of Stockade Wash Rd, 1.2 mi SE of Capt. Jack Spg, n. Eleana Range, NW Yucca Flat, in Pinyon-Juniper; 6000 ft. (NTS)

16018 - Williams 183, 11 June 1976. Same as 16017; 6000 ft. (NTS)

16035 - Williams 178, 10 June 1976. N of Rd 19-01, 2.6 mi E of Pahute Mesa Rd, SE edge of Pahute Mesa; common in open gravelly soil; s. Kawich Valley drainage, in Artemisia-Pinyon-Juniper; 7200 ft. (NTS, and (2))

16041 - Williams 270, 30 Sept 1976. Off N side of Shoshone Mtn Rd, 0.4 mi E of turnoff to Motorola Site, 0.6 air miles ENE of Shoshone Peak, Topopah Valley drainage, in Artemisia-Pinyon-Juniper; occasional plants on gravel areas between white volcanic outcrops with S exposure on moderate slope; new foliage; 6350 ft. (NTS)

OTHER COLLECTIONS:

- Crane 4216C(NY). Toiyabe National Forest, Clover Hill, S of Manhattan, Nye County (Gillett, ibid, p. 1997).

CRITICAL HABITAT:

The large populations of this subspecies occur over many acres extending northward from the southeast rim of Pahute Mesa. They occur here on some sites with Frasera pahutensis, and often in dense stands over large areas.

The populations in the Capt. Jack Spring area of the Eleana Range have a somewhat different aspect (especially with respect to pubescence), and the southeast Pahute Mesa and northern Eleana Range sites should be considered the "critical habitats" for this subspecies. It occurs locally elsewhere on southern Pahute Mesa and on Shoshone Mtn on the Test Site, and at White Blotch Spring west of the northern Groom Range on the Air Force Range, but in view of the extremely large population on southeast Pahute Mesa, it is perhaps not necessary for the outlying stations to be designated "critical habitats".

The distribution of this subspecies in relation to the other subspecies is shown in Gillett (ibid, p. 1993).

Fig. 52. Trifolium andersonii ssp. beatleyae, other than in the large population on the uplands back of the southeast rim of Pahute Mesa, occurs in usually small local populations along certain washes elsewhere. The type locality for ssp. beatleyae is along the wash at Topopah Spring, in northern Topopah Valley at the base of the south face of Shoshone Mountain. It occurs along washes of the Capt. Jack Spring area in the Eleana Range overlooking Yucca Flat (photo above), and locally on southwestern Pahute Mesa. Beyond the Test Site it is known from a few scattered localities in southern Nevada and nearby California, including the wash below White Blotch Spring in Groom Lake, west of the Groom Range.

Figs. 53 and 54. Typical habitat of Trifolium andersonii ssp. beatleyae back of southeast rim of Pahute Mesa on the Nevada Test Site, where it occurs in a large population over a hundred or more acres; the area is apparently the center of distribution of the subspecies. On many sites it occurs with Frasera pahutensis, and the whole area is a "critical habitat" for these two taxa, and a number of other rare southern Nevada plants.

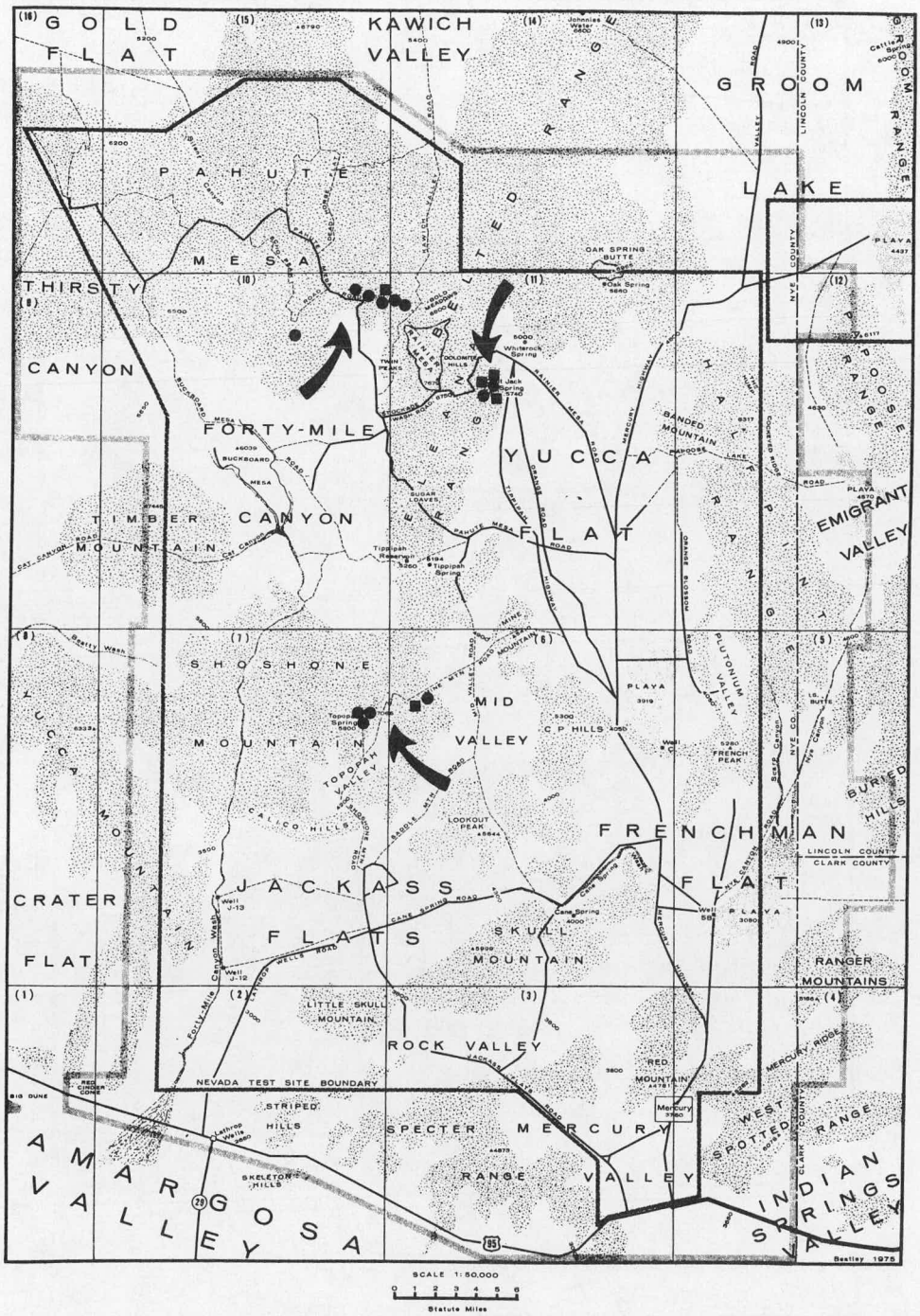


Fig. 55. Areas of occurrence (and collections) of Trifolium andersonii ssp. beatleyae on the Nevada Test Site, Nye County, Nevada

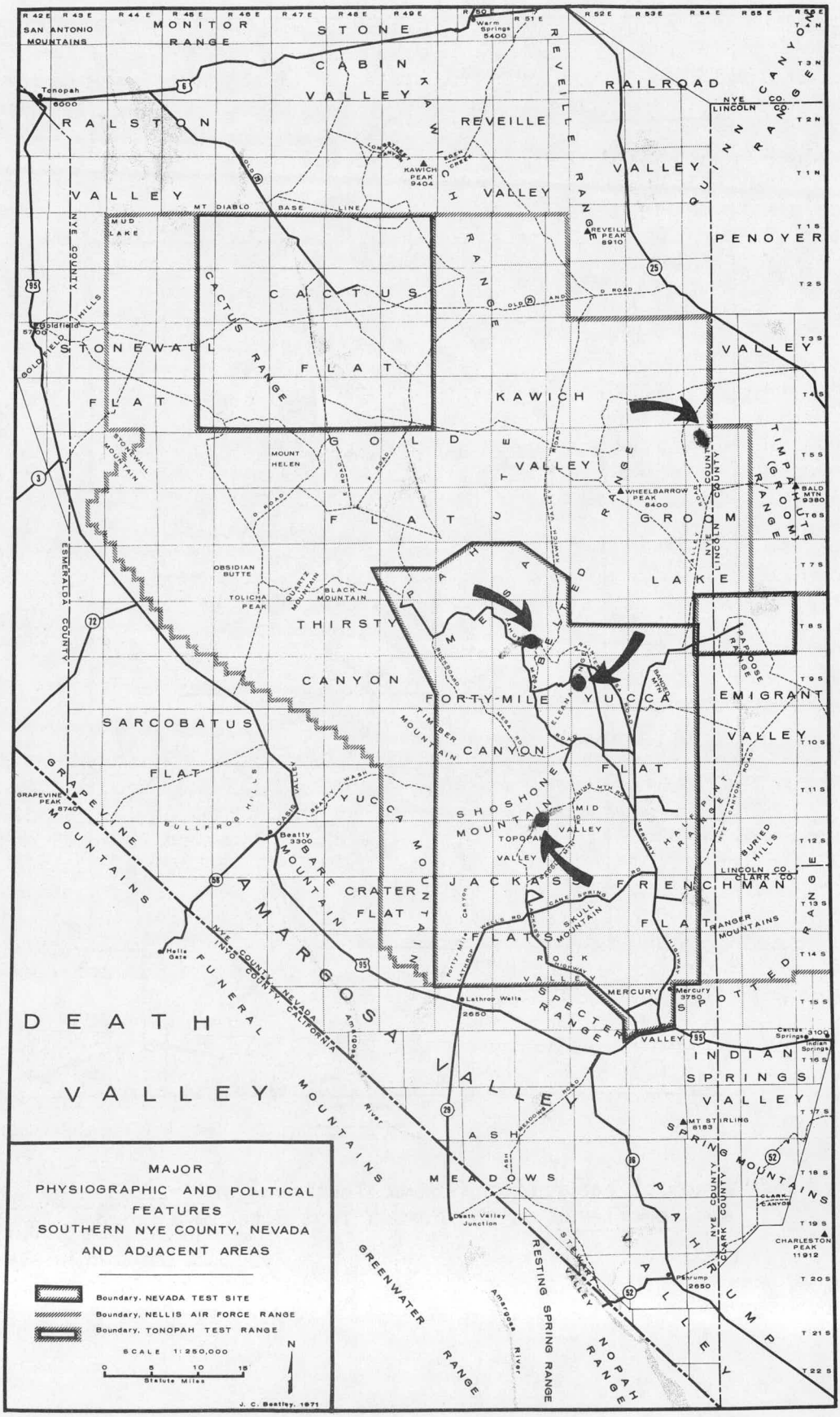


Fig. 56. Areas of known occurrence (and collections) of Trifolium andersonii ssp. beatleyae in southern Nye County, Nevada

APPENDIX I

RECOMMENDATION for area of preservation of Endangered Plant Species, northern Ash Meadows, Nye County, Nevada

The whole of northern and eastern Ash Meadows, including the spring and seepage areas and the uplands, was the "critical habitat" for most of the rare and endemic plant species of this oasis in the Mojave Desert. In the springs of this area, the Desert Pupfish (Cyprinodon nevadensis) was widely-occurring, and at Devils Hole, Cyprinodon diabolis is a critically Endangered Species and the object of continuing litigation to insure its survival.

Of the limited unplowed tracts remaining in these spring areas, the 40-acre tract south of Devils Hole, here referred to as the "Collins Ranch", offers the principal suitable area for preservation. All but one (Nitrophila mohavensis) of the Endangered Plant Species, and all three of the Threatened Species, occur on this tract of land; of the six Endangered Species in Ash Meadows, the "Collins Ranch" is the type locality for four of the species.

On this tract, which could easily be incorporated into the Devils Hole acreage of Death Valley National Monument, there are two springs and well-defined seepage areas, level and dissected uplands with low hills, and the major plant communities of the Ash Meadows area -- Ash-Screwbean-Baccharis, Atriplex confertifolia, Atriplex-Haplopappus acradenius, and communities of year-round wet soils, including Distichlis and Juncus meadows. All is in an extremely disturbed condition at present.

Another 40 acres lie between the "Collins Ranch" and the south boundary of the Devils Hole tract, and this together with the "Scruggs Ranch" constitute the parcels which at the minimum must be preserved, if the Endangered Plant Species have any chance for survival. The area is indicated in Figure 57, and includes the land up to the Spring Meadows boundaries, beyond which the habitat has been totally obliterated. Over all of this area, but especially on the "Collins Ranch", extremely severe and thorough trampling and grazing by horses on open range has taken a heavy toll on the vegetation and soils; unless protected in the very near future, its potential for preservation of the species will no longer exist.

Following is believed to be a nearly complete list of the native plant species in this part of Ash Meadows and all are supported by herbarium specimens. This does not include the flora of the unnamed limestone mountain where Devils Hole is located; this mountain is uncollected for its plants, and probably has on it many species of interest. In the list, species marked with an asterisk occur on the "Collins Ranch"; those marked with a + occur in the spring area of the "Scruggs Ranch"; and those unmarked occur on the uplands south and west of Devils Hole (including the School Spring area) up to the boundaries of Spring Meadows Farm. Endangered Species of the Federal Register lists are in capital letters, and Threatened Species are underscored.

NATIVE VASCULAR PLANTS OF NORTHERN ASH MEADOWS, NEVADA

Trees, Shrubs, Woody Vines, and Cacti:

* Ephedra funerea
Ambrosia dumosa
+* Baccharis emoryi
* Chrysothamnus albidus
* Chrysothamnus albidus X (C. nauseosus ssp. mohavensis X C. n. ssp. hololeucus)
+* Chrysothamnus nauseosus ssp. mohavensis X ssp. hololeucus
* Encelia frutescens
* Gutierrezia microcephala
Haplopappus acradenius ssp. acradenius
* ssp. eremophilus
+* Iva acerosa
Pluchea sericea
* Stephanomeria pauciflora
Stanleya pinnata
+ var. inyoensis
var. pinnata
Opuntia basilaris
Opuntia echinocarpa
Opuntia ramosissima
Atriplex canescens
+* Atriplex confertifolia
Atriplex hymenelytra
* Atriplex parryi
+ Atriplex torreyi
+* Suaeda intermedia
* Prosopis glandulosa var. torreyana
+* Prosopis pubescens
* Psorothamnus fremontii
+ Krameria parvifolia
Petalonyx thurberi
+* Lythrum californicum
+* Fraxinus velutina var. coriacea
* Polygala acanthoclada
* Populus fremontii
Salix exigua var. stenophylla
Lycium andersonii
Lycium pallidum var. oligospermum
+* Vitis arizonica
Larrea tridentata

Herbs (and Suffrutescent Perennials):

Tidestromia oblongifolia
* Berula erecta
* Hydrocotyle verticillata
Amsonia tomentosa
+ Apocynum cannabinum var. glaberrimum
Asclepias erosa
+* Asclepias fascicularis
Aster exilis
* Aster intricatus
+* Aster pauciflorus
+* Cirsium mohavense
Conyza canadensis
Conyza coulteri
* Enceliopsis nudicaulis var. corrugata
+* GRINDELIA FRAXINO-PRATENSIS
* Haplopappus racemosus ssp. sessiliflorus
Helianthus annuus
+ ssp. jaegeri
+ ssp. lenticularis
* Helianthus nuttallii
Machaeranthera tortifolia var. tortifolia
Monoptilon bellioides
+* Pluchea purpurascens
Psathyrotes annua
+* Solidago spectabilis
* Xanthium strumarium var. canadense
Cryptantha angustifolia
Cryptantha confertiflora
Cryptantha virginensis
+ Heliotropium curassavicum var. oculatum
* Plagiobothrys stipitatus
+ Descurainia pinnata ssp. glabra
* Hutchinsia procumbens
Lepidium flavum
+ Lepidium fremontii
+ Lepidium lasiocarpum
* Lepidium montanum ssp. cinereum
+ Streptanthella longirostris
* Thelypodium integrifolium

* Cleomella brevipes
Oxystylis lutea
Atriplex phyllostegia
Monolepis nuttalliana
* Nitrophila occidentalis
Cuscuta nevadensis
Euphorbia micromera
Euphorbia parishii
Euphorbia serpyllifolia
* ASTRAGALUS PHOENIX
* Astragalus preussii
+* CENTAURIUM NAMOPHILUM
Nama pusillum
* MENTZELIA LEUCOPHYLLA
Mentzelia obscura
Mentzelia oreophila
Camissonia brevipes
ssp. pallidula
+ Gaura parviflora
ARCTOMECON MERRIAMII
Plantago insularis
var. fastigiata
Gilia latifolia
Ipomopsis polycladon
Langloisia schottii
Langloisia setosissima
Chorizanthe rigida
Eriogonum brachypodum
Eriogonum contiguum
+ Eriogonum inflatum
Eriogonum reniforme
Eriogonum thomasii
Eriogonum trichopes
* Dodecatheon pulchellum

+* Samolus floribundus
+* Oligomeris linifolia
* IVESIA EREMICA
+* Anemopsis californica
+* Castilleja linariaefolia
* Cordylanthus tecopensis
* Mimulus guttatus
* Veronica americana
Datura meteloides
Phoradendron californicum
* Carex praegracilis
* Cladium californicum
+* Eleocharis parishii
+* Eleocharis rostellata
+ Fimbristylis thermalis
+* Schoenus nigricans
Scirpus olneyi
Scirpus robustus
+* Sisyrinchium demissum
* Juncus balticus
+* Juncus nodosus
Triglochin concinnum
var. debile
+ Spiranthes romanzoffiana
+* Distichlis spicata
var. stricta
Elymus cinereus
* Muhlenbergia asperifolia
* Phragmites australis
* Poa scabrella
* Spartina gracilis
* Sporobolus airoides
+ Typha domingensis

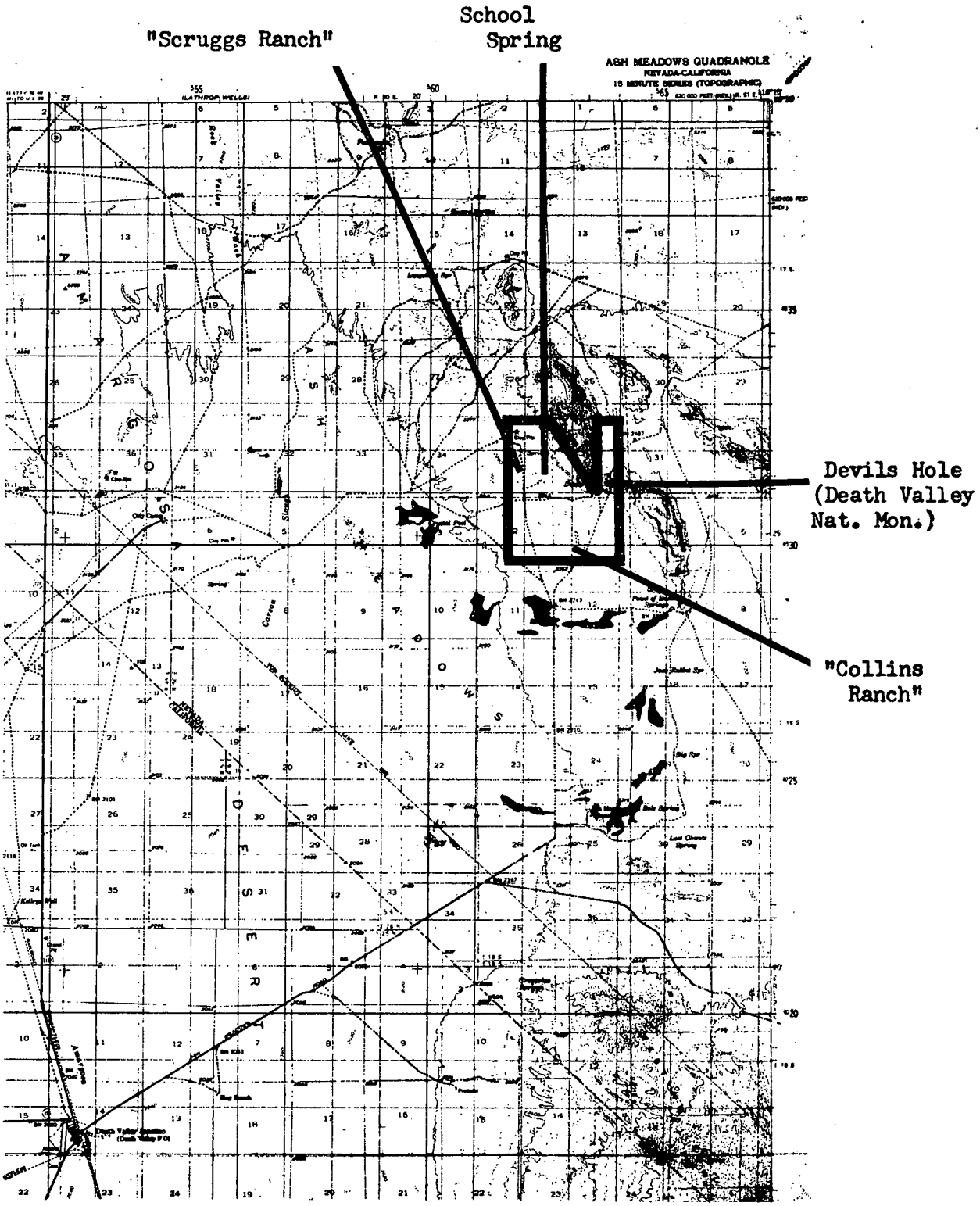


Fig. 57. Devils Hole area of northern Ash Meadows, Nye County, Nevada, within which the vascular plants listed on p. 72-73 are known to occur. Five of the six Endangered Species strictly endemic to Ash Meadows occur on the "Collins Ranch", which is also the type locality for four of the five species; the three Threatened Species also occur on this tract. The whole area delimited above is critically endangered by the Spring Meadows Farm operation, adjacent to the south and west boundaries, and extreme overgrazing and trampling by free-ranging horses, especially on the "Collins Ranch". The area outside Devils Hole is urgently in need of preservation.

Fig. 58. "Collins Ranch", showing the abandoned cabin which burned down the evening of October 30, 1971 (from a camp-fire by transients). Setting is a grove of Ash (Fraxinus velutina var. coriacea), Screwbean (Prosopis pubescens), and Cottonwood (Populus fremontii). Photo looking west from edge of Ash Meadows Road, October 1970, by Carl W. Henderson.

Fig. 59. Spring area back (west) of cabin, "Collins Ranch", with large Phragmites clump where Helianthus nuttallii and a number of other species formerly occurred (now grazed nearly to the soil surface). The major spring and its drainage channel are at right center in photo. Photo October 1970 by Carl W. Henderson.

Fig. 60. "Collins Ranch", where every square foot of soil is thoroughly trampled, as shown in photo, by horses on open range. Photo taken October 1970, and the severe trampling and grazing have continued year-round to the present time (1977). Photo by Carl W. Henderson.

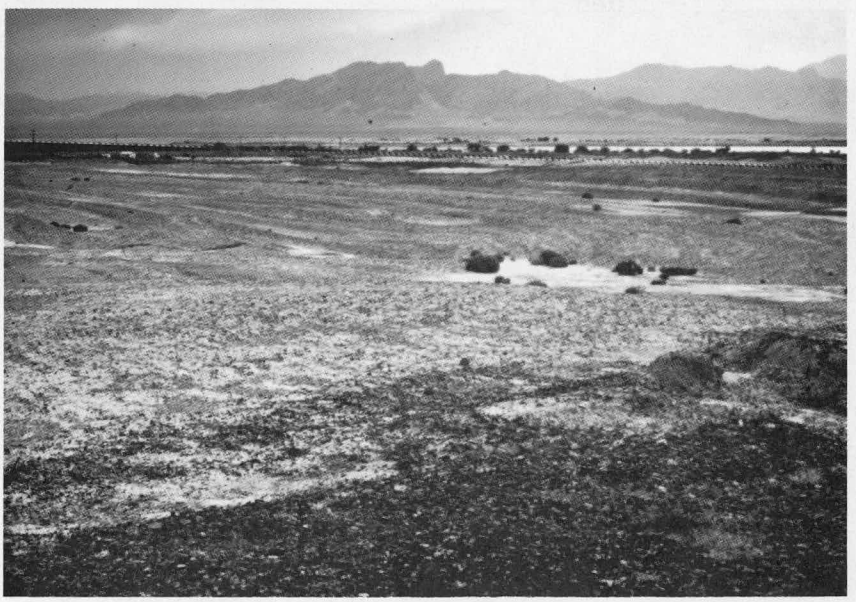


Fig. 61. From south boundary of "Collins Ranch", looking southwest across Spring Meadows Farm, where all vegetation and the native soils have been destroyed. In background, the Funeral Mountains, Inyo County, Calif., 12 miles distant. Photo July 1976.

See also Fig. 41, p. 50

APPENDIX II

PHACELIA PARISHII A. Gray

Gray, Asa. Proc. Amer. Acad. 19: 88. 1883.

TYPE (GH): Parish & Parish 1314, 1882. San Bernardino Co., Calif., dry alkaline lake near Rabbit Spgs. Isotypes, DS, F, NY, UC, US.

COLLECTIONS: Nevada Test Site, Nye Co., Nevada.

- Ripley & Barneby 3425, 1941. Foothills of Spotted Range toward Frenchman Flat, Nye Co. (CAS, RSA)

16000 - Williams 99, 4 May 1976. White volcanic knolls NW of Rd 28-03, 0.8 mi NE of jnct with Jackass Hwy, e. Rock Valley, in Atriplex confertifolia-Lycium pallidum; 3500 ft. (CAS, RENO, UC)

16001 - Williams 120, 20 May 1976. Same site as 16000. (CAS, RENO, US)

16002 - Williams 145, 26 May 1976. Same site as 16000, 16001. (UC, US)

16003 - Williams 173, 8 June 1976. On pink volcanic outcrops 1 mi E of Pinks Hole Hill, sw. Frenchman Flat; rare, on bare ground, in Atriplex confertifolia; 3500 ft. (NTS)

OTHER COLLECTIONS (as recorded in J. T. Howell, Amer. Midl. Natur. 29: 16. 1943)

- Ripley & Barneby 3265. Lucerne dry lake, below Rabbit Spgs, San Bernardino Co., Calif. (CAS, P)

- Eastwood & Howell 8958. Alluvial flats near Las Vegas, Clark Co., Nevada (CAS, GH, IU, P, RM, US)

- Barneby 2917. Arid gravelly slopes, S base of Pintwater Mtns, Clark Co., Nevada (CAS)

- M. E. Jones, 1906. Muncy, White Pine Co., Nevada (DS, P)

- M. E. Jones, 1891. Steptoe Valley, White Pine Co., Nevada (CAS, GH, P, UC, US)

Although this species has not been commonly collected in southern Nevada and southern California, it is probable that it is much more widely distributed and of more frequent occurrence than the collections to date would indicate. It is one of the small winter annual Phacelias -- and a species germinating following a winter rain, as occurred in the 1976 season in southern Nevada, rather than the usual autumn rain triggering germination of winter annuals -- and its distribution and documentation of persistence in the areas of past collections depend on a collector being present at the right place and the right time within its range in Nevada and California. Its candidacy for either an Endangered or Threatened status, therefore, cannot be here supported.