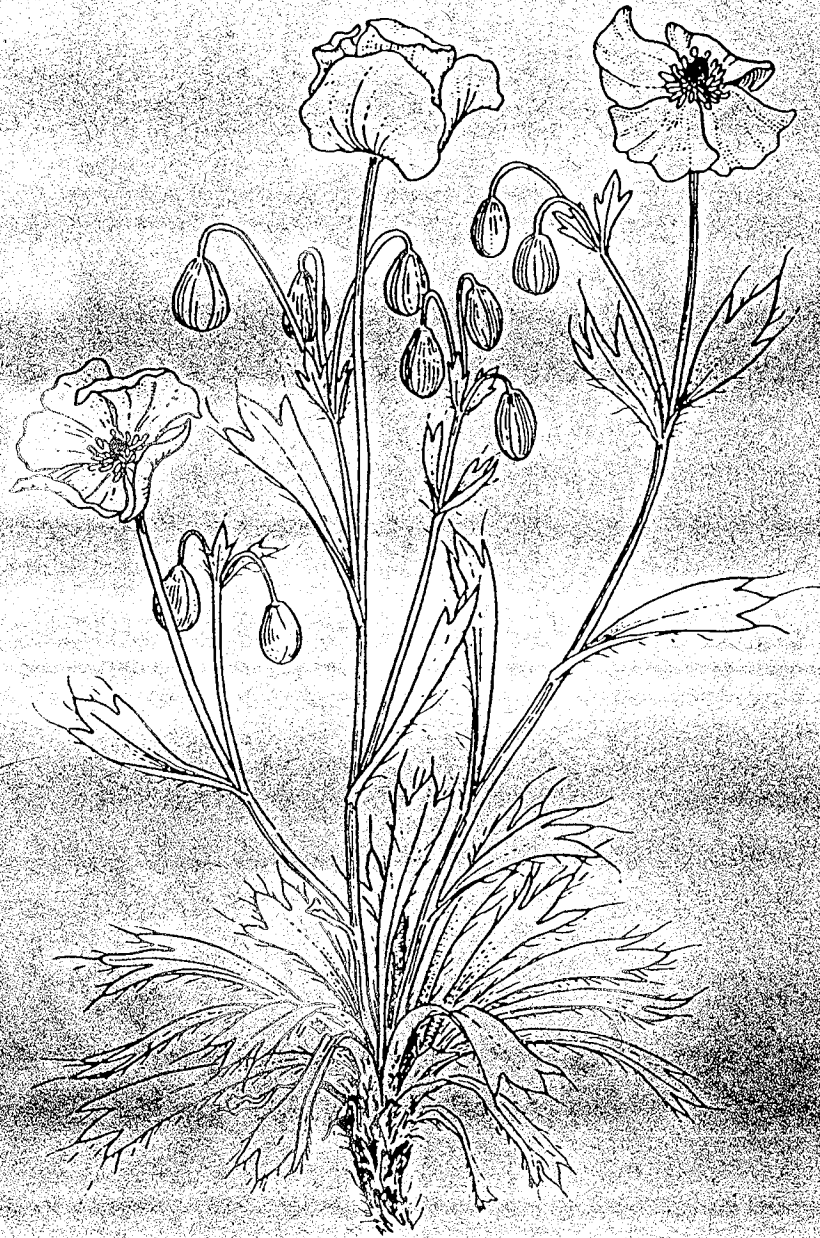
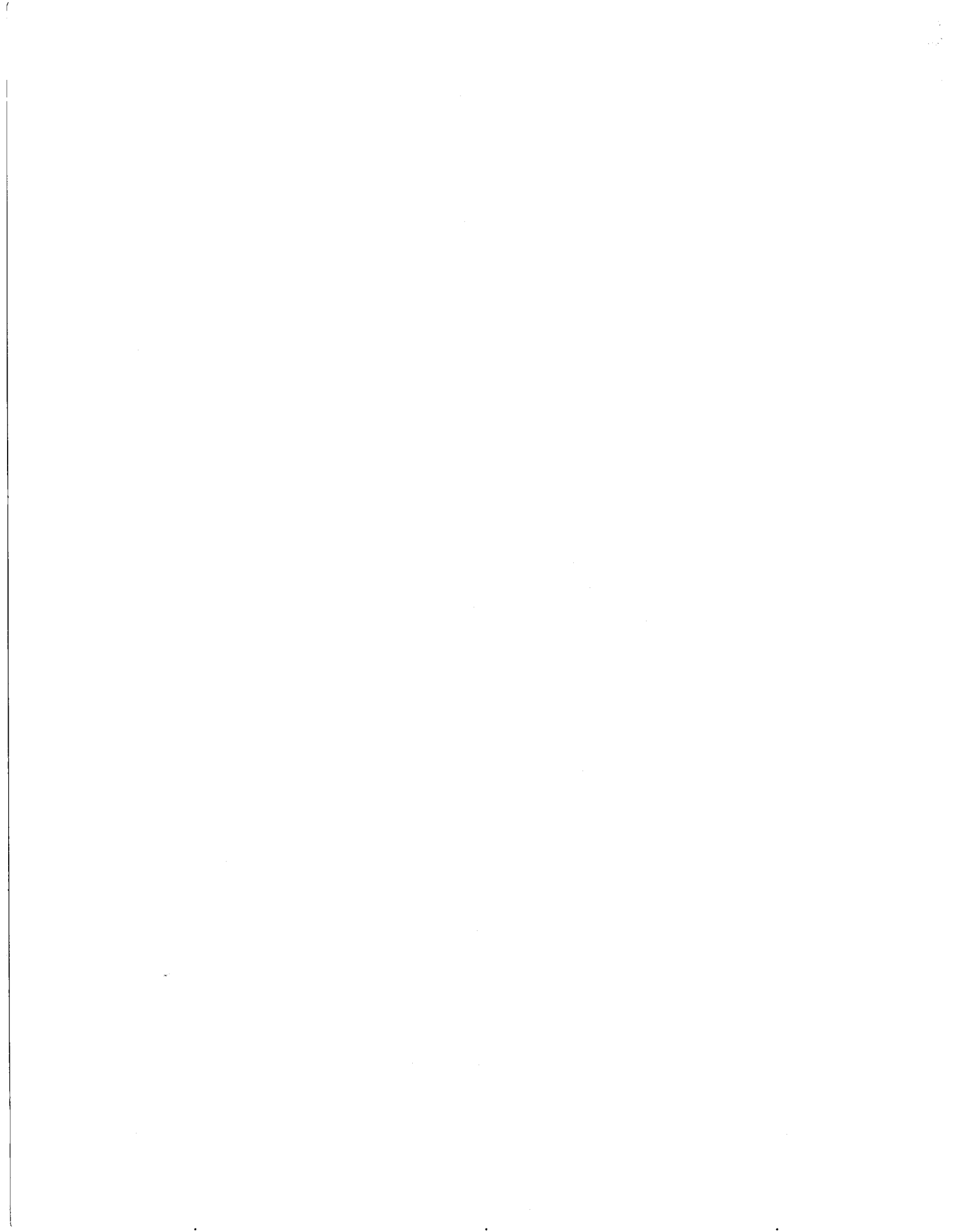


DWARF BEAR-POPPY

(ARCTOMECON HUMILIS COVILLE)

RECOVERY PLAN





DWARF BEAR-POPPY  
ARCTOMECON HUMILIS COVILLE  
RECOVERY PLAN

Prepared by the U.S. Fish and Wildlife Service

John Anderson  
Denver, Colorado

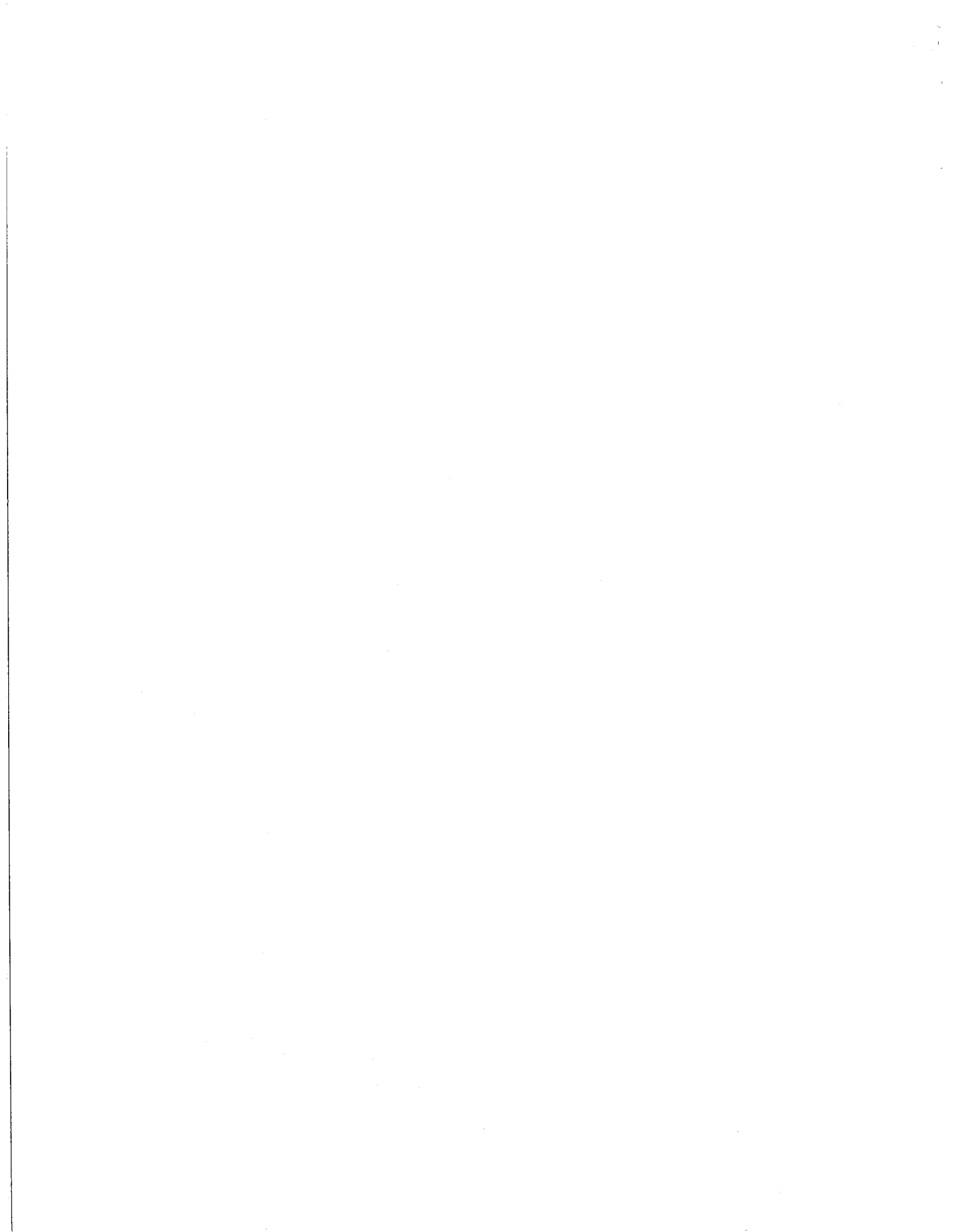
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for Region 6  
U.S. Fish and Wildlife Service  
Denver, Colorado

APPROVED

DATE: 12-31-85

U.S. Fish and Wildlife Service: James V. Burtel  
Regional Director, Region 6



This is the completed Dwarf Bear-Poppy Recovery Plan. It has been approved by the U.S. Fish and Wildlife Service. It does not necessarily represent official positions or approvals of cooperating agencies and does not necessarily represent the views of all individuals who played a role in preparing this plan. This plan is subject to modification as dictated by new findings, changes in species status, and completion of tasks described in the plan. Goals and objectives will be attained and funds expended contingent upon appropriations, priorities, and other constraints.

Acknowledgements should read as follows:

The Dwarf Bear-Poppy Recovery Plan, dated December 31, 1985, prepared by the U.S. Fish and Wildlife Service in cooperation with Dr. Duane Atwood, Mr. Ralph Gierisch, Dr. Susan Meyer, Dr. Wesley Niles, and Dr. Stanley Welsh, who provided valuable assistance in reviewing the technical draft. The cover drawing of the dwarf bear-poppy is a reproduction of a drawing by Ms. Kaye Thorne, Technical Illustrator and Assistant Curator at the Brigham Young University Herbarium.

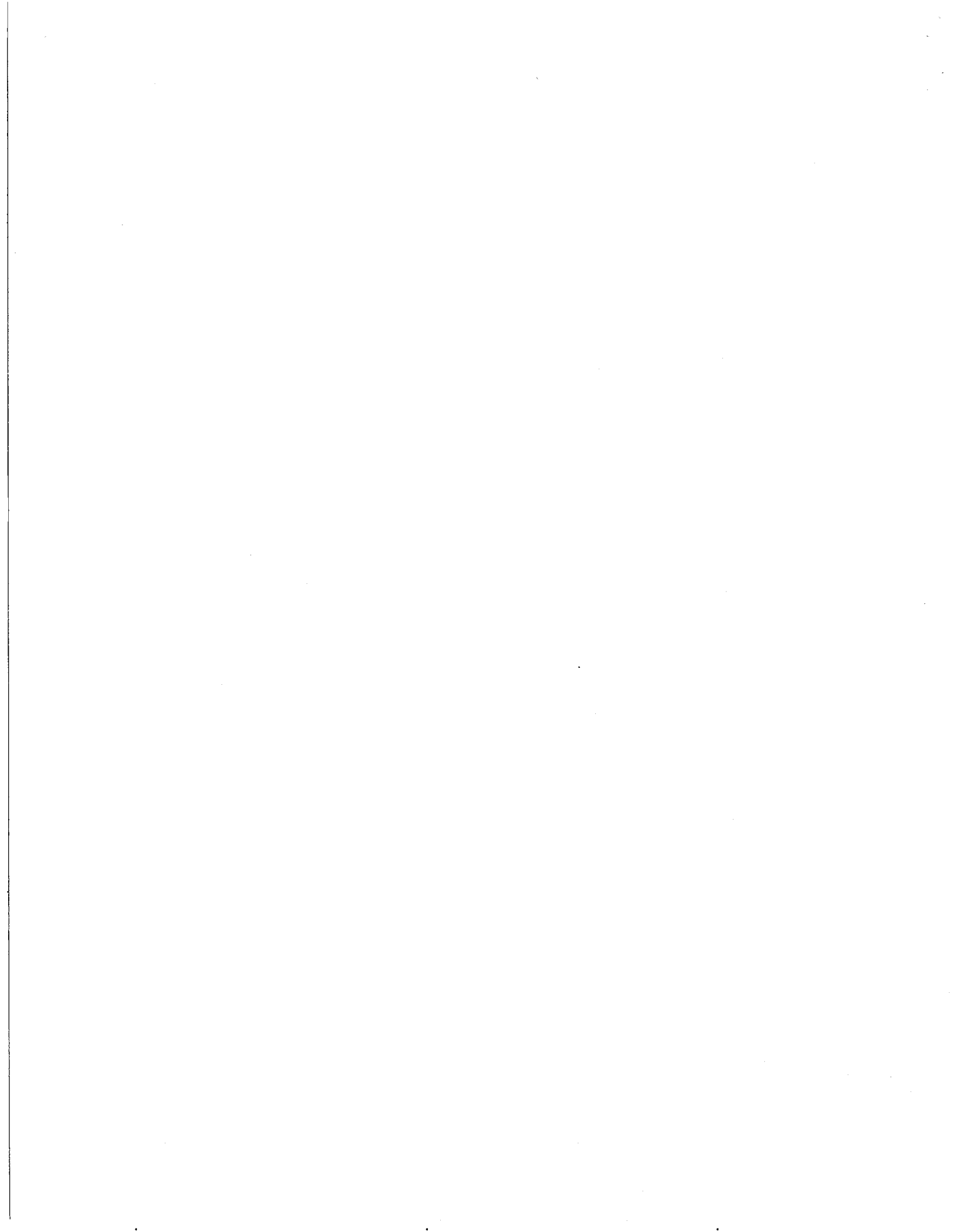
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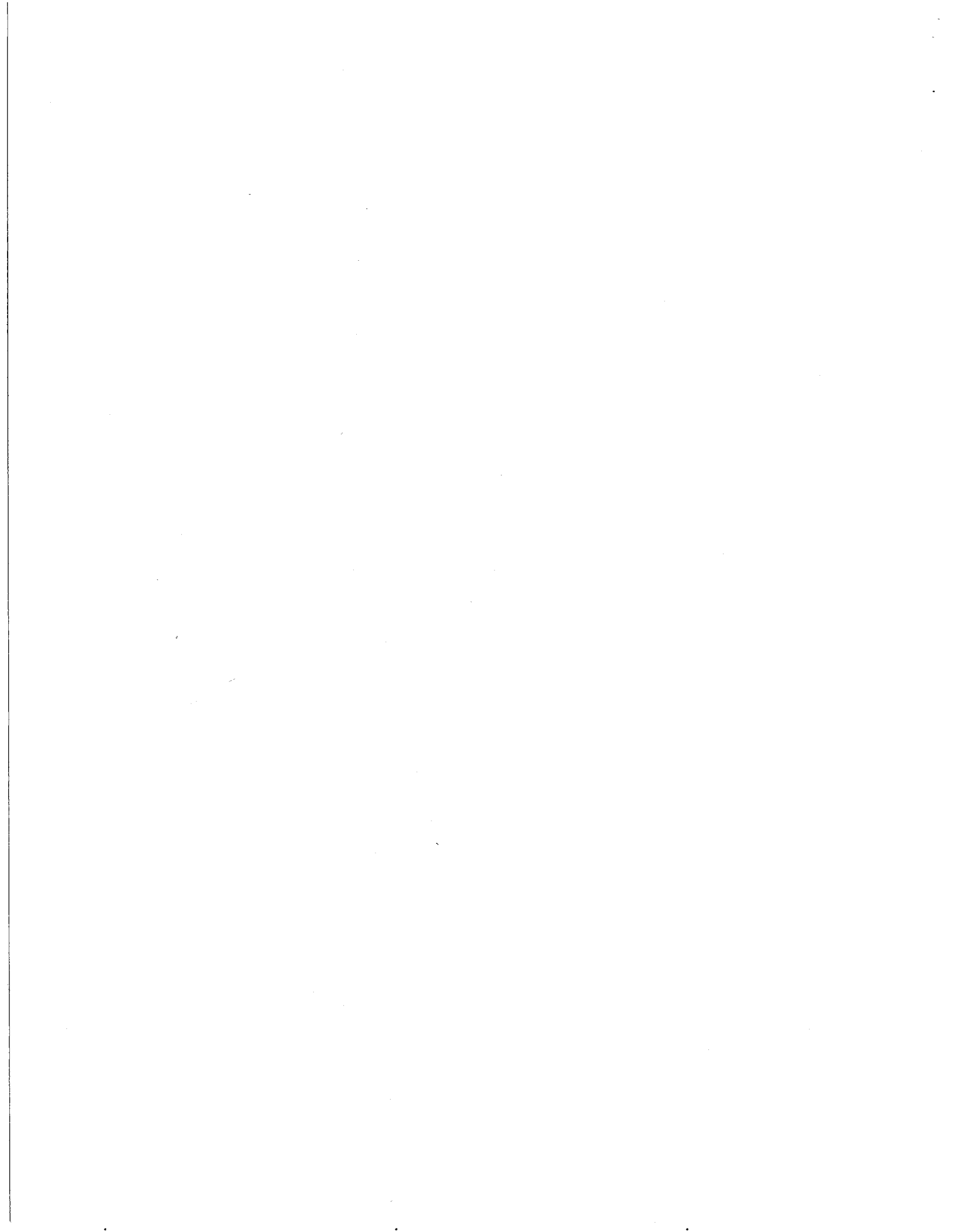
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## PART I

### INTRODUCTION

The dwarf bear-poppy, Arctomecon humilis Coville, was listed as endangered on November 6, 1979 (44 FR 64250). The other two members of the genus, A. californica Torr. & Frem. and A. merriamii Coville, are both in the 1980 Notice of Review as candidates (45 FR 82480). All are gypsophiles (plants that grow on gypsum-rich soils), the first two obligatory and the latter one facultative, and occupy a restricted range in the Mohave Desert. Their narrow range apparently is based on both the species adaptation to gypsum soils and their apparently restricted status as Paleo-endemic species (Clokey 1951; Meyer 1986a, 1986b).

#### Taxonomy

The bear-poppies were first discovered in 1844 when John C. Fremont collected Arctomecon californica in soil that was "sterile and gravelly" on his second expedition to the western United States (Torrey 1845). The first collection of A. humilis was made in 1874 by Dr. C. C. Parry. Although the three species are quite distinct from each other, there was a delay of 18 years from the time of Parry's collection to the recognition and publication of A. humilis as a separate species, apparently due to problems with the original material of Fremont. The third species, A. merriamii, was first collected by Dr. C. Hart Merriam on the Death Valley Expedition in 1891. When Frederick Coville was preparing the publication of Merriam's specimen the next year as a new species, he realized that Parry's specimen also represented a distinct species. Fremont's original specimen has been lost except for two fruit fragments (Larry Morse, New York Botanical Garden, correspondence to Janet Hohn, U.S. Fish and Wildlife Service, 1979). Coville in 1892 published A. humilis (based on Parry's 1874 specimen as the type collection) along with A. merriamii (Coville 1892).

#### Morphology

While the three species of bear-poppy share common morphological features, the combination of features is distinctive in each one. The dwarf bear-poppy exhibits similar stamen and pistil structure to A. merriamii and the racemose inflorescence of A. californica rather than the solitary inflorescence of A. merriamii. The clustered pure white flowers of the dwarf bear-poppy and the bright yellow-flowered A. californica make them quite attractive in their arid environment.

The dwarf bear-poppy is characterized by several unique features including stature, leaf morphology, and floral parts. Its short leafy peduncles are only 12-15 cm tall. Both other species have tall naked peduncles: A. merriamii, 20-35 cm, and A. californica, up to 60 cm. Due to the short leafy stems, the white flowers appear to float above the cluster of leaves,

accentuating the plant's low stature. Although each species may have from 4-6 petals, the dwarf bear-poppy usually has 4 petals while the others commonly possess 6 petals (Atwood 1977). The genus name is based on the bear paw-like appearance of the shaggy villous leaves of A. californica. While A. merriamii also shares this feature, the leaves of the dwarf bear-poppy are only slightly lannate with deeply 3-toothed leaves at the apex (versus the shallowly toothed leaves of the other two species).

### Distribution

The dwarf bear-poppy is the easternmost species of the genus. It occurs at the eastern edge of the Mohave Desert in Washington County, Utah, in the vicinity of the city of St. George. A. merriamii ranges from Death Valley (Inyo County, California) to Las Vegas (Clark County, Nevada) and A. californica from Las Vegas to the Lake Mead area of Mohave County, Arizona (Janish 1977). Thus, while the other two species are sympatric around Las Vegas, the dwarf bear-poppy is isolated from them by a distance of at least 50 miles to the northeast (Figure 1). Between Las Vegas and St. George lie the 7,000- to 8,000-foot Beaver Dam Mountains and Virgin Mountains, which act as effective barriers further isolating the dwarf bear-poppy. The different vegetative morphology of the species may be a reflection of this isolation. It is the most unique of the three species.

The dwarf bear-poppy grows on an edaphic archipelago within a semicircle (7 miles in radius) to the east, south, and west of St. George, except for Beehive Dome 9 miles to the southeast. Within this area, it only occurs on select gypsiferous soil outcrops of the Moenkopi Formation. The country directly to the north of St. George is mostly derived from Navajo Formation. South of St. George, the dwarf bear-poppy grows on low hills at three sites: between Webb Hill and the Price City Hills, at White Dome, and near the ghost town of Atkinville (adjacent to the freeway). It also occurs at the base of ridges and buttes west of St. George. There are large populations at the base of Red Bluff just west of Bloomington and at the base of the north side of Santa Clara Butte (the northwesternmost site). Low density groups of one plant per acre occur at the base of Boomer Hill, the White Hills, and near Val Spring (the southwesternmost site).

On the east, a healthy population with densities of up to 25 plants per acre occurs at the base of Warner Ridge from Punchbowl Dome south to the Warner Valley Road, a 1.5-mile distance. A small outlying colony also occurs at the south end of Warner Ridge on Beehive Dome less than a mile from the State line; this is the southeasternmost site of the dwarf bear-poppy. The northeasternmost colony consists of a few dozen plants at the base of the south side of Shinob Kibe, a small butte across the Virgin River from the town of Washington (Figure 2).

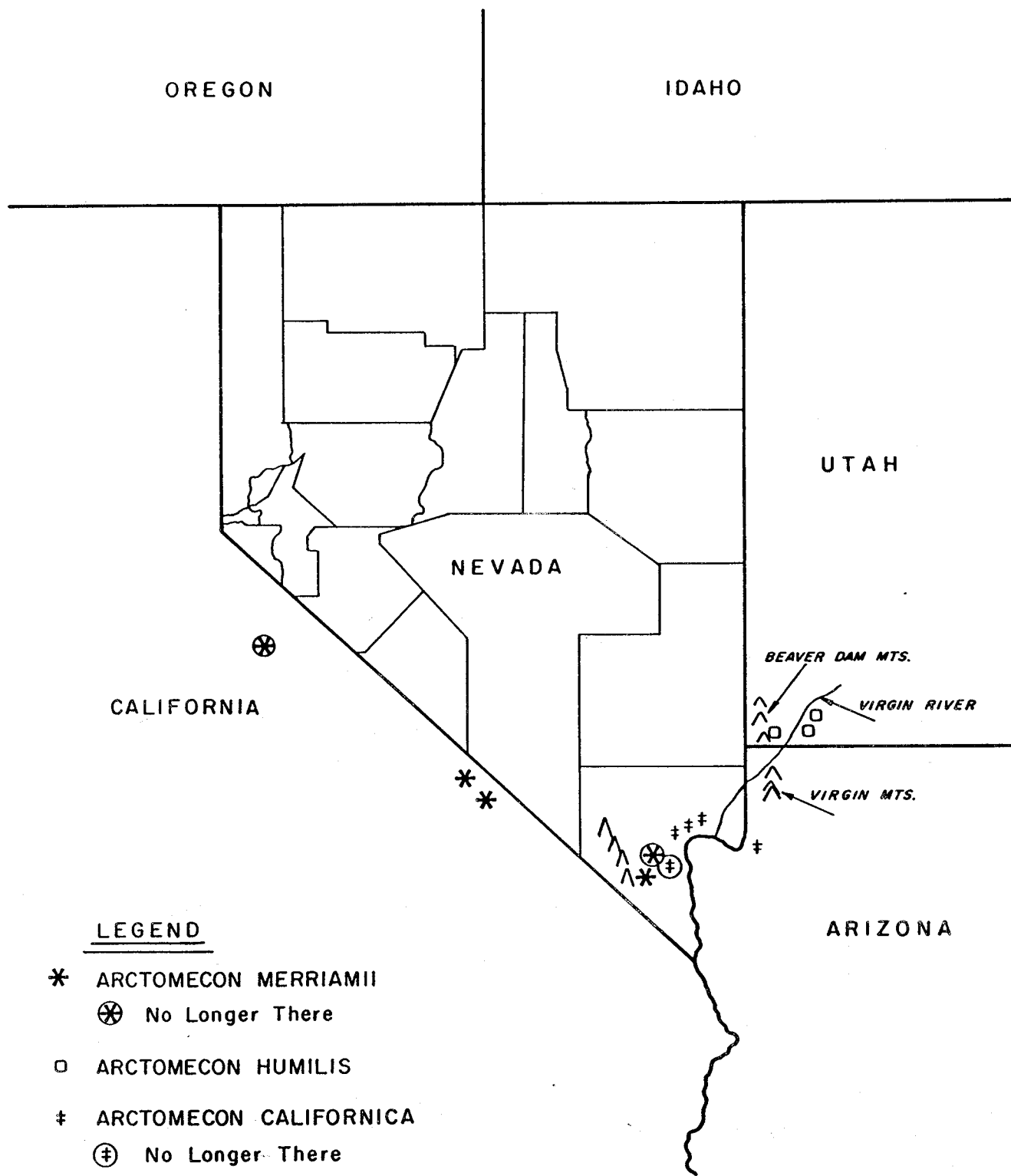
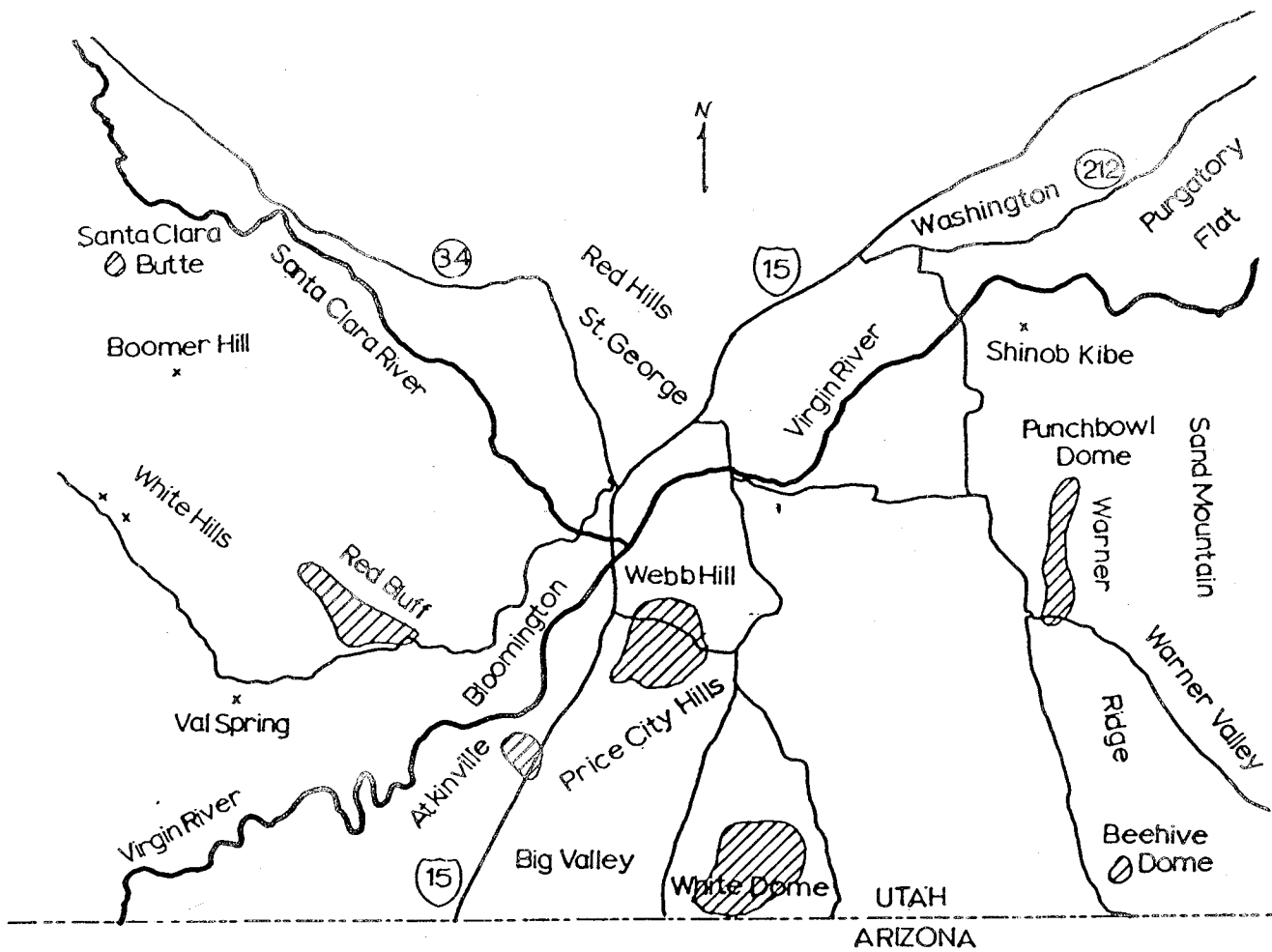


FIGURE 1. DISTRIBUTION OF THE GENUS ARCTOMECON



MAP LEGEND


Arctomecon humilis sites: large  or small x

FIGURE 2. DISTRIBUTION OF THE DWARF BEAR-POPPY

## Habitat

The dwarf bear-poppy grows in a unique area called the Dixie Corridor, which is created by the meeting of a floristic province, the Mohave Desert, with a physiographic province, the Colorado Plateau. (There are also elements of the Great Basin and Navajoan Desert floristic provinces at this common meeting ground.) It is only in this area that the characteristic creosote-dominated vegetation of the Mohave Desert grows on the sedimentary strata of the Colorado Plateau. Several of these strata form a "badlands" topography (low rolling hills with sparse vegetation). Within this "badlands" area are two distinct soil types, one formed by erosive, alkaline clay-loam soils with a high shrink-swell capacity, the other formed by erosive, nonalkaline, gypsiferous soil with a low shrink-swell capacity and with a conspicuous cryptogamic crust. The common feature which causes these two distinct soil types to be considered "badlands" is their tendency to form indurate surface crusts (through different processes) which impede seedling emergence by offering mechanical resistance. The assumption that gypsum soils present a more xeric environment than other upland desert soils is not warranted; evidence suggests that gypsiferous soils have less severe early-summer soil water deficiency than other desert soils. This may be the advantage offered to Arctomecon humilis and other species which have overcome the gypsum toxicity and soil crust problems of their habitat (Meyer 1986a).

The most concise way to describe the dwarf bear-poppy's habitat is to name the formation to which it is restricted--the Moenkopi. In the St. George area, the Moenkopi Formation contains six members (Figure 3). While the formation itself is not rare around St. George, the dwarf bear-poppy only grows on selected sites on the Moenkopi Formation. Usually, it appears to grow on the upper three members: the upper red, the Shnabkaib (the white gypsiferous member), and the middle red member just below ridges and buttes formed by the overlying resistant Shinarump formation. The exact geologic strata and edaphic requirements need to be determined as they might provide clues to the restricting factors of the species--such as why it does not occur in Purgatory Flat or across the State line into Arizona, for example.

Elevation may be a restricting factor as important as geology. The dwarf bear-poppy occurs only on the Moenkopi Formation from 2,700 to 3,300 feet in elevation, with most of the plants occurring between 2,800 and 3,000 feet. This is basically the elevation of the bands of Moenkopi that are exposed around St. George. At Moenkopi exposures farther east (beyond Warner Ridge), the dwarf bear-poppy does not presently occur, even at similar elevations (e.g. Purgatory Flat). However, other Moenkopi endemics with which it is sympatric over parts of its range occur there. An exposure of Moenkopi on the east end of Warner Valley contains another Moenkopi endemic, Pediocactus sileri, currently listed as endangered, but there are no dwarf bear-poppies. However, the two are sympatric only 8 miles away at Beehive Dome. This site is at 3,350 feet elevation, only slightly higher than the elevational range at which the dwarf bear-poppy is found. Similarly, at the Red Bluff site on the west end of the dwarf bear-poppy's range, it grows sympatrically with the Moenkopi endemic Eriogonum thompsonae var. albiflorum. However, at Hurricane Cliffs 10 miles to the east, only the latter species is found at the base of

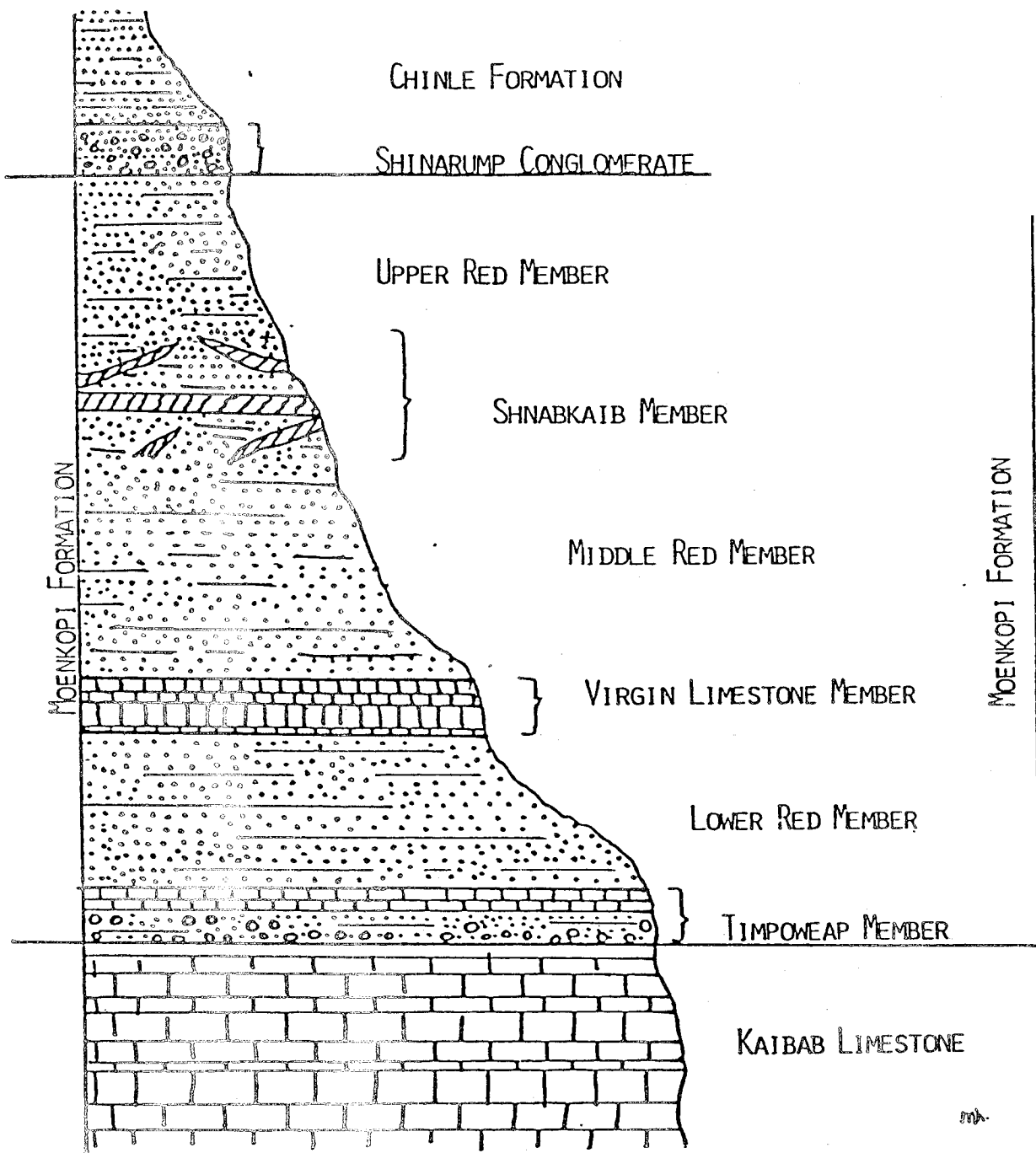


FIGURE 3. MEMBERS OF THE MOENKOPI FORMATION

Little Creek Mountain at 4,500 feet elevation. The combination of narrow geological/edaphic requirements and elevational range restrict the dwarf bear-poppy to a very specific habitat type. In view of these restricting factors (and probably others), the species may be difficult to transplant.

At some places on the Moenkopi hills, a thick cryptogamic crust covers the soil, protecting it from erosion and sometimes apparently excluding most herbaceous plants, including the dwarf bear-poppy. This exclusion may be a function of competition or of a physio-chemical soil surface environment which affects seedling establishment. This is reflected in differences in the substrates of different Moenkopi strata. For example, at Warner Ridge, the thick cryptogamic crust occurs on the outer foothills while the dwarf bear-poppy grows on the inner foothills. At other sites, such as the low hills at the Atkinville, Price City Hills, and Red Bluff sites, the dwarf bear-poppy grows with the cryptogamic crust.

The edaphic islands created by the Moenkopi Formation support a different vegetation from the surrounding creosote-dominated community. They are characterized by a mixed warm desert shrub community whose dominants are Fremont indigo bush (Psoralea fremontii), cheesebush (Hymenoclea salsola), Nevada Mormon tea (Ephedra torreyana), saltbush (Atriplex confertifolia), shrubby buckwheat (Eriogonum corymbosum), and Fremont pepperweed (Lepidium fremontii). This plant community also grows on other substrates, but on the Moenkopi Formation the herbaceous component is largely made up of gypsophiles like the dwarf bear-poppy, including Phacelia pulchella, Phacelia palmeri, and the unusual sandpaper bush Petalonyx parryi. These three gypsophiles also grow in association with Arctomecon californica.

### Land Ownership

There are large blocks of Utah State land around St. George and Bloomington. These areas contain most of the larger dwarf bear-poppy populations: all of the sites south of St. George (White Dome, Price City Hills, and Atkinville) and at Red Bluff, west of Bloomington. The Price City Hills and Red Bluff sites contain small parcels of land administered by the Bureau of Land Management (Bureau). The largest population on Bureau land is at Warner Ridge. The smaller ones at Santa Clara Butte, Boomer Hill, White Hills, and Val Spring are also on Bureau land. The Shinob Kibe site is split between Bureau and private ownership.

Because such a large proportion of the poppies occur on Utah State land, any successful recovery effort will require the participation and cooperation of the State of Utah.

### Impacts and Threats

The present and historic ranges of the dwarf bear-poppy are very similar. There are no old unrelocated collection sites or any old collections from anywhere other than the St. George area. Within the historic range, some of

the "islands of the archipelago" have been destroyed, and others are being impacted or have the potential of being impacted. Historically, surveys for the plant were not conducted before development projects were carried out. Therefore, the extent of historical impact is based on extrapolation from project sites to known occurrences of the dwarf bear-poppy.

Dwarf bear-poppies are located along Interstate Highway 15 where it passes through Atkinville and by the Price City Hills. Construction of the freeway may have eliminated significant portions of these populations. St. George, like Bloomington, extends south from the base of a bluff, the Red Hills. How much of St. George now covers historical sites of the dwarf bear-poppy is unknown. The type locality for one of the dwarf bear-poppy's sympatric gypsophiles, Petalonyx parryi, is "within a stone's throw of the great Mormon Temple" in St. George (Parry 1875). Also, the Moenkopi formation can be seen between the lanes of the northeast interchange of the freeway in St. George. In his comments, Dr. Atwood indicated the dwarf bear-poppy was observed in parts of Bloomington prior to its development, but the area now is covered by houses (Duane Atwood, pers. comm.).

The most severe threat impacting the dwarf bear-poppy, in addition to the continuing rapid expansion of St. George, is off-road vehicle (ORV) use associated with recreation and mineral exploration. ORV activity can cause large denuded strips on the face of the Moenkopi hills. More widespread and, presumably, less fragile species which grow in association with the dwarf bear-poppy are also unable to grow on these barren strips. Sometimes, dwarf bear-poppies have been seen in ORV tracks, but only where ORV use has been light. Wherever there has been sustained ORV use, the result is soil compaction and vegetative denudation. Barren scars are left on the hillsides where the cryptogamic crust occurred and vascular plants such as the dwarf bear-poppy used to grow. The sites most heavily impacted by ORV use are naturally those closest to St. George and Bloomington: Red Bluff, Atkinville, Price City Hills, and White Dome. A study is recommended to analyze the specific effects of ORV use on the Moenkopi ecosystems.

Distance from town does not seem to be a factor in the amount of disturbance received from mineral exploration. While the Warner Ridge population is located farther from town and is not as severely impacted by motorcycles and other ORV's, there are several bulldozer roads in this area. Possibly this is due to the higher probability of mineralization along the anticline of Warner Ridge.

Seismic exploration trucks have also been active in this area on the Moenkopi but, so far, only in areas adjacent to areas supporting the dwarf bear-poppy. The area is staked with many mining claims. However, recent claims may not be valid since the area was withdrawn until recently by the Bureau of Reclamation for the Dixie Water Project. Although there may not be profitable deposits present, the annual assessment work on the claims may result in heavy impact.



The westernmost sites--Santa Clara Butte, Boomer Hill, and White Hills--are the most remote and hence the least impacted. Of these, the Santa Clara Butte site contains the largest and most vigorous population of approximately 400 plants. This site is 2 miles from the nearest road, a dirt track to a livestock reservoir.

Collecting for landscaping purposes is a potential threat of unknown magnitude. While the showiness and beauty of the dwarf bear-poppy make it a tempting item for collection and transplantation to houses with desert landscaping, there is no indication of the extent, if any, such activity is taking place. Little evidence of collecting has been seen at the various sites.

Because of its restricted range and specialized habitat parameters, the dwarf bear-poppy is thought to be difficult to transplant and cultivate.

### Management

Utah and Arizona have been extensively inventoried for populations of dwarf bear-poppy by Bureau botanists John Anderson and Dr. Duane Atwood of the Cedar City District, Utah, and Ralph Gierisch of the Arizona Strip District, Arizona. Its range is reasonably well known. Soil analyses of different members of the Moenkopi have been done by Ralph Gierisch. No trend studies have been conducted to date.

As a result of a recent ORV inventory by the Bureau, the Warner Ridge sites at Beehive Dome and Punchbowl Dome were declared closed to ORV's. Notification of the closed sites has been published in a map of the Bureau's Cedar City District, but the areas have not been posted. The State of Utah has posted dwarf bear-poppy habitat on its lands closed to ORV use. All areas where the dwarf bear-poppy occurs on Federal land administered by the Bureau are open to mineral exploration and entry. The Bureau has not disposed of dwarf bear-poppy habitat on the isolated lands under its management within the range of the species.

## PART II

### RECOVERY

#### OBJECTIVE

The primary objective of this recovery plan is to restore the dwarf bear-poppy (Arctomecon humilis) to nonendangered status. This can be accomplished by protecting the extant populations from existing human threats and ensuring that they are maintained as vigorous self-sustaining populations in their natural habitat. Specific measurements on the density of plants needed to maintain a vigorous self-sustaining population have not been made. An estimate based on the Warner Valley population is 15-20 plants per acre.

#### STEPDOWN OUTLINE

1. Remove threats to the dwarf bear-poppy by enforcement of existing regulations, including the Endangered Species Act, National Environmental Policy Act, and the Federal Land Policy and Management Act.
  11. Enforce existing regulations.
    111. Post the boundaries of the existing ORV closure areas at Warner Ridge (Punchbowl and Beehive Domes).
    112. Establish periodic monitoring of these sites.
  12. Implement management practices to protect additional sites.
    121. Pursue various realty actions and conservation agreements with the State of Utah and other dwarf bear-poppy habitat landowners.
      1211. The Warner Ridge site (the largest federally owned population) should be designated an Area of Critical Environmental Concern.
      1212. Investigate various realty actions such as exchanges, easements, or agreements on the State-owned sites of White Dome, Atkinville, Price City Hills, and Red Bluff.
    122. Manage ORV use.
      1221. Close the White Dome, Atkinville, Red Bluff, and Price City Hills sites to ORV's all year long.
      1222. Apply 111 and 112 to these sites.

- 1223. Fence off the Warner Ridge site.
- 1224. Establish alternate areas where the dwarf bear-poppy does not occur as ORV use areas.
- 123. Manage mining use.
  - 1231. Map existing mining claims on dwarf bear-poppy sites.
  - 1232. Determine validity of these claims.
  - 1233. Determine impacts of assessment work and the potential degree of impact from actual mining (and the probability of mining).
  - 1234. Investigate the need for mineral withdrawals on those sites undergoing impact from mining activities.
- 2. Sustain healthy populations in their natural habitat at the existing sites.
  - 21. Study the ecology of the dwarf bear-poppy.
    - 211. Autecology - determine its specific geological/edaphic requirements.
    - 212. Synecology - study the relationship between the dwarf bear-poppy, the cryptogamic crust, and associated species.
    - 213. Demographics - monitor population numbers to try to separate the effects of natural cycles from trends caused by human impacts.
  - 22. Determine the environmental parameters defining and restricting the habitat and distribution of the dwarf bear-poppy.
  - 23. Develop a habitat management plan for the entire Moenkopi-based ecosystem.
  - 24. Inventory for the dwarf bear-poppy.
    - 241. Map exact boundaries for known sites in Utah.
    - 242. Search for any sites in Arizona.
- 3. Develop public awareness, appreciation, and support for the conservation of the dwarf bear-poppy.
  - 31. Increase the public's knowledge of the dwarf bear-poppy and its problems with pamphlets or audio-visual programs.

32. Enlist the support of public interest groups.
33. Establish alternate recreational areas (see 1224 above).

## NARRATIVE

The primary objective of this recovery plan is to restore the dwarf bear-poppy (Arctomecon humilis) to nonendangered status. This can be accomplished by protecting the extant populations from existing human threats and ensuring that they are maintained as vigorous self-sustaining populations in their natural habitat. Specific measurements on the density of plants needed to maintain a vigorous self-sustaining population have not been made. An estimate based on the Warner Valley population is 15-20 plants per acre.

The main threats to the dwarf bear-poppy are habitat loss to urban development and heavy ORV use on the hills where it grows. These threats have increased dramatically in recent years. Mineral exploration and claim assessment work are secondary threats which might have higher potential impact. Protection of the habitat occupied by the dwarf bear-poppy from the impacts described above is necessary to achieve its recovery. Recovery to the point of down-listing to threatened status will involve management of ORV use as well as realty actions, such as exchanges, easements, withdrawals, etc., on the habitat of the dwarf bear-poppy. If the extant populations are sustained as vigorous and healthy ones, detailed and expensive scientific studies may not be necessary. Until the dwarf bear-poppy is secure, research studies and monitoring are recommended to provide a greater understanding of the dwarf bear-poppy's ecology and its relationship to various impacts. These data can then be used to suggest better management techniques (which may modify the recovery plan in the future).

1. Remove threats to the dwarf bear-poppy by enforcement of existing regulations, including the Endangered Species Act, National Environmental Policy Act, and the Federal Land Policy and Management Act.

Because of the rarity of the dwarf bear-poppy, all existing colonies and populations must be protected by the enforcement of existing regulations and management of the threats to the species.

11. Enforce existing regulations.

The sites already closed to motorized vehicles, Punchbowl and Beehive Domes at Warner Ridge; need to have the Bureau's ORV regulations enforced.

111. Post the boundaries of the existing ORV closure areas at Warner Ridge (Punchbowl and Beehive Domes).

Without the signs posted, the exact areas closed will be hard to determine by the ORV users. The areas are not fenced, and the ORV maps are at a small scale.

112. Establish periodic monitoring of these sites.

Periodic monitoring of the sites needs to be done. The location of the sites near St. George should help make monitoring easier. The Bureau's weekend patrols should include these areas.

12. Implement management practices to protect additional sites.

Several actions elaborated below need to be taken to protect other populations.

121. Pursue various realty actions and conservation agreements with the State of Utah and other dwarf bear-poppy habitat landowners.

Approximately two-thirds of the dwarf bear-poppy sites are on Utah State land. Realty actions such as exchanges, easements, or other agreements should be pursued for those sites which are on Utah State land. (The State of Utah has no legal statutes for the protection of rare and endangered plants.) Also, special land designations should be considered for all sites on Federal land.

1211. The Warner Ridge site (the largest federally owned population) should be designated an Area of Critical Environmental Concern.

The entire Moenkopi outcrop at Warner Ridge from Punchbowl Dome to Beehive Dome which contains both Arctomecon humilis and Pediocactus sileri should be declared an Area of Critical Environmental Concern. It has been less impacted by ORV's than the other large sites and is the largest population on Federal land. Although various activities could still be allowed within the Area of Critical Environmental Concern, this designation would give the dwarf bear-poppy special management consideration in environmental assessments on future actions in this area.

1212. Investigate various realty actions such as exchanges, easements, or agreements on the State-owned sites of White Dome, Atkinville, Price City Hills, and Red Bluff.

Those public lands that should be investigated for exchanges include White Dome (T43S R15W S28, 29, 32 and 33; Bureau land adjoins on the east), Atkinville (T43S R16W NE1/4 S23; Bureau land adjoins on the west), Price City Hills (T43S R15W N1/2 S18), and Red Bluff (T34S R16W SW1/4 S9, Bureau land adjoins on the west). Bureau lands around St. George without a high level of

environmental values should be offered in exchange; these could be Bureau land adjacent to other Utah State land or isolated Bureau tracts. Examples are Bureau land in T42S R16W S4, 5, 7, 8, 9, 10, 14, 15, 25, 26, and 35; T42S R15W S15, 17, and 23; T43S R16W S1; and T43S R15W SE1/4 S8, S9, 11, 14, 15, 21, and W1/2 NW1/4 S24. Another possibility for exchange is Bureau land at the north end of Sand Mountain.

Alternately, conservation easements, agreements (e.g. Research Natural Areas) and management (such as fencing) should be discussed with the State of Utah at the same time. If its services are requested, The Nature Conservancy has agreed to act as a catalyst between the parties involved in the land exchanges.

122. Manage ORV use.

The primary threat that needs to be eliminated is the heavy ORV use on the Moenkopi badlands where the poppy grows. Several of the sites are crisscrossed by barren strips caused by ORV usage. In order to maintain a viable ecosystem for the dwarf bear-poppies' habitat, ORV use needs to be eliminated from the dwarf bear-poppy sites and transferred to more suitable areas where less environmental damage will result.

1221. Close the White Dome, Atkinville, Red Bluff, and Price City Hills sites to ORV use all year long.

It is important that these damaged sites be recovered. They have been very heavily impacted. Support from the State of Utah in its ORV closure on dwarf bear-poppy habitat in this area is needed to prevent further serious degradation of the species habitat.

1222. Apply 111 and 112 to these sites.

1223. Fence off the Warner Ridge site.

The Warner Ridge site, the best dwarf bear-poppy site on public land, should be fenced off. Part of its boundaries already have existing fences. Only connecting fences between these, a total of about 2 miles, would need to be built.

1224. Establish alternate areas where the dwarf bear-poppy does not occur as ORV use areas.

To replace the closed areas, alternate areas must be provided to give ORV use another outlet. One possible site is Purgatory Flat east of Washington where Moenkopi

hills occur on both sides of Highway 17 without the dwarf bear-poppy. If the present level of motorcycle activity can be diverted to alternate mutually acceptable sites, then the dwarf bear-poppy habitat may be restored. The alternate areas chosen should be far enough away from the dwarf bear-poppy sites to prevent "secondary impacts" to the dwarf bear-poppy from occurring.

123. Manage mining use.

The current and potential extent of possible mining activities needs to be determined.

1231. Map existing mining claims on dwarf bear-poppy sites.

Until the exact locations of mining claims have been mapped, the total impact cannot be evaluated.

1232. Determine validity of these claims.

Those claims filed during the last 20 years when some of the sites were withdrawn by the Bureau of Reclamation for the Dixie Project may not be valid. Also, those claims which have not had the yearly assessment work done may not be valid.

1233. Determine impacts of assessment work and the potential degree of impact from actual mining (and the probability of mining).

The data gathered under 1231 and 1232 should provide an accurate picture of mining impacts. Until now, few of the claims have been developed, indicating there may not be profitable deposits present (at least at current prices).

1234. Investigate the need for mineral withdrawals on those sites undergoing impact from mining activities.

To prevent the impacts of mineral exploration or development, mineral withdrawals for the dwarf bear-poppy sites may need to be initiated, especially at Warner Ridge. This site has been less degraded than the others, and it is important that it be maintained in that state.



2. Sustain healthy populations in their natural habitat at the existing sites.

Because of the rarity of the dwarf bear-poppy, all existing colonies or populations must be sustained in a healthy and vigorous state. An in-depth knowledge of the dwarf bear-poppy's ecology is needed to understand its habitat requirements. When these are known, they can be used to sustain healthy, natural populations.

21. Study the ecology of the dwarf bear-poppy.

Along with the dwarf bear-poppy's requirements, its limiting factors need to be discovered. This will provide an index to the amount of potential habitat present, potential for site recovery, areas needing the most management, and feasibility of the management practices in item 12.

211. Autecology - determine its specific geological/edaphic requirements.

Seemingly identical Moenkopi hills may or may not support colonies of the dwarf bear-poppy. Autecological studies on specific geologic/edaphic parameters need to be done to uncover any such reasons influencing its exact distribution. The dwarf bear-poppy's life cycle, including seed germination, reproduction, and seed dispersal, should be studied.

212. Synecology - study the relationship between the dwarf bear-poppy, the cryptogamic crust, and associated species.

Other possible sources of limiting factors include competition from other species, specifically the cryptogamic crusts, and the dwarf bear-poppy's association with these species on some areas of the Moenkopi Formation. Synecological studies need to be undertaken to determine the degree of competitive exclusion, if any, occurring.

213. Demographics - monitor population numbers to try to separate the effects of natural cycles from trends caused by human impacts.

Natural populations are often cyclical in their numbers from year to year. Overlying this natural variation can be environmental perturbations induced by human impacts. Demographic studies are needed to separate the effects of these two influences on the dwarf bear-poppy's numbers and determine its trend relative to human impacts. The establishment of permanent transects with photo trend plots may be useful in such a study.

22. Determine the environmental parameters defining and restricting the habitat and distribution of the dwarf bear-poppy.

A number of questions exist regarding the specific environmental parameters which limit the distribution of the dwarf bear-poppy. For example, it is not known why it occurs at both ends of Warner Ridge (Punchbowl and Beehive Domes, which are 3 miles apart), but not in the center, even though the Moenkopi habitat appears superficially the same. With well-defined knowledge of the factors restricting the distribution of the species on apparently more widespread habitat, it would be possible to accurately distinguish habitat which is suitable for dwarf bear-poppy introduction from that which is unsuitable.

23. Develop a habitat management plan for the entire Moenkopi-based ecosystem.

By combining the results, a habitat management plan can be developed for the whole Moenkopi ecosystem encompassing both the dwarf bear-poppy and Pediocactus sileri. Considering the total ecological support system will ensure the continued existence of the dwarf bear-poppy and its recovery.

24. Inventory for the dwarf bear-poppy.

Final inventories are needed to map the exact range of the dwarf bear-poppy and determine its rarity. Such data can be utilized in the formulation of management actions.

241. Map exact boundaries for known sites in Utah.

The exact boundaries of the Utah sites need to be mapped for use in designating ORV closure areas and implementing realty actions and studies.

242. Search for any sites in Arizona.

There is a nonconfirmed collection from Mohave County, Arizona, in 1940 by Peebles and Parker (#14749) on the Arizona-Utah border due north of Wolf Hole at 2,700 feet elevation (Kearney and Peebles 1960). Although the location is thought to be in error, this old site should be located and surveyed.

3. Develop public awareness, appreciation, and support for the conservation of the dwarf bear-poppy.

Education of the public is a vital part of this recovery process. The cooperation of the public is essential for the ultimate success of the above recovery measures.

31. Increase the public's knowledge of the dwarf bear-poppy and its problems with pamphlets or audio-visual programs.

An appreciation of the unique species and ecosystem in their midst needs to be developed along with an understanding of its fragility. A discussion of its specialized habitat should include a section on the consequent difficulty of transplantation and cultivation. This can be started with educational programs such as pamphlets and audio-visual programs for use in schools and groups interested in conservation.

32. Enlist the support of public interest groups.

Public interest groups, especially local conservation organizations and civic organizations, need to be involved. The visibility of their support can be instrumental in shaping public opinion.

33. Establish alternate recreational areas (see 1224 above).

As mentioned before, it is especially important to establish alternate recreational areas for activities to substitute for closed areas. Otherwise, it is much more likely that closed areas will continue to be used.

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**PART III**  
**IMPLEMENTATION SCHEDULE**

**Definition of priorities**

- Priority 1: All actions that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
- Priority 2: All actions that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.
- Priority 3: All actions necessary to provide for full recovery (or reclassification) of the species.

**Abbreviations used in Implementation Schedule**

BLM	Bureau of Land Management
FWS	U.S. Fish and Wildlife Service
SE	Endangered Species
TNC	The Nature Conservancy
U	The State of Utah

**Other Definitions**

- Continuous - Task which will be required over a very long or undetermined period of time.
- Ongoing - Task which is now being implemented.

## GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES

### Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

### Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

### Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

### Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

DWARF BEAR-POPPY IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY			FISCAL YEAR COSTS FY-01 (8a)	FISCAL YEAR COSTS FY-02 (8b)	FISCAL YEAR COSTS (EST.) FY-03 (8c)	COMMENTS/NOTES (9)
					FWS REGION (6)	FWS PROGRAM (6a)	OTHER (7)				
0-3	Sign boundaries	111	1	1 year			BLM	1,000	--	--	
0-2	Establish monitoring procedures	112	1	ongoing	6	SE	BLM	--	--	--	Funding covered mainly through salaries
M-7	Warner Ridge ACEC	1211	2	2 years			BLM	--	--	--	Funding covered mainly through salaries
A-3,4	Actions re: State of Utah land	1212	1	2 years	6	SE	BLM, U, TNC	--	--	--	Funding covered mainly through salaries
M-3	ORV closure	1221	1	ongoing	6	SE	BLM, U	--	--	--	Funding covered mainly through salaries
M-3	Post and monitor 1221 sites	1222	1	ongoing	6	SE	BLM, U	--	--	--	Funding covered mainly through salaries
M-3	Fence Warren Ridge population	1223	1	1 year			BLM	2,000	--	--	
M-3	Establish alternate areas	1224	1	2 years			BLM	--	--	--	Funding covered mainly through salaries

DWARF BEAR-POPPY IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY			FISCAL YEAR COSTS FY-01 (8a)	FISCAL YEAR COSTS FY-02 (8b)	FISCAL YEAR COSTS (EST.) FY-03 (8c)	COMMENTS/NOTES (9)
					FWS REGION (6)	FWS PROGRAM (6a)	OTHER (7)				
I-2	Map existing claims	1231	2	1 year			BLM	--	--	--	Funding covered mainly through salaries
I-2	Determine validity of Claims	1232	2	1 year			BLM	--	--	--	Funding covered mainly through salaries
I-2	Determine mining impacts	1233	2	1 year			BLM	--	--	--	Funding covered mainly through salaries
A-5	Mineral withdrawals	1234	2	2 years			BLM	--	--	--	Funding covered mainly through salaries
R-3	Autecology	211	2	5 years	6	SE	BLM	2,000 2,000	2,000 2,000	2,000 2,000	
R-10	Synecology	212	2	5 years	6	SE	BLM	2,000 2,000	2,000 2,000	2,000 2,000	
R-6	Demographics	213	2	5 years	6	SE	BLM	2,000 2,000	2,000 2,000	2,000 2,000	



DWARF BEAR-POPPY IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY			FISCAL YEAR COSTS (EST.)		COMMENTS/NOTES (9)
					FWS REGION (6)	FWS PROGRAM (6a)	OTHER (7)	FY-01 (8)	FY-02 FY-03	
M-3	Habitat requirements	22	2	2 years	6	SE		--	--	Tasks to be done after tasks 211, 212, & 213
M-3	Moenkopi habitat management plan	23	2	1 year	6	SE	BLM	--	--	Funding covered mainly through salaries
I-1	Map exact boundaries	241	2	1 year	6	SE	BLM	500 500	--	
I-1	Search in Arizona	242	3	1 year	6	SE	BLM	500 500	--	
0-1	Audio-visual program and pamphlets	31	3	continuous	6	SE		--	4,000	
0-1	Public interest group support	32	3	continuous	6	SE	BLM	--	--	Funding covered mainly through salaries
0-1	Alternate recreational areas	33	1	2 years			BLM	--	--	Funding covered mainly through salaries

PART IV

APPENDIX

Commenters on the Technical and Agency Drafts  
of the Dwarf Bear-Poppy Recovery Plan

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