

ASHY DOGWEEED

(*Thymophylla tephroleuca*)

RECOVERY PLAN



J.S. Fish and Wildlife Service
Albuquerque, New Mexico

1987

ASHY DOGWEED
(Thymophylla tephroleuca)

RECOVERY PLAN

1987

Prepared by:

Jackie M. Poole
Texas Natural Heritage Program
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

for

U.S. Fish and Wildlife Service, Region 2
Albuquerque, New Mexico

Reviewed and edited by:
Charles McDonald

Approved: 
Acting Regional Director, Region 2

Date: 29 July 1988

DISCLAIMER

This is the completed Ashy Dogweed 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.

Literature Citations should read as follows:

U.S. Fish and Wildlife Service. 1987. Ashy Dogweed (Thymophylla tephroleuca) Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico 46 pp.

Additional copies may be purchased from:

Fish and Wildlife Reference Service
6011 Executive Blvd.
Rockville, Maryland 20852
301/770-3000

1-800-582-3421

ACKNOWLEDGEMENTS

Information and assistance in preparation of this plan were provided by Texas Plant Recovery Team members: Mr. Harold Beaty, Dr. William Mahler, Mr. David Riskind, Mr. Gerard Hoddenbach, Dr. Richard Worthington, Ms. Jackie Poole, Dr. Allan Zimmerman, and Dr. Elray Nixon.

SUMMARY

- Goal:** To remove ashy dogweed from the Federal list of endangered and threatened species by managing the species and its habitat in a way that will assure the continued existence of self-sustaining wild populations.
- Recovery Criteria:** Quantified criteria for downlisting and/or delisting ashy dogweed have not yet been determined. The implementation of studies in this recovery plan will provide the necessary data from which quantified downlisting and/or delisting criteria can be established.
- Actions Needed:** Major steps needed to recover ashy dogweed include: maintaining present populations through landowner cooperation and habitat management; establishing new populations in suitable habitats; obtaining biological information needed for effective management; and developing public support for preservation of ashy dogweed.

TABLE OF CONTENTS

DISCLAIMER..... 1

ACKNOWLEDGEMENTS..... 11

SUMMARY..... 111

PART I INTRODUCTION..... 1

 Brief Overview..... 1

 Taxonomy..... 2

 Morphology..... 3

 Habitat..... 4

 Associated Species..... 5

 Past and Present Distribution..... 6

 Land Ownership..... 8

 Impacts and Threats..... 9

 Conservation and Research Efforts..... 11

PART II RECOVERY..... 13

 Primary Objective..... 13

 Step-down Outline..... 14

 Narrative..... 16

 References Cited..... 30

PART III IMPLEMENTATION SCHEDULE..... 32

APPENDIX..... 36

 List of Reviewers..... 36

 Comments Received..... 38

 Response to Comments..... 46

PART I

INTRODUCTION

Brief Overview

The ashy dogweed, Thymophylla tephroleuca (S.F. Blake) Strother, was listed as an endangered species on July 19, 1984 (USFWS 1984). This species is currently known from Zapata County in south Texas with a historic locality in adjacent Starr County. There are no other members of the genus currently listed as threatened or endangered, nor are there any that are proposed or candidates for listing (USFWS 1985). In addition to being listed by the Federal Government, the ashy dogweed is also listed as endangered by the State of Texas.

The objective of this plan is to outline steps to recover the ashy dogweed by achieving long-term stability of its population level in the wild, and by removing and preventing threats to the species and its habitat. Attainment of these goals will lead to the ultimate objective of removal of the ashy dogweed from the list of threatened and endangered species.

This plan begins with background information on the status of ashy dogweed and includes taxonomy, morphology, habitat, associated species, past and present distribution, land ownership, threats, and conservation efforts. This background is followed by a step-down outline and narrative that provide information on

tasks to reduce threats to the species and protect its habitat. The final section of this plan contains an implementaion schedule that lists the recovery tasks, their priorities, agencies involved, and estimated costs.

Taxonomy

The ashy dogweed is a member of the sunflower family (Compositae or Asteraceae) and belongs to the tribe Helenieae or Tageteae. The ashy dogweed was first collected by Dr. E. U. Clover of the University of Michigan in 1932. Dr. S. F. Blake described the new species in 1935. The population at the type locality has never been relocated. In 1965, Dr. D. S. Correll discovered the currently known location, which has subsequently been visited by many botanists.

Dr. J. L. Strother did a taxonomic revision of the genus Dyssodia for his Ph.D. dissertation in 1967. He determined a chromosome count of $n=8$ from the Zapata County population. Strother placed the species Dyssodia tephroleuca in the subgenus Hymenatherum, section Gnaphalopsis, partly based on chromatographic evidence.

Strother later (1986) resurrected several genera that were formerly submerged in Dyssodia, because these genera were allied more closely with other genera of the tribe Tageteae than with each other. The new name combination that applies to ashy dogweed

is Thymophylla tephroleuca (S. F. Blake) Strother. Thymophylla tephroleuca is equivalent to and will replace the older name, Dyssodia tephroleuca, in this plan and in subsequent U.S. Fish and Wildlife Service publications.

Morphology

Perennial herb to 30 cm (11.8 in.) tall; main branches spreading, woody near the base, covered with soft, ashy-white, wooly hairs; leaves alternate, linear, entire or somewhat trifid at the apex, 10-15 mm (.4-.6 in.) long, 0.3-0.8 mm (.01-.03 in.) wide, with several glands hidden in the dense pubescence; peduncles white-wooly, 1-3 cm (.4-1.2 in.) long, with 0-3 foliaceous bracts; calyculum of 3-4 linear bracts about half as long as the phyllaries, with one gland near the base and often a second gland near the middle, wooly beneath, practically glabrous above; involucre a campanulate cup, 5-10 mm (.20-.40 in.) high, about 8 mm (.31 in.) across, white-wooly; phyllaries 12-13, connate about three-quarters of their length, with apex acutely triangular, 1.5-2 mm (.06-.08 in.) long, with glands in the upper half to third; receptacle flat-convex to nearly hemispheric, with a few fine bristles or naked; ray florets 10-15, bright golden yellow, the tube about 2 mm (.08 in.) long, the lamina oblong-oval, 6-8 mm (.24-.31 in.) long, 3-4 mm (.12-.16 in.) wide, with 2-3 teeth at the tip; disc florets 30-70, yellow, 4.5-5 mm (.18-.20 in.) long, tube about 1 mm (.04 in.) long, throat about 3 mm (.12 in.) long, slender, funnel-form, only slightly dilated, lobes ovate to triangular, erect; style

branches with short, deltoid, hispidulous cuspidate appendages; pappus of 10-11 subequal scales about equaling the disc corollas in length, each scale with a central awn and 2-4 mm (.08-.16 in.) long, slender, black, striate, sparsely pubescent on the striations; $n=8$ (Adapted from Strother, 1969 and Turner, 1980).

Habitat

The only currently known population of Thymophylla tephroleuca occurs in the ceniza-blackbrush-creosotebush brush community (McMahan, Frye and Brown 1984) within the South Texas Plains vegetation area (Gould, 1975). However, the site may have originally been a grassland (Turner, 1980). The ashy dogweed grows in open areas on fine sandy-loam according to Turner (1980). However, the general soil map of Zapata County (Soil Conservation Service, 1971) shows the site to be on the Maverick-Caterina soils association. These soils are clayey, saline, deep to shallow, fine textured, and slowly permeable. The underlying geology in the area is the Laredo Formation, which is composed of Eocene sandstones and clays (Bureau of Economic Geology, 1976). The elevation is between 400 and 415 feet.

Precipitation averages about 51 cm (20 in.) per year with a high in August-October, particularly September, and a lesser peak in May-June (Bomar, 1983). Droughts are common. The average date of the last freeze is February 10, and the average date of the first frost is December 2 (Bomar, 1983). The average annual

temperature is 23° C (73° F) (Larkin and Bomar, 1983). The winds blow primarily from the southeast (Larkin and Bomar, 1983).

Associated Species

At one time the habitat of ashy dogweed probably supported a more diverse assemblage of plants, but heavy grazing, land clearing, and the introduction of buffelgrass have taken their toll on the community. The dominant species are:

buffelgrass	<u>Cenchrus ciliaris</u>
mesquite	<u>Prosopis glandulosa</u>
goatbush	<u>Castela texana</u>
cenizo	<u>Leucophyllum frutescens</u>
anacahuita	<u>Cordia boissieri</u>
yucca	<u>Yucca</u> sp.
javelina brush	<u>Microrhamnus ericoides</u>

Other common species are:

prickly pear	<u>Opuntia</u> sp.
heliotrope	<u>Heliotropium</u> sp.
croton	<u>Croton</u> sp.
goldaster	<u>Heterotheca</u> sp.
lovegrass	<u>Eragrostis</u> sp.
gramagrass	<u>Bouteloua</u> sp.
common dogweed	<u>Dyssodia pentachaeta</u>
common sunflower	<u>Helianthus annuus</u>

blackfoot daisy	<u>Melampodium leucanthemum</u>
palafoxia	<u>Palafoxia</u> sp.
Texas kidneywood	<u>Eysenhardtia texana</u>
hairy zexmenia	<u>Zexmenia hispida</u>
jicamilla	<u>Jatropha cathartica</u>
broomweed	<u>Gutierrezia</u> sp.
windmill grass	<u>Chloris</u> sp.
milkweed vine	<u>Matelea</u> sp.
bighead greenthread	<u>Thelesperma megapotamicum</u>
blackbrush	<u>Acacia rigidula</u>
prostrate milkweed	<u>Asclepias prostrata</u>
paloverde	<u>Cercidium</u> sp.

Past and Present Distribution

Thymophylla tephroleuca was first collected by Elzada Clover in 1932 in Starr County eight miles north of Rio Grande City. Although several independent searches have been conducted through the years, no one has yet relocated this population (Figure 1).

On Christmas day, 1965, Dr. D. S. Correll discovered the ashy dogweed at the Zapata County location (Figure 1). He visited the site twice in 1966. Dr. J. L. Strother also inspected the locale in 1966 as part of his doctoral work. Dr. B. L. Turner and Dr. A. D. Zimmerman visited the area in 1980. They described the habitat, made a list of associated species, evaluated threats, and estimated the number of plants while working on the U.S. Fish and Wildlife

Service status report. The staff of the San Antonio Botanical Gardens visited the site in September 1984 and collected cuttings and seeds for propagation. The author observed the population in July 1986. In spite of the less than suitable habitat (a highway right-of-way and adjacent pasture), the population has persisted in this location for many years.

Jim Everitt of the U.S. Department of Agriculture has worked in the Starr/Zapata County area for many years. He feels that the species must be quite rare because the plant's ashy gray color makes it highly visible and he has only seen it at the Zapata County site (Everitt, Weslaco, TX, pers. comm., 1986).

The currently known population occupies the right-of-way and extends into the adjacent pasture on both sides of the highway. The population occupies about 10 hectares (25 acres) and has been estimated at 1300 plants (USFWS, 1984), but more reliable estimates of occupied area and number of plants should be made.

Land Ownership

The currently known population occurs on Texas Highway Department right-of-way, and also on private land. Complete ownership information is available from the U.S. Fish and Wildlife Service, Office of Endangered Species, Albuquerque, New Mexico.

Impacts and Threats

Practices by the ranching industry and the Texas Highway Department are undoubtedly the greatest present threat and have had the most impact on the ashy dogweed. A gas pipeline crossing the population has had a negative but lesser impact.

Although cattle probably do not eat the ashy dogweed (owing to its strong odor and surely unpleasant taste), their trampling disturbs the soil surface, possibly making seedling establishment difficult. After cattle have eaten all the desirable grasses and the range has become poorer, the pasture is usually improved for grazing by clearing (chaining, blading, dozing, disking). The ashy dogweed, being a taprooted perennial, might be able to survive this practice. However, many plants are located along or near the fence line, which suggests that they prefer an unbladed habitat. Many pastures in south Texas are currently being seeded with buffelgrass (Cenchrus ciliaris), a forage grass introduced from India. This species forms dense stands and outcompetes much of the native vegetation. Buffelgrass from the pasture east of the highway is invading the right-of-way and threatening the ashy dogweed.

Some management practices of the Texas Highway Department appear to be detrimental to the ashy dogweed. The area appears to be mowed frequently, although this may not affect the ashy dogweed

because of its small stature. However, the right-of-way has been bladed level with the pavement for several feet on each side of the highway. Ashy dogweed plants are currently growing on the edge of a dirt curb about one to two feet above the bladed area. Some of these plants appear to be dying. It is unknown whether herbicides have been used in the area, but this use would certainly present a major threat. The original construction of the highway possibly destroyed many individuals, and any widening of the highway would threaten many more.

Clearing and construction of the gas pipeline probably destroyed numerous individuals. Also, future pipeline maintenance may kill more plants as well as prevent recolonization.

Even though over-collecting does not currently threaten the ashy dogweed, publication of its one location could increase the threats of vandalism and imprudent taking. The entire known population could be extirpated by one thoughtless or intentional act.

Because the population consists of relatively few individuals, the species is vulnerable to any number of natural factors that could lead to its extinction. All plants appear to be mature, and a few may be senescent. Stabilization and recovery of the ashy dogweed will require that more be learned about its population biology and habitat preferences.

Conservation and Research Efforts

Aside from Strother's dissertation in 1967, which included a chromosome count and the results of paper chromatography work, no research has been done on the ashy dogweed except for field searches. Nothing is known about the population biology, the population ecology, or the specific habitat requirements of the species.

In September 1984, the staff of the San Antonio Botanical Gardens visited the ashy dogweed population and obtained cuttings and seeds for propagation. The cuttings rooted promptly and plants are currently being maintained. Plants grown from seeds planted in February 1986 will also be maintained as part of the botanical garden population (Cox, San Antonio Botanical Center, pers. comm., 1986). This work is being carried out with the help and direction of the Center for Plant Conservation.

The Texas Natural Heritage Program has identified the site of the ashy dogweed population as one of the top 20 sites for the Texas Nature Conservancy to protect in the coming year. The site has been given the name "Dolores" after the nearby town. The Texas Natural Heritage Program contacted the Texas Highway Department and visited the site with the department's local maintenance engineers and headquarters landscape personnel in July 1986.

The Texas Nature Conservancy has contacted the local landowners to make them aware of the ashy dogweed and to solicit their support in protecting plants. Thus far, landowner response has been positive.

PART II

RECOVERY

Primary Objective

The primary objective of this recovery plan is to protect Thymophylla tephroleuca and its habitat from further destruction owing to human activities, and to establish healthy populations in their natural habitat at levels that would allow the species to be downlisted to threatened and eventually delisted. At this time limited data make it impossible to quantify habitat and plant abundance with the precision needed to establish quantified downlisting and delisting criteria. Information must be acquired on specific habitat requirements, population biology, and population ecology. Continued searches of potential habitat are needed to establish the precise limits of its distribution and determine its specific habitat requirements. When existing threats to the ashy dogweed are removed, and the success of management practices to enhance the species can be determined, this plan will be reevaluated to: 1) determine if either downlisting to threatened or delisting are practical goals, and, if so, 2) establish quantified downlisting and/or delisting criteria.

Step-down Outline

1. Manage the known plants and habitat by removing and preventing threats to their existence.
 11. Protect the existing habitat.
 111. Survey to determine presently occupied habitat and to delineate essential habitat required for the species' continued existence.
 112. Contact landowners.
 1121. Work with landowners of essential habitat to make them aware of the importance of the plants and the habitat.
 1122. Work with landowners on various land management practices.
 113. Obtain permanent protection of essential habitat.
 114. Notify Texas Highway Department of the exact location of plants on or near highway right-of-way.
 115. Conduct required consultations under Section 7 of the Endangered Species Act.
 116. Erect and maintain fences around protected site.
 12. Develop management plans.
 13. Monitor population.
 14. Establish downlisting and delisting criteria.
2. Study the life history and ecology of the ashy dogweed.
 21. Determine precise habitat requirements.
 211. Edaphic factors.

- 212. Local microclimate.
- 213. Air and water quality requirements.
- 214. Physiographic and topographic characteristics.
- 215. Vegetation physiognomy and community structure.
- 216. Frequently associated species.
- 217. Dominance and frequency.
- 218. Successional phenomena.
- 219. Dependence on natural disturbance.
- 22. Study population biology.
 - 221. Demography.
 - 222. Phenology.
 - 223. Reproductive biology.
 - 2231. Types of reproduction.
 - 2232. Pollination biology.
 - 2233. Seed dispersal.
 - 2234. Seed biology.
 - 2235. Seedling biology.
 - 2236. Survival and mortality.
- 23. Study population ecology.
 - 231. Positive and neutral interactions.
 - 232. Negative interactions.
 - 233. Hybridization.
- 3. Search potential habitat for additional populations.
- 4. Establish additional populations in suitable natural habitat within the historic range of the species.
- 41. Develop and refine cultivation techniques.

42. Search for suitable transplant sites within the species' historic range.
43. Maintain populations in cultivation at botanical gardens.
5. Develop public awareness, appreciation, and support for the preservation of ashy dogweed.

Narrative

1. Manage the known plants and habitat by removing and preventing threats to their existence.

One of the main objectives of recovery is to remove and prevent threats to the species and its habitat. Currently both are threatened by land management practices such as root-plowing, blading, disking, and other methods of land clearing. Heavy grazing, which forces livestock to eat less desirable species and compacts the soil surface by trampling, threatens the species. Buffelgrass, which was introduced for forage, outcompetes the ashy dogweed as well as many other species. Herbicide use may present yet another threat. In order for the ashy dogweed to survive in its natural habitat, these threats must be removed and prevented by managing the habitat as well as the species.

11. Protect the existing habitat.

If the ashy dogweed is to be maintained in nature, suitable habitat must also be maintained. Landowners should be contacted for permission to conduct surveys on their

property. The surveys should determine presently occupied habitat and delineate essential habitat needs to maintain a viable population. After these boundaries are delineated landowners and agencies should be made aware of the presence and basic management needs of the ashy dogweed. With landowner permission, habitat should be fenced to exclude or reduce grazing.

111. Survey to determine presently occupied habitat and to delineate essential habitat required for the species' continued existence.

The amount of land needed for the species' survival and expansion should be delineated. A protected site as well as a buffer zone should be described. The protected site would be the absolute minimum area required for survival, while the buffer zone should include area that could affect the protected site. Such a plan would help in management and in working with landowners and other agencies.

112. Contact landowners.

All private landowners should be notified of the presence of a federal and state endangered species on their property. They should be made aware of why the species is important, what steps they should take to protect it, and all legal aspects of the state and federal laws.

1121. Work with landowners of essential habitat to make them aware of the importance of the plants and the habitat.

Private landowners can play a crucial role in protecting an endangered species and its habitat. They should be made aware of the importance of the species and the need to preserve the habitat. They should be offered photographs, status reports, and recovery plans in order to inform them about the species. Informative brochures, such as those available from various conservation groups, that detail the importance of species preservation and biological diversity should be sent to landowners.

1122. Work with landowners on various land management practices.

Certain land management practices may be detrimental to the ashy dogweed. Among these are brush clearing and introduction of exotic species. Brush clearing by methods such as blading, root-plowing, disking, or herbicides destroys the habitat and the species. Exotic species such as buffelgrass are often planted for pasture improvement and easily outcompete other plants. Land-

owners of the essential habitat should be encouraged to avoid such practices and offered alternatives.

113. Obtain permanent protection of the essential habitat.

The essential habitat should be set aside through any method that would permanently protect the species and habitat from present or future threats.

114. Notify the Texas Highway Department of the exact location of plants on or near the highway right-of-way.

A large number of plants occur in or close to highway right-of-way. The Highway Department, especially at the local level, needs to be aware of the precise location in order to adjust management procedures (no herbicides, no blading, infrequent mowing) to protect the species.

115. Conduct required consultations under Section 7 of the Endangered Species Act.

Federal agencies, such as the Federal Highway Administration, must conduct biological assessments and formally consult with the Fish and Wildlife Service if any projects they authorize, permit, or fund may affect the ashy dogweed.

116. Erect and maintain fences around protected site.

Once permanent protection of the essential habitat is obtained, the protected site should be fenced. This would allow greater grazing management or, if necessary, allow complete grazing elimination. An enclosure would also help protect the species from being inadvertently destroyed.

12. Develop management plans.

Aside from eliminataing the obvious threats to the ashy dogweed, such as root-plowing, blading, disking, herbicide application, heavy grazing, and introduction of exotic species, an approach should be developed to return the habitat to its natural state and to maintain and expand the present habitat and population. Information from study of the ashy dogweed's life history and ecology should be used to develop a suitable management plan for establishing optimum habitat for the species.

13. Monitor population.

The known population should be visited at least once a year to evaluate any population changes, especially among age classes. Attributes discussed in the population biology section should be recorded, and the overall reproductive success of the population noted. This information will be used to fine tune the management plan as needed.

14. Establish downlisting and delisting criteria.

Once more is learned about the ecological and life history requirements of the species, and the success of management for the species can be determined, this plan will be reevaluated and, if appropriate, quantified downlisting and delisting criteria will be established.

2. Study the life history and ecology of the ashy dogweed.

Many aspects of the life history and ecology are unknown. Precise habitat requirements, population biology, and population ecology studies are needed to better understand and maintain populations of the ashy dogweed. This information is needed to develop an effective management plan.

21. Determine precise habitat requirements.

It is not understood why the ashy dogweed occurs in only a single locality and not in other areas that are seemingly suitable for the species. By acquiring data on a variety of habitat criteria, the precise requirements can be elucidated. Such information can be used in the management of the known population, the identification of potential habitat, and in the location of suitable sites for establishing new populations.

211. Edaphic factors.

The soils of Zapata County have not been precisely mapped. Characteristics such as soil texture, soil

moisture and drainage, presence and thickness of litter layer, Soil Conservation Service classification, pH, parent material, bedrock type, depth to bedrock or impermeable pan, percentage of rock cover and of rock throughout, soil profile, structure, porosity, soil water potential, chemical composition, nutrient status and availability, and presence of toxic elements should be recorded.

212. Local microclimate.

A weather station should be established as close as possible to the known population to measure temperature, precipitation, wind direction and velocity, and light intensity. Climate data within this report is taken at Laredo, approximately 15 miles to the north.

213. Air and water quality requirements.

Susceptibility of the ashy dogweed to contaminants in air and water is not known. Because the known population is within 10 feet of a highway, studies should be conducted to determine the effect of exhaust fumes and highway run-off on the species.

214. Physiographic and topographic characteristics.

The relief, elevation range, geologic formations, slope and aspect, and watershed or drainage basin

should be determined for the specific area occupied by the ashy dogweed.

215. Vegetation physiognomy and community structure.

The local vegetation type and the structure (trees, shrubs, forbs; open, closed, etc.) of the community should be described both in its present, disturbed state and its undisturbed state. The latter can probably be only roughly inferred.

216. Frequently associated species.

A list of the species most commonly found with the ashy dogweed should be compiled.

217. Dominance and frequency.

The percentage cover and frequency should be calculated for the species in the ashy dogweed's community.

218. Successional phenomena.

Colonizing ability, tolerance to disturbance, shade tolerance, and growth on unstable substrates should be determined to decide the seral stage of the ashy dogweed.

219. Dependence on natural disturbance.

Studies should be done to determine whether the ashy dogweed depends on dynamic, periodic, and/or

cyclic natural disturbances of climate (floods, droughts, temperature extremes), landforms (erosion, deposition), or biotic features (fires, insect population fluctuations, changes in associated species composition).

22. Study population biology.

Most aspects of the population biology of the ashy dogweed are, at best, only superficially known. Information gained from studies of these characteristics will be extremely valuable for management and maintenance of the ashy dogweed.

221. Demography.

Population expansion or decline should be evaluated by recording such details as population area, number of individuals, age or size classes of individuals, density, presence of dispersed seeds, and evidence of reproduction.

222. Phenology.

Patterns and times of budding, leafing, flowering, fruiting, seed dispersal, senescence, and germination should be calculated. This information would be useful for determining times of easy field identification. The phenology should also be compared to climatic events to determine any correlations.

223. Reproductive biology.

An understanding of the various components of the species' reproductive biology is necessary for the management of a healthy population.

2231. Types of reproduction.

Methods of reproduction (outbreeding, inbreeding, cloning, and other methods of asexual reproduction), age at reproduction, and the importance of each type of reproduction should be characterized.

2232. Pollination biology.

Pollination mechanisms, agents, additional visitors, and the vulnerability of pollinators to disturbance should be investigated.

2233. Seed dispersal.

Mechanisms and/or agents, vulnerability of mechanisms or agency to disturbance, and dispersal patterns should be examined.

2234. Seed biology.

Amount and variation in production, viability, longevity, dormancy requirements, germination requirements, and percentage germination should be determined for the

species. This data should be collected in both the field and the laboratory.

2235. Seedling ecology.

Factors affecting the growth and development of seedlings such as light, moisture, nutrients, and soil disturbance should be investigated.

2236. Survival and mortality.

Causes of mortality and at what life stages they occur should be recorded.

23. Study population ecology.

An understanding of ashy dogweed's interaction with other species within the habitat will be important for developing a management plan, expanding the natural population, and growing plants in cultivation.

231. Positive and neutral interactions.

The obligatory and facultative relationships between ashy dogweed (at any stage in its life cycle) and other organisms should be examined.

232. Negative interactions.

Herbivores, predators, pests, parasites, diseases, intra- or interspecific competitors, and toxic and

allelopathic interactions with other organisms should be identified.

233. Hybridization.

Searches should be done for any naturally occurring hybrids. Production of artificial hybrids should be attempted in the laboratory. The potential for spontaneous hybrids in cultivation should be investigated before the ashy dogweed is grown in botanical gardens or suitable natural sites.

3. Search potential habitat for additional populations.

Data from the various studies of life history and ecology can be employed to form a profile of the ashy dogweed's potential habitat to aid in searches for possible undiscovered populations. Finding additional populations could make habitat protection less critical and provide new management information. A greater number of individuals and populations in less threatened habitats could influence any decisions to downlist or delist the species. Any additional populations should be monitored the same as the known population.

4. Establish additional populations in suitable natural habitat within the historic range of the species.

Although the ideal conservation method is to maintain organisms in their known natural habitat, having only one known population invites easy species extinction. At least two additional

wild populations should be established in suitable potential habitat. Populations should also be maintained at botanical gardens.

41. Develop and refine cultivation techniques.

Propagation and maintenance of the ashy dogweed in cultivation will require experimentation to develop and refine propagation techniques. Proper techniques can ensure an ample supply of cultivated material that will have maximum likelihood of survival when introduced into natural habitats.

42. Search for suitable transplant sites within the species' historic range.

Areas to transplant individuals grown in cultivation will be selected using the criteria developed for identifying potential habitat sites. If plants become established at such sites, the populations should be monitored the same as those at the original site.

43. Maintain populations in cultivation at botanical gardens.

Populations should be maintained in cultivation to provide material for research, introduction into the wild, and education. The San Antonio Botanical Gardens in concert with the Center for Plant Conservation is currently cultivating the ashy dogweed.

5. Develop public awareness, appreciation, and support for the preservation of ashy dogweed.

The public should be made aware of the ashy dogweed and encouraged to support its preservation. Conservation groups, garden clubs, and various organizations concerned with rare species could be enlisted to help. Talks, slide shows, and local and statewide articles would be useful.

References Cited

- Blake, S. F. 1935. New Asteraceae from the United States, Mexico, and South America. Journ. Wash. Acad. Sci. 25:311-325.
- Bomar, G. W. 1983. Texas Weather. University of Texas Press, Austin.
- Bureau of Economic Geology. 1976. Geologic Atlas of Texas: Laredo Sheet. University of Texas at Austin.
- Gould, F. W. 1975. Texas Plants--A Checklist and Ecological Summary. Texas A & M University, College Station.
- Larkin, T. J. and G. W. Bomar. 1983. Climatic Atlas of Texas. Texas Department of Water Resources, Austin.
- McMahan, C. A., R. G. Frye and K. L. Brown. 1984. The Vegetation Types of Texas. Texas Parks and Wildlife Department, Austin.
- Soil Conservation Service. 1971. General Soil Map, Zapata County. U. S. Department of Agriculture, Washington, D.C.
- Strother, J. L. 1967. Systematics of Dyssodia (Compositae: Tageteae). Ph.D. Dissertation, University of Texas at Austin.

_____. 1969. Systematics of Dyssodia Cav. (Compositae: Tageteae). Univ. Calif. Publ. Bot. 48:1-87.

_____. 1986. Renovation of Dyssodia (Compositae: Tageteae). Sida 11:371-378.

Turner, B. L. 1980. Status Report on Dyssodia tephroleuca Blake. U. S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico.

U. S. Fish and Wildlife Service. 1984. Final rule to determine Dyssodia tephroleuca (Ashy dogweed) to be an endangered species. Federal Register 49:29232-29234.

U. S. Fish and Wildlife Service. 1985. Review of plant taxa for listing as endangered or threatened species. Federal Register 50: 39526-39527.

PART III

IMPLEMENTATION SCHEDULE

The following Implementation Schedule outlines actions and costs for the ashy dogweed recovery program. It is a guide to meeting the objectives elaborated in Part II of this plan. This schedule indicates the general category for implementation, recovery plan tasks, corresponding outline numbers, task priorities, duration of tasks ("on-going" denotes a task that once begun should continue on an annual basis), which agencies are responsible to perform these tasks, and lastly, estimated costs for U.S. Fish and Wildlife Service tasks. These actions, when accomplished, should bring about the recovery of the ashy dogweed and protect its habitat. It should be noted that monetary needs for agencies other than the U.S. Fish and Wildlife Service are not identified and therefore, the Implementation Schedule may not reflect the total financial requirements for recovery of this species.

General Categories for Implementation Schedule

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 contamination
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Mgmt. Agrt.
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

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

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

Recovery Action Priorities

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

Abbreviations Used

- FWS - USDI Fish and Wildlife Service
 RE - Realty
 CCES - Corpus Christi Ecological Services Field Office

IMPLEMENTATION SCHEDULE

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK DURATION	RESPONSIBLE FWS REGION PROGRAM	AGENCY OTHER	FISCAL YEAR COSTS (EST)*			COMMENTS
							FY1	FY2	FY3	
M7	Identify essen- tial habitat	111	2	3 years	2	CCES	1,000	1,000	1,000	
M3	Make landowners aware of plants and habitat	1121	2	1 year	2	CCES	2,000			
M3	Work with land- owners on land management tech- niques	1122	2	ongoing	2	CCES	1,000	1,000	1,000	
A7	Obtain perman- ent protection of habitat	113	1	2 years	2	CCES RE	5,000	1,000		
M7	Notify Texas Highway Dept. of plant localities	114	2	1 year	2	CCES	500			
O3	Conduct Sec. 7 consultations	115	2	ongoing	2	CCES	500	500	500	
M3	Erect fences around pro- tected sites	116	1	1 year	2	CCES	5,000			
M7	Develop manage- ment plans	12	2	1 year	2	CCES	1,000			
I1	Monitor popu- lation	13	2	ongoing	2	CCES	2,000	2,000	2,000	
O4	Establish down- listing & delist- ing criteria	14	3	1 year	2	CCES			250	

*Costs refer to USFWS expenditures only.

IMPLEMENTATION SCHEDULE

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK DURATION	RESPONSIBLE		AGENCY OTHER	FISCAL YEAR COSTS (EST)*			COMMENTS
					FWS REGION	PROGRAM		FY1	FY2	FY3	
I3	Determine habitat requirements	211- 219	2	ongoing	2	CCES		10,000	10,000	10,000	
I6	Study demo- graphy	221	2	5 years	2	CCES		4,000	4,000	4,000	
I14	Study phen- plogy	222	2	3 years	2	CCES		2,000	2,000	2,000	
I14	Study reproduc- tive biology	2231- 2236	2	3 years	2	CCES		10,000	10,000	10,000	
I14	Study popula- tion ecology	231- 233	2	3 years	2	CCES		5,000	5,000	5,000	
I14	Search for additional populations	3	2	2 years	2	CCES		2,000	2,000		
I7	Develop cultiva- tion techniques	41	2	3 years	2	CCES		2,000	2,000	2,000	
I13	Search for suitable natural habitat to estab- lish new populations	42	2	1 year	2	CCES		2,000			
I7	Maintain popu- lations in botanic gardens	43	2	ongoing	2	CCES		2,000	2,000	2,000	
O1	Develop public awareness	5	2	ongoing	2	CCES		1,000	1,000	1,000	

*Costs refer to USFWS expenditures only.

APPENDIX

List of Reviewers

A technical/agency review draft of the Ashy Dogweed Recovery Plan was sent to the following individuals and agencies on December 10, 1986.

- Ms. Jackie Poole, Texas Natural Heritage Program, Austin, TX
- Mr. Gerard Hoddenbach, National Park Service, Santa Fe, NM
- Dr. William Mahler, Southern Methodist University, Dallas, TX
- Mr. David Riskind, Texas Parks and Wildlife Department, Austin, TX
- Mr. Gary Valentine, U.S. Soil Conservation Service, Temple, TX
- Dr. Richard Worthington, The University of Texas at El Paso, El Paso, TX
- Dr. Elray Nixon, Stephen F. Austin State University, Nacogdoches, TX
- Mr. Andrew Sansom, The Texas Nature Conservancy, San Antonio, TX
- Dr. Allan Zimmerman, Chihuahuan Desert Research Institute, Alpine, TX
- Mr. Harold Beaty, Temple, TX
- Mr. Paul Cox, San Antonio Botanical Gardens, San Antonio, TX
- Dr. Francis Thibodeau, The Center for Plant Conservation, Jamaica Plain, MA
- Executive Director, Texas Parks and Wildlife Department, Austin, TX
- Regional Supervisor, Realty, U.S. Fish and Wildlife Service, Region 2
- Field Supervisor, Ecological Services, Fort Worth Field Office, U.S. Fish and Wildlife Service, Region 2

Field Supervisor, Ecological Services, Corpus Christi Field Office, U.S. Fish and Wildlife Service, Region 2

Director (AFA/OES), Office of Endangered Species, U.S. Fish and Wildlife Service, Washington, D.C.

Director (WR), Division of Research, U.S. Fish and Wildlife Service, Washington, D.C.

Comments Received

Comment letters are reproduced in this section followed by the Service's response to each comment. Some reviewers submitted comments marked directly on the draft plan or submitted comments by phone. These comments have not been reproduced.

3. The recovery objectives for the threatened bunched cory cactus and Lloyd's Mariposa cactus have interim goals of 10,000 individuals and 20,000 individuals, respectively. Why is the interim goal for the Lloyd's cactus double that of the bunched cory cactus?
4. All maps and drawings should include a scale to better depict size and distance. A-3
5. Most of the plans do not quantify the primary objective. This should be done if at all possible. A-4

I hope these comments are useful as you prepare the final draft of these recovery plans for the Regional Director's approval. Upon his approval, notify the Office of Endangered Species, 500 Broyhill Building, and provide them with 30 copies of the printed plan when it is available.

Ronald E. Lamberton

Attachments

TEXAS NATURAL HERITAGE PROGRAM
 GENERAL LAND OFFICE
 STEPHEN F. AUSTIN BUILDING
 1700 NORTH CONGRESS AVENUE
 ROOM 619
 AUSTIN, TEXAS 78701
 (512) 463-5299
 1-800-252-RARE

January 7, 1987

Dr. Charlie McDonald
 U.S. Fish and Wildlife Service
 Endangered Species Office
 P.O. Box 1306
 Albuquerque, New Mexico 87103

Dear Charlie,

Thank you for allowing me the opportunity to comment on the recovery plan for Thymophylla (Dyssodia) tephroleuca.

Since I wrote the recovery plan, I have visited the only known locality in the company of various employees of the Texas Department of Highways and Public Transportation. My last observation date, noted in the Past and Present Distribution section should be amended to July 1986. At that time I surveyed the site with the local maintenance engineers and headquarters landscape personnel. The roadside is bladed for a fire lane. The local maintenance engineers stated that such scraping was usually done at the request of the adjacent landowners. The engineers were unsure if the landowner still wanted this done or not. I feel that the U.S. Fish and Wildlife Service also needs to contact the Texas Department of Highways and Public Transportation, and work with them on a management plan which will be implemented.

B-1

B-2

B-3

As of December 1986, the name change proposed by Dr. John Strother had been officially published. The new name should be substituted throughout the plan. The references is: Strother, J. L. 1986. Renovation of Dyssodia (Compositae: Tageteae). Sida 11:371-378.

B-4

In the Morphology section, two typographical errors need correcting. They are "ray florets...about 2 mm (.08 in.) long" and "the lamina...3-4 mm (.12-.16) wide."

B-5

Sincerely,



Jackie M. Poole
Botanist, Texas Natural Heritage Program

JMP:mt

Responses to Comments

- A-1 Any information that could be used to identify the exact locality of the plants has been removed from this plan.
- A-2 The Implementation Schedule has been reviewed to ensure that recovery task priorities are appropriate.
- A-3 Suggestion has been incorporated.
- A-4 For many endangered plants with restricted distributions and low numbers, too little is known about their reproduction and ecological requirements to establish any realistic numerical goals for downlisting or delisting. This plan contains a task to establish numerical goals once adequate biological information is available.
- B-1 This information has been added to the plan.
- B-2 This change has been made.
- B-3 Comment noted.
- B-4 This plan and subsequent Fish and Wildlife Service publications will follow the nomenclature of Strother. Therefore, Dyssodia tephroleuca has been changed to Thymophylla tephroleuca throughout the plan.
- B-5 Corrections have been made.
- C-1 Comment noted.
- C-2 Because some non-technical readers may not be familiar with metric measurements, both metric measurements and English equivalents have been used throughout the plan.
- C-3 Suggestion has been followed.
- D-1 Comment noted.
- E-1 Comment noted.