

review

RECOVERY PLAN
ALABAMA LEATHER FLOWER

Alabama Leather Flower
(Clematis socialis)
Recovery Plan

Prepared by

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for

Southeast Region
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Atlanta, Georgia

Approved:


Regional Director, U.S. Fish and Wildlife Service

Date:

December 27, 1989

Recovery plans delineate reasonable actions which are believed to be required to recover and/or protect the listed species. Plans are prepared by the U.S. Fish and Wildlife Service, sometimes with the assistance of recovery teams, contractors, State agencies, and others. Objectives will only be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Recovery plans do not necessarily represent the views nor the official positions or approvals of any individuals or agencies, other than the U.S. Fish and Wildlife Service, involved in the plan formulation. They represent the official position of the U.S. Fish and Wildlife Service only after they have been signed by the Regional Director or Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species' status, and the completion of recovery tasks.

Literature Citations should read as follows:

U.S. Fish and Wildlife Service. 1989. Alabama Leather Flower Recovery Plan. U.S. Fish and Wildlife Service, Jackson, Mississippi. 21 pp.

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EXECUTIVE SUMMARY

Current Status: The Alabama leather flower is only known from two sites in northeast Alabama and is therefore extremely vulnerable. Both sites are on private lands, one of which is owned by The Nature Conservancy.

Goal: Protection/enhancement of existing populations and reclassification to threatened. Delisting is probably unattainable.

Recovery Criteria: Reclassification to threatened will be considered when 10 viable and geographically distinct populations, occupying a minimum of one acre of habitat each, are known and protected. Viability of populations will be assessed through periodic monitoring for a period of not less than 10 years. Delisting will be considered if 20 such populations are secured.

Actions Needed:

- (1) Protect populations.
- (2) Search for additional populations.
- (3) Monitor populations to determine trends.
- (4) Gain information on species' biology and determine habitat requirements.
- (5) Determine management needs and implement.
- (6) Establish experimental population(s), if deemed appropriate.

Date of Recovery: Unable to determine at this time.

Total Cost of Recovery: Unable to determine at this time.

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I. INTRODUCTION

Background

On September 26, 1986, the U.S. Fish and Wildlife Service published in the Federal Register a final rulemaking indicating its determination that Clematis socialis, the Alabama leather flower, is an endangered species under the Endangered Species Act of 1973, as amended. C. socialis is only known from two locations in northeast Alabama.

Taxonomy and Description

Clematis socialis, a member of the family Ranunculaceae, was described as a new species in 1982 by Dr. Robert Kral. The most distinctive features are its rhizomatous habit and formation of dense clones with erect stems reaching 0.2-0.3 meters (m) or 7-12 inches (in.) in height. The leaves are variable from the base to the apex of the stem. The lowermost leaves are scalelike, oblong or triangular in shape and mostly under 1 centimeter (cm) (0.39 in.) long; median leaves are simple, mostly elliptic-linear in shape, 4-12 cm (1.6-4.7 in.) long, and 0.5-1.0 cm (0.20-0.39 in.) wide; upper leaves are 3 to 5 foliolate and shaped as in median leaves. The flowers are solitary at the tips of slender stems, urn to bell-shaped, 2-3 cm (0.79-1.18 in.) long, and blue-violet in color. The fruits are aggregates of achenes which are densely pubescent and 2.5-3.0 cm (0.98-1.18 in.) in length (Figure 1). Clematis socialis, a member of the Viorna section of Clematis, superficially resembles the more widespread C. crispa but is distinguished by its erect stems, rhizomatous nature, solitary flowers and lack of tendrils (Kral 1982, 1983).

Reproductive Biology

Little is known regarding the reproductive biology of this recently described Clematis. It is perennial and typically flowers from late April into May. Fruit development begins in June. The plants increase vegetatively by means of spreading and forking rhizomes resulting in dense clones of many shoots (Kral 1982).

Distribution and Ownership

Clematis socialis is currently known from northeast Alabama at only two sites, one each in St. Clair and Cherokee Counties (Figure 2). This species was first discovered by Dr. Robert Kral (1982) in 1980 in St. Clair County. A second population was located in Cherokee County in June 1985 by Whetstone and Norquist. Attempts to locate additional populations have been unsuccessful.

Both sites are in private ownership, one of which is primarily owned by The Nature Conservancy (St. Clair County site). Plants occur on adjacent roadside rights-of-way which are under jurisdiction of the Alabama State Highway Department. A few plants also occur near a powerline right-of-way at the St. Clair County site, which is managed by the Alabama Power Company.

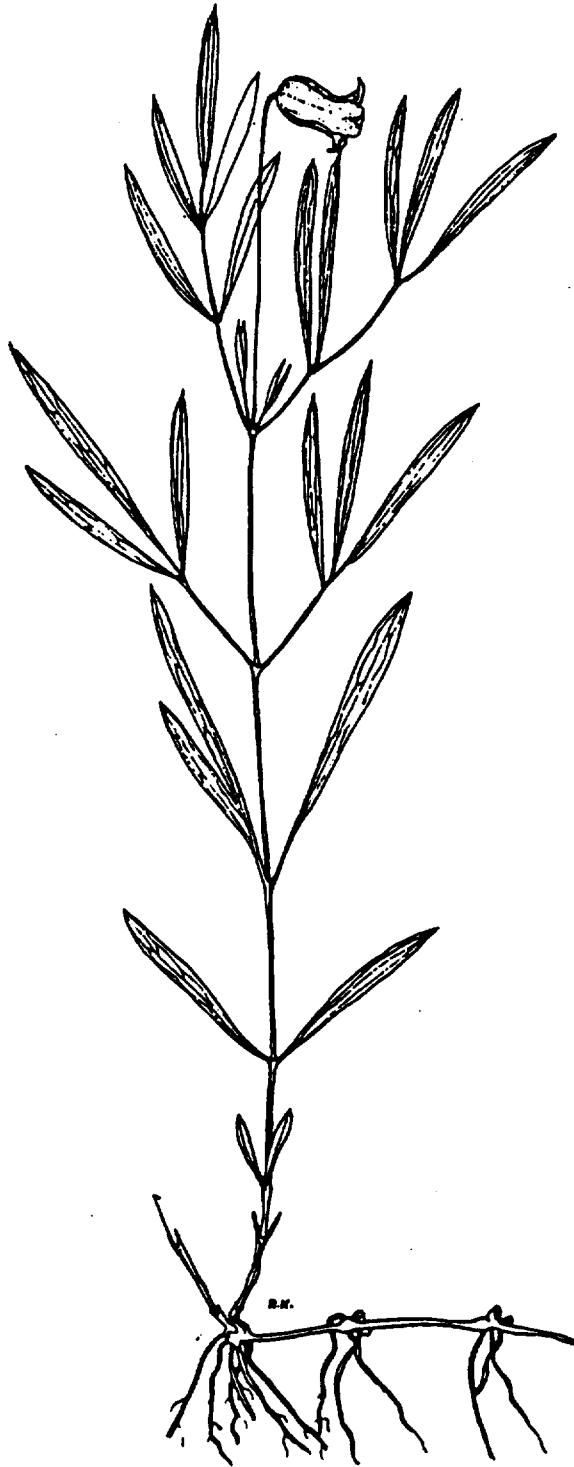


Figure 1. Alabama leather flower. Illustration by Robert Kral.

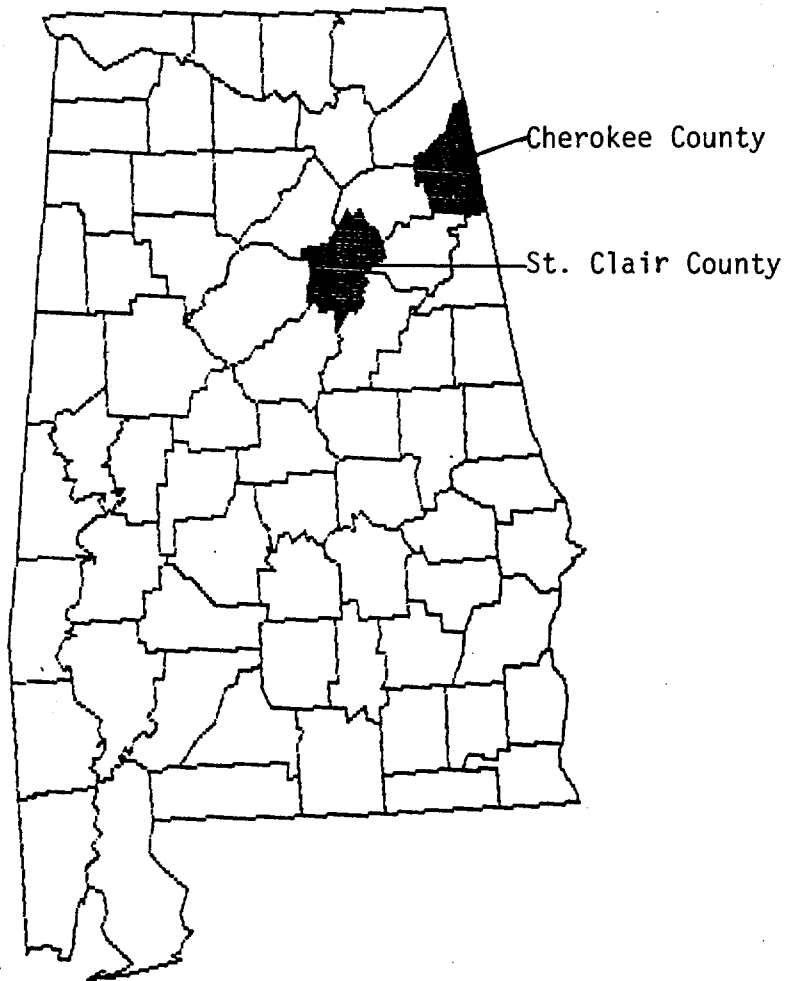


Figure 2. Distribution of Alabama leather flower.

Habitat

Clematis socialis occurs in the Ridge and Valley physiographic region of northeast Alabama. The specific vegetation type is difficult to determine since the known populations occur in habitat which has been altered from its natural condition. In St. Clair County, plants occur in a highway right-of-way and in contiguous woods which have been selectively logged. In Cherokee County, plants are located on a highway right-of-way and in an area which has been routinely bush-hogged.

Both populations are located in mesic flats approximately 15-30 meters (50-100 feet) from intermittent creeks. C. socialis is rooted in silty-clayey soils of the Conasauga series which are weathered from interbedded shale or shaley limestone of the Conasauga Formation (USDA 1978, 1985). The soils are circumneutral or slightly basic with a high hydroperiod (Kral 1982). Plants occur in full sun or partial shade in a grass-sedge-rush community in association with several species of Carex (C. lurida, C. flaccosperma, C. tribuloides, C. squarrosa), Rhynchospora (R. caduca, R. corniculata), Scirpus (S. lineatus, S. atrovirens), Eleocharis (E. tenuis, E. compressa), Juncus (J. effusus, J. coriaceus, J. marginatus, J. filipendulus), Panicum (P. virgatum, P. agrostoides), and Andropogon (A. gerardi, A. scoparius). Other associates include Glyceria striata, Poa, Ranunculus fascicularis, R. pusillus, Thalictrum, Ptilimnium, Phlox glaberrima, Penstemon laevigatus, Cicuta maculata, Gratiola floridana, and many composites such as Silphium terebinthinaceum, Liatris spicata, Helianthus, Eupatorium and Erigeron (Kral 1982, 1983). The woodlands consist of pine and mixed hardwoods including Quercus phellos, Q. lyrata, Celtis laevigata, Carya ovata, Ulmus americana, Fraxinus pennsylvanica, Liquidambar styraciflua, Diospyros virginiana and Acer rubrum. The understory consists primarily of Ilex decidua, Amorpha, Cornus and Viburnum (Kral 1982). Due to the presence of a number of prairie indicator species, Kral (1982) suggests natural openings present in the area prior to the arrival of early immigrants were natural habitat for Clematis socialis.

Current Status and Population Size

It is difficult to determine the exact number of individual plants in a population due to the species' clonal nature. The type locality, in St. Clair County, Alabama, supports an estimated 50 plants which are scattered over a few acres in area. The Nature Conservancy owns most of this property which affords this population protection from any adverse land use changes. An estimated 10-15 plants occur outside The Nature Conservancy's property boundary.

The second population, in Cherokee County, Alabama, consists of approximately 15-20 individuals. Sufficient data to document population trends are lacking.

Threats and Limiting Factors

Factors which are likely to limit or threaten the continued existence of Clematis socialis include:

- 1) destruction or adverse modification of habitat,
- 2) lack of knowledge on species' biology and habitat management, and
- 3) vulnerability due to limited number of populations.

The two existing populations occur on private land and extend onto highway rights-of-way. In the past, some plants were damaged or destroyed by herbicide application and excessive mowing in association with routine vegetation control on the rights-of-way. Future road improvements near these sites could jeopardize this species unless precautions are taken. A few plants occur near a powerline right-of-way and could be adversely impacted if proper precautions are not taken.

Logging activity has severely degraded the habitat at one of the sites. The heavy equipment used has left this highly erodible soil deeply rutted in places and individual plants may have been destroyed.

Any land use changes on unprotected sites could negatively impact or destroy populations if precautions are not taken. At one area, plants occur adjacent to a pasture with a few individuals located just inside the pasture. Pasture improvement through expansion or introduction of more competitive forage grasses would eliminate Clematis socialis and its natural associates. Habitat for this species has been reduced through such agricultural usage while other areas have been converted to pine plantations, used for row crops, or succeeded to woodland.

Preliminary observations indicate that C. socialis is a poor competitor, as it appears most vigorous in areas with little competing vegetation and bare areas of exposed ground. This species may benefit from occasional limited disturbance which arrests succession. Apparently, C. socialis can remain dormant for a period as evidenced by its appearance in openings created in woods which had been selectively logged. Even though the increased light initially benefitted C. socialis, it also stimulated more aggressive competing vegetation including the exotic Japanese honeysuckle. Both populations of C. socialis are in need of active management due to shading and competition from more aggressive vegetation. However, the lack of information on the life history of this species hinders management and recovery work. More information is needed to determine ecological requirements before deciding on the proper long-term management technique.

This species is vulnerable due to its limited number of populations which occupy no more than a few acres in size. Attempts to locate additional populations have been unsuccessful, thus far. Furthermore, this species may have low genetic variability within populations due to its clonal nature.

Collecting is not a documented threat at this time. However, a horticultural demand could develop in the future, perhaps as a result of its recognition as an endangered species. Collecting could become a threat to natural populations if other sources are not developed.

Recovery Actions Taken To Date

All landowners and other involved parties have been notified regarding this rare species on their properties. The landowner of the St. Clair County site has donated a 26-acre tract to The Nature Conservancy which contains a major portion of the population, plus a sizeable buffer area. An estimated 10-15 clones occur outside this boundary. The landowner of the second population (Cherokee County) has entered into a voluntary protection agreement with the Service.

Personnel of the Alabama Highway Department and Alabama Power Company are aware of the plants on or near the rights-of-way which they maintain and of the importance of protecting them. An informal agreement exists between the U.S. Fish and Wildlife Service and the Alabama Highway Department for protection of the plants on their rights-of-way. This involves the abolishment of herbicides near these sites and a special mowing schedule (late summer) to allow the plants ample time to flower and set seed. An interim management plan has been prepared for the Nature Conservancy site in St. Clair County by their staff. A prescribed burn has been conducted at this site the last several years by the Alabama Forestry Commission as a means of controlling competing vegetation.

During the summer of 1989, seed was collected from the St. Clair County population for the North Carolina Botanical Garden, a member garden with the Center for Plant Conservation.

II. RECOVERY

A. Objective

Clematis socialis will be considered for reclassification from endangered to threatened status when ten geographically distinct, self-sustaining populations, occupying a minimum of one acre of habitat each, are known and protected from any foreseeable threats. Delisting will be considered when 20 such populations are secured. Viability of populations will be assessed through a periodic monitoring program for at least a ten year period.

The possibility of achieving these recovery goals depends on the discovery and protection of additional populations. It is expected that more populations will be discovered if extensive surveys are conducted. It is possible that eight additional viable populations will be located and protected, making reclassification to threatened status probable. However, it is unlikely that an additional ten such populations will be located; therefore, delisting is probably unattainable.

B. Narrative Outline

1. Protect and manage populations and habitat. The first step in the recovery process is to protect the populations and their habitat. Protection efforts, excluding Section 7 obligations, may include land donations, conservation easements, long-term conservation agreements, land acquisition or other methods. Appropriate management will be determined through Task 4.2.

1.1 Protect and manage existing populations. To ensure the survival of Clematis socialis, the two existing populations must first be protected and managed.

1.1.1 Protect and manage plants on rights-of-way.

Cooperation with the Alabama Highway Department and Alabama Power Company is necessary to protect the plants that occur on or near rights-of-way. These agencies are aware of this rare species and interested in protecting plants on property which they manage. Cooperative Agreements outlining appropriate protective measures should be established with these agencies and the U.S. Fish and Wildlife Service.

1.1.2 Protect and manage population on Nature Conservancy property. A 26-acre tract, part of which is the type locality for the Alabama leather flower, was donated to The Nature Conservancy in 1986. A Conservation Agreement has been established between the Service and the Conservancy allowing the Service to conduct recovery activities for this species on their property. This Agreement also gives management responsibility of this site to the Service.

An interim management plan has been devised by the Conservancy's staff to address some of these management problems until appropriate management techniques are determined through Task 4. Habitat at this site has been severely degraded by past logging activities (rutted soils, competition). Prescribed burns were conducted at this site to control competition.

1.1.3 Secure plants on private property. An estimated 10-15 plants have been located on private property just outside the Conservancy's property boundary in St. Clair County, Alabama. These plants should be protected and preferably incorporated into the Conservancy's preserve.

The second population of Alabama leather flower occurs on private land in Cherokee County, Alabama. The landowner has entered into a long-term Conservation Agreement (10-year) with the Service to protect the Alabama leather flower on their property. However, the only assured method of protection for populations on private land is through their acquisition by a conservation organization or agency.

- 1.2 Search for additional populations. A thorough systematic search for new populations is needed. Location of additional populations is essential to recovery and will provide more information on this species' habitat requirements. Potential habitat should be identified by an investigation of the habitat of known populations for common ecological characteristics and indicator species, followed by a thorough examination of soil, topographic or other maps. The two known populations occur on flats near intermittent creeks on the same soil type (Conasauga series). A thorough survey of these associated drainages should be conducted, as well as searches throughout other areas in northeast Alabama and adjacent northwest Georgia. Searches should be carried out when the species is in flower and for a minimum of two field seasons. New populations should be secured as in Task 1. Information gained will also be useful in identifying suitable habitat for introduction (Task 6), if deemed necessary.
2. Establish a monitoring program for protected sites. A monitoring program should be established on protected sites in order to track population trends and evaluate effectiveness of recovery efforts.
 - 2.1 Determine size and viability of populations. General information should be gathered for each site including size of population (approximate hectares), numbers of plants (if discernible), size of individual colonies (approximate meters), and indications of vigor. Individual plant locations should be plotted on large-scale maps with topographic features indicated for each site.
 - 2.2 Design sampling method for monitoring. Baseline data must be gathered before monitoring can be initiated. Sample plots or transects should be established as permanent reference points to monitor changes in the population. The number and size of samples should be statistically valid and representative of the population. Photo stations should be established for each population and photographs taken annually at the same dates each year. Parameters to be measured for each population may include frequency, percent cover, numbers of plants, and flowering activity as well as others. Separate plots should be established to monitor the development of individual plants with respect to microhabitat conditions.

- 2.3 Conduct periodic monitoring. In order to reach recovery, certain criteria regarding population size and viability must be met which can only be determined through a long-term monitoring program. Populations should be censused annually during their flowering and fruiting period. Measurements of parameters selected in Task 2.2 should be recorded, as well as general weather conditions. Any management activity or disturbance since the last census should be noted. With frequent monitoring, problems can be detected early and corrective measures taken.
3. Study ecology and species' biology. An understanding of the ecology and species' biology of the Alabama leather flower is necessary in order to appropriately manage and protect this species.
- 3.1 Determine ecological parameters of habitat. An understanding of this species' habitat will help determine what limits its distribution. This information will be useful in locating potential habitat for new populations (Task 1.2) and for possible introduction sites (Task 6).
- 3.1.1 Analyze physical habitat. Soil type may affect the distribution of this species. The two known sites both occur on the Conasauga Soil Series. A complete soil analysis should be conducted on all sites. Topographic relations and microclimate should also be analyzed. Some factors which should be studied are elevation, geologic formations, watershed, and moisture relations.
- 3.1.2 Determine community composition and structure. A vegetation analysis should be conducted on this species' habitat. Community composition and structure should be determined through an analysis of each vegetation layer. An attempt should be made to determine the undisturbed vegetation state which will be important in determining management. Such information may be gained through an analysis of historical literature and conversations with local landowners. An associated species' list should be developed for each site.
- 3.2 Gain information on species' biology and life history. An understanding of this species' biology and life history is important for management and protection of healthy populations. This information is also essential to completing other required recovery activities. Information will be obtained through field observations and greenhouse/laboratory studies.

- 3.2.1 Study pollination and types of reproduction. Reproduction appears to be primarily asexual via rhizomatous clonal shoots. Breeding systems and pollination biology should be investigated to identify essential components of sexual reproduction. The relative importance of asexual and sexual reproduction should be assessed.
- 3.2.2 Investigate rhizome dormancy. The Alabama leather flower is apparently able to exist as dormant rhizomes under certain unsuitable conditions. An assessment of the longevity and viability of its rhizomes is important to understanding this species' long-term survival and ability to recolonize.
- 3.2.3 Study seed biology and seedling ecology. Investigate parameters of seed biology (seed set, viability, dormancy, longevity, dispersal, germination requirements, percent germination) and seedling ecology (factors affecting growth and development of seedlings).
- 3.2.4 Conduct genetic analysis of populations. Due to this species' clonal nature, an assessment of the amount of genetic variability within populations, and the species as a whole, is needed. Such is important in assessing long-term chances of survival and minimum viable population parameters. The information gained will ensure that an appropriate number of populations are selected to preserve the entire range of genetic diversity in this taxon. This task will be accomplished through electrophoretic analysis.
4. Determine effective management for maintaining or increasing populations. Management needs of the Alabama leather flower are largely unknown; however, this species appears more vigorous in areas of partial or full sunlight with little competition. In order to maintain or expand populations, active management of its habitat, targeted at controlling competing vegetation, will probably be necessary. Management is further necessitated due to the disturbed nature of the present sites. Thus, the tasks outlined below (4.1, 4.2) will be essential for ensuring that vigorous populations are maintained.
- 4.1 Conduct management technique experiments. Experiments should be designed to evaluate the cost and effectiveness of different management techniques. Long-term effects should be determined through observations of permanent study plots over many years. Evaluations should be based on changes in colony size, numbers of plants, reproduction, and changes in associated vegetation. Such research should be conducted on a

natural population but should never risk damage to a significant portion of the population.

- 4.1.1 Conduct experimental burns. Fire is an effective means of controlling competing vegetation. Prescribed burns have been conducted on The Nature Conservancy site (St. Clair County). The Alabama leather flower appeared to respond favorably in areas which were burned, showing an increase in colony size (through vegetative reproduction) and flowering activity. However, the effects of fire on this species, as well as its native and non-native competitors, should be examined over a longer period in order to adequately determine its effectiveness. Prescribed fires should be conducted only during this species' dormant season (late fall and winter). Various fire intervals should also be investigated.
- 4.1.2 Test removal of competitors by manual or mechanical means. Hand removal of vegetation may be an effective means of controlling succession in smaller populations. This procedure would probably be too laborious for larger sites. Bush-hogging, mowing or other mechanical methods should be investigated as means of controlling competitors. Such experiments should not be conducted during flowering or fruiting periods.
- 4.1.3 Study effectiveness of selective timber-cutting. Selective timber-cutting should be investigated as a means of improving the vigor of populations. Selective logging at one site in 1985 clearly favored Clematis socialis. Prior to logging, plants were only known from the adjacent roadside right-of-way. The increased light, through logging, stimulated growth of plants in this area where they had presumably existed as dormant rhizomes. However, this "opening of the canopy" also encouraged the growth of more aggressive competitors. A method of controlling the growth of competitors will be needed in conjunction with selective timber-cutting.
- 4.2 Prepare individual site management plans. Make use of findings from the above research (Task 4.1) to determine the best way to maintain habitat for each individual population. Information gained from habitat analysis and species' biology studies will also be important to completing this task.
5. Preserve genetic stock. This species is extremely vulnerable due to such few populations. Protection of the gene pool should be accomplished through seed bank storage and by maintaining material in cultivation. Additionally, this will provide material for research, propagation, and horticultural interests to reduce pressure on wild populations and other recovery activities. Such

activities should be conducted under the guidance of the Center for Plant Conservation which sponsors the establishment of garden populations of endangered plants at member botanical gardens.

- 5.1 Establish seed bank. Seed should be collected from all natural populations at the appropriate time, as determined through species' biology studies. Some seed should be maintained in a long-term storage facility (ensuring each population is maintained separately) and tested for viability every few years.
 - 5.2 Maintain material in cultivation. Populations should be maintained in cultivation to provide material for research, education and possible introduction into the wild. The North Carolina Botanical Garden, one of the Center for Plant Conservation's participating institutions, has initiated seed collection of C. socialis to be maintained on a long-term basis.
 - 5.3 Investigate propagation techniques. The best technique for propagating this species will be determined through experimentation. Possible cultivation methods include rhizome segmentation, tissue culture, and artificially grown seedlings.
6. Establish experimental population(s) within historic range, if deemed necessary. Clematis socialis is only known from two sites and only one is protected. If after extensive surveys, no new populations are located and secured, it may be necessary to establish additional ones in the wild to decrease this species' vulnerability.
 - 6.1 Identify introduction sites within historic range. Suitable habitat for experimental populations will be identified through Task 1.2. Sites should possess the same habitat characteristics as known populations (determined through Task 3.1), be within probable historic range, and be secured as outlined in Task 1. The number of populations to be established will be determined after suitable habitat has been identified. Effort should be made to establish populations on public lands.
 - 6.2 Establish and monitor populations. The appropriate method for introduction (seed, seedling, rhizomes) and time to plant will be determined through information gained in species' biology studies (Task 3.2) and propagation experiments (Task 5.3). After establishment, population(s) should be monitored periodically to determine viability and management needs.

7. Develop public awareness and support for conservation of this species. Public support is an important part of the recovery process. Several articles have appeared in local newspapers and newsletters featuring the Alabama leather flower and were positively received by the public. Additional articles could be written and an interpretive display could be established at the Birmingham Botanical Garden. All public education attempts should keep the precise locations confidential, carry a strong conservation message, and establish a contact if additional populations are discovered.

Governmental agencies, conservation organizations, and private landowners should be kept informed and encouraged to assist in recovery activities for this species.

C. Literature Cited

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- Kral, R. 1983. A report on some rare, threatened, or endangered forest-related vascular plants of the South. USDA, Forest Service, Technical Publication R8-TP2, pp. 409-412.
- U.S.D.A. 1978. Soil Survey - Cherokee County, Alabama. U.S.D.A. Soil Conservation Service.
- U.S.D.A. 1985. Soil Survey - St. Clair County, Alabama. U.S.D.A. Soil Conservation Service.

III. IMPLEMENTATION SCHEDULE

The following Implementation Schedule outlines actions and costs for the Clematis socialis recovery program. It is a guide for meeting the objectives elaborated in Part II of this plan. This schedule indicates the general category for implementations, recovery plan tasks, corresponding outline numbers, task priorities, duration of tasks, (continuous denotes a task that 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 Clematis socialis and protect its habitat.

Key to Implementation Schedule Columns

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

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

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.

IMPLEMENTATION SCHEDULE

General Category	Plan Task	Task Number	Priority	Task Duration	Region	Division	*1 Other	*2 FY 1	FY 2	FY 3	Comments/Notes
A 1-7, M3, M4	Protect and manage populations	1.1	1	continuous	4	FWE	TNC, AID AFC	3,000	3,000	3,000	*1 Other agencies responsibilities will be of a cooperative nature, possibly on projects funded under a Service contract. In some cases, contracts may be let to private individual *2 Funding estimates only for Service cost
I 1-3 I 13	Search for additional populations	1.2	2	3 years	4	FWE	con-tractor	4,000	4,000	4,000	
18 I 1	Determine population size/viability	2.1	2	1 year	4	FWE	con-tractor	2,000	-	-	On-going, in the event new populations are found.
I 6	Design monitoring study and gather baseline data	2.2	2	1 year	4	FWE	con-tractor	4,000	-	-	
I 1, I 2, I 4, I 10	Conduct periodic monitoring	2.3	2	continuous	4	FWE	con-tractor	-	5,000	5,000	
I 3	Analyze physical habitat	3.1.1	2	2 years	4	FWE	con-tractor	2,500	2,500	-	
I 3, I 4, I 10	Determine community composition/structure	3.1.2	2	2 years	4	FWE	con-tractor	2,000	2,000	-	

IMPLEMENTATION SCHEDULE

General Category	Plan Task	Task Number	Priority	Task Duration	Region	Division	Other	FY 1	FY 2	FY 3	Comments/Notes	
	I 14	Study reproductive biology	3.2.1	3	3 years	4	FWE	con-tractor	5,000	3,000	3,000	
	I 14	Rhizome dormancy	3.2.2	3	continuous	4	FWE	con-tractor	-	-	-	Cost to be determined.
	I 14	Seed biology/seedling ecology studies	3.2.3	3	3 years	4	FWE	con-tractor CPC	2,000	2,000	2,000	May be accomplished by CPC under tasks 5.1 and 5.2.
	I 1, 14	Genetic analysis	3.2.4	3	2 years	4	FWE	con-tractor	-	-	-	Cost to be determined.
	R 4, M 3, M 4	Management technique experiments	4.1	1	5 years	4	FWE	con-tractor AFC	5,000	5,000	5,000	
19	M 3, M 4	Site management plans	4.2	1	1 year	4	FWE	con-tractor	-	-	-	Covered under task 4.1.
	M 1-7	Establish seedbank	5.1	2	continuous	4	FWE	CPC	5,000	-	-	A one-time fee to CPC to carry out activities on long-term basis.
	M 1-7	Maintain material in cultivation	5.2	2	continuous	4	FWE	CPC	-	-	-	Covered under task 5.1.
	I 7, M 1-2	Investigate propagation techniques	5.3	2	3 years	4	FWE	CPC	2,500	2,500	2,500	Partially included under task 5.2.
	I 3, I 13	Identify introduction sites	6.1	2	3 years	4	FWE	con-tractor	-	-	-	Partially accomplished under task 1.2. Will be implemented if deemed necessary.

IMPLEMENTATION SCHEDULE

General Category	Plan Task	Task Number	Priority	Task Duration	Region	Division	*1 Other	*2 FY 1	FY 2	FY 3	Comments/Notes
M 1, M 3 I 2	Establish and monitor populations	6.2	2	5 years+	4	FWE	con-tractor	-	-	5,000	
O 1	Educate public	7	3	continuous	4	FWE	CPC TNC	500	1,000	1,000	

List of Abbreviations

- FWE - Fish and Wildlife Enhancement (Endangered Species Division)
- TNC - The Nature Conservancy
- AHD - Alabama Highway Department
- AFC - Alabama Forestry Commission
- CPC - Center for Plant Conservation

IV. APPENDIX

List of Reviewers

The Cornell Plantations
One Plantation Road
Ithaca, New York 14850

Division of Endangered Species
and Habitat Conservation
U.S. Fish and Wildlife Service
Washington, D.C. 20240

Office of Public Affairs
U.S. Fish and Wildlife Service
Washington, D.C. 20240

Division of Refuges
U.S. Fish and Wildlife Service
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Division of Realty
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