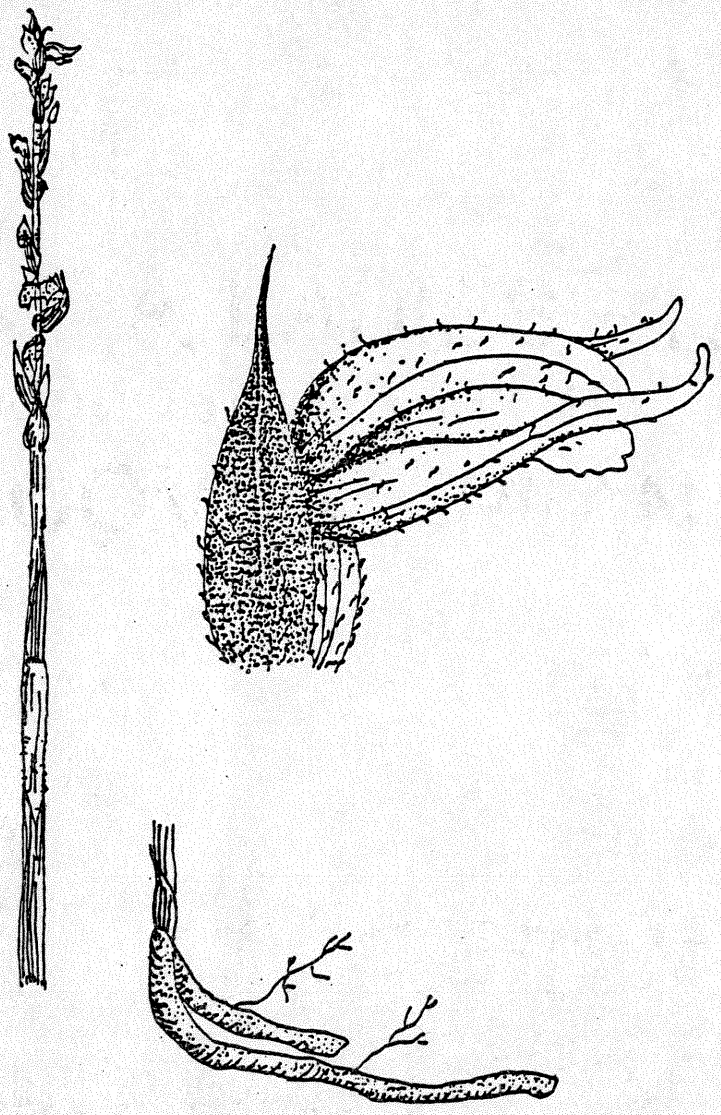
NAVASOTA LADIES'-TRESSES
(Spiranthes parksii)
RECOVERY PLAN



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

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Navasota Ladies'-Tresses (Spiranthes parksii), Final Draft, R2 Lead

Background: Spiranthes parksii, a small white-flowered orchid occurs only in association with the Post-Oak Savanna vegetation type in Brazos, Robertson, and Burleson counties, Texas. Since its discovery in 1947 approximately 1,816 individuals have been found. This species is the rarest of the North American orchids. It is presently threatened by a number of habitat disturbing activities including a highway expansion, residential development, strip mining, and a proposed industrial park. Probably the only hope for the survival of the species is protection of the habitat by a private conservation organization or the State or Federal government.

Accomplishment (FY 1984): Discussions with the landowners and The Nature Conservancy concerning protection. The 1983 field survey conducted by Dr. Hugh Wilson and Geyata Ajilvsgi revealed 1,816 individual plants. This is a twelve-fold increase over the past population estimate. A secondary center of plant density consisting of 400+ individuals was located in Grimes County. Based on the 1983 field survey, the USFWS reinitiated Section 7 consultation and issued a new biological opinion of non-jeopardy for the Texas Highway 6 expansion.

Needs:

1. Protect the habitat of the main population.

2. Continue to monitor the species.

3. Establish new populations.

4. Enhance existing populations if the habitat is protected.

RECOVERY PLAN FOR THE NAVASOTA LADIES'-TRESSES

Spiranthes parksii Correll

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For:

U.S. Fish and Wildlife Service, Region 2

APPROVED: _____
Regional Director, Region 2
U.S. Fish and Wildlife Service

DATE: 9/21/84

SUMMARY

Goal: To remove the Navasota ladies'-tresses from the Federal list of endangered and threatened species by protecting the existing populations and their habitat from present and future human and natural threats.

Recovery Criteria: Criteria for the downlisting of the Navasota ladies'-tresses are based on the establishment and maintenance of two safe sites for the species. These sites would contain a large proportion of the known individuals of Spiranthes parksii. Because of the continuing nature of the threats to this species and the small numbers and limited range of the species, continuing protection will be necessary and it is unlikely that delisting will be feasible for the Navasota ladies'-tresses in the foreseeable future.

Action Needed: Major steps needed to meet the recovery criteria include: establishment of two safe sites; preparation and implementation of management plans for those sites; alleviation of threats to the species on those sites; monitoring of existing populations; search for new populations; and research on the species, its ecological needs, its taxonomy, and its biology.

DISCLAIMER

This is the completed Navasota Ladies'-Tresses 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 it does not necessarily represent the views of all individuals who played a key role in preparing this plan. This plan is subject to modification as dictated by new findings and 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 budgetary constraints.

Literature citation should read as follows:

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PART I

Introduction

Spiranthes parksii Correll, the Navasota ladies'-tresses, was listed as endangered on May 6, 1982 (47 FR 19539). No other members of this orchid genus are listed; however, *S. lanceolata* var. *paludicola* and *S. polyantha*, located in Florida, the Caribbean, and Central America, are in the 1980 Notice of Review (45 FR 82480) and its 1983 Supplement (48 FR 53640) as candidate taxa.

Spiranthes parksii was originally described by Correll (1947) from material collected by H. B. Parks in 1945. The location associated with Parks' specimens was "Democrat bridge," a well known collecting locality on the floodplain of the Navasota River in northern Brazos County, Texas. Thus, the plant was believed to inhabit alluvial sites "along the Navasota River" (Correll and Johnston, 1970). However, subsequent attempts to locate the plant (Luer, 1975) were not successful until 1978. The "rediscovery" of *S. parksii* (Catling and McIntosh, 1979) demonstrated that the plant is a unique inhabitant of upland Post Oak Savanna in Brazos County.

A 1982 survey (unpublished data) by Dr. Hugh Wilson located approximately 100 individual plants at four sites in Brazos County, Texas. During the 1983 field season (Wilson and Ajilvsgi, 1983), 1,816 individual plants were observed scattered throughout Brazos, Grimes, Burleson, and Robertson Counties, Texas.

Although there has been an increase in abundance and range, the species is still highly vulnerable because of current and projected development of oil and lignite deposits and light industry, urban encroachment, collection by orchid fanciers, and natural modification of habitat via succession.

The objective of this report is to outline a plan for facilitating the recovery of Spiranthes parksii, principally by the establishment and maintenance of two safe sites. Survival of the species and ultimately the removal of the species from endangered status is the intention of the recovery plan. The plan incorporates recommendations on protection, management, and research provided by scientists and laymen over the past five years.

Taxonomy

Spiranthes parksii is unusual, possibly unique, among species of the genus in that the taxon has not been altered with regard to rank or circumscription since the original description (Correll, 1947). This, perhaps, can be attributed to its rarity, although specialists tend to stress the distinctive aspect of this species. Correll and Johnston (1970) indicate that floral characters "conveniently separate this species

from all other species of Spiranthes found in Texas." Recent examination of living plants (Catling and McIntosh, 1979) indicates that S. parksii is a "very distinctive species."

While S. parksii is clearly defined as a taxonomic species, its association with other elements of the genus is not clear at the present time. Correll's (1950) suggestion of linkage with tropical American orchids is not a likely possibility. Following Schlechter's (1920) classification of the genus, this connection would link S. parksii with taxa that are placed in other genera (Sheviak, pers. comm.). On the basis of a recent, biosystematic study, there can be little doubt that S. parksii is clearly within Spiranthes s. str., possibly associated with the S. cernua complex of species (Sheviak, 1982). Preliminary electrophoretic work (Walters and Wilson, 1982) also indicates the possible association of S. parksii with the S. cernua complex.

Morphology

The genus Spiranthes is composed of terrestrial herbs with clustered tuberous or rarely fibrous roots. The basal leaves are variable in shape, ranging from broadly ovate to elliptic, or absent at flowering. The flowering stem carries persistent, sheathing bracts. Flowers, arranged in

a more or less spirally twisted, showy or inconspicuous terminal spike, are typically a shade of white. As is the case with the orchid family, flowers consist of three sepals, three petals, and a central column. The lower petal or "lip" is morphologically differentiated from the two lateral petals.

Spiranthes parksii is an erect, slender stemmed perennial up to 30 cm tall; leaves mostly basal, linear, usually absent when flowering; inflorescence a slender, solitary spike of small flowers surrounded by conspicuously white-tipped bracts; petals rounded or ovate with a green central stripe; lateral petals conspicuously shorter than the sepals; lip margin distinctly ragged (Mahler, 1980).

The most unusual characters for identification of S. parksii in the field are the short, wide lateral petals, cream colored (rather than white) perianth, and a tendency for the floral bracts, and sometimes the stem bracts to be white-tipped. A rough diagramatic comparison of S. parksii and its sympatric, fall flowering relatives is provided in Figures 1 and 2.

Distribution

Spiranthes parksii has been found at 24 sites in Brazos, Grimes, Burleson, and Robertson Counties, Texas (Figure 3). These areas are

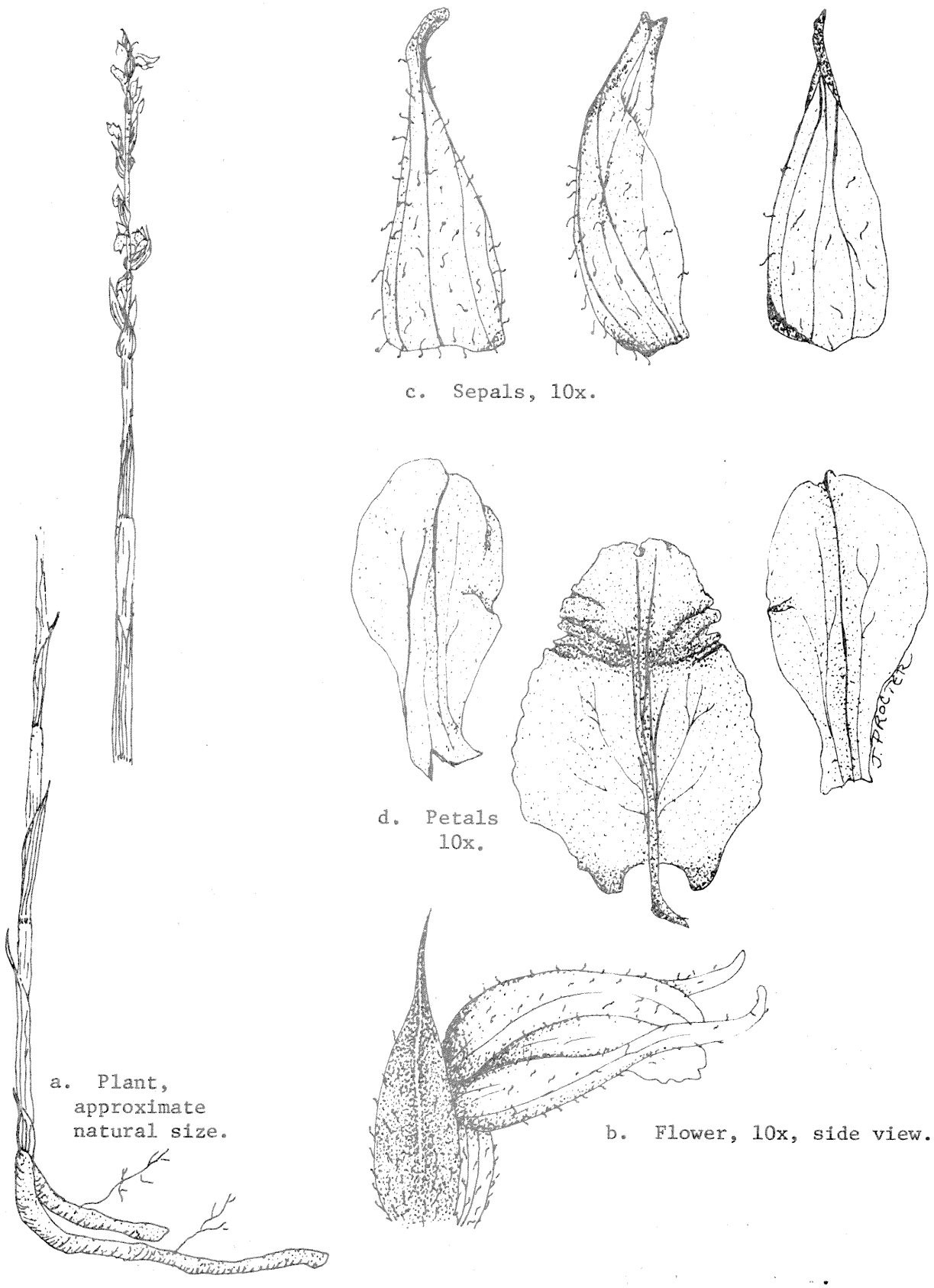

Figure 1. Illustration of S. parksii (Drawn by Jessica Proctor for the U.S. FWS)

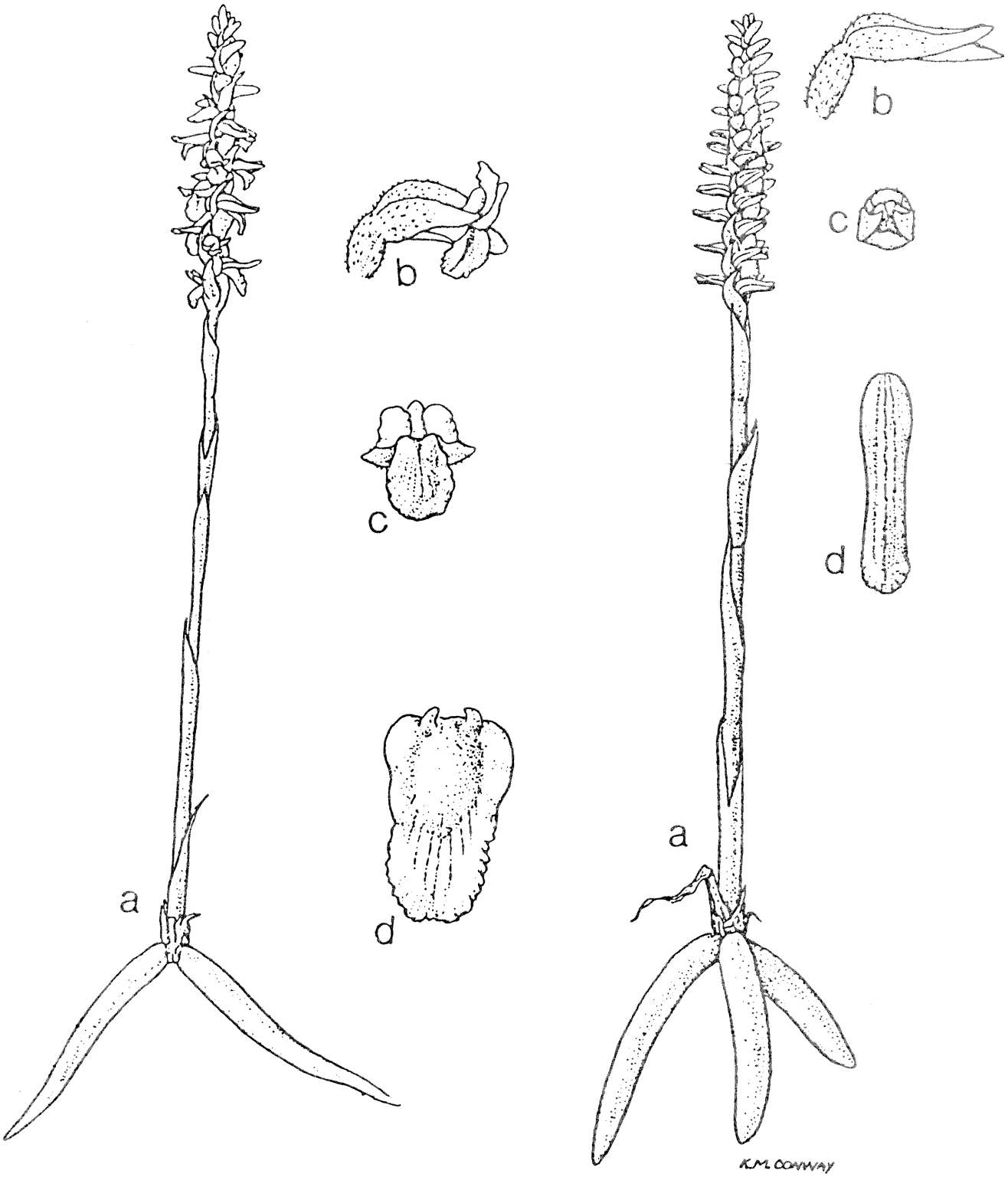

Figure 2. General morphology of S. cernua as the species occurs in the Brazos County flora. Two forms are depicted, "woodland" cernua (left side of page) and "big" cernua (right side of page). Diagrams taken from (Sheviak, 1982); "woodland" cernua actually a composite of figs. 20a (plant) and 19a,b,c,d (flower). "Big" cernua taken from Sheviak's fig. 23.

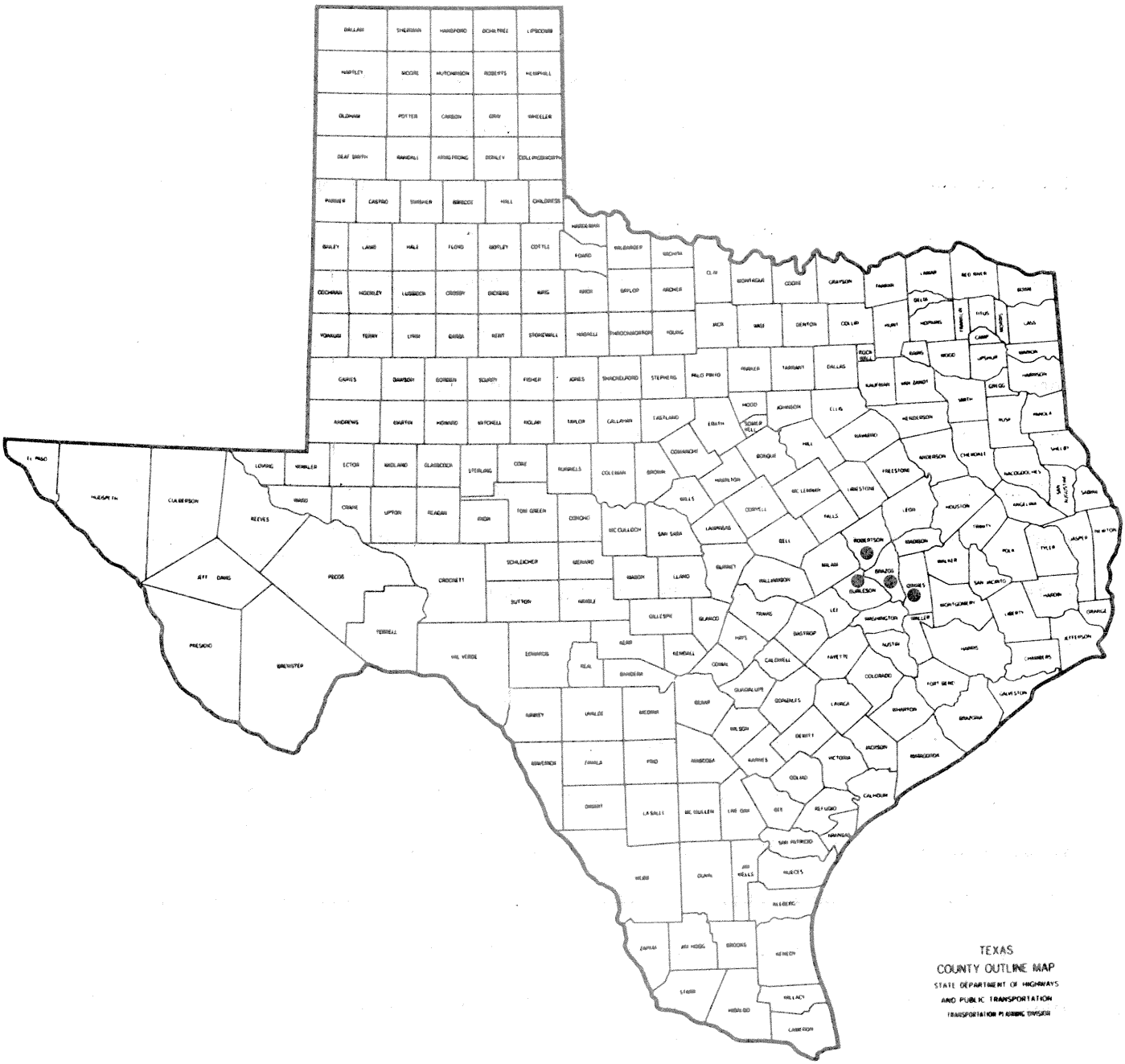

Figure 3. General distribution of Spiranthes parksii Correll, from 1982 and 1983 field surveys.

located in oak forested uplands associated with the Navasota River and the Brazos River drainages.

Data from the 1982 and 1983 field surveys (Wilson and Ajilvsgi, 1983) clearly demonstrate that S. parksii is most abundant over its known distribution in woodlands adjacent to Texas International Speedway (TIS) in Brazos County. It appears that the species was heavily impacted by construction of the speedway. The current center of S. parksii distribution within the TIS area is in woodlands and openings north of the speedway. The area supporting at least 41 percent (750 individuals) of the known S. parksii individuals is bounded by TIS on the south, State Highway 6 on the west, Alum Creek on the north, and the pipeline right-of-way on the east. The highest concentration of S. parksii within this area appears to be along the unnamed tributary flowing northward to Alum Creek, due north of the speedway.

The 1983 field survey extended the known range of distribution to the eastern uplands of the Navasota Valley in Grimes County. The relatively large population (400+ individuals) located just west of Carlos, Texas, represents a secondary center of plant density, nearly comparable to the populations inhabiting woodlands adjacent to TIS. This population contains approximately 22 percent of the known S. parksii individuals.

In addition to these two centers of distribution, S. parksii was located as far east as Anderson, Texas (Grimes County). Scattered

individuals were encountered several miles south of the TIS center along the western uplands of the Navasota Valley in Brazos County, and several miles west of State Highway 6 near the TIS area. The 1983 field survey (Wilson and Ajilvsgi, 1983) also revealed populations associated with the Brazos River drainage; a few plants in southwestern Robertson County and 80 individuals occurring along the western slopes of the Brazos Valley in Burleson County.

These data are certainly not complete. However, while the detail of S. parksii distribution may change with additional survey work, it appears likely that the pattern reflected by these data will remain the same.

Land Ownership

All known populations of S. parksii are located on privately owned land. Information available at the present time concerning ownership of the two main centers of distribution is provided below.

Brazos Co.

Primary center of distribution:

Mr. J.W. McFarland
Global Natural Resources
Houston, Texas
(713/224-9926)

Grimes Co.

Secondary center of distribution:

Ms. Anne C. Teasdale (owner)

Mr. Johnnie Churchwell (leasee)

(409/873-2024)

Habitat

Spiranthes parksii is clearly associated with the Post Oak Savanna vegetation type of east-central Texas. The plant has not been encountered in "natural" prairie sites or in mesic alluvial floodplains of the Navasota River or the Brazos River. Areas supporting the highest number of individuals are lightly wooded, lightly grazed, stream banks of minor tributaries associated with the Navasota and Brazos drainages. As is the case with most species of the S. cernua complex, S. parksii appears to be part of a successional community (Sheviak, 1982). However, the association of essentially all known individuals with trees and shrubs, and the lack of individuals in cleared areas indicate that these plants focus on a late successional niche that occurs within an established woodland.

Given its distribution, and the occurrence of endemism in east-central Texas, it is highly probable that S. parksii occupies a

unique habitat within the Post Oak Savanna. The paucity of available ecological data does not permit specific habitat determination at this time.

Population Biology

Demography

Thirty-one plants were marked during the 1982 field survey for further study. This will allow for relocation of individual plants at times other than the flowering period. In the 1983 field survey, 1,816 individuals were counted. Based on previous field surveys, the survey teams feel they may have missed as much as 75 percent of the plants occurring in known populations. On this basis the estimated number of individuals could be as high as 5,448.

The total estimated area of the known populations is approximately 4.5 km^2. The number of individuals of *S. parskii* per unit is highly variable. During the 1982 and 1983 surveys, densities from as low as 2 individuals per 0.5 km^2 to as high as 80 individuals per 10.5 m^2 were found.

As is the case with most orchids, *S. parksii* produces thousands of tiny seeds per fruit. While it can be safely assumed that seeds are wind

dispersed, examination of actual seed dispersal and seedling establishment has not been accomplished. Given the microscopic size of both seeds and seedlings, this may not be possible.

As indicated by Catling and McIntosh (1979), S. parksii is equipped, in terms of floral structure, for insect pollination. However, the 1982 and 1983 surveys produced no records of insect visitors. In addition, it appears that S. parksii can develop seed without pollination. Catling and McIntosh (1979) observed fruit set on flowers that had received no pollen. Seeds examined by Catling and McIntosh (1979) and Sheviak (pers. comm.) are polyembryonic. Polyembryony in Spiranthes is associated with adventive development of embryos via mitotic division of sporophytic tissue in the seed (Sheviak, 1982; Swamy, 1948). Thus, reproduction in S. parksii could be asexual, although the relationship between polyembryony and apomixis is not direct. Obviously, this important factor must be clarified by more detailed study. The age of plants before reproduction is also unknown.

Botanists have been searching for this plant for many years. The plant was first collected in 1947, and it was not relocated until 1978 when Catling and McIntosh (1979) located 20 individual plants in two populations. In 1979, nine individual plants were observed by Mahler

(1980). In 1982, 100 plants were located by Wilson and Ajilvsgi (unpublished data). The 1983 survey by Wilson and Ajilvsgi resulted in 1,816 individual plants recorded from four counties in east-central Texas.

The area has been screened on a small scale since 1978, and a concentrated "team" approach was used for the 1983 survey. The first indication that 1983 was an unusual year for the local Spiranthes species came in the spring when a large number of plants were observed in the "rosette" condition, i.e., in the photosynthetic stage of the life-cycle when the small leaves emerge. However, this took on no great significance at the time since the relationship between the number of photosynthetic plants (spring rosettes) versus the number of plants actually flowering in the fall was not known. The second indication came in the fall when large numbers of both S. cernua and S. parksii were observed in areas that were closely searched in 1982 with only scattered individuals of both species present. Since the 1982 and 1983 field surveys represent the only detailed observations of the area, it is not known if this type of radical population fluctuation is common. Since the plants appear to photosynthesize and grow only during the winter and spring months, it would seem that the causative variable could be a weather factor occurring between January and May. During this period in 1983, the weather was unusually cool (3°F below normal) and unusually high rainfall (8 inches above normal) occurred. In addition, there were essentially no hard

frosts (lowest monthly temperature = 25°F) during the 1983 winter. These conditions could have acted to promote unusually active vegetative growth and/or seedling establishment and thereby produced the abundance of Spiranthes observed in the fall of 1983.

Phenology

Navasota ladies'-tresses bud from early to late October, flower from mid-October to mid-November, and form fruit from mid-October to the first frost (usually late November). Anthesis and fruit formation occur in an indeterminate sequence from the base of the inflorescence to the tip. The fruit dehisces from mid-November to December and possibly January. Dormancy and other aspects of germination in the natural habitat is unknown. As is often the case with other orchids, a fungal associate may be involved. Dr. Craig Nessler, Department of Biology, Texas A&M, has germinated seeds in an artificial, sterile, tissue culture medium. Growth for about one year under these conditions produces seedlings approximately one cm. tall. Transplantation of these seedlings into 3" pots of various soil types under greenhouse conditions was not successful.

Associated Species

The following list of associated species was generated from the 1982 and 1983 field survey work (Wilson and Ajilvsgi, 1983) and observations of Catling and McIntosh (1979):

TREES

Quercus stellata Wang.
Q. nigra L.
Q. marilandica Muenchh.
Ulmus alata Michx.
Celtis laevigata Willd.

SHRUBS

Ilex vomitoria Ait.
Forestiera ligustrina (Michx). Poir.
Callicarpa americana L.
Ascyrum hypericoides L.
Stillingia sylvatica L.

HERBS

Hypoxis hirsuta (L.) Cov.
Gaillardia pulchella Fong.
Gratiola flava Leavenw.
Claytonia virginica L.
Viola triloba var. dilitata (Ell.) Brainard
Baptisia leucophaea Nutt.
Chaetopappa asteriodes (Nutt.) DC
Allium drummondii Regel.
Monarda punctata L.
Heterotheca graminifolia (Michx.) Shinners
Oxalis violacea L.
Linum medium (Planch.) Britt. var. texanum (Planch.) Fern.
Heterotheca pilosa (Nutt.) Shinners
Andropogon ternaris Michx.
A. virginicus L.
Muhlenbergia capillaris (Lam.) Trin.
Paspalum setaceum Michx.
Drosera annua E. L. Reed
Pteracaulon virgatum (L.) DC
Hedyotis crassifolia Raf.
Aigadenus nuttallii Gray
Asclepias viridis Walt.
Aster patens Ait.

HERBS cont.

Spiranthes gracilis (Bigel.) Beck. var. gracilis

S. cernua (L.) Rich

Heleastrum hemisphaericum (Alex.) Shinners

Panicum brachyanthum Stued.

Sporobolus junceus (Michx.) Kunth

Linum rigidum Pursh.

Cassia fasciculata Michx.

Commelinia erecta L.

Schizachyrium scoparium (Michx.) Nash

Aristida longispica Poir.

Eupatorim compositifolium Walt.

VINES

Smilax bona-nox L.

Passiflora lutea L.

Impacts and Threats

The existence of S. parksii is threatened by three primary factors: 1) human modification of the habitat; 2) collection by orchid fanciers; and 3) artificial maintenance of the habitat.

Human Modification of the Habitat

Recent, massive growth at Texas A&M University, current and pending development of light industry, plus current and projected development of

oil and lignite deposits in Brazos County combine to place the Bryan/College Station area as a national center for economic development. Construction and population expansion, currently progressing at a rapid rate, can be expected to increase with improvement of the national economic picture. Unfortunately, the geographic center for future development in the Brazos County area is along State Highway 6, south of College Station. As discussed earlier, the major population system of S. parksii inhabits this area. The College Station Industrial Park, currently being established, lies just to the northeast of this site. Land adjacent to the site on the south, owned by the Texas International Speedway, is currenty being sold as potential industrial sites. Apparently unrelated to local plans, but certainly enhancing the potential for development of the area, is the expansion of State Highway 6 to a limited access highway with associated "feeder" roads on either side. It is estimated that highway construction would eliminate approximately 2.5 percent of the known S. parksii individuals.

The Spiranthes parksii population north of TIS is underlaid by a massive seam of lignite. This land was purchased by the current owners as a potential source of fuel for a large power facility in nearby Grimes County. However, the escalation of land values resulting from development south of College Station has reduced the likelihood of lignite mining in this area, although mining will always remain a possibility.

Brazos County has been a center for massive oil exploration and development during the past four years. While this activity has decreased recently, it is likely to increase with improving economic conditions. Drilling activities, at the site south of TIS, eliminated about 10 acres of habitat and an unknown but probably substantial number of S. parksii individuals in 1981.

The leasing arrangements for the Grimes County population center have yet to be determined, but this land is within sight of a relatively new lignite-burning power plant at Carlos, Texas. This plant, operated by the Texas Municipal Power Authority, was positioned to be in close proximity to the rich lignite deposits underlying western Grimes County and eastern Brazos County. This relationship does not place the relatively large population of 400+ S. parksii in Grimes County in a secure position.

Both the Burleson and Robertson County populations are along fence rows and are subject to threats from cattle grazing and road maintenance.

In summary, the most immediate and serious threat to the continued existence of S. parksii is human modification of the habitat. Planned urban development of land and lignite mining pose the most immediate threat to the species. Certainly, discovery of the Grimes County population provides some buffer, and the newly discovered patches of

individuals at various locations in Brazos, Burleson, Grimes, and Robertson Counties provide some assurance that the species will continue to exist if the major population centers at TIS and Carlos, Texas, are eliminated. However, elimination of these centers will leave only 20 percent of the known individuals of this species.

Collecting

Luer's recent volume on North American orchids (1975) contains illustrations of all species except one, S. parksii. Orchids attract the widest and most intense interest from "fanciers." Clearly, S. parksii is among the rarest of North American orchids. This unique condition of rarity from both national and international perspectives places the species as a target for collectors.

It is unrealistic to perceive this as a minor threat from a few eccentric hobbyists. Collection of rare plants, especially orchids, can be a profitable enterprise for unscrupulous commercial operators. While not as immediate or potentially massive a threat as human modification of the habitat, the problem of "loving to death" by fanciers will remain indefinitely for all known, yet unprotected populations.

Artificial Maintenance of the Habitat

As compared to collecting and human modification of habitat, this

potential threat is both uncertain and distant. Plants of this species do not occupy areas of well developed forest, nor are they found in natural prairie sites or open, recently disturbed areas. Therefore, it is reasonable to conclude that S. parksii may be part of a subclimax community that exists only as a successional stage. Natural ecosystem disruptions, such as fire or grazing, may be necessary for maintenance of the community in which S. parksii can exist. Complete protection of the habitat by man could allow natural succession to proceed to a level that no longer provides the factors required by S. parksii. The Post Oak Savanna is, by definition, oak woodland interspersed by natural openings. Thus, S. parksii could be adapted to the complex, natural interplay among ecological variables that produces scattered openings. Since we know essentially nothing about S. parksii and its ecological amplitude, this uncertainty will remain until relevant data are developed.

The potential threat of natural habitat modification is relatively distant because we know that significant natural change, if it occurs, will not impact known S. parksii for at least several years. Thus, while this potential threat does not require immediate attention, it will be an important factor with regard to recovery from the long term perspective.

PART II

RECOVERY

Because the distribution of Spiranthes parksii lies within a geographic matrix of surging economic development, the establishment and maintenance of vigorous, self-sustaining populations throughout the known range would be impractical. Therefore, the primary objective of this recovery plan is the establishment and maintenance of two safe sites. It is felt that this approach will focus effort and available funding into activities that would ensure preservation of known population ecosystems and also provide the foundation for possible restoration of the species beyond the safe sites in the future. Thus, the following plan places first priority on the establishment of two safe sites and the success of the recovery plan will hinge on this.

The nature of the threats to S. parksii is such that it is unlikely they can be totally abated. Urban and industrial growth in the Bryan/College Station area will continue, at least in the foreseeable future, and pressure for exploitation of energy resources is also expected to continue to increase in the foreseeable future. Collection of this orchid, and ecological successional processes will also continue to threaten the species. This species is vulnerable due to its small numbers and limited range. Such vulnerability and continuing threat will necessitate constant protection of the species. Therefore, it is unlikely that delisting will be feasible for S. parksii in the foreseeable future. The goal of this recovery plan then, is to secure recovery for the species to the point at

which downlisting can occur. The criteria for initiation of downlisting procedures is the establishment and securing of two safe sites containing portions of the existing S. parksii population, through cooperative agreements, purchases, easements or other means of obtaining management rights, and through preparation and implementation of management plans.

Step-down Outline

1. Remove immediate threats to S. parksii by protecting the major population systems from threats posed by human modification of the habitat and impact from collecting.
    11. Establish two safe sites for S. parksii through protection of lands carrying the largest concentrations of individuals.
        111. Protect land north of Texas International Speedway in Brazos County, Texas.
        112. Protect land near Carlos in Grimes County, Texas.
    12. Develop a management plan for each safe site.
    13. Ensure that the safe sites, once established, are secure from possible impacts from the surrounding area.
        131. Maintain the integrity of drainage systems leading into and out of the safe sites.
        132. Ensure that access into the sites can be controlled.
        133. Establish an appropriate buffer between populations of S. parksii within the safe sites and the surrounding area.

14. Develop a baseline set of ecological data from the safe sites.

    141. Survey the vascular plant flora.

    142. Identify faunal elements that could be interactive with S. parksii.

    143. Define parameters associated with safe site microclimate, soils, topography, and water resources.

2. Minimize long term threats to S. parksii through development of a base of information that is relevant to recovery.

    21. Conduct analysis of those characteristics that would allow identification of S. parksii in the vegetative condition, and would clarify its taxonomy.

        211. Examine variation in leaf structure.

        212. Compare electrophoretic (macromolecular) variation in samples extracted from leaf tissue.

        213. Compare variation in micromolecular (flavonoids, phenolics, and related compounds) constituents of leaf extracts.

        214. Conduct root tip chromosome counts.

    22. Examine phenomena associated with potential for S. parksii propagation and relocation of plants.

        221. Test transplantation methods.

        222. Test procedures associated with seed germination and growth of seedlings.

        223. Determine the extent and nature of fungal association with growth and development of S. parksii.

224. Examine the possibility of large-scale propagation from seed.

23. Initiate a long term (5-year) monitoring program for two known populations, preferably at the safe sites.

231. Determine microclimatic parameters.

232. Survey flora specifically associated with populations of S. parksii.

233. Mark all flowering individuals.

234. Determine parameters associated with reproductive biology.

235. Determine natural threats and assess potential impact.

24. Establish and maintain a long term (5-year) survey program to elucidate actual distribution of S. parksii.

241. Monitor known populations other than safe sites.

242. Search for new populations.

243. Take data from populations beyond the safe sites to determine comparative value of the general data base.

3. Develop public awareness, appreciation, and support for protection and recovery of S. parksii.

31. Establish mechanisms to distribute information and materials associated with recovery efforts.

32. Establish a local technical interest group to initiate and implement recovery projects.

33. Establish a local public interest group to support and become involved with recovery projects.

Narrative

1. Remove immediate threats to S. parksii by protecting the major population systems from threats posed by human modification of the habitat and impact from collecting.

This species is in immediate danger of extinction. Protection of as many individuals as possible must stand as the highest priority.

11. Establish two safe sites for S. parksii through protection of lands carrying the largest concentrations of individuals.

All land inhabited by S. parksii populations is under private ownership. The Endangered Species Act is most effective in protecting populations on Federal lands. Protection of the species will require Federal involvement if the full protection of the ESA is to be obtained. Therefore, actions such as easements, cooperative agreements, or purchases by FWS, The Nature Conservancy, or other conservation organizations should be considered for the establishment of safe sites. Such action by the FWS would require prior preparation of a Land Protection Plan.

111. Protect land north of Texas International Speedway in Brazos County, Texas.

First priority with regard to selection of a safe site is clearly land immediately north of the Texas International

Speedway. An area about 1 mile square with State Highway 6 as the western boundary and Texas International Speedway as the southern boundary would provide maximum protection for the largest number of individuals. Land north of Alum Creek supports scattered individuals in relatively isolated, widely separated populations.

112. Protect land near Carlos in Grimes County, Texas.

Land just west of Carlos, Texas, represents the secondary center of plant density, 400 individuals within a 5-acre area. This population is in an area underlain with lignite deposits and is in close proximity to a lignite-burning power plant, operated by Texas Municipal Power Authority.

12. Develop a management plan for each safe site.

As protection is obtained for each safe site, a management plan should be prepared for the site. These plans should establish goals and objectives for management of the Spiranthes parksii and their habitat on the site.

13. Ensure that the safe sites, once established, are secure from possible impacts from the surrounding area.

Protection of land, such as the site north of TIS and the site west of Carlos, Texas, establishes safe sites. The next step is

to ensure that this investment will provide the desired return with regard to recovery, i.e., take those actions necessary to maximize protection of the populations.

131. Maintain the integrity of drainage systems leading into and out of the safe sites.

Spiranthes parksii shows a definite tendency to occupy ground immediately adjacent to lines of drainage, i.e., stream banks and openings adjacent to streams. It is therefore important to ensure that drainage patterns, rates of flow, and water quality are not altered by land modifications in areas adjacent to the safe sites.

132. Ensure that access into the sites can be controlled.

There can be little doubt that activities associated with establishment of safe sites may draw attention to the areas, and the safe sites may become targets for collectors. This, plus the need for security against other types of entry into the areas, will require fencing the perimeter of the safe sites.

133. Establish an appropriate buffer between populations of S. parksii within the safe sites and the surrounding area.

Concentration of individuals within the site north of TIS appears to be highest along the unnamed tributary running

north from Texas International Speedway. The populations cover about 200 acres. A buffer zone beyond this center of distribution for the species would extend to State Highway 6 on the west, the pipeline right-of-way on the east, Texas International Speedway on the south, and about 5 km north of Alum Creek on the north. This area, about 260 hectares (640 acres), would provide for inclusion of a larger number of S. parksii individuals on the safe site and provide the required buffer for the central population. A buffer would also be necessary for the Grimes County site. Specifications of the size and boundaries of that site and buffer must yet be determined.

14. Develop a baseline set of ecological data from the safe sites.

Future recovery operations concerning this species will require a better understanding of ecological parameters. The status of populations and their surroundings through time will have to be monitored. This activity will require an initial foundation of data. One advantage of the safe sites concept, beyond the elimination of immediate threats, is the establishment of two stable areas for the observation of individuals.

141. Survey the vascular plant flora.

A better understanding of the relationship between S. parksii and successional patterns in its habitat is

essential. In addition, we need to obtain a clearer understanding of the relationship of species immediately associated with S. parksii. Thus, a primary objective of study within the safe sites will be identification and frequency determination of the associated vascular flora. Assessment of changes in floristic composition of the two primary S. parksii population areas will provide a better understanding of this species as it relates to local successional change.

142. Identify faunal elements that could be interactive with S. parksii.

Animals could play an important role in the life of S. parksii, either as an element of change in the local ecology or a vector for dispersal.

143. Define parameters associated with safe site microclimate, soils, topography, and water resources.

A central question with regard to recovery efforts concerns the current distribution of S. parksii. Are the major population systems occurring at particular sites because of a unique factor associated with the areas, or is the present distribution a result of historical factors? Clarification of this question will require a better definition of ecological parameters associated with the

population sites. A weather station should be established at the sites, a thorough soils survey should be conducted in the areas, a clear picture of both macro- and microtopographic contexts of the areas should be established, and the nature and quality of the water supply should be determined.

2. Minimize long term threats to S. parksii through development of a base of information that is relevant to recovery.

While establishment of two safe sites will protect the major population systems of S. parksii, aspects of actual recovery should be pursued. This involves analysis of those factors relating to the use of the safe sites as refuges for salvaged plants and a detailed analysis of basic biological factors.

21. Conduct analysis of those characteristics that would allow identification of S. parksii in the vegetative condition and would clarify its taxonomy.

A major problem with regard to data acquisition for this plant is the difficulty differentiating S. parksii from other species of the genus when the plants are not in flower. During the active photosynthetic period, spring and early summer, Spiranthes is evident in the local flora only as a basal cluster of elongate, fleshy leaves. It appears that only a subset of the photosynthetic population will produce inflorescences in the

fall. Thus, researchers have access to a large number of plants in the spring, but without the ability to recognize S. parksii, their ability to gather data is limited. In addition, these analyses will help to clarify the taxonomy of S. parksii and its relationship to other members of the genus.

211. Examine variation in leaf structure.

Leaf structure is generally a rather conservative feature and there may be no distinct characteristics separating the different species of Spiranthes. However, this would be the most efficient method for field identification of the non-flowering stage of S. parksii if such features were present, and the possibility should be examined.

212. Compare electrophoretic (macromolecular) variation in samples extracted from leaf tissue.

Prior electrophoretic work (Walters and Wilson, 1982) has demonstrated variation in isozyme patterns among local Spiranthes taxa. However, this work was conducted from floral extracts. Because isozyme variation is under relatively simple genetic control, we can expect a higher probability of locating a specific "marker" for S. parksii with this method. Thus, work with leaf tissue extracts should be pursued.

213. Compare variation in micromolecular (flavonoids, phenolics, and related compounds) constituents of leaf extracts.

Chromatographic separation of methanolic leaf extracts often yields distinctive patterns among vascular plant taxa. This approach could therefore provide the desired "marker" for S. parksii.

214. Conduct root tip chromosome counts.

Chromosome counts will help determine the taxonomic posi- of S. parksii, particularly the questions of its relationship to the S. cernua complex. Sheviak (1982) considers all tetraploids to be S. cernua.

22. Examine phenomena associated with potential for S. parksii propagation and relocation of plants.

Given the level of development in the east-central Texas area, it is reasonable to assume that salvage efforts will come into play. We therefore need to know more about the dynamics of S. parksii manipulation and propagation.

221. Test transplantation methods.

An initital transplantation effort of a few individuals in the fall of 1982 demonstrated that S. parksii can be moved into a new area and survive through the photosynthetic, spring phase of the life cycle. These plants failed to flower in the fall of 1983, but developed leaves in the spring of 1984. Additional experiments of this nature, as required by forced removal due to immediate threats, will

both enhance our ability to work with the plant and allow rough determination of ecological amplitude.

222. Test procedures associated with seed germination and growth of seedlings.

Seeds have been germinated and young plants have been grown in a sterile, tissue-culture medium. Additional work in this area, with a focus on determination of factors required for the establishment of lab-grown seedlings in the natural habitat, will provide enhanced flexibility for future recovery efforts.

223. Determine the extent and nature of fungal association with growth and development of S. parksii.

This factor, possibly of great importance in the life-cycle of S. parksii, is essentially unknown at this time. Further elucidation will require analysis of root anatomy for mycorhizzal association and, possibly, incorporation of potential fungal symbionts in adjusted artificial growth media to test interaction with seeds of S. parksii.

224. Examine the possibility of large-scale propagation from seed.

This is an attractive option for dealing with pressure on natural populations that could come from orchid fanciers.

Availability of artificially propagated material representing this species would lessen the impact of this threat. In addition, dissemination of this type of material would serve, at least to some extent, to extend the distribution of S. parksii into a new, but artificial, habitat. Finally, development of these procedures would provide the foundation for possible recovery of the species through introduction of propagated individuals into new areas.

23. Initiate a long term (5-year) monitoring program for two known populations, preferably at the safe sites.

This is essentially a program that would build from the data base established in item #13. A 5-year accumulation of data would provide needed definitions for factors associated with reproduction biology and ecology which are essentially unknown at this time.

231. Determine microclimatic parameters.

The climate of the S. parksii range is characterized by fairly wide annual fluctuations. Thus, specific data drawn from the study sites should be taken on a multi-year basis. In addition, data taken for other aspects listed in this section will have greater application and relevance if they are supported by microclimatic data.

232. Survey flora specifically associated with populations of S. parksii.

Fluctuation with regard to local species composition through time will provide valuable data concerning the successional position of S. parksii. An annual floristic survey will monitor this fluctuation.

233. Mark all flowering individuals.

This is the only method whereby important life history questions can be approached. What percentage of plants in a given population flower each year? Is the population growing? Do plants reproduce vegetatively by root-shoots? How long does it take a plant to reach reproductive age? What is the life span of an individual plant?

234. Determine parameters associated with reproductive biology.

This will involve determination of pollen vectors, amount of self-pollination, hybridization potential with other, sympatric species of the genus, and general assessment of reproductive potential and genetic structure of population systems.

235. Determine natural threats and assess potential impact.

This will essentially be a "spin-off" aspect from activities associated with those items listed above in this section. Actual damage to plants or potentially negative interactions will be noted and tracked in study populations.

24. Establish and maintain a long term (5-year) survey program to elucidate actual distribution of S. parksii.

Recovery efforts cannot be limited to work with the two largest populations. While this plan focuses on the areas of greatest density of individuals, effort in other areas must be maintained.

241. Monitor known populations other than the safe sites.

Periodic visits, at least once a year during flowering, should be made to those sites known to carry populations or individuals representing S. parksii.

242. Search for new populations.

This activity, limited to a few weeks each October/ November, should be maintained for at least 5 years. Identification of S. parksii requires thorough site survey by individuals that are familiar with the plant. Given the limited amount of time available each year, we can only search a finite amount of potential habitat. Thus, a final determination of distribution and frequency for this species will require a sustained effort.

243. Take data from populations beyond the safe sites to determine comparative value of the general data base.

A critical subset of ecological data included in the safe sites study will be taken from outlier populations of S.

parksii. This will allow an assessment of our ability to generalize from the safe sites' data and also provide a picture of overall ecological amplitude for this species.

3. Develop public awareness, appreciation, and support for protection and recovery of S. parksii.

Work on this plant, to date, would not have been possible without dedicated support from members of the community. All survey teams, approximately 20 people, were manned by volunteers. Other aspects of the recovery/protection effort will require public awareness and support.

31. Establish mechanisms to distribute information and materials associated with recovery efforts.

This will involve basic public relations activities, both at the local and national levels.

32. Establish a local technical interest group to initiate and implement recovery projects.

Such a group, mainly composed of life science faculty and staff at Texas A&M University, has been informally assembled. Several individuals were involved in survey efforts during the fall of 1982 and 1983. Others have indicated a willingness to assist with aspects of the recovery effort that involve their speciality. Success of the recovery effort will require the establishment of such a group.

33. Establish a local public interest group to support and become involved with recovery projects.

As indicated above, a team of interested citizens can significantly expedite the implementation of this plan. In addition, public support in a less direct manner will facilitate many aspects of the work. Every effort should be made to enlist local appreciation and support for recovery activities.

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PART III

IMPLEMENTATION SCHEDULE

Priorities in column four of the implementation schedule are assigned using the following guidelines:

Priority one (1) - Those actions absolutely necessary to prevent extinction of the species.

Priority two (2) - Those actions necessary to maintain the species' current population status.

Priority three (3) - All other actions necessary to provide for full recovery of the species.

Abbreviations used: FWS - USDI Fish and Wildlife Service
SE - Office of Endangered Species
RE - Realty
TNC - The Nature Conservancy

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 & education
2. Law enforcement
3. Regulations
4. Administration

PART III - IMPLEMENTATION SCHEDULE

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK DURATION	RESPONSIBLE AGENCY			FISCAL YEAR COSTS (EST.)*			COMMENTS
					FWS		OTHER	FY 1	FY 2	FY 3	
(1)	(2)	(3)	(4)	(5)	REGION (6)	PROGRAM (6)	(7)	(8)			(9)
A6	Protect land north of Texas International Speedway in Brazos Co., TX.	111	1	ongoing	2	SE RE	TNC				
A6	Protect land near Carlos in Grimes, Co., TX.	112	1	ongoing	2	SE RE	TNC				
M3	Develop a management plan for each safe site.	12	2	1	2	SE			3,000		
M3	Ensure that the safe sites are secure from possible impacts from surrounding area.	13	1	ongoing	2	SE		10,000	5,000	5,000	
I3	Develop a baseline suite of ecological data from the safe sites.	14	2	2	2	SE		5,000	5,000		
R1	Conduct analysis of those characteristics that could allow identification of S. parksii in the vegetative condition.	21	3	2	2	SE		10,000	10,000		

*Costs refer to USFWS expenditures only.

PART III - IMPLEMENTATION SCHEDULE

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK DURATION	RESPONSIBLE AGENCY			FISCAL YEAR COSTS (EST.)*			COMMENTS
					FWS		OTHER	FY 1	FY 2	FY 3	
					REGION	PROGRAM					
(1)	(2)	(3)	(4)	(5)	(6)	(6)	(7)	(8)			(9)
R7	Examine phenomena associated with potential for S. parksii propagation and relocation of plants.	22	3	3	2	SE		5,000	5,000	5,000	
I1 I2 I3	Initiate a long term monitoring program for two safe sites.	23	2	5	2	SE		10,000	10,000	10,000	
I1 R3	Establish and maintain a long term survey program to elucidate actual distribution of S. parksii.	24	3	5	2	SE		5,000	5,000	5,000	
O1	Establish mechanisms to distribute information and materials associated with recovery efforts.	31	3	ongoing	2	SE		3,000	3,000	3,000	
M7	Establish a local technical interest group to initiate and implement recovery projects.	32	3	ongoing	2	SE		5,000	5,000	5,000	

*Costs refer to USFWS expenditures only.

PART III - IMPLEMENTATION SCHEDULE

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK DURATION	RESPONSIBLE AGENCY			FISCAL YEAR COSTS (EST.)			COMMENTS
					FWS		OTHER	FY83	FY84	FY85	
					REGION	PROGRAM					
(1)	(2)	(3)	(4)	(5)	(6)	(6)	(7)	(8)			(9)
M7	Establish a local public interest group to support and become involved with recovery projects.	33	3	ongoing	2	SE		3,000	3,000	3,000	

*Costs refer to USFWS expenditures only.

APPENDIX

LIST OF REVIEWERS

A Technical Review draft was sent out for review on October 18, 1983, and was commented upon by the following people:

Carol M. Natella, Environmental Protection Agency, Ecological Effects Branch
Harold E. Beaty, Texas Plant Recovery Team Leader, Temple, Texas
Regional Director, National Park Service, Southwest Region, Santa Fe, New Mexico
Dr. Elray S. Nixon, S. F. Austin State University, Nacogdoches, Texas
Director, U.S. Fish and Wildlife Service, Washington, D.C.

An Agency Review draft was sent out for review on March 26, 1984, and was commented on by the following people:

Harold E. Beaty, Texas Plant Recovery Team Leader, Temple, Texas
Robert E. Cook, Cornell Plantations, Ithaca, New York
Railroad Commission of Texas, Austin, Texas
U.S. Department of Transportation, Federal Highway Administration, Austin, Texas
Texas Natural Heritage Program, Austin, Texas
Texas Parks and Wildlife Department, Austin, Texas
Texas Department of Water Resources, Austin, Texas
Director, U.S. Fish and Wildlife Service, Washington, D.C.
U.S. Fish and Wildlife Service, Ecological Services Field Office, Fort Worth, Texas
U.S. Environmental Protection Agency, Revion IV, Dallas, Texas

46

IN REPLY REFER TO:

SE

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

MAR 26 1984

End. Sp. R-2	
JOHNSON	
Bowman	
Carley	
Halvorson	
Hoffman	
Kolenski	
~~Longwell~~	
KAYSER	
Hood	
Padilla	
SANCHEZ	
FILE Peggy	

Mr. Charles D. Travis
Executive Director
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

Attn: Nongame Program Director

Dear Mr. Travis:

Enclosed for your review and comments is a copy of the agency review draft recovery plan for Spiranthes parksii.

This review involves agencies and individuals that may be affected by the recovery plan. This plan is a draft and has not yet been approved by the U.S. Fish and Wildlife Service. It was prepared by Service personnel from the technical review draft and from comments by reviewers of that draft. The plan is subject to modification following review and receipt of comments by cooperating agencies and other informed and interested parties.

We would appreciate receiving your comments by May 15, 1984. If you have any questions, please contact Peggy Olwell of the Endangered Species Office at (505) 766-3972.

Thank you for your interest and assistance.

Sincerely yours,

Assistant Regional Director

FWS REG 2
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Enclosure

bc: Mr. Harold Beaty w/enclosure

30 March 1984

A-1 The attached draft recovery plan for Spiranthes parksii has been reviewed. I have made a few suggested editorial changes and additions. It is my feelings that a map (Fig. 5) of the site in Grimes County would be useful. Personally, I find this draft recovery plan is realistic and well-prepared - my personal congratulations to the authors.

Harold E. Beaty
3414 Forest Trail

Leader, TX Plant Recovery

CORNELL PLANTATIONS
The ARBORETUM, BOTANICAL GARDEN, and NATURAL AREAS of CORNELL UNIVERSITY

ONE PLANTATIONS ROAD
ITHACA, NEW YORK 14850
607-256-3020

May 6, 1984

Mr. Daniel James
Acting Recovery Coordinator
Office of Endangered Species
U.S. Fish and Wildlife Service
Washington, D.C. 20240

Dear Mr. James,

I hope you will forgive me for taking so long to write some comments on the Spiranthes parksii recovery plan; spring brings too many things to do in a botanic garden. The recovery plan for Spiranthes is generally very good, and I have only a few comments to add. First, in executing the plan, it will be important to be economical. I don't see how a large system for collecting baseline data is going to be helpful, either on associated flora or microclimate. Exactly how will it tell us anything that will be helpful? Focus on the population biology for now. I do think it will be important to determine the "successional status" of the vegetation (pg 11), but not to be too bound by a rigid concept of "succession". Focus on the scale and frequency of disturbances such as fire, flood, herbivory, etc.

A-2

Second, determining accurate population numbers is essential. Orchids don't always come up every year, and a dormant year may look like an individual is dead. Tracking marked plants over several years is critical. The plan fails to give sufficient details on methods of marking and counting (pg 12, 36). This should be stated clearly for comparison and critique.

A-3

Third, orchid seedlings often form mycorhizal associations and may remain below ground for many years after germination. This area of its biology needs much work. Since seeds can be germinated, seedlings need to be inoculated with native soil from the site of the parent. They might then be sown back into the site, but won't appear as seedlings for several years. This, along with intermittent dormancy of adults below ground, may account for the appearance of "radical population fluctuations" (pg 14) which really have nothing to do with actual changes in population numbers.

A-4

Fourth, the possibility of asexual reproduction by seeds needs verification and development. It could take care of collectors and provide a source of many seedlings for sowing after germination.

A-5

Finally, discovering new populations is always a good idea. Extensive work to examine secondary compounds (pg 33) seems impractical; find some vegetative characters to identify plants with.

A-6

I hope this has been helpful. I sometimes get down to Washington for business; perhaps I'll stop by and say hello. My best wishes to you for spring.

Sincerely,

Robert E. Cook

Robert E. Cook
Director

RAILROAD COMMISSION OF TEXAS

SURFACE MINING AND RECLAMATION DIVISION

J. RANDEL (JERRY) HILL
Director

105 W. RIVERSIDE DRIVE — CAPITOL STATION — P. O. DRAWER 12967 — AUSTIN, TEXAS 78711

April 19, 1984

RE: Review and Comments on Fish and Wildlife Service Agency Review Draft Recovery Plan for Spiranthes parksii

Conrad Sjetland
Assistant Regional Director
Fish and Wildlife Service
Endangered Species Office
P. O. Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Sjetland:

We have reviewed the copy of the agency review draft recovery plan for Spiranthes parksii you sent us. As you know, the colonies of Spiranthes parksii of primary concern to the Railroad Commission are those in Grimes County that are near or within the permit area for the TMPA Gibbons Creek Lignite Mine. A review of our files has shown that there is presently no disturbance planned in the area on the northern boundary of the TMPA permit where a major colony of at least 400 Spiranthes parksii plants was found.

We agree with the plan's recommendations providing for the safety of the Spiranthes parksii. Although we have no problems with the proposed plan, we request the opportunity to review the final draft before the plan is implemented. If I can be of further assistance please give me a call at 512/475-8751.

A-7

Sincerely,

J. Randel (Jerry) Hill
Director

JRH/sg

xc: Bob Markey

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
826 FEDERAL OFFICE BUILDING
AUSTIN, TEXAS 78701

End. Sp. R-2	
JOHNSON	
Bowman	
Carley	
✓ Halverson	
Hoffman	
✓ Sadowski	
Stomkowski	
KAYSER	
Leon	
Ortiz	
SANCHEZ	
FILE Peggy PO	

April 12, 1984

IN REPLY REFER TO
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CL-4-148

Mr. Michael J. Spear
Regional Director
U. S. Department of the Interior
Fish and Wildlife Service
P. O. Box 1306
Albuquerque, NM 87103

Attention: Peggy Olwell

Dear Sir:

We have reviewed the draft recovery plan for Spiranthes parksii in the Bryan, Texas area and have the following comment.

A-8 During the Section 7 consultation for the proposed SH 6 project, the Texas State Department of Highways and Public Transportation agreed to permit use of an approximate seven acre site in the Peach Creek Road interchange area for protection of the Navasota ladies'-tresses. The use of this area will have to be by some form of agreement or permit with that agency.

Sincerely yours,

For: John J. Conrado
Division Administrator

APR 16 1984

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APR 17 '84
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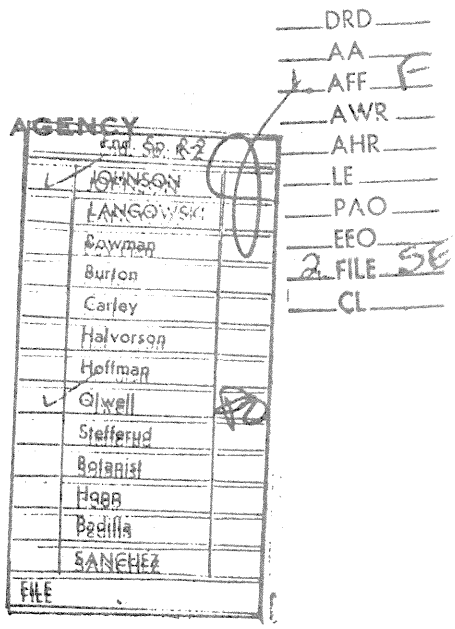
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
INTERFIRST TWO BUILDING. 1201 ELM STREET
DALLAS, TEXAS 75270



May 16, 1984

Mr. Conrad Fjetland
Assistant Regional Director
U.S. Department of Interior
Fish and Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Fjetland:

We have reviewed the draft Recovery Plan for the Navasota Ladies' Tresses, Spiranthes parksii Correll. We believe the plan effort to be comprehensive and technically sound.

We have the following specific comments:

A-9 1. A public awareness program should be carefully considered before initiation to avoid any "backfiring" resulting in increased collecting by the public.

A-10 2. On page 13, the statement on density is difficult to follow. It may possibly be clarified using number of individuals per single unit.

We are very interested in the Recovery Plan as additional lignite mines are proposed to occur in the general area, for which affects would be considered. We would appreciate being informed of any proposed modifications to this plan and status of its adoption. Please call me, Norm Thomas or Jeanene Peckham (FTS-729-9883) at Region 6 on these matters.

Sincerely yours,

Clinton B. Spotts

Clinton B. Spotts
Chief, Federal Activities Branch (6ES-F)

51

TEXAS NATURAL HERITAGE PROGRAM

THE TEXAS NATURE CONSERVANCY

JOHNSON
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General Land Office

Ms. Jackie M. Poole
Botanist

RD
DRD
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2. FILE SE
CL

April 10, 1984

Mr. Conrad Sjetland
Assistant Regional Director
U.S. Fish & Wildlife Service
Post Office Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Sjetland:

I have reviewed the agency review draft recovery plan for Spiranthes parksii, and feel the following comments should be addressed.

A-11 (1) On p. 2, the first sentence in the taxonomy section states that "Spiranthes parksii is unusual . . . in that the taxon has not been altered with regard to rank or circumscription." This hardly seems unusual or unique for a taxon described only 37 years ago, and one with no additional material except the type specimen collected for 31 years. Also Luer (1975)* included, albeit questionably, S. parksii in S. lacera var. gracilis, which would broaden the circumscription.

A-12 (2) On p. 3, still in the taxonomy section, S. parksii is said to be "clearly defined as a taxonomic species." While S. parksii may be defined morphologically by its floral characteristics, its status as a species does not seem as clear. In addition to the Luer reference mentioned above, he also states that "very possibly S. parksii represents an aberrant or polyploid form of var. gracilis, or a non-persisting hybrid of var. gracilis and S. cernua." Sheviak (pers. comm.) thinks that S. parksii is part of the S. cernua complex. In his biosystematic study of the complex, Sheviak (1982) stated that "all tetraploids must be treated as S. cernua." Root tip chromosome counts should be of high priority to rule out the possibility of S. parksii being merely a form of S. cernua.

A-13 (3) On p. 11 in the habitat section, if the phrase "most species of the genus" directly refers to Sheviak's 1982 work, Sheviak was speaking of the S. cernua complex, not the entire genus.

* All references are the same as in the agency review draft.

REG 2 EIVED
APR 16 '84
SE

REC'D
FWS-Region 2
APR 13 1984

AFF

(512) 475-0860
Stephen F. Austin Building 1700 North Congress Austin, Texas 78701

(4) Also on p. 11 in the same section, a "high incidence of endemism" is said to occur in east-central Texas. Although I do not know what "high" is in comparison with, other areas of Texas, such as the Trans-Pecos and the Edwards Plateau have many more endemics. East-central Texas is not noted for a high incidence of endemics (Diamond, pers. comm.; Riskind, pers. comm.; Johnston, pers. comm.).

A-14

(5) On pp. 32 and 33, several methods are proposed to identify S. parksii in the vegetative state. Two of these methods, the flavonoid and electrophoretic work, may not be of much value. Sheviak (1982) states that in the cernua complex "flavonoids have been found to be in such low concentrations that samples cannot be obtained from single individuals as is necessary in the complex populations under study." Thus, leaf extracts may not yield any valuable information. The same may also be true of electrophoretic work. Although isozyme variation is under relatively simple genetic control, the S. cernua complex is a compilospecies (Sheviak 1982), meaning the genes of many related species are incorporated in the complex. Thus, isozyme relationships may vary among individuals of a species as well as among species, and electrophorectic evidence may be inconclusive. Probably the most important work which needs to be done is root tip chromosome counts. Sheviak (1982) gives excellent instructions for preparation and fixation of the root tips. He has done many counts on other species in the S. cernua complex. As I quoted from his work earlier, he considered all tetraploids part of S. cernua. Thus, obtaining a chromosome count is most desirable.

A-15

Although Spiranthes parksii is already listed as endangered, I feel the most important questions are whether S. parksii is part of the cernua complex, and if so, is it just a part of cernua itself. Sheviak (pers. comm.) thought that S. parksii was part of the cernua complex because the seeds of S. parksii are like those of the cernua complex which are unique. Also he felt the wider lateral petals might be a "semi-peloric" condition; that is, tending toward three lip-like structures, rather than the lip narrowing to produce linear-lanceolate lateral petals as in most peloric flowers. He agreed that chromosome counts are essential to determine the status of S. parksii, either as a species or merely part of the highly variable S. cernua.

At this time, I feel that habitats for S. parksii should be preserved either through easements or conservation agreements. Habitat should not be purchased until S. parksii is clearly verified as a distinct species.

A-16

Sincerely,

Jackie M. Poole

Jackie M. Poole

Botanist, Texas Natural Heritage Program

53

TEXAS
PARKS AND WILDLIFE DEPARTMENT
4200 Smith School Road Austin, Texas 78744

✓	JOHNSON
✓	LANGOWSKI
	Bowman
	Burton
	Carley
	Halvorson
	Hoffman
	Olwell
	CHARLES D. TRAVIS Executive Director
	Botanist
	Hopp
	Padilla
	SANCHEZ
	FILE

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FILE
Action
CL-5-230

May 24, 1984

Mr. Michael J. Spear
Director, Region 2
U. S. Fish and Wildlife Service
P. O. Box 1306
Albuquerque, New Mexico 87103

MAY 29 1984

Dear Mike:

This is in response to your letter of March 26, 1984 regarding the agency review draft recovery plan for Spiranthes parksii.

A-17

The plan appears to be adequate, but rearrangement of priorities could place the species in better perspective. Determination of its systematics would seem central to solving the problems of understanding habitat requirements, distribution, presumed population decline, fungal association, and management. In other words, what is it--a distinct species or a variant of one of the Spiranthes cernua complex of species? The answer could easily modify not only major parts of the plan, but possibly negate need for listing. In view of the systematic problems associated with the species, perhaps C. J. Sheviak should have been included as a technical reviewer.

We appreciate the opportunity to review the draft plan. Let us know if we may be of further assistance.

Sincerely,

Charles D. Travis
Executive Director

CDT:FEP:aeh

FWS REG 2
RECEIVED
MAY 30 '84

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR,
FISH AND WILDLIFE SERVICE

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In Reply Refer To:
FWS/OES

MAY 15 1984

RECEIVED
BSF & W-REG. 2
MAY 21 1984
OFFICE OF THE
REGIONAL DIRECTOR

Memorandum

To: Regional Director, Region 2 (ARD/AFF)

From: Acting Associate Director

Subject: Comments on Navasota Ladies'-Tresses Recovery Plan- Agency Draft

We have reviewed the subject plan and provided comments in the margin of the attached plan. We would like to highlight the following comments:

A-18 1. There are numerous references to Dr. Wilson's 1982 and 1983 surveys (which Geyata Ajilvsgi apparently assisted in) but the work is never cited. This should at least be cited as unpublished data.

A-19 2. If collecting is as severe a problem as indicated, Figure 4 should be modified or deleted as it depicts rather specific site locations. Also, the plan should provide a method of dealing with illegal take. If collecting is not a significant problem, then the other populations, especially the one west of Carlos, should be depicted on a map similar to the one used in Figure 4.

A-20 3. As noted in our comments on the technical draft, a portion of Part I is in a narrative format, and a portion is in an expanded outline format. Please revise the format to be consistent throughout Part I.

A-21 4. Much of the discussion in Part I, particularly in the Impacts and Threats section, deals with the Texas International Speedway site. If it is available, we should provide more information on the other sites.

A-22 5. The Impacts and Threats section would benefit from a reorganization of paragraphs and sentences, as noted on page 20.

A-23 6. Will achieving the Primary Objective (establishment and maintenance of two safe sites) allow us to downlist or delist the species? Criteria for consideration of down/delisting should be stated. If downlisting is not feasible, this should also be stated.

A-24 7. Task 1, which calls for the establishment of safe sites, should also call for the development of management plans for each site.

A-25 8. The Narrative for Task 11 should include the development of a Land Protection Plan to determine the best way for the sites to be protected.

A-26 9. The Narrative for Task 123 should discuss the establishment of a buffer zone at the Carlos site, as well as the Speedway site.

A-27 10. We are also enclosing, for your consideration, a copy of a letter dated April 24, 1984, from Jackie Poole of the Texas Natural Heritage Program which addresses several topics germane to the recovery plan.

We hope these comments will assist you in the preparation of the final plan for approval. If you disagree with any of these comments, please provide your rationale in a return memorandum. Upon approval of this plan, please provide the Office of Endangered Species with a copy of the approval page and 30 copies of the printed plan when it is available.

Attachments

James R. Fielding

J. R. Fielding

UNITED STATES GOVERNMENT U.S. FISH & WILDLIFE SERVICE

Memorandum

End. Sp. R-2
JOHNSON
Bowman
Carley
Halverson
Hoffman
Kodoski
Lamowski
KAYSER
Hobb
Padilla
SANCHEZ
FILE

Peggy

TO : Regional Director, FWS, Albuquerque, NM (SE) DATE: April 6, 1984

FROM : Acting Field Supervisor, FWS, Fort Worth, TX (ES)

SUBJECT: Agency Review Draft Recovery Plan - Navasota Ladies'-Tresses (Spiranthes parksii)

We have reviewed the subject document and offer the following comments. We believe Texas A&M University has done an outstanding job in identifying potential impacts and measures needed to protect this endangered species.

Please direct any questions concerning this review to Tom Cloud or Mike McCollum.

David A. Curtis

57

United States Department of the Interior

NATIONAL PARK SERVICE
SOUTHWEST REGION
P.O. Box 728
Santa Fe, New Mexico 87501

IN REPLY REFER TO:

N1621(SWR-ONR)

NOV 4 1983

Memorandum

To: Regional Director, U.S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico
Attention: Dr. Russell Kologiski

From: Regional Director, Southwest Region

Subject: Technical Review Drafts and Federal Register Notice

Thank you for sending us copies of the technical review draft recovery plans for Spiranthes parksii correll, Eriogonum gypsophilum, Sclerocactus mesae-verdae, Callirhoe scabriuscula, Hedeoma todsenii, Echinocereus viridiflorous, Coryphantha minima, and Hedeoma apiculatum. The majority of these species do not occur on National Park Service administered lands and, thus, we have no specific comments to make. Our park observation records at Big Bend National Park do indicate the presence of Echinocereus viridiflorous var. davisii; however, Mr. Heil did not show locations within the park for the plant in his draft recovery plan. Mr. Heil and Mr. Stephen Brack will be researching the distributions of sensitive cactus species in Big Bend this coming summer and their work will detail whether E. v. davisii does, indeed, occur in the park.

Hedeoma apiculatum occurs in Guadalupe Mountains National Park and we have reviewed that draft recovery plan in more detail. In order to prevent any misunderstandings, we feel Dr. Irving might state that various trail developments were already constructed in Guadalupe Mountains before H. apiculatum became officially listed. Additionally, more discussion and agreement needs to be completed in regard to Item #125 of the Step-Down Outline. The question still remains as to who will monitor and analyze data from the plant populations and on what time schedule.

We have no specific comments on the Federal Register (Vol. 48, No. 197: 46086-46088) announcement proposing to list Styrax texana as an endangered species.

FWS REG 2
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NOV 7 '83
SE

cc:
Superintendent, Carlsbad Caverns/Guadalupe Mountains
Superintendent, Big Bend

58

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

TEXAS WATER DEVELOPMENT BOARD
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Charles E. Nemir
Executive Director

TEXAS WATER COMMISSION
Paul Hopkins, Chairman
Lee B. M. Biggart
Ralph Roming

April 17, 1984

Regional Director
U.S. Department of the Interior
Fish and Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103

Dear Sir:

Re: Draft Recovery Plan for Spiranthes parksii

We appreciate the opportunity provided to the Department for review of the draft Recovery Plan for the Navasota Ladies' Tresses (Spiranthes parksii Correll). Staff members of our Environmental Studies Unit, Planning and Development Division, have reviewed the report and offer the following comments for your consideration.

As the State's principle water resource agency, the Department of Water Resources is charged with the responsibilities for water quality protection, water conservation and supply, flood protection, and other water-related needs. A major part of that responsibility involves the planning and development of surface water reservoirs to meet the growing needs and to supplement current use of the State's ground-water supplies. Optimal sites for major surface-water reservoirs in the State of Texas are extremely limited due to engineering, economic, environmental, and water availability constraints. The authorized Millican Reservoir Project, originally sited on the Navasota River adjacent to the City of Millican, faces just such a dilemma from these constraints. Recent efforts have been made by the U.S. Corps of Engineers District Office to select an alternative site which would protect the economically valuable lignite deposits located in the Brazos-Grimes County area and

to protect the two populations of the Navasota Ladies' Tresses identified in the 1979 field survey. With the most recent survey (1983), the known population for the plant has risen from 20 individuals in two populations to 1,816 individuals at 24 sites in four counties of east-central Texas. Because of the paucity of information and characteristics of the Navasota River basin in the area of the proposed project, it is possible that the authorized reservoir could impact some yet undiscovered populations of the plant. It is unlikely, however, that any of the proposed alternative reservoir sites would have any impact on the two Ladies' Tresses populations identified near Carlos, Texas, and the Texas International Speedway, respectively.

A-28

We concur with recommendations to gather additional information to better understand the life history of this species.

Thank you for the opportunity of providing comment on the above referenced recovery plan. If I can be of further assistance to you or you should require additional information, please advise.

Sincerely,

Seth Burnett for

Charles E. Nemir
Executive Director

RESPONSES TO COMMENTS ON AGENCY REVIEW DRAFT

A-1 Appropriate changes were made.

A-2 The Service agrees that economy is a consideration in recovery plan implementation, and that population biology should receive top priority for research on S. parksii. However, the area occupied by this species is small enough that a thorough study of many aspects of each safe site is feasible.

A-3 Methods for marking individual plants, and for census in connection with such marking, has not yet been worked out. The recovery plan provides overall guidance for actions and goals needed for the species' recovery, but is not intended to be a manual of methods and techniques to be used in the actual work. Monitoring, research, and census techniques will be worked out later and will use up-to-date procedures administered by reputable botanists.

A-4 This is covered under recovery item 22.

A-5 This is covered under recovery item 22.

A-6 Finding vegetative characters with which to identify non-flowering S. parksii is highly desirable, but may not be possible. Thus, other methods should also be pursued.

A-7 Standard procedure for recovery plan review includes a technical review followed by revision, and then an agency review followed by additional revision. The plan is then issued as final. Additional review by interested agencies and persons may be done if major revisions are made following agency review. This plan received only minor revisions, primarily non-substantive, and additional review would entail unnecessary delay in issuing the plan.

A-8 Negotiation of such an agreement or permit is a part of recovery item 11.

A-9 Care will be exercised in developing public awareness. Such awareness can help to protect the plants from collectors.

A-10 Suggestion was incorporated.

A-11 Information noted.

A-12 The Service realizes that there are varying opinions in the botanical community on the taxonomic position of S. parksii. The technical draft of this plan contained a more lengthy taxonomic discussion. Comments received on that draft indicated that such involved

taxonomic discussion was not relevant to a recovery plan. The exact position of S. parksii in the genus is important to this recovery plan only insofar as it pertains to whether or not S. parksii is a valid and distinct species. The suggested chromosome counts will help to clarify this problem, and this item has been added to the plan.

A-13 Suggestion was incorporated.

A-14 Suggestion was incorporated.

A-15 Chromosome counts have been incorporated into the plan. Electrophoretic and flavenoid work are also included as valid possibilities for solving taxonomic and identification problems.

A-16 The Service agrees that easement or some form of cooperative agreement are a more desirable method for protection of S. parksii habitat than outright purchase. This is set forth in item II.

A-17 See response to A.12.

A-18 Suggestion was incorporated.

A-19 Suggestion was incorporated.

A-20 Suggestion was incorporated.

A-21 The information available on the Grimes County site is sparse. Information known about threats to that population is presented.

A-22 Suggestion was incorporated.

A-23 Downlisting and delisting criteria were added.

A-24 Suggestion was incorporated.

A-25 Suggestion was incorporated.

A-26 Suggestion was incorporated.

A-27 The Texas Natural Heritage comments are addressed under responses A-11 to A-12.

A-28 Noted.