

Western Prairie Fringed Orchid Recovery Plan

(Platanthera praeclara)



Department of the Interior
United States Fish & Wildlife Service



PLATANHERA PRAECLARA (WESTERN PRAIRIE FRINGED ORCHID)

RECOVERY PLAN

Prepared in consultation with
THE WESTERN PRAIRIE FRINGED ORCHID RECOVERY TEAM

Dr. Craig Freeman, Team Member
Kansas Biological Survey
Natural Heritage Inventory
Lawrence, Kansas

Dr. Llewellyn Manske, Team Member
North Dakota State University
Range Science Department
Dickinson, North Dakota

Mr. Joe Milton, Jr., Team Member
Sheyenne Valley Grazing Association
McLeod, North Dakota

Mr. Larry Potts, Team Member
U.S. Forest Service
Sheyenne National Grassland
Lisbon, North Dakota

Dr. Carolyn Hull Sieg, Team Member
U.S. Forest Service
Rocky Mountain Forest and Range Experiment Station
South Dakota School of Mines
Rapid City, South Dakota

Edited by
Ms. Nancy Sather, Team Leader
Minnesota Department of Natural Resources
Natural Heritage Program
St. Paul, Minnesota
for
Region 3
U.S. Fish and Wildlife Service
Ft. Snelling, Minnesota

Approved:


Regional Director, U.S. Fish and Wildlife Service

Date:

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EXECUTIVE SUMMARY

Current Status: *Platanthera praeclara* (western prairie fringed orchid), classified as threatened under the Endangered Species Act of 1973, as amended, is a terrestrial orchid currently known to occur at 175 sites in 8 ecoregions, including 41 counties of 6 states and 1 population complex in Manitoba. Approximately 90 percent of known western prairie fringed orchids in the United States occur in the Red River Valley of North Dakota and Minnesota (ecoregion 251A). Populations in the southern portion of the range account for a mere 3 percent of known plants. The species is apparently absent from both Oklahoma and South Dakota. Table 3 summarizes population sizes, ownership, protection status, and management. This table reflects peak numbers of plants recorded at each site between 1970 and 1994.

Habitat Requirements and Limiting Factors: Preferred habitat is unplowed, calcareous prairies and sedge meadows; plants have also been observed in successional communities such as borrow pits, old fields, and roadside ditches. The major historical cause of the species' decline was conversion of habitat to cropland. Hydrologic changes that draw down or contaminate the water table may also adversely affect the species. Other land management practices such as burning, grazing, and mowing may affect the species depending on their timing, frequency and intensity. However, some disturbance may be important for establishment.

Recovery Objective: Delist.

Recovery Criteria: *Platanthera praeclara* will be considered for delisting when sites that include occupied habitat harboring 90 percent of plants in each ecoregion are protected at protection codes 4 through 9 (public ownership or higher level of protection), and managed in accordance with a Service-approved management plan or guidelines. This plan must assure implementation of management practices that provide the range and spatial distribution of successional and hydrologic regimes required to maintain the species and its pollinators in self-sustaining, naturally occurring populations, and must remain in effect following delisting.

Implementation of these criteria is further clarified in the Strategy of Recovery section at the end of the introduction.

Actions Needed:

1. Maintain habitat of known populations as native prairie.
2. Provide the highest level of state legal protection appropriate for all populations.
3. Develop and implement habitat management plans that sustain and enhance *P. praeclara* populations.
4. Conduct appropriate research and monitoring.
5. Identify and search potential habitat.
6. Disseminate information about the species to a variety of audiences.

Cost of Recovery (000's):

Year	Need 1	Need 2	Need 3	Need 4	Need 5	Need 6	Total
1996	300	3	60	100	30	5	498
1997	300	5	60	100	30	5	500
1998	300	5	60	100	30	5	500
1999	300	5	60	100	30	5	500
2000	0	5	60	100	20	5	190
2001	0	5	60	80	20	0	165
2002	0	0	60	80	20	0	160
2003	0	0	60	80	10	0	150
2004	0	0	60	80	10	0	150
2005	0	0	60	80	10	0	150
Total	1,200	28	600	900	210	25	2,963

Date of Recovery: If needed recovery actions are implemented and recovery criteria have been met, the species could be delisted by the year 2005.

I. INTRODUCTION

A. Description

Platanthera praeclara Sheviak and Bowles (western prairie fringed orchid) is a terrestrial member of the Orchidaceae (orchid family). The species was proposed as a threatened species under the Endangered Species Act of 1973, as amended (Act), by the U.S. Fish and Wildlife Service (Service) (USFWS 1988) and listed as such on September 28, 1989 (USFWS 1989).

Platanthera, included in the genus *Habenaria* by some taxonomists, comprises approximately 200 species of temperate and tropical North Africa, North America, Central America, and Eurasia (Airy Shaw 1973, Luer 1975). There are 24 species, 36 taxa, and 5 named hybrids of *Platanthera* in North America, north of Mexico (Luer 1975). *Platanthera praeclara* was described in 1986 from material collected by M.L. Bowles on the Sheyenne National Grassland in Ransom County, North Dakota (Sheviak and Bowles 1986). Previously, the species was included in a broader taxonomic concept of *P. leucophaea*.

Platanthera praeclara, a smooth, erect, perennial herb grows to 1.2 meters (m) [4 feet (ft)] tall (Figure 1). Plants have two to five fairly thick, elongate, hairless leaves each. The open, spike-like flowering stalk bears up to 24 showy, 2.5 centimeters (cm) [1-inch (in)] wide, white flowers. The lower petal of each flower is deeply 3-lobed and fringed, hence the common name. The seedpods, which contain many tiny seeds, are about 2.5 cm (1 in) long and tapered on both ends (Sheviak and Bowles 1986).

Described in technical terms (Sheviak and Bowles 1986), *P. praeclara* is a erect, stout, herbaceous perennial, usually 30 to 85 cm (12 to 34 in) tall, sometimes ranging from 20 to 120 cm (8 to 47 in) tall. The plant typically has numerous coarse, fleshy roots arising from a fleshy tuber. Each plant usually has a single, glabrous, unbranched, and barely angled stem bearing two to five oblong-elliptic to lanceolate, keeled, glabrous leaves. Leaves are usually 7 to 15 cm (3 to 5.9 in), sometimes up to 26 cm (10.2 in), long and 1 to 4 cm (0.4 to 1.6 in), sometimes up to 5 cm (2 in) wide.

The inflorescence, a showy raceme of 5 to 25 flowers, is 5 to 22 cm (2 to 8.7 in) long, 4 to 7 cm (2 to 3 in), sometimes up to 10 cm (4 in) in diameter, with lanceolate, acuminate bracts 1.5 to 4 cm (0.6 to 1.6 in) long and 0.4 to 0.7 cm (0.2 to 0.3 in) wide. The flowers are creamy white to white or rarely greenish white and have a perianth which is directed forward and forms a hood over the column. The dorsal sepal is ovate to suborbiculate, concave, 9 to 13 millimeters (mm) (0.4 to 0.5 in) long, and 5 to 8 mm (0.2 to 0.3 in) wide. The lateral sepals are obliquely-obovate, asymmetrical, 7 to 14 mm (0.3 to 0.6 in) long, and 5 to 10 mm (0.2 to 0.4 in) wide. The lateral petals are cuneate to flabelliform, rounded to truncate, 9 to 16.5 mm (0.4 to 0.6 in) long, and 6.5 to 13.5 mm (0.3 to 0.5 in) wide, with lacerate distal margins. The lip (lower petal) is deeply 3-lobed, sometimes as short as 1.7 cm (0.7 in) long, but usually 2 to 3.2 cm (0.8 to 1.3 in) long, 2 to 3.9 cm (0.8 to 1.5 in) wide, fringed, and bears a slender, arcuate, clavate, 4 to 5.5 cm (1.6 to 2.2 in) long, sometimes as short as 2 cm (0.8 in) long, spur. The ellipsoid capsule is 2 to 2.5 cm (0.8

to 1.0 in) long and 4 to 6 mm (about 0.2 in) in diameter and releases minute seeds through slits in the mature seedpods.

Throughout its range, flowering specimens of *P. praeclara* are most likely to be confused with *P. leucophaea* (eastern prairie fringed orchid) or with *P. lacera* (ragged fringed orchid) (Table 1). All three species inhabit tallgrass prairie communities in at least a portion of their ranges.

Platanthera leucophaea and *P. praeclara*, a species pair similar in gross morphology, can be distinguished by flower color, fragrance, and size; column structure; petal shape; and sepal width. The lateral lobes of the lip of *P. praeclara* are often, but not always, narrower than those of *P. leucophaea*. The basic distinguishing characteristics of *P. praeclara* are its slightly larger flowers and less elongated inflorescence. In addition, there are other differences in more technical characteristics (Sheviak and Bowles 1986), including a significant difference in anther morphology. *Platanthera praeclara* has divergent anther sacs with viscidia widely spaced to place pollinia on the compound eyes of moths, while in *P. leucophaea* (and the similar, but less closely-related *P. lacera*), anther sacs are parallel with viscidia in position to attach to the tongue of moths.

Although a preliminary examination of genetic variation between *P. praeclara* and *P. leucophaea* did not allow Pleasants and Klier (1995) to distinguish the two species by examining allozymes, the positions of the pollinaria and stigmata on the two species preclude cross pollination (Sheviak and Bowles 1986).

Platanthera praeclara is known to occur only west of the Mississippi River, whereas *P. leucophaea* occurs both east and west of the Mississippi. *Platanthera leucophaea* populations west of the Mississippi River include the historical type locality in Oklahoma (Sheviak and Bowles 1986), two historical and two extant populations in Iowa (Roosa *et al.* 1989), six suggested historical populations in eastern Missouri (Morgan 1980), and one historical population in eastern Nebraska (Sheviak and Bowles 1986). Despite the fact that *P. leucophaea* occurs west of the Mississippi River, there are no known locations where the two species coexist.

Platanthera praeclara and *P. lacera* both occur in southeastern Kansas, southern Missouri, northern Minnesota (Luer 1975), and southeastern Manitoba (White and Johnson 1980). The two species inhabit physiognomically similar habitats, but there are no reports of the two species co-occurring at the same site. *Platanthera lacera* is distinguished by its more dense inflorescence, which bear more numerous, smaller, greenish white flowers (Great Plains Flora Association 1986). Bowles and Duxbury (1986) suggest the species usually grows in soils more acidic than the soils of *P. praeclara* (Table 1).

B. Distribution

Published accounts and herbarium records suggest *P. praeclara* was widespread and perhaps locally common prior to European settlement (Bowles and Duxbury 1986). Historically, Brownell (1984) and Lobeck (1957) suggest western prairie fringed orchid was distributed throughout much of the western Central Lowlands and eastern Great Plains physiographic provinces of the central United States and Interior Plains in extreme south-central Canada. Historical observations or collections (last observed prior to 1970 and/or confirmed destroyed) are known from 81 counties in 8 states. Comparison of the historical and extant ranges shows the species apparently has been lost from South Dakota and Oklahoma, with significant reductions in counties of occurrence in Iowa, southeastern Kansas, Missouri, and eastern Nebraska. A single collection reported from Wyoming (Bowles 1983, Sheviak and Bowles 1986) is of dubious origin (Bjugstad and Fortune 1989) and is excluded from the following discussions.

Historically known locations are summarized in Table 2 and extant population in Table 3. Comparison of these tables reveals that, although the species is no longer known to occur in nearly 75 percent of counties where it was historically documented, populations have been found in an additional 28 counties since 1970. Recent discovery of the orchid in these counties is probably not the result of expansion of the species range, but of increased interest in the species arising from its listing as a federally-threatened species. Because intensive searches have concentrated first in historic locations, it is less likely new populations will be discovered in counties from which it has been lost.

Two phases of decline are hypothesized to have occurred: The first occurred in the latter half of the nineteenth century when there was rapid conversion of prairie to agricultural use and the second, which continues today, as hay meadows and pasture are converted to cultivation, (Bowles and Duxbury 1986).

Extant populations of *P. praeclara* reportedly occur in 41 counties in 6 states and 8 ecoregions (Figures 2 and 3). County distribution is as follows: Iowa (15 counties), Kansas (7 counties), Minnesota (9 counties), Missouri (3 counties), Nebraska (5 counties), North Dakota (2 counties), and Manitoba, Canada. Status surveys have been conducted, and information about the species summarized for the entire range (Bowles 1983), the Great Plains (Bowles and Duxbury 1986), central Great Plains (Freeman and Brooks 1989), Iowa (Watson 1983, 1994), Kansas (Magrath 1972), Minnesota (Sather 1991, Smith 1981), Missouri (Morgan 1980), Oklahoma (Watson 1989), Sheyenne National Grassland (Bjugstad and Fortune 1989, Hansen *et al.* 1994, Sieg and Bjugstad 1994, Wolken 1995, Sieg and King 1995), and Canada (Brownell 1984, Collicutt 1992, Davis 1995).

Table 3 summarizes the following information about each known extant population of *P. praeclara*: county, site name, ecoregion, highest number of flowering plants recorded between 1970 and 1994, dates of first and last observations (with population size in parentheses if known), ownership, protection status, present management, and monitoring status. The state-by-state

distribution of populations among ecoregions, management, and ownership are displayed in Figures 3, 4, and 5, respectively.

Three conceptual metapopulations, each with several populations totaling 3,000 or more plants, are suggested for the northern part of the range: the Pembina Trail prairie complex of Minnesota (Sather 1991), the Sheyenne Delta (North Dakota), and Vita Prairies (Manitoba, Canada). All three metapopulations lie in ecoregion 251A, the Red River Valley Section of the Prairie Parkland Province (Bailey *et al* 1994). These metapopulations are dynamic groupings of populations within which it is very likely that cross-pollination occurs. Although there is a reasonable probability of independent local population extinctions, independent colonizations may also occur, allowing the metapopulation to persist. In addition to these conceptual metapopulations, there are 3 population complexes in which several populations lie within a 5-6 square mile area and total between 100 and 1,000 plants. These populations are located in ecoregion 251A in Kittson and Clay Counties, Minnesota, and in ecoregion 332C in Cherry County, Nebraska (Bray and Wilson 1993, Nebraska Game and Parks Commission 1995). The remaining populations are either isolated, small or both. No population in Kansas or Missouri is known to contain more than 50 individuals.

C. Habitat

1. Ecoregions and Soils

Bailey *et al.* (1994) produced a map of the ecological provinces and province sections of the United States based on the U.S. Forest Service National Hierarchical Framework (ECOMAP 1993). These provinces and sections are frequently referred to as "ecoregions; provinces are identified by a 3-number descriptor and sections are identified by a 3-number descriptor with capitol letter suffix. Provinces are characterized by geologic, edaphic, aquatic, and vegetative variables; sections are characterized by regional climate, geomorphic process, stratigraphy, geologic origin, topography, drainage networks, and potential natural vegetation.

Platanthera praeclara is a perennial orchid of the North American tallgrass prairie and is found most often on unplowed, calcareous prairies and sedge meadows. Its occurrence has also been suggested at disturbed sites in successional communities, such as borrow pits, old fields, and roadside ditches (Freeman and Brooks 1989, Minnesota Department of Natural Resources 1979 to present, Nebraska Games and Parks Commission 1987 to present).

Surveys suggest the largest known populations of *P. praeclara* occur in ecoregion 251A, the Red River Valley Section of the Prairie Parkland Province (Bailey *et al* 1994) in eastern North Dakota (North Dakota Parks and Recreation Department 1995, Hansen *et al.* 1994), northwest Minnesota (Minnesota Department of Natural Resources 1995), and southeastern Manitoba (Catling and Brownell 1987, Collicutt 1992, Davis 1995) (Figures 2 and 3). In North Dakota, *P. praeclara* most frequently occurs in the sedge meadow community on the Glacial Sheyenne Delta (Bjugstad and Fortune 1989) and also in the tallgrass prairie community classified as Midland

Grassland habitat type (Manske and Barker 1988). This delta is a periglacial feature of Wisconsinan age formed when meltwater from the glacial Sheyenne River emptied into glacial Lake Agassiz, depositing clay, gravel, and sand. Soils of the area are Calciaquolls (calcium rich wet prairie soils), Haploquolls (wet prairie soils with minimum horizon development), and Haploborolls (cool prairie soils with minimum horizon development) (USDA 1975). On the Sheyenne National Grassland, soils supporting orchids include not only Mollisols (mostly Endoaquolls and Haploborolls), but also, suggests Wolken (1995), Entisols and a few Inceptisols. A nearly impervious layer of lake sediments below the delta formation results in a perched water table in the area (Bjugstad and Fortune 1989).

In Polk County, Minnesota, most populations and subpopulations in the Pembina Trail prairie complex lie on a lacustrine plain between two well developed beachlines of Glacial Lake Agassiz. A detailed soil survey of the county has not been completed, but general soils maps of the area show *P. praeclara* populations are associated with poorly drained to moderately well-drained, nearly level to gently sloping soils formed on loamy and clayey glacial till (University of Minnesota 1980). A preliminary soil survey of the Pembina Trail Preserve indicates the greatest concentrations of the species occur on nearly level Haploquolls (wet soils with minimum horizon development) (USDA 1974).

Farther north, in Kittson County, Minnesota, the beach ridges of Glacial Lake Agassiz are broken into discontinuous remnants with less clearly defined interbeach areas. The northernmost United States population occurs on sandy over loamy, poorly drained dark soils in an undifferentiated complex of Haplaquents (azonal wet soils with minimum horizon development) and Calciaquolls (calcium rich wet soils) in the interbeach area (USDA 1979).

In Manitoba, the species occurs in a lake terrace area where the nearly indistinguishable beach ridges are replaced by reworked till with coarse boulder layers. The complex soils of this region developed when the ice sheet of the last glaciation formed the eastern boundary of Lake Agassiz. Collicutt (1992) and Ehrlich *et al.* (1953) suggest *P. praeclara* populations occur in wet prairie to meadow vegetation developed on poorly drained grey wooded soils (Alfisols) with a thin sandy mantle overlying stony calcareous reworked till.

Populations in glaciated Iowa (Iowa Department of Natural Resources 1995), southwestern Minnesota (Minnesota Department of Natural Resources 1995) and northeast Nebraska (Nebraska Game and Parks Commission 1995) occur in ecoregion 251B, the North Central Glaciated Plains Section of the Prairie Parkland Province. Those in northeastern Kansas, northwestern Missouri, eastern Nebraska and southern Iowa occur in ecoregion 251C, the Central Dissected Till Plains Section of the Prairie Parkland Province. Populations in southeastern Minnesota and northeastern Iowa occur in ecoregion 222M, the Minnesota and Northeast Iowa Morainal Oak Savannah Section of the Eastern Broadleaf Forest Province (Bailey *et al.* 1994). The suggested habitat in these areas are wet-mesic to mesic tallgrass prairie on Kansan- or Wisconsin-age drift (Freeman and Brooks 1989). Post-glacial erosion has removed the drift in many areas, exposing Pennsylvanian to Cretaceous age sediments. The soils in these areas are

usually Udolls or Udic Ustolls (humid to intermittently dry mollisols, or prairie soils) on gentle to moderate slopes (USDA 1975).

Populations in eastern Kansas (Kansas Department of Wildlife and Parks 1995) south of the Kansas River occur in ecoregion 251E, the Osage Plains Section of the Prairie Parkland Province (Bailey *et al* 1994). In this area, *P. praeclara* is found in mesic to wet-mesic upland prairies on unglaciated, level to hilly, Pennsylvanian-age sediments covered with a thin, discontinuous mantle of loess residuum. Freeman and Brooks (1989) suggest the species also occurred historically on wet-mesic prairies along the floodplains of several major rivers.

In north-central Nebraska, *P. praeclara* occurs in ecoregion 332C, the Great Plains Steppe Province, Nebraska Sandhills Section (Bailey *et al* 1994, Nebraska Game and Parks Commission 1995). The sandhills are wind-borne dunes of late Pleistocene age (Flint 1971). Soils in the Nebraska Sand Hills are Ustipsamments (poorly developed sandy soils of warm climates) that tend to be slightly acidic to circumneutral and on gentle or moderate slopes (USDA 1975). Plants typically grow on tallgrass prairies or sedge meadows in swales among the dunes. In eastern Nebraska, the species also occurs in ecoregion 251G, the Central Loess Plains Section of the Prairie Parkland Province and ecoregion 332E, South Central Great Plains Section of the Great Plains Steppe Province (Bailey *et al* 1994). In this area of the state, the orchid's habitat is on wet-mesic prairies and sedge meadows along the floodplain of the Platte River. Many of these habitats are similar in that they are subirrigated by near-surface groundwater, which provides a reliable source of water (Nagel and Kolstad 1987, Tolstead 1942).

2. Associated Species

Platanthera praeclara occurs in several kinds of fire- and grazing-adapted communities dominated by species of Poaceae (grass family). Table 4 generalizes the communities within which the species is found for each state and province of occurrence. Table 5 summarizes associated species from a variety of sites for which data are available. Data are derived from several types of sources, including quantitative data from orchid habitat and species lists for entire tracts. Because the latter data are from a wider area, the degree to which they reflect the microhabitats in which *P. praeclara* occurs is unknown.

Tallgrass prairies within which the orchid occurs are usually dominated by *Andropogon gerardii* (big bluestem), *A. scoparius* (little bluestem), and *Sorghastrum nutans* (Indiangrass), with *Deschampsia caespitosa* (tufted hairgrass) and *Panicum virgatum* (switchgrass) common associates in wetter sites. These prairies generally support a great variety of annual and perennial forbs and grasses with few shrubs unless fire or grazing is suppressed. *Platanthera praeclara* generally occurs within the wetter facies of such prairies or in associated sedge meadows.

Sedge meadows occur in seasonally hydric to wet-mesic conditions and are dominated by perennial taxa of the Cyperaceae (sedge family), especially *Carex* spp. (sedges) and *Eleocharis* spp. (spikerushes). A variety of annual and perennial grasses and forbs also occurs in this

community type, with shrubs becoming increasingly prevalent northward. For example, *Poa pratensis*, *Carex lanuginosa*, *Juncus balticus*, *Salix exigua*, and *Salix bebbiana* were the dominant species in 16 swales supporting the species on the Sheyenne National Grasslands (Sieg and Bjugstad 1994). However, in this area orchid density was most highly correlated with canopy cover of *Calamagrostis stricta* (Sieg and King 1995). Wolken (1995) compared 19 swales that supported orchids with 19 swales devoid of orchids on the Sheyenne National Grassland and suggested the plant canopy cover of baltic *Juncus balticus*, *Stachys palustris*, and *Carex* spp. was higher in orchid swales than in swales without orchids.

D. Biology

Root systems of the genus *Platanthera*, including the herbaceous perennial *P. praeclara*, are fusiform tubers that regenerate during the growing season by forming a new tuber and a perennating bud, which gives rise to vegetative shoots the following season. This is the major mode of perpetuation of established populations. Various investigators suggest these plants may, infrequently, form multiple buds and tubers that may become isolated from the parent plant (Bowles 1983, Bowles and Duxbury 1986, Currah *et al.* 1990). Sieg and King (1995) documented the presence of double and triple ramets arising from individual plants on the Sheyenne National Grassland. Wolken (1995) verified the occurrence of multiple ramets and tubers from a single plant by excavation. Vegetative shoots develop from a perennating bud and emerge from the soil in the late spring after a period of soil warming, which usually occurs from mid-April in the South to late May in the North (Pleasants 1995a). Two months of vegetative growth may pass before an inflorescence will fully develop on a flowering plant. Studies suggest it is also common for *P. praeclara* to remain vegetative throughout the entire growing season (Sieg and King 1995, Sather and Smith 1994). Plants that remain vegetative throughout the growing season are shorter and usually have one to three leaves (Sieg and King 1995).

Researchers (Bowles 1983, Bowles and Duxbury 1986) have suggested sexual reproduction is the principal means of recruitment of new individuals into populations. Bowles (1983) believes formation of floral primordia in *P. praeclara* is initiated in the perennating bud the season prior to anthesis, as in *P. leucophaea*. Research by Bowles (1983) and Bowles and Duxbury (1986) suggests blooming in *P. praeclara* is stimulated by burning. Circumstantial evidence suggests flowering at the Platte River Trust's Mormon Island Crane Meadows near Grand Island, Nebraska, responds to high flows and concomitant soil saturation along the Platte River (Platte River Trust 1995). Density of flowering orchids in 1993 on the Sheyenne National Grassland was positively correlated with the surface soil moisture both that year and the previous year (Sieg and King 1995). Pleasants (1995a) also found flowering in a particular year appears to be stimulated by above average precipitation the previous year. Both *P. leucophaea* and *P. praeclara* produce indeterminate inflorescence with showy flowers. Plants bloom from mid-June in the southern portion of the range to late July in the northern portion. Individual flowers last up to 10 days, and inflorescence produce flowers for up to 3 weeks.

Pollination is required for seed production in *P. praeclara*. Pleasants (1994) suggested pollinator activity levels, as measured by pollinia removal rates, and fruit set were correlated over three years in two study areas. Pleasants and Moe (1993) found hand-pollinated plants to be self fertile. The relative proportion of selfed and outcrossed progeny within any given population has not been investigated. Both *P. leucophaea* and *P. praeclara* have evolved outcrossing pollination systems (Sheviak and Bowles 1986). The white flowers lack nectar guides, bear long nectariferous spurs, and are fragrant at night, a suite of features typical of sphingophyllous (sphinx moth-pollinated) plants. Sheviak and Bowles (1986) suggest the column of *P. praeclara* is adapted to deposit pollinia on the compound eyes of appropriate pollinators. Using a limited number of museum specimens, Sheviak and Bowles (1986) identified four common prairie hawkmoths as potential pollinators of *P. praeclara*: *Eumorpha achemon*, *Hyles lineata*, *Sphinx drupiferatum*, and *S. kalmiae*. Pleasants and Moe (1993) identified three additional potential pollinators: *Catacola* sp., *Ceratomia undulosa*, and *Hyles galli*. Efforts to identify putative pollinators in 1990 at Tarkio Prairie in Missouri were unsuccessful because, as suggested by Ashley (1990) plants failed to bloom. The most definitive data for pollen vectors of *P. praeclara* are from the Sheyenne National Grasslands, where Cuthrell and Rider (1993) suggest individuals of *Eumorpha achemon* and *Sphinx drupiferatum* carried pollinia in 1993 and 1992, respectively. Hawkmoths are capable of flying great distances, for example, hawkmoth species considered strictly southern in distribution are frequently collected in more northerly latitudes. At present, pollinator densities are unknown and the ratio of local and in-migrant pollinators at any given site remains unexamined. It is also important to note the dependence of the orchid on hawkmoths is not reciprocal. Although the orchid depends on hawkmoths for pollination, adult hawkmoths can apparently feed from a number of non-orchid nectar sources, thus having the ability to sustain their populations before and after orchid anthesis, or during years of low orchid flowering (Cuthrell, personal communication). It is not known at the present time whether these alternative nectar sources are all native plants or whether the moths have also adapted to use introduced species.

Bowles and Duxbury (1986) suggest seeds mature on the plant and are released in early fall, the capsules opening at the onset of dormancy. A single capsule may produce thousands of seeds. Therefore, under ideal circumstances for germination and survivorship, the reproductive potential of a small population could be very large. Seeds are wind-dispersed and may also be adapted for dissemination through the soil profile by water (Bowles 1983). Orchid seeds are extremely small, and each bears a minute, morphologically undifferentiated embryo that often consists of only a few cells (Cronquist 1981). Orchid seeds contain very limited food reserves and exhibit limited development (Harley and Smith 1983). Continued growth of the seedling in natural conditions requires association with a compatible soil-inhabiting mycorrhizal fungus, as suggested by Bowles and Duxbury (1986), Cronquist (1981), and Currah *et al.* (1990). After infection with this symbiont fungus, orchids may persist in an underground saprophytic stage until or beyond the second year before the first green foliage leaves appear (Harley 1969). Seedling establishment may also be linked to the availability of suitable microhabitats, edaphic factors controlling soil mycorrhizae, and interspecific competition.

Orchid ecology is probably closely linked with edaphic factors controlling mycorrhizal fungi (Sheviak 1974). Bowles (1983) and Bowles and Duxbury (1986) suggest the formation of a symbiotic mycorrhizal association between the seedling and soil fungus probably is required for *P. praeclara* seedling establishment and is believed to continue as the plant matures. It has been hypothesized that annual tuber regeneration requires reinfection by mycorrhizae, dependent on appropriate ecological conditions for the mycorrhizae (Sheviak 1974). A counter-hypothesis suggests, that although mycorrhizae are necessary for germination, they may be killed by the plants as they mature (From 1995). A number of endophytic fungi have been isolated from roots of species of *Platanthera* (Currah *et al.* 1990), including members of the genus *Rhizoctonia* (Bjugstad-Porter 1993), the newly-described species *Ceratorhiza pernacatena* (Zelmer and Currah 1994), and *Epulorhiza* spp. (Zelmer 1994).

Reproductive success, survivorship, and mortality may be limited at several stages in the life cycle of *P. praeclara*. Although the orchid is reportedly long-lived (Sheviak and Bowles 1986), more recent published and unpublished data from demographic studies from various parts of the range suggest longevity varies geographically depending on soil moisture and other factors (Sieg and Bjugstad 1994, Sather and Smith 1994, Johnson 1994, Pleasants 1995b, Sieg and King 1995, Fritz personal communication 1995). On the Sheyenne National Grassland, published demographic data indicate the orchid could have a half life as short as one to three years (Sieg and King 1995). Most plants observed over a 7-year period that included both droughty conditions and flooding in this study area were present aboveground less than three years, and once absent, plants rarely reappeared (Sieg and King 1995). Unpublished data from Minnesota also suggests a high attrition rate, but that individual plants absent in a given year may reappear aboveground in subsequent years (Sather and Smith 1994). Although a small number of orchids on the Sheyenne National Grassland appeared aboveground every year for eight years, a predictable pattern in life states was not apparent. Sieg and King (1995) noted flowering plants can flower the following year, can reappear as vegetative plants, or be absent. Unpublished data from Minnesota (Sather and Smith 1994) suggest individual orchids in this study area can reappear aboveground for equally long periods of time and display a similar lack of predictable pattern in life state from year to year.

Habitat management, such as burning, grazing, or mowing, could have a positive or negative effect on recruitment and survivorship, depending on its frequency, intensity, and timing. Controlled studies of management are logistically difficult and require collection of data over a period of years. Preliminary studies have been restricted to particular populations, their methods are far from comparable, and their results to date are less conclusive than might be desired by those actively involved in management.

It has been suggested that flowering may be suppressed by litter accumulation and stimulated by fire (Bowles 1983, Bowles and Duxbury 1986). The effect of fire on flowering is probably influenced by intensity and timing of the burn and weather conditions both at the time of the burn and the time of flowering. In studies of individual plants subjected to controlled burns at Sheeder Prairie, Iowa, in 1993 and 1994, flowering probability did not differ between burned and

unburned plants in either year, but survivorship of individual plants burned in 1993 was significantly higher than that of control plants over the period 1992-1994, suggesting short-term survivorship under these experimental conditions may have been enhanced by fire. Preliminary data from this study indicate a greater portion of plants disappeared on unburned plots than on plots burned two years previously (Pleasants 1995a). In a small-scale study in the Sheyenne National Grasslands, prescribed burning of plots in the fall did not significantly affect orchid numbers, heights, number of leaves, phenology, and condition the following year compared to paired plots that were not burned in the fall (Bjugstad-Porter 1993). Because of the species' apparent variability in response to environmental factors, caution must be exhibited in extrapolating the results of these studies until they have been replicated and similar research has taken place in other populations.

In an effort to assess the effects of management on a broader scale, data collected on the Sheyenne National Grassland between 1987 and 1994 have not documented any consistent, significant differences in orchid densities or flowering rates among areas with five ambient management regimes (Sieg and King 1995). These management regimes included livestock grazing with and without spring burning, and no grazing with and without burning. As is the case with all studies conducted in only a single part of the species' range, these results need corroboration at additional sites before they can be extrapolated to populations across the species' range.

Present management of extant sites is presented in Table 3, and is illustrated in Figures 4 and 5, which show the proportion of plants in each predominant management within ecoregions and within states, respectively. The best management for this species is likely to be that which best maintains the quality of the grassland and prairie habitats. Additional experimentally-designed and replicated research is needed to document the influence of various management techniques on the orchid in all parts of the species' range.

E. Threats and Limiting Factors

Platanthera praeclara has been and continues to be jeopardized by both natural and human-caused threats. The Endangered Species Act (Act) requires the Service to consider five specified factors in making its listing decisions. The final rule listing *P. leucophaea* and *P. praeclara* addressed those five factors as quoted below (USFWS 1989):

1. The present or threatened destruction, modification, or curtailment of its habitat or range.

"The prairie fringed orchids [eastern and western species] have declined significantly throughout their ranges due to conversion of most of their habitats to cropland, overgrazing, intensive hay mowing, drainage, and for fire protection; these and related threats continue. . . . Over 35 percent of the known populations of *Platanthera praeclara* occur in hay meadows; these plants seldom are seen, and populations apparently are small. Bowles (1983) and Bowles and Duxbury (1986) suggest hay mowing annually removes seed capsules and plant biomass before natural seed

dispersal can occur. This prevents recruitment of seedlings into populations and probably weakens adult plants, resulting in gradual population decline through attrition. Changing land use also threatens hay meadow populations. At least four Kansas hay meadows known to support *Platanthera praeclara* populations have been converted to cultivated cropland since their discovery in the 1970s, while one Oklahoma hay meadow now is threatened with subdivision (Bowles and Duxbury 1986). The use of herbicides, especially on highway and railroad rights-of-way, continues to threaten these species in a number of instances. . ."

2. Overutilization for commercial, recreational, scientific, or educational purposes.

"Native terrestrial orchids rarely are grown from seed; adult plants are often sought for scientific and commercial purposes, or for private gardens. Smaller populations of the prairie fringed orchids would be adversely affected by collecting. . . . However, because of the recent description of *Platanthera praeclara* (western prairie fringed orchid) and its usually small populations, over-collecting may also become a serious problem for this species. At least one instance of removal of a western prairie fringed orchid plant for commercial purposes has taken place in Minnesota."

3. Disease or predation.

"No diseases are known to be adversely affecting either prairie fringed orchid species. All inflorescence were removed from one Minnesota population of *Platanthera praeclara* by an unknown herbivore, but the long term impact remains unknown. Conehead grasshoppers (Orthoptera: *Neoconocephalus*) occasionally are observed eating the flowers or fruits of these orchids. However, the major predator is man through use of this orchid's community for pasture or hay. Long term overgrazing or haying apparently leads to population decline because plants either are harvested or are not allowed to complete their life cycles."

4. The inadequacy of existing regulatory mechanisms.

"The prairie fringed orchids [eastern and western species] are formally or officially listed as endangered, threatened, or rare in 10 states (IA, IL, ME, MI, MN, MO, NE, ND, OH, WI) throughout their range. However, only a few states where these species are extant offer protection to listed plants beyond that afforded by their presence on public lands. State laws of Illinois, Iowa, Minnesota, Michigan, and Missouri prohibit the removal and sale of listed plants. Although *Platanthera leucophaea* and *P. praeclara* are offered various forms of recognition or protection under state laws, the Endangered Species Act offers possibilities for protection through section 6 by cooperation between States and the Service, and cooperation with other Federal agencies through section 7 (interagency cooperation) requirements. The plants are considered rare in Canada, but are not afforded any official designation or protection."

5. Other natural or manmade factors affecting its continued existence.

"Pollination of the prairie fringed orchids is required for seed set, and is accomplished only by hawkmoths (Sphingidae). As a result, long-term population survival requires maintenance of hawkmoths. Any threat to these insects (such as the use of insecticides) or their habitats and food plants, is a threat to survival of prairie fringed orchids. . ."

The Western Prairie Fringed Orchid Recovery Team recognizes the conversion of *P. praeclara* habitat to cropland as the single most detrimental threat to the species. Although approximately 50 percent of Canadian plants are protected (Davis 1995) and 60 percent of sites in the two northern metapopulations are owned by public agencies or private conservation groups (Minnesota Department of Natural Resources 1995, North Dakota Parks and Recreation Department 1995), conversion of habitat to cropland continues as the single most detrimental threat in the southern portion of the species' range, where the majority of isolated, small populations remain unprotected (Iowa Department of Natural Resources 1995, Kansas Department of Wildlife and Parks 1995, Nebraska Game and Parks Commission 1995, Missouri Department of Conservation 1995). Figure 5 illustrates ownership patterns in each of the states. This figure reveals the majority of plants are in public or private conservation ownerships that allow for implementation of appropriate management techniques.

Within ecoregion 251A, an ecoregion where the majority of populations are relatively large and habitat relatively unfragmented, the threat of habitat conversion has increased since the species was listed because cultivation of newly developed potato varieties requiring new ground is rapidly expanding in the Sheyenne delta. Despite this, the major challenge for conservation of the orchid in this ecoregion is the determination and implementation of appropriate management techniques for the 60 percent of orchids presently assured protection from the plow. As can be seen from Figure 4, predominant management techniques vary with state. Whereas the majority of Minnesota orchids are managed with fire, the majority of North Dakota orchids are *under the influence* of grazing. The practices of burning, grazing, and mowing may have either positive or detrimental impacts on orchid populations depending on the frequency, intensity, and timing of these treatments. The most appropriate management may vary from one physiographic region to another. However, at present there are no available data to determine an appropriate balance of management activities across the range or within states or physiographic regions.

Because data from throughout the range indicated a decrease in flowering and an increase in mortality during the extreme drought of the late 1980s, it is more certain that hydrologic alterations that draw down the local water table near the root zone of the orchid have the potential of serious adverse impacts. This threat probably varies from site to site, depending on local climate, groundwater hydrology, and soil characteristics.

Among the biological threats not fully discussed in the listing package are potential changes in community composition resulting from invasion by natural succession and/or noxious species. Of these threats, competition for space, light, water, and nutrients by the naturalized, introduced

Euphorbia esula (leafy spurge) and *Carduus nutans* (musk thistle) are probably the most severe current threat to *P. praeclara*. Studies suggest leafy spurge is a highly invasive, deeply rooted, persistent weed species known from orchid sites in North Dakota (Sieg and Bjugstad 1994) and Minnesota (Winter 1994) and has the potential of outcompeting native vegetation. The direct effect of competition with these and other weed species is exacerbated by the potential threat of control measures. In the absence of toxicity studies on *P. praeclara* or its pollinators, the potential impact of commonly used pesticides remains unknown. Musk thistle is frequently found on prairie hay meadows in eastern Kansas, but it is a serious problem at only one orchid site.

Various investigators suggest damage to plants is due not only to conehead grasshoppers (Bowles and Duxbury 1986) and unknown herbivores (Smith 1981) mentioned in the Service's final listing rule, but also to moose (Smith and Sather, personal observation), deer (Pleasants 1994), cattle (Freeman and Brooks 1989), unknown insects (Freeman and Brooks 1989), the weevil *Stethobaris commixta* (Sieg and O'Brien 1993), and two species of Tortricidae (leaf roller moths): *Sparganothis xanthoides* and *S. sulfureana* (Cuthrell and Rider 1993). Preliminary data on the impact of angora goats on the Sheyenne National Grassland introduced as a biological control for leafy spurge indicate both non-flowering orchids (19 percent) and flowering orchids (100 percent) were damaged when goats were herded three times through the area. However, Wolken (1994) suggests plants in plots protected from goats were not unscathed -- 16 percent of 61 non-flowering control orchids and 13 percent of 22 budding orchids in these plots sustained insect damage.

F. Conservation Measures

Several conservation and recovery activities for western prairie fringed orchid began before the species was listed under the Act, other activities followed listing, but prior to approval of this plan.

Federal action to protect *P. praeclara* was initiated under section 12 of the Act which directed the Secretary of the Smithsonian Institution to draft a list of plants considered to be endangered, threatened, or extirpated. This report was presented to Congress on January 9, 1975, and designated House Document No. 94-51 (Smithsonian Institution 1975). It included the then undescribed *P. praeclara* under the name *H. leucophaea* and recommended its listing as threatened. On July 1, 1975, the Service published notice of acceptance of the Smithsonian report as a petition under the Act and of its intent to review the status of the included taxa (USFWS 1975). Based on comments and data assembled in response to House Document No. 94-51 and its 1975 notice, the Service published a proposed rule on June 16, 1976, including roughly 1,700 vascular plant species, but not including *H. leucophaea* (USFWS 1976). Portions of the 1976 proposal that were not finalized were withdrawn on December 10, 1979 (USFWS 1979). A new notice of review was issued on December 15, 1980 (USFWS 1980), which included *P. leucophaea* as a category 1 candidate for listing [Category 1 candidate status denoted a species found by the Service to warrant publication of a proposed listing rule under the Endangered Species Act, but for which the Service had not yet listed. Today, such species are referred to

simply as candidates, with no numerical categorization.]. Notices issued November 28, 1983 (USFWS 1983), and September 27, 1985 (USFWS 1985), changed the species' status to category 2, a candidate category formerly designating species for which the Service needed further biological data before deciding whether to publish a proposed rule to list the species. On October 11, 1988, the Service issued a proposed rule to determine both *P. leucophaea* and *P. praeclara* as threatened species (USFWS 1988). The final rule listing *P. praeclara* as threatened under the Act, was issued on September 28, 1989 (USFWS 1989), and became effective October 30, 1989.

Conservation measures provided to *P. praeclara* as a threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, state, and private agencies, groups, and individuals. The Act provides for, but does not require, land acquisition and cooperation with the States; it requires recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibition against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to species proposed or listed as endangered or threatened and with respect to their critical habitat, if any is designated. Regulations implementing interagency cooperation under section 7 of the Act are codified at 50 CFR Part 402. Section 7(a)(2) requires Federal agencies to insure the activities they authorize, fund, or implement are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service. *Platanthera praeclara* was listed as a threatened species without critical habitat designation. Where the species occurs on land administered by a Federal agency, or for actions requiring Federal permit (regardless of land ownership), or when Federal funding is used, section 7(a) of the Act must be followed.

The Act and its implementing regulations found at 50 CFR 17.71 and 17.72 set forth general prohibitions and exceptions that apply to all threatened plant species not covered by a special rule. No special rule has been published for *P. praeclara*. The prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.76, apply to this species. These prohibitions, in part, make it illegal, with respect to any endangered or threatened plant subject thereto, for any person subject to the jurisdiction of the United States to import or export; transport in interstate or foreign commerce in the course of a commercial activity; sell or offer for sale this species in interstate or foreign commerce; or to remove and reduce to possession this species from areas under Federal jurisdiction; maliciously damage or destroy this species on any area under Federal jurisdiction; or remove, cut, dig up, damage, or destroy this species on any other area in knowing violation of any State law or regulation or in the course of any violation of a State criminal trespass law. "Plant" means any member of the plant kingdom, including seeds, roots, and other parts thereof. Because *P. praeclara* is a threatened plant species, seeds from cultivated specimens are exempt from these prohibitions provided a statement of "cultivated origin" appears on their containers. Certain exceptions apply to agents of the Service and state conservation agencies. Any occurrence of *P.*

praeclara on Federal land is protected by section 9(a)(2) of the Act. Any occurrence which is adversely affected as a result of violation of the State laws indicated above is also protected by the Act.

The Act and 50 CFR 17.72 also provide for the issuance of permits to carry out otherwise prohibited activities involving threatened species under certain circumstances. Such permits are available for scientific purposes or to enhance propagation or survival of the species. It is anticipated that few trade permits would be sought or issued for this species because it is not common in cultivation or in the wild. Requests for copies of the regulations on plants and inquiries regarding them may be addressed to the Permits Coordinator, Division of Endangered Species, U.S. Fish and Wildlife Service, 1 Federal Drive, Fort Snelling, Minnesota 55111-4056 (Telephone: 612/725-3536, Fax: 612/725-3526).

Protections and considerations, provided by laws and authorities other than the Act, became applicable to the western prairie fringed orchid with its listing under the Act. Examples are discussed below.

The Federal Native Plant Conservation Memorandum of Understanding, concluded in 1994, established and described a Federal Native Plant Conservation Committee composed of the Bureau of Land Management, National Biological Survey (now National Biological Service), National Park Service, Agricultural Research Service, Soil Conservation Service (now Natural Resource Conservation Service), and Fish and Wildlife Service. The purpose of the Committee is to identify priority conservation needs for native plants and their habitats and coordinate implementation of programs for addressing those needs.

Also in 1994, a memorandum of understanding was signed by the U.S. Forest Service, Department of Defense, U.S. Army Corps of Engineers, National Marine Fisheries Service, Bureau of Land Management, Bureau of Mines, Bureau of Reclamation, Minerals Management Service, National Park Service, U.S. Coast Guard, Federal Aviation Administration, Federal Highway Administration, Environmental Protection Agency, and Fish and Wildlife Service. The Memorandum establishes a general framework for cooperation and participation among the signatory agencies in the exercise of their responsibilities under the Act. More specifically, the goals of the memorandum are to (1) conserve species federally listed under the Act, (2) use existing Federal authorities and programs to further the purposes of the Act, and (3) improve efficiency and effectiveness of the interagency consultations conducted pursuant to section 7(a)(2) of the Act.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (TIAS 8249, 50 CFR Part 23) prohibits the following actions involving species listed under CITES: Import; export; re-export; or possession of individuals of species which have been illegally imported, export, or re-exported. The United States and many other countries are parties to CITES, and *P. praeclara* is protected under the treaty.

Individual Federal agencies develop their own policies for listed species. For example, rules for protection of listed plants in the National Forests are in the Forest Service Manual Title 2600--Wildlife, Fish, and Sensitive Plant Habitat Management, Chapter 2670--Threatened, Endangered and Sensitive Plants and Animals. The Forest Service must abide by the Act and the National Environmental Protection Act in managing the lands it is responsible for. The National Forest Management Act of 1976 mandates a Management Plan be written for each National Forest. The Custer National Forest Management Plan (USFS 1986) includes management actions to be performed for endangered, threatened, and special concern plants. In addition, management guidelines specific for *P. praeclara* on the Sheyenne National Grassland have been developed (USFS 1993). These guidelines are considered important and necessary for recovery of the orchid. They will (1) help implement management direction found in the Custer National Forest Management Plan and the Western Prairie Fringed Orchid Recovery Plan, (2) provide a broad umbrella under which management activities will occur that will not adversely impact the orchid, (3) provide a framework for implementing a realistic orchid monitoring program specific to the Sheyenne National Grasslands, and (4) provide a basis for setting priorities for allotment management plan revisions.

The Service prepared, under section 7 of the Act, a biological opinion on the Forest Service's management guidelines (USFWS 1994). The biological opinion concluded "management of the Sheyenne National Grasslands by means of the western prairie fringed orchid management guidelines is not likely to jeopardize the continued existence of the orchid. This opinion is based in part upon the recorded increased number of orchids during the 1993 growing season and provisions of the guidelines that allow for specific metapopulation management in core areas and the Forest Service's commitment to continue monitoring orchid response on grassland management activities. Should monitoring determine a decline in orchid numbers, the Forest Service will amend the guidelines and reinitiate section 7 consultation. Also, management practices not addressed in these guidelines will undergo section 7 consultation on a case-by-case basis."

Many tracts containing *P. praeclara* have Federal or state legal protection (Appendix B). Other occurrences have management plans or protection strategies in place. Some occurrences have little protection. Protection status of each population of *P. praeclara* is included in Table 3.

Four state natural resource agencies presently contribute to the conservation of the species. Three states officially list *P. praeclara* as endangered and Iowa lists it as threatened. Iowa endangered species law prohibits the possession, transport, or sale of listed plants. The Kansas Nongame and Endangered Species Conservation Act does not provide protection for native plant species. Minnesota endangered species law prohibits taking and sale of protected species without a permit except through actions necessary for agriculture or accidental taking. Missouri endangered species law prohibits the export or sale of listed plants without permit and taking without the permission of the property owner. Current legal protection status is summarized by state and Canadian province in Table 6.

In addition to legal protections, the Service has for several years contributed endangered species funding to state agencies' and others' surveys, monitoring, and management and genetic studies for the conservation of western prairie fringed orchid. Citizen volunteers provide invaluable assistance to some of the survey and monitoring efforts. The Minnesota State Department of Agriculture has a landowner contact program wherein owners of lands with listed plants are alerted to the presence of the plants on their land and are offered voluntary, custom tailored pesticide management plans to protect the orchids and other listed plants. Many landowners in Minnesota have adopted the voluntary plans and western prairie fringed orchid is a significant beneficiary.

G. Strategy of Recovery

The recovery strategy for *P. praeclara* focuses on assuring protection of the habitat of remaining populations from conversion to agricultural use; assuring that the frequency, intensity, and timing of management practices are appropriate for the enhancement and maintenance of *P. praeclara* populations; and providing the highest level of legal protection appropriate for all populations. Decisions related to habitat management and protection are to be made based on the best current scientific information of the biology of the species and monitoring data. The highest priority recovery tasks for *P. praeclara* are those that have a direct impact on the plants themselves: maintaining the habitat of known populations as native prairie and providing the highest level of protection appropriate for all populations. Because the major historic cause of decline of populations of this species throughout its range is conversion of native tallgrass prairie to intensive agricultural use, maintenance of native prairie is the highest priority recovery action.

In addition to sites already in public ownership or protective management, fulfillment of the recovery goal in certain ecoregions will require bringing additional sites into protective management. Necessary actions are spelled out on an ecoregion by ecoregion basis in the stepdown outline and narrative. The objective is protection from the plow and other direct physical destruction, from pesticide impacts on the plant and its pollinators, and from hydrologic alterations.

Because mechanisms for protection differ from state to state and change over time, the plan does not spell out specific conservation tools or protection levels on a population by population basis. It is becoming increasingly clear that conservation tools other than fee acquisition by public agencies can provide effective protection for endangered resources where these measures guarantee perpetual protection and ensure appropriate management (protection levels 4 and 5) (The Nature Conservancy 1996). Effective protection means a population is permanently safe from conversion from grassland into any other use and is subject to a management plan approved by the Service and implemented through at least three management cycles. In practice, the majority of sites listed at protection levels 4 and above in Table 3 have been protected from habitat conversion, but still require preparation and implementation of a management plan or guidelines. Protection levels designated in this plan are those effective on the date of release of the plan. They reflect the ownerships and management measures in effect on that date. The

present distribution of ownerships within ecoregions and within states is illustrated in Figures 6 and 7, respectively. The distribution of predominant management regimes within ecoregions and states is illustrated in Figures 4 and 5, respectively. The protection level listed for any population is not absolute and permanent, but may shift up or down in the event that either the population's ownership or management status changes. The final judgement about whether protection fulfills the recovery goal lies with the Service in consultation with other agencies and experts. This judgement will be based on the permanence and effectiveness of protection and management.

Examples of activities that contribute to effective protection include, but are not limited to: pesticide protection programs administered by state Departments of Agriculture, landowner agreements, conservation easements, dedication of State Nature Preserves, and acquisition by conservation organizations or public agencies with operational management guidelines. The mix of conservation tools, lead agencies or conservation groups, and specific sites brought into protective management is entirely dependent on the engagement of willing landowners. For this reason no effort has been made to match specific actions and agencies or organizations with particular sites. The Recovery Goal can be best met by bringing into protective management the largest unprotected populations listed in Table 3 in each ecoregion where additional protective management is needed to meet the recovery criteria. However, in the event some of these sites cannot be brought into protective management, the strategy for recovery allows for site substitutions within the ecoregion.

Assuring compliance with existing legal protection for the species and development of additional state protective measures will help prevent further loss of populations. These tasks, the basis of the long-term conservation of the species, can be implemented through cooperation of involved parties and thorough analysis of all factors relating to the species' biology.

Additional recovery tasks include species biology and management regime research, population monitoring, development and implementation of appropriate management regimes, and development and distribution of educational materials about the species. Despite the large numbers of plants in actively managed protective ownership in ecoregions 251A, many sites in public ownership still need to have management guidelines either prepared or implemented. Protection will not be considered adequate for recovery until management guidelines have been fully implemented for three management cycles (depending on the site-by-site management specifications). For example, if guidelines call for a 3-year frequency of prescribed fire, the guidelines would not be fully implemented until the third prescribed burn had taken place. In the case of public lands or conservation easements the agency with management authority over the site is responsible for implementation of guidelines, but these guidelines must be approved by the Service in order to qualify a site as "recovered."

II. RECOVERY

A. Recovery Plan Objective: Delisting.

B. Recovery Criteria: *Platanthera praeclara* will be considered for delisting when sites that include occupied habitat harboring 90 percent of plants in each ecoregion are protected at protection levels 4 through 9 (The Nature Conservancy 1996) and managed in accordance with a Service-approved management plan or guidelines. This plan must assure implementation of management practices that provide the range and spatial distribution of successional and hydrologic regimes required to maintain the species and its pollinators in self-sustaining, naturally occurring populations, and must remain in effect following delisting. Implementation of these criteria is further clarified in the strategy of recovery section above and in the recovery narrative below.

C. Stepdown Outline

Service guidelines classify recovery actions into three priority classes. Priority 1 tasks must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future. Because *P. praeclara* is listed as threatened and a high proportion of all plants are presently in protective ownership, none of the recovery tasks identified below are Priority 1. Priority 2 tasks must be taken to prevent significant decline in species population/habitat quality, or some other significant negative impact short of extinction. Most recovery actions specified in this plan qualify as priority 2 actions. Actions are listed below in order of their priority for the perpetuation of the species, beginning with those that have the most direct affect on the species and proceeding to those with an indirect affect. Priority 3 actions are other actions necessary to meet the recovery objective. Although a high level of public knowledge about the orchid may not be necessary to prevent significant declines in the species populations or habitat quality, a higher level of public interest in the species will facilitate implementation of Priority 2 actions. Public education and information is therefore deemed necessary to meet the recovery objective and is considered a Priority 3 action.

1. Maintain habitat of known populations as native prairie.
 11. Prevent agricultural conversion of native prairie habitat.
 111. Within ecoregion 251A, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites collectively harboring a total of 626 or more plants.
 112. Within ecoregion 251B, maintain protective management of all sites presently owned by public agencies or conservation organizations and

secure protective management at privately-owned sites collectively harboring a total of 12 or more additional plants.

113. Within ecoregion 251C, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites harboring an additional 245 plants.
 114. Within ecoregion 251E, secure protective management at both privately-owned sites to reach the recovery criteria.
 115. Within ecoregion 251G, maintain protective management of sites.
 116. Within ecoregion 222M, enhance populations presently in the ownership of public agencies and/or conservation organizations.
 117. Within ecoregion 332C, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites harboring an additional 26 plants.
 118. Within ecoregion 332E, maintain protective management and hydrology of the remaining site.
2. Provide the highest level of legal protection appropriate for all populations.
 21. Insure compliance with all laws and regulations protecting *P. praeclara*.
 22. Develop and implement new laws for the protection of *P. praeclara* in those states not now offering statutory protection.
 3. Develop and implement habitat management plans that sustain and enhance *P. praeclara* populations.
 31. Develop or maintain appropriate burning regimes.
 32. Develop or maintain appropriate grazing regimes.
 33. Develop or maintain appropriate mowing regimes.
 34. Develop or maintain appropriate noxious weed control practices.
 35. Develop and implement pesticide management plans.

36. Develop and implement hydrologic guidelines.
 37. Use direct seeding, artificial pollination, and/or artificial propagation, as appropriate in ecoregions 222M and 251E.
4. Conduct appropriate research and monitoring.
 41. Conduct necessary research.
 411. Experimentally determine appropriate management practices to maintain and enhance populations of *P. praeclara*.
 4111. Determine appropriate fire regimes.
 4112. Determine appropriate grazing regimes.
 4113. Determine appropriate mowing regimes.
 4114. Determine appropriate methods of noxious weed control.
 4115. Determine effects of pesticides on plants.
 42. Determine parameters required to maintain viable self-sustaining populations.
 421. Conduct research to determine physical limiting factors.
 4211. Determine the role of soil disturbance.
 4212. Determine the role of groundwater hydrology.
 422. Conduct research on reproductive biology.
 4221. Identify principal pollinator(s) and their biology.
 4222. Develop propagation methods.
 4223. Determine the importance of vegetative reproduction and the mycotrophic state.
 423. Conduct research on species synecology.
 4231. Determine the role of competitors.

424. Conduct a population viability analysis for the species.
43. Monitor populations.
 431. Monitor status and trends of all populations.
 432. Conduct demographic monitoring.
 433. Establish consistent monitoring criteria.
5. Identify and search potential habitat.
 51. Search historical sites.
 52. Identify and search potential new sites.
6. Disseminate information to a variety of audiences.
 61. Develop modular educational materials for the public.
 62. Distribute educational modules to appropriate audiences.
 63. Conduct education and training programs.
 64. Assure publication of research results.
 65. Identify a central repository for information about *P. praeclara*.
 66. Provide opportunities for local members of the public, to become actively involved in recovery efforts.

D. Narrative

1. Maintain habitat of known populations as native prairie.

Bowles and Duxbury (1986) suggest the major cause of decline in *P. praeclara* populations throughout the range is conversion of native tallgrass prairie to intensive agricultural cropland. Maintain habitat of known populations as native prairie through a variety of conservation tools, including, but not limited to, protection and appropriate management of populations on public land, as well as voluntary acquisition, easements, registry agreements, and tax exemption programs to assure protection and appropriate management on private lands. Wherever possible, assure sites are sufficiently large to allow plant community succession to occur and *P. praeclara* populations to move and make use of suitable microhabitats. Where sites are too small to permit

natural succession to occur, manage communities to maintain the species' specific microhabitat requirements.

11. Prevent agricultural conversion of native prairie habitat.

Where there are willing sellers, bring into protective public or private ownership and appropriate management the populations needed to satisfy recovery within each ecoregion. Recovery can be most easily reached by protection of those populations noted with an asterisk following the current protection status in Table 3. However, within any given ecoregion, the recovery criteria can be met by substitution of any combination of sites that collectively protect the target number of plants listed below. Substitutions may include both privately and publicly owned equivalent sites discovered after final approval of this plan. The actions listed below are needed in addition to preparation and implementation of management guidelines at all sites presently owned by public agencies and/or conservation organizations.

111. Within ecoregion 251A, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites collectively harboring a total of 626 or more plants.

112. Within ecoregion 251B, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites collectively harboring a total of 12 or more additional plants. This criterion can be met by protecting any one of the three largest remaining unprotected Iowa populations.

113. Within ecoregion 251C, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites harboring an additional 245 plants.

114. Within ecoregion 251E, secure protective management at both privately-owned sites to reach the recovery criteria.

115. Within ecoregion 251G, maintain protective management of all sites presently owned by public agencies or conservation organizations.

Protective management of privately-owned sites will not be necessary if management guidelines are prepared and implemented at all sites presently owned by public agencies or conservation organizations.

116. Within ecoregion 222M, enhance populations presently in the ownership of public agencies and/or conservation organizations.

There are no known privately-owned sites of sufficient size to contribute to the recovery criteria.

117. Within ecoregion 332C, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites harboring an additional 26 plants.

118. Within ecoregion 332E, where the sole population is in the ownership of a single conservation organization, maintain protective management, including maintenance of appropriate hydrologic regime.

2. Provide the highest level of legal protection appropriate for all populations.

21. Insure compliance with all laws and regulations protecting *P. praeclara*.

22. Develop and implement new laws for the protection of *P. praeclara* in those states not now offering statutory protection.

3. Develop and implement habitat management plans that sustain and enhance *P. praeclara* populations.

Use a prudent conservation strategy to focus on maintaining or restoring the composition, function, and structure of the ecosystem on which *P. praeclara* depends, even though specific autecological and synecological information is lacking for the species. Develop management practices that duplicate the natural processes of the tallgrass prairie ecosystem, which evolved with frequent natural disturbances, including fire and ungulate grazing. Maintain open grassland habitats by developing, implementing, and reviewing management practices regularly and refining them as relevant research results become available.

For each population of *P. praeclara*, conduct a field assessment to identify existing or potential threats and to determine if existing management practices provide ecological conditions appropriate for maintenance of the population. Based on these assessments, develop and implement management plans for all populations owned by public agencies or private conservation organizations in all ecoregions. These plans should include specific management regimes required for maintenance and enhancement of populations and associated habitat.

31. Develop or maintain appropriate burning regimes.

Perform prescribed burns as appropriate, modifying burn prescriptions as necessary to maintain and enhance *P. praeclara* populations when results of research become available.

32. Develop or maintain appropriate grazing regimes.

Modify grazing regimes if necessary to maintain and enhance *P. praeclara* populations when results of research become available.

33. Develop or maintain appropriate mowing regimes.

Modify mowing regimes if necessary to maintain and enhance *P. praeclara* populations when results of research become available.

34. Develop or maintain appropriate noxious weed control practices.

Use methods of noxious weed control that are least likely to have adverse effects on *P. praeclara* populations. Modify methods as results of research become available. Control noxious weeds with non-chemical methods whenever possible.

35. Develop and implement pesticide management plans.

If herbicides are required, use them as part of an integrated pest management plan. Use only chemicals and application methods which have been proven to have the least adverse effects according to the best available research results relevant to *P. praeclara* populations. Regularly review and update control methods in response to the results of toxicity tests (Task 4115).

36. Develop and implement hydrologic guidelines.

Develop appropriate aquifer management guidelines based on groundwater hydrology research (Task 4212) that demonstrates the relationship of local hydrologic regimes and soil characteristics to the survival and enhancement of *P. praeclara* populations.

37. Use artificial pollination, direct seeding, and/or artificial propagation, as appropriate, in ecoregions 222M and 251E.

Populations within these ecoregions are small, isolated, and appear to be declining. Extant populations need to be enhanced to achieve the Recovery criteria in these ecoregions. Although pollination rates are not presently known, it is reasonable to assume that enhancing pollination is a good first step toward increasing population sizes. It is important that accompanying management practices in these populations are timed to allow fruit set to occur.

4. Conduct appropriate research and monitoring.

Conduct research to determine experimentally the most appropriate management practices to maintain and enhance *P. praeclara* populations, to determine limiting factors, and to better understand the species' life history and synecology. Conduct long-term monitoring to determine the status of populations, to measure progress towards recovery, and to obtain life history data. Wherever and whenever experimental research is conducted, dedicated research areas are needed to assure adequate controls and replications.

41. Conduct necessary research.

411. Experimentally determine appropriate management practices to maintain and enhance populations of *P. praeclara*.

4111. Determine appropriate fire regimes.

Conduct experimental research to determine the effect of various prescribed fire regimes on *P. praeclara* and to compare these effects with other potential management practices that may affect populations of the species.

4112. Determine appropriate grazing regimes.

Conduct experimental research to determine the effect of a variety of various grazing regimes on *P. praeclara* and to compare these effects with other potential management practices that may affect populations of the species.

4113. Determine appropriate mowing regimes.

Conduct experimental research to determine the effect of various mowing regimes on *P. praeclara* and to compare these effects with other potential management practices that may affect populations of the species.

4114. Determine appropriate methods of noxious weed control.

Determine which noxious weed species require control and appropriate methods and frequency of control. Conduct experimental research to determine if effective methods of noxious weed control can replace or supplement pesticide use in sensitive areas while maintaining populations of the species.

4115. Determine effects of pesticides on plants.

Conduct toxicity tests to determine susceptibility of *P. praeclara* to the entire range of agricultural chemicals to which the species may be subjected. Initially focus these tests on those pesticides that currently are most widely used in and adjoining the species' habitat.

42. Determine parameters required to maintain viable self-sustaining populations.

421. Conduct research to determine physical limiting factors.

4211. Determine the role of soil disturbance in *P. praeclara* recruitment and maintenance of early successional communities.

4212. Determine the role of groundwater hydrology.

Determine at a local level the interactive role of groundwater hydrology and soil characteristics as factors limiting the establishment, flowering, and persistence of *P. praeclara* populations.

422. Conduct research on reproductive biology.

4221. Identify principal pollinator(s) and their biology as it relates to *P. praeclara*.

Include in this research effectiveness of pollination, pollinator behavior, alternative nectar sources, flight range, and role of pollinator availability as a limiting factor for *P. praeclara*. Attention should particularly be paid to pollinator success in large metapopulations versus small, isolated populations.

4222. Develop propagation methods.

In developing propagation methods, include direct seeding and artificial propagation. Use these methods when needed to develop captive populations for research purposes (such as Task 4115) or in the event reintroduction is needed.

4223. Determine the importance of vegetative reproduction and the mycotrophic state.

Determine the importance of vegetative reproduction (yearly regeneration of photosynthetic plants) and of the mycotrophic state (persistence as an underground plant dependent on mycorrhizal associates) in maintaining *P. praeclara* populations. Presently-available data suggest these factors may vary in importance in different parts of the range.

423. Conduct research on species synecology.

4231. Determine the role of competitors.

Conduct research to determine how plant species other than noxious weeds compete with *P. praeclara*.

424. Conduct a population viability analysis for the species.

Use data from research conducted in Tasks 421 through 424 to develop a population viability model for *P. praeclara*. Use the population viability model as a tool to guide management and restoration decisions by simulating potential effects of management regimes and environmental perturbations on populations of given sizes under given conditions.

43. Monitor populations.

Monitor population trends to provide the basis for assessing the status of individual populations or effects of management treatments through time. Develop a plan for monitoring the status of individual populations through time for all *P. praeclara* populations.

431. Monitor status and trends of all populations on a regular basis.

Visit all known *P. praeclara* populations at 3-year intervals and monitor overall status of the populations (presence/absence, estimate of number of flowering individuals, comments on management, and other relevant factors). Visit populations not observed in the regular year of monitoring the following year.

432. Conduct demographic monitoring at selected sites.

Long term demographic monitoring is the only method of assessing recruitment, mortality, and changes in population structure. Establish or expand monitoring programs, as needed.

433. Establish consistent monitoring criteria.

Consistently record a minimum set of variables at each demographic monitoring site.

5. Identify and search potential habitat.

Search suitable habitats for new populations of *P. praeclara* throughout its range.

51. Search historical sites where *P. praeclara* has been found and habitat is still present.

In locations where *P. praeclara* is known to have occurred historically, but populations currently are not known, the species may still be present in a natural seed bank which is dormant during drought or in small numbers that are difficult to locate. Survey these sites at 3- to 5-year intervals to determine if populations are present. Historical sites where *P. praeclara* has been found are identified by State in Table 2. This task is especially important in those ecoregions where there are few populations and these populations are small.

52. Identify and search potential new sites.

Identify prairies believed to provide suitable habitat requirements for *P. praeclara* and search them for new populations. Sites with suitable habitat that have been identified to date are listed by State in Appendix A. Continue to examine references from amateur and professional botanists, botanical literature, and herbarium records for identification of additional sites. Location of additional sites may assist recovery efforts by increasing the pool of potential substitution sites for protective management.

6. Disseminate information to a variety of audiences.

Public awareness of *P. praeclara* and its role in grassland ecosystems is low. Therefore, give the same priority to public education concerning the species as to other recovery tasks, such as enforcement of protective regulations, population management, and preservation of natural habitats.

61. Develop modular educational materials for the public.

Include topics such as history of the species within the region or state, management practices that maintain habitat quality, practices that contributed to the species' decline, species biology and identification, and steps being taken to recover the species.

62. Distribute educational modules to appropriate audiences.

Appropriate audiences for educational modules might include land management agencies, private landowners, and others whose actions may affect the recovery of *P. praeclara*.

63. Conduct education and training programs.

In addition to printed materials, conduct interactive educational programs, field trips, and training workshops as needed. These programs will generate public interest in *P. praeclara* and will help assure that managing agencies, private landowners, and others whose activities may affect the species are aware of its current status and of specific actions required to maintain and enhance populations.

64. Assure publication of research results.

Publish research results in a timely fashion to ensure management prescriptions can be based on the best available scientific data. Encourage researchers to publish or make available their research results.

65. Identify a central repository for information about *P. praeclara*.

A central repository is needed to act as a clearinghouse for information and help avoid redundancy of efforts and expenditures.

66. Provide opportunities for local members of the public to become actively involved in recovery efforts. Involvement of local citizens and private landowners is especially crucial in those instances where conservation tools, other than fee acquisition, are being used to secure protective management.

SUMMARY:

Recovery of *P. praeclara* is dependent on a mix of legal protection, maintenance of habitat as native grassland through a variety of protection mechanisms, appropriate management, monitoring and research. Public appreciation of the plant and involvement in recovery is essential to the success of its recovery.

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III. IMPLEMENTATION SCHEDULE

The following Implementation Schedule outlines actions and estimated costs for the recovery program. It is a guide for meeting the objective discussed in Part II of this Plan. This schedule indicates task priorities, task numbers, task descriptions, duration of tasks, responsible agencies, and estimated costs. These actions, when accomplished, should lead to the recovery of the species and protect its essential habitat. The estimated funding needs for all parties anticipated to be involved in recovery are identified and, therefore, Part III reflects the total estimated costs for the 10-year recovery program for this species. The estimated recovery costs for the 10-year program are \$2,963,000. If delisting occurs, a minimum of five years of monitoring is required by the Act to assess the adequacy of recovery actions and determine if there will be cause to consider relisting. Because of special concerns with the biology of *Platanthera praeclara*, a minimum of 10 years of monitoring is necessary for this species.

Priorities in the first column of the following implementation schedule are assigned as follows:

Priority 1: An action that *must* be taken to prevent extinction or to prevent the species from declining irreversibly in the *foreseeable* future.

Priority 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.

Priority 3: All other actions necessary to meet the recovery objectives.

Implementation Schedule for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan

PRIORITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000-2005	
				Region	Program						
2	111	Within ecoregion 251A, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites collectively harboring a total of at least 626 plants. This criterion can be met by protecting any of several different combinations of MN and ND populations.	Ongoing	3, 6	TE	MN, ND, USFS, TNC, NRCS, FWS	See note	See note	See note	See note	Overall cost for tasks 111 through 117 is indeterminate, but exceeds \$1,200,000 rangewide.
2	112	In ecoregion 251B, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites collectively harboring a total of 12 or more additional plants. This criterion can be met by protecting any one of the 3 largest remaining unprotected IA populations.	Ongoing	3, 6	TE	IA, MN, TNC, NRCS, FWS	"	"	"	"	"

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¹ A key to abbreviations is at the end of this table.

Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIOR- ITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000- 2005	
				Region	Program						
2	113	Within ecoregion 251C, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites harboring an additional 245 plants. This criterion can only be met by protecting the three largest remaining unprotected IA populations and the largest remaining unprotected NE population.	Ongoing	3, 6	TE	IA, KS, MO, NE, TNC, NRCS, FWS	See note	See note	See note	See note	Overall cost for tasks 111 through 117 is indeterminable, but exceeds \$1,200,000 rangewide.
2	114	Within ecoregion 251E, secure protective management at the largest remaining unprotected KS population.	Ongoing	6	RE, RW, TE	KS, TNC, NRCS, FWS	"	"	"	"	"
2	115	Within ecoregion 251G, maintain protective management of all sites presently owned by public agencies or conservation organizations.	Ongoing	6	RE, RW, TE	NE, TNC, NRCS, FWS	"	"	"	"	"

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¹ A key to abbreviations is at the end of this table.

Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIOR- ITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000- 2005	
				Region	Program						
2	116	Within ecoregion 222M, enhance populations presently in the ownership of public agencies and/or conservation organizations.	Ongoing	3	RE, RW, TE	MN, IA, TNC, NRCS, FWS	See note	See note	See note	See note	Overall cost for tasks 111 through 117 is indeterminable, but exceeds \$1,200,000 rangewide.
2	117	Within ecoregion 332C, maintain protective management of all sites presently owned by public agencies or conservation organizations and secure protective management at privately-owned sites harboring an additional 26 plants. This criterion can be met by protecting any combination of the largest three remaining unprotected NE populations.	Ongoing	6	RE, RW, TE	NE, TNC, NRCS, FWS	"	"	"	"	"

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¹ A key to abbreviations is at the end of this table.

Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIOR- ITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000- 2005	
				Region	Program						
2	118	Within ecoregion 332E, where the sole population is in the ownership of a single conservation organization, maintain protective management, including maintenance of appropriate hydrologic regime.	Ongoing	6	RE, RW, TE	NE, TNC, NRCS, ICF, FWS, WY	See note	See note	See note	See note	Overall cost for tasks 111 through 117 is indeterminable, but exceeds \$1,200,000 rangewide.
2	21	Insure compliance with all laws and regulations protecting <i>P. praeclara</i> .	Ongoing	3, 6	LE TE	States (DAG, DNR, DOT), USDOT, EPA, USFS,	--	--	--	--	Conducted with existing funds.
2	22	Develop and implement new laws for the protection of <i>P. praeclara</i> in those states not now offering statutory protection.	2	3, 6	TE	TNC, States (DNR)	3	5	5	15	
2	31	Develop or maintain appropriate burning regimes.	Ongoing	3, 6	TE	Counties, Owners, State (DAG, DNR), TNC, USFS	10	10	10	70	

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¹ A key to abbreviations is at the end of this table.

Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIORITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000-2005	
				Region	Program						
2	32	Develop or maintain appropriate grazing regime.	Ongoing	3, 6	TE	USFS, USDA, Owners, States, ICF, FWS	5	5	5	30	Assumes some income to offset costs.
2	33	Develop or maintain appropriate mowing regime.	Ongoing	3, 6	TE	Owners, States, SVGA, USFS, TNC, Univ., FWS	5	5	5	40	Assumes some income to offset costs.
2	34	Develop and maintain appropriate noxious weed control practices.	Ongoing	3, 6	TE	Counties, A PHIS, NRCS, Owners, States, TNC, USDA	10	10	10	60	
2	35	Develop and implement pesticide management plans.	Ongoing	3, 6	TE	Owners, States, SVGA, TNC, USDA, EPA, USFS, NPS	10	10	10	70	
2	36	Develop and implement hydrologic guidelines.	Ongoing	3, 6	TE	States, Counties, U SFS, USGS	10	10	10	105	
2	37	Use direct seeding, artificial pollination, and/or artificial propagation, as appropriate in ecoregions 222M and 251E.	2	6	TE	IA, KS, FWS, TNC	10	10	10	45	

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¹ A key to abbreviations is at the end of this table.

Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIORITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000-2005	
				Region	Program						
2	4111	Determine appropriate fire regimes.	Ongoing	3, 6	TE	States (esp. MN), (DNR, DAg), TNC, Univ., USFS	5	5	5	90	\$40,000/yr. for 10 years.
2	4112	Determine appropriate grazing regimes.	10	3, 6	TE	ARS, States (esp. MN, ND), (DAg, DNR), Univ., USFS, USDA, USFS	15	15	15	90	\$40,000/yr. for 10 years.
2	4113	Determine appropriate mowing regimes.	10	3, 6	TE	States (esp. ND, NE), (DAg, DNR), Univ., USDA, USFS	5	5	5	20	\$40,000/yr. for 10 years.
2	4114	Determine appropriate methods of noxious weed control on plants.	2	3, 6	TE	APHIS, ARS, EPA, USFS, States, Univ.	5	5	5	10	

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Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIOR- ITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000- 2005	
				Region	Program						
2	4115	Determine effects of pesticides on plants.	2	3, 6	TE	APHIS, ARS, Chem. indus., States, (Dag), Univ., EPA, USFS	5	5	5	50	
2	4211	Determine the role of soil disturbance.	2	3, 6	TE	States (Dag, DNR), Univ., USDA, USFS	--	--	--	5	Mainly concurrent with other research.
2	4212	Determine the role of groundwater hydrology.	5	3, 6	TE	State (GS), Univ., USFS, USGS	20	20	20	40	
2	4221	Identify principal pollinator(s) and their biology.	4	3, 6	TE	States (DNR), TNC, Univ., USFS	15	15	15	40	
2	4222	Develop propagation methods.	2	3, 6	TE	CPC, IUCN, Univ., Orchid soc.	5	5	5	0	

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Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIOR- ITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000- 2005	
				Region	Program						
2	4223	Determine the importance of vegetative reproduction and the mycotrophic state.	2	3, 6	TE	Res., States (DNR), Univ., USFS	--	--	--	--	Accom- plished through task 432.
2	431	Monitor status and trends of all populations.	To and beyond recovery	3	TE	States (DAG, DNR), TNC, USFS	6	6	6	85	
2	432	Conduct demographic monitoring.	To and beyond recovery	3	TE	States (DNR), TNC, USFS	15	15	15	140	
2	433	Establish consistent monitoring criteria.	1	3, 6	TE	Recov. Team, States, TNC, Univ., USFS, NPS	2	2	2	--	
3	423	Determine role of competitors.	6	3, 6	TE	States, Univ., USFS	2	2	2	10	In conjunction with other research.
3	424	Conduct a population viability analysis for the species.	1	3, 6	TE	CBSG, Res., Univ., USFS	--	--	--	20	

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Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIOR- ITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000- 2005	
				Region	Program						
3	51	Search historical sites.	6	3, 6	TE	States, TNC, USFS, NRCS, FWS	5	5	5	10	
3	52	Identify and search potential new sites.	6	3, 6	TE	States, TNC, USFS, NRCS, FWS	5	5	5	10	
3	61	Develop modular educational materials for the public.	3	3, 6	RW TE	States (Dag, DNR, DOE, Ext. Serv.) EPA USFS	35	35	35	7	
3	62	Distribute educational modules to appropriate audiences.	3	3, 6	TE	States USDA, EPA, Ext. Svc., USFS	--	--	5	--	Cost of printing existing materials.
3	63	Conduct education and training programs.	Ongoing	3, 6	TE	States, Univ., Ext. Svc., USDA, EPA, TNC, FWS	3	3	--	--	
3	64	Assure publication of research results.	Ongoing	3, 6	TE	USFS, States, Univ., TNC	--	--	--	--	In conjunction with other research.

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Implementation Schedule (continued)
for *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan.

PRIORITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE PARTY			COST ESTIMATES (\$000)				NOTES
				USFWS		Other ¹	FY97	FY98	FY99	FY2000-2005	
				Region	Program						
3	65	Identify a central repository for information about <u>P. praeclara</u> .	Ongoing	3, 6	TE	Recov. Team, States, Univ., TNC, USFS, ICF	--	--	--	--	Conducted with existing funds.
3	66	Provide opportunities for local members of the public to be actively involved in recovery actions.	Ongoing	3, 6	TE	2	2	--	--	--	

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¹ A key to abbreviations is at the end of this table.

Implementation Schedule abbreviations:

APHIS Animal & Plant Health Inspection Service
ARS Agricultural Research Stations
Chem. ind. Chemical industry
CPC Center for Plant Conservation
Dag State Department of Agriculture
" Ditto
DOT State Departments of Transportation
EPA U.S. Environmental Protection Agency
FWS U.S. Fish & Wildlife Service
GS State geological survey
IA Iowa State agencies
ICF Intl. Crane Foundation (headquarters at Baraboo, WI)
IUCN Intl. Union for the Conservation of Nature
KS Kansas State agencies
MN Minnesota State agencies
MO Missouri State agencies
NE Nebraska State agencies
50 ND North Dakota State agencies
NPS National Park Service
NRCS Natural Resources Conservation Service (formerly U.S. Soil Conservation Service)
Orchid soc. Orchid & native plant societies
Owners Private owners of plant sites
Res. Any private, academic, or agency research entity
States State agencies
SVGA Sheyenne Valley Grazing Association
TE Threatened and Endangered Species Program of FWS
TNC The Nature Conservancy
Univ. Universities
USDA U.S. Department of Agriculture
USDOT U.S. Department of Transportation
USFS U.S. Forest Service
USGS U.S. Geological Service

IV. TABLES

Table 1

Characteristics separating *Platanthera lacera*, *Platanthera leucophaea*, and *Platanthera praeclara*.¹

CHARACTERISTIC	PLATANTHERA LACERA	PLATANTHERA LEUCOPHAEA	PLATANTHERA PRAECLARA
BLOOMING TIME	mid-June to August	June, July, rarely August	June, July, rarely August
COLUMN	--	rounded	somewhat angled
FLOWER COLOR	green, yellow-green, or cream	pure white lip & petals, green sepals & claws	creamy white lip & petals, greenish-white sepals
HABITAT	#sterile acid-soil	mesic to wet calcareous prairie; marshes, fens, & bogs	mesic to wet calcareous prairies
LIP	0.5-1.9 cm wide	1.5-2.5 cm wide	3.0 cm wide (mean)
LIP FRINGE	cut nearly to base	cut 1/3-1/2 length of lip segments	cut 1/3-1/2 length of lip segments
PETALS	linear to spatulate, 5-7 mm long, 2 mm wide	obovate (wedge-shaped) 9.6 mm long (mean), 5.8 mm wide (mean)	nearly triangular (fan-shaped) 13.1 mm long (mean), 9.5 mm wide (mean)
PLANT	sparse to stout, 20-80 cm tall	stout, 20-100 cm tall	stout, 38-85 cm tall
RACEME	rather dense; 15- to 60-flowered, 5-25 cm long, 2.0-4.5 cm wide	elongate; 12- to 30-flowered 12.8 cm long (mean)	short; 8- to 16-flowered (usually <20), 5-15 cm long, 5-9 cm wide
POLLINIA	--	closely spaced	divergent
RANGE	Newfoundland & Nova Scotia to Manitoba & MN, south to GA, AL, MS, AR, TX, MO	mostly east of Mississippi River: IA, KS, MN, MO, NE, ND, OK, Manitoba	west of Mississippi River: IL, ME, MI, OH, VA, WI, Ontario
SEPALS - LATERAL	4-6 mm long, 3 mm wide	8.1 mm long (mean), 5.0 mm wide (mean)	12.0 mm long (mean), 8.3 mm wide (mean)
SPUR	1.1-1.7 cm long	2.0-3.5 cm long	3.5-5.3 cm long
VISCIDIA	--	essentially parallel	somewhat forward

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¹Information from Case 1987, Sheviak and Bowles 1986, and Smith 1993.

Table 2

Historical reports of *Platanthera praeclara* (last observed prior to 1970 and/or confirmed destroyed).

COUNTY	SITE NAME	DATE OF FIRST OBSERVATION	DATE OF LAST OBSERVATION	STATUS AND COMMENTS
IOWA				
Adair	Greenfield	1891	1892: July 4	Status unknown; reported by Iowa Natural Heritage Program 1990.
Benton	Shellsburg	1918: July 8	1918: July 8	Status unknown.
Black Hawk	Cedar Falls	1894	1894	Status unknown.
Buena Vista	Marathon	1921: August 2	1921: August 2	Status unknown.
Cedar	unknown	undated	undated	Status unknown; reported in Roosa <i>et al.</i> 1989.
Chickasaw	Chickasaw Depot	1925: June 25	1926: June 25	Status unknown.
Clayton	Edgewood	1932: August 19	1932: August 19	Status unknown.
Decatur	Decatur	1898	1905: July 4	Status unknown.
Dickinson	Caylor Prairie State Preserve Wahpeton	1952: July 28 1943	1953: July 14 1945: July 15	Status unknown; site has not been searched systematically (Loeschke, unpub.) Status unknown.
Emmet	Armstrong Estherville Superior Wallingford 1 Wallingford 2	1892: August 1952: July 24 1949: July 14 1954: July 16 1944: July 4	1892: August 1952: July 24 1949: July 14 1954: July 16 1944: July 4	Status unknown. Status unknown. Status unknown. Status unknown. Status unknown.
Fayette	Fayette	undated	undated	Status unknown; not known if the same as West Union Prairie.
Grundy	Grundy	1903: July	1903: July	Status unknown.
Guthrie	Beaver	1952: June 21	1952: June 21	Status unknown.
Hamilton	Ellsworth	1940: June 1	1940: June 1	Status unknown.
Hancock	Lake Edwards	1896: July 20	1896: July 20	Status unknown.
Ida	Battle Creek	1945: June 24	1945: June 24	Status unknown.
Iowa	Homestead South Tama	1950: June 28 1903: July 4	1950: June 28 1903: July 4	Status unknown. Status unknown.

Table 2

Historical reports of *Platanthera praeclara* (last observed prior to 1970 and/or confirmed destroyed).

COUNTY	SITE NAME	DATE OF FIRST OBSERVATION	DATE OF LAST OBSERVATION	STATUS AND COMMENTS
Johnson	Iowa City	1903	1903	Status unknown.
Linn	Coggon Linn Mound Farm	1928: July 18 1921: July 2 1939: June 26	1928: July 18 1921: July 2 1939: June 26	Status unknown. Status unknown. Status unknown.
Muscatine	unknown	undated	undated	Status unknown; reported in Roosa <i>et al.</i> 1989.
Palo Alto	Crippen Siding	1943: July 27	1943: July 27	Status unknown.
Pottawat- tamie	unknown	undated	undated	Status unknown; reported in Roosa <i>et al.</i> 1989.
Poweshiek	Poweshiek	1884: July 8	1884: July 8	Status unknown.
Scott	unknown	undated	undated	Status unknown; reported in Roosa <i>et al.</i> 1989.
Story	Ames Story City	1907 1891: July 7	1907 1891: July 7	Status unknown. Status unknown.
Tama	Tama	1908: June 19	1908: June 19	Status unknown.
Union	Douglas	1952: June 30	1952: June 30	Status unknown.
Webster	Oakdale Otho Webster	1904: July 29 1903 1904: July 19	1904: July 29 1904: July 28 1904: July 19	Status unknown. Status unknown. Status unknown.
Winneshiek	Decorah Fort Atkinson Lincoln	1881: June 26 1903: August 11 1933: August 10	1881: June 26 1903: August 11 1933: August 10	Status unknown. Status unknown. Status unknown.
Wright	Eagle Grove	1902: July 9	1902: July 9	Status unknown.

Table 2

Historical reports of *Platanthera praeclara* (last observed prior to 1970 and/or confirmed destroyed).

COUNTY	SITE NAME	DATE OF FIRST OBSERVATION	DATE OF LAST OBSERVATION	STATUS AND COMMENTS
KANSAS				
Anderson	Wesphalia Prairie	1969: June 23	1969: June 23	Status unknown; reported in Bowles & Duxbury 1986; repeated unsuccessful survey (Freeman & Brooks 1989).
Atchison	unnamed	1866: July	1866: July	Status unknown; reported in Bowles & Duxbury 1986.
Coffey	Waverly Prairie	1969: June 23	1969: June 23	Prairie destroyed; converted to cropland (Freeman & Brooks 1989).
Crawford	Frisco Tree Farm	1950: June 24	1950: June 24	Population assumed destroyed; site of former tree farm, now used for agriculture (Bowles & Duxbury 1986).
Douglas	Elkins Prairie Wakarusa Valley Prairie Lawrence	1969: June 18 1941: June 15 undated	1983 1941: June 15 undated	Prairie destroyed; plowed in 1990. Prairie destroyed; converted to cropland (Freeman & Brooks 1989). Status unknown; reported in Bowles & Duxbury 1986; 3 vouchers listed from county without dates.
Jefferson	Dean's Prairie	1969: June 23	1969: June 23	Status unknown; reported in Bowles & Duxbury 1986; surveyed in 1989, but no plants observed (Freeman & Brooks 1989).
Johnson	Olathe Prairie	1970: June 17	1970: June 17	Prairie destroyed; converted to cropland (Freeman & Brooks 1989).
Leavenworth	Lansing Prairie	1969: June 23	1969: June 23	Prairie destroyed; converted to cropland (Freeman & Brooks 1989).
Lyon	Reading	1909: June 24	1909: June 24	Status unknown; reported in Bowles & Duxbury 1986.
Neosho	unnamed	undated	undated	Status unknown; reported in Correll 1950.
Pottawat- tamie	near Onaga	1904: June	1904: June	Status unknown; reported in Bowles & Duxbury 1986.
Riley	unnamed	1896: June	1896: June	Status unknown; reported in Bowles & Duxbury 1986.
Shawnee	Topeka	1879: May 5	1879: May 5	Status unknown; reported in Bowles & Duxbury 1986.
Unknown	Manniouth Westport, Arkansas [Territory?]	1878: June 14 undated	1878: June 14 undated	Status unknown; reported in Bowles & Duxbury 1986. Status unknown; reported in Bowles & Duxbury 1986; possible location in Sheviak 1987.

Table 2

Historical reports of *Platanthera praeclara* (last observed prior to 1970 and/or confirmed destroyed).

COUNTY	SITE NAME	DATE OF FIRST OBSERVATION	DATE OF LAST OBSERVATION	STATUS AND COMMENTS
MINNESOTA				
Douglas	Alexandria	1878: July	1878: July	Status unknown; general area searched but no plants found (W. Smith, unpub).
Freeborn	10 mi east of Albert Lea	1939: July	1939: July	Status unknown; searched 1980, 1981, but no plants found (W. Smith, unpub).
Goodhue	Cannon Falls	1881: August	1881: August	Status unknown; label information too general to relocate.
Hennepin	Fort Snelling	1909: July 19	1909: July 19	Status unknown; label information too general to relocate.
Houston	Railroad along Crooked Creek	1899: July 7	1899: July 7	Status unknown; label information too general to relocate.
Kandiyohi	Spicer	1892: August	1892: August	Status unknown; label information too general to relocate.
Nicollet Nicollet	Swan Lake unnamed	1878 1878	1893: July 1883	Status unknown; label information too general to relocate. Status unknown; label information too general to relocate.
Nobles	Worthington	undated	undated	Status unknown; label information too general to relocate.

Table 2

Historical reports of *Platanthera praeclara* (last observed prior to 1970 and/or confirmed destroyed).

COUNTY	SITE NAME	DATE OF FIRST OBSERVATION	DATE OF LAST OBSERVATION	STATUS AND COMMENTS
MISSOURI				
Clinton	unnamed	undated	undated	Listed in Steyermark 1963, but specimen evidence is lacking.
Greene	unnamed	undated	undated	Listed in Steyermark 1963, but specimen evidence is lacking.
Jackson	Grain Valley	1895: July 4	1898: July 11	Reported extirpated in Morgan 1980.
Jasper	unnamed	????: June 15	????: June 15	Status unknown; recent searches, no plants found (T. Smith, MO DOC, 1995 <u>pers. comm.</u> to N. Sather).
Johnson	Near Warrensburg	1926: June 20	1926: June 20	Reported extirpated in Morgan 1980.
Lawrence	3.5 mi northeast of Aurora	1952: June 10	1952: June 10	Reported extirpated in Morgan 1980.
Newton	unnamed	undated	undated	Listed in Steyermark 1963, but specimen evidence is lacking.
Stone	unnamed	undated	undated	Status unknown; reported in Thurman and Hickey 1989.
Vernon	unnamed	1873: July 25	1873: July 25	Status unknown; reported in Morgan 1980.

Table 2

Historical reports of *Platanthera praeclara* (last observed prior to 1970 and/or confirmed destroyed).

COUNTY	SITE NAME	DATE OF FIRST OBSERVATION	DATE OF LAST OBSERVATION	STATUS AND COMMENTS
NEBRASKA				
Antelope	Neligh	1887: July 1	1887: July 1	Status unknown; reported in Bowles & Duxbury 1986.
Brown	Long Pine	1893: July 8	1893: July 8	Status unknown; reported in Bowles & Duxbury 1986.
Cass	near Plattsmouth	1890	1890	Status unknown; reported in Bowles & Duxbury 1986.
Cherry	Dewey Lake Kennedy Lone Tree Lake, Kennedy Oasis Pullman	1912: July 6 1889: July 11 1928: July 28 1912: July 13 1892: July 20	1912: July 6 1889: July 11 1928: July 28 1912: July 13 1892: July 20	Status unknown; reported in Bowles & Duxbury 1986, Freeman & Brooks 1989; several searches of general area have failed to relocate plants. Status unknown; reported in Bowles & Duxbury 1986. Status unknown; reported in Bowles & Duxbury 1986; search 1985, none found. Status unknown; reported in Bowles & Duxbury 1986, Freeman & Brooks 1989. Status unknown; reported in Bowles & Duxbury, Freeman & Brooks 1989.
Dodge	Union Pacific Railroad Prairie	1903: June 26	1903: June 26	Presumed extirpated prairie highly degraded (Bowles & Duxbury 1986, Freeman & Brooks 1989).
Grant	Whitman	1913: July 2	1913: July 2	Status unknown; reported in Bowles & Duxbury 1986, Freeman & Brooks 1989.
Greeley	Chalk Mine Wayside at Scotia	1974-1979	1974-1979	Status unknown; reported in Bowles & Duxbury 1986, Freeman & Brooks 1989.
Jefferson	Diller	1885: July 13	1885: July 13	Status unknown; reported in Bowles & Duxbury 1986.
Kearney	Newark Platte River	1891: June 30 1891: June 15	1891: June 30 1891: June 15	Status unknown; reported in Bowles & Duxbury 1986. Status unknown; reported in Bowles & Duxbury 1986.
Lancaster	Lincoln area	1873: June 18	1927: June 27	Status unknown; reported in Bowles & Duxbury 1986; includes 5 collections from the general vicinity of Lincoln made over a 50-year period.
Otoe	near Bennett Nebraska City area	1894: July 1 1900: June	1894: July 1 1900: July 27	Status unknown; reported in Bowles & Duxbury 1986. Status unknown; reported in Bowles & Duxbury 1986; includes 2 specimens from the vicinity of Nebraska City.
Pierce	Plainview	1907: July	1907: July	Status unknown; reported in Bowles & Duxbury 1986.
Sarpy	near Bellevue	1884: July 6	1884: July 6	Status unknown; reported in Bowles & Duxbury 1986.

Table 2

Historical reports of *Platanthera praeclara* (last observed prior to 1970 and/or confirmed destroyed).

COUNTY	SITE NAME	DATE OF FIRST OBSERVATION	DATE OF LAST OBSERVATION	STATUS AND COMMENTS
Washington	Rathgen Prairie	undated	undated	Status unknown; reported in Bowles & Duxbury 1986; area invaded by shrubs.
Unknown	Greely Center Iron Mountain	1889: July 4 1889: June 21	1889: July 4 1889: June 21	Status unknown; reported in Bowles & Duxbury 1986. Status unknown; reported in Bowles & Duxbury 1986.
NORTH DAKOTA				
Cass	unnamed	1929: July 4	1929: July 4	Status unknown; reported in Bowles & Duxbury 1986, specimen may have been collected in Richland County.
Ransom	13 mi west and 8 mi south of McLeod	1953: July 15	1953: July 15	Status unknown; reported in Bowles & Duxbury 1986; area searched 1983, but no plants found.
Richland	Section 22 Prairie	1908: August 6	1908: August 6	Prairie destroyed; converted to cropland (Bowles & Duxbury 1986).
	Waldron	1890: July 19	1890: July 19	Status unknown; reported in Bowles & Duxbury 1986.
OKLAHOMA				
Craig	White Oak Prairie	1975: June 21	1975: June 21	Status unknown; surveyed several years, no plants observed
Rogers	Foyil Prairie	1975: June 21	1975: June 21	Status unknown; surveyed several years, no plants observed
SOUTH DAKOTA				
Brookings	Brookings	1892	1892	Status unknown; reported in Bowles & Duxbury 1986.
Minnehaha	Near Brandon	1916: July 14	1916: July 14	Status unknown; reported in Bowles & Duxbury 1986.
WYOMING				
unknown	Platte Bottom	undated	undated	Status unknown; reported in Bowles & Duxbury 1986 (now assumed spurious).

The majority of old collections were collected under the name *P. leucophaea*, but have been subsequently determined to be *P. praeclara*.

Table 3.

Extant populations of Platanthera praeclara (1st observed or reconfirmed after 1970).

STATE	COUNTY	SITE NAME	POP. I ZE ¹	PROTECTION LEVEL ²	ECO REGION ³	OWNERSHIP	1ST SEEN	LAST SEEN	PRE- DOMINANT MANAGEMENT	MONITORING
Iowa	Adair	Woodside Prairie	71	1	251C	private	1967	1979	Burned	
Iowa	Bremer	Brayton Prairie	1	1	222M	private	1973	1994(0)	Burned	Periodic census
Iowa	Bremer	Ray Prairie	1	1	222M	private	1982	1982	Hayed	Periodic census
Iowa	Buena Vista	Low Morris Prairie	11	1	251B	private	1993	1994(3)	Hayed	Periodic census
Iowa	Cherokee	Steele Prairie State Preserve	141	9	251B	IA DNR	1985	1989	Burned	Periodic census
Iowa	Clay	Kirchner Prairie	27	1	251B	private	1982	1994(5)	Hayed	Periodic census
Iowa	Crawford	Welch Prairie	2	1	251C	private	1993	1994(2)	Grazed	
Iowa	Dickinson	Bergman Becker Prairie	18	1	251B	private	1983	1994(0)	Hayed	Periodic census
Iowa	Emmet	Anderson Prairie State Preserve	1	9	251B	IA DNR	1983(1)	1994(0)	Burned	
Iowa	Emmet	Superior Railroad Prairie	5	1	251B	Railroad	1994(5)	1994(5)	Unknown	
Iowa	Emmet	Estherville Railroad Prairie	3	1	251B	Railroad	1994(3)	1994(3)	None	
Iowa	Fayette	Potratz Ditch	1	1	222M	ROW	1992	1992(1)	None	Periodic census
Iowa	Fayette	West Union Prairie	23	9	222M	private	1991(23)	1991(23)	None	
Iowa	Guthrie	Sheeder Prairie State Preserve	282	9	251C	IA DNR	1974	1987	Burned	
Iowa	Guthrie	Rosehill Cemetery	1	0	251C	ROW	1993	1994(1)	None	
Iowa	Howard	Hayden Prairie State Preserve	27	9	222M	IA DNR	1981	1994(1)	Burned	
Iowa	Howard	Crossman Prairie State Preserve	11	9	222M	TNC	1982	1994(3)	Burned	
Iowa	Kossuth	Bernau Prairie	1	1	251B	private	1986	1986	Hayed	
Iowa	Mills	Wearin Prairie	2	1	251C	private	1993	1994(1)	Hayed	
Iowa	Mills	Burgoin Prairie	1	1	251C	private	1993	1994(1)	Unknown	
Iowa	Mills	Mills County #3	100	0	251C	private	1995	1995	Hayed	
Iowa	Pocahontas	Kalsow Prairie State Preserve	13	9	251B	IA DNR	1954	1994(13)	Burned	
Iowa	Taylor	Powell Prairie	55	1	251C	private	1994(55)	1994(55)	Hayed	
Kansas	Douglas	Colyer Prairie	10	0	251C	private	1991	1993	Hayed	
Kansas	Franklin	Fowler Hill Prairie	1	0	251E	private	1970	1970	Hayed	

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STATE	COUNTY	SITE NAME	POP. I ZE ¹	PROTECTION LEVEL ²	ECO REGION ³	OWNERSHIP	1ST SEEN	LAST SEEN	PRE- DOMINANT MANAGEMENT	MONITORING
Kansas	Jackson	Hoyt Prairie	1	0	251C	private	1970	1970	Hayed	Demographic
Kansas	Jefferson	Rockefeller Prairie	30	8	251C	KS	1969	1994	Burned	Periodic census
Kansas	Leavenworth	High Prairie	1	0	251C	private	1986	1986	Hayed	Demographic
Kansas	Osage	Osage Prairie	14	2	251E	private	1986	1991	Hayed	Periodic census
Kansas	Shawnee	Shawnee Heights Prairie	1	0	251C	private	1970	1970	Hayed	Demographic
Minnesota	Clay	Bicentennial Prairie	25	9	251A	County	1979(25)	1994(6)	Burned	Periodic census
Minnesota	Clay	Bluestem Prairie	6	8	251A	TNC	1992(6)	1994(3)	Burned	Demographic
Minnesota	Clay	Bluestem Prairie	48	8	251A	TNC	1987(7)	1994(48)	Burned	Demographic
Minnesota	Clay	Bluestem Prairie	86	6	251A	MN DNR	1991(18)	1994(45)	Burned	Demographic
Minnesota	Clay	Ulen WMA	55	6	251A	MN DNR	1986(38?)	1994(55)	Unknown	
Minnesota	Clay	Riverton 11	1	1	251A	MSU	1992(1)	1994(0)	Burned	Demographic
Minnesota	Clay	Elkton 1	1	0	251A	private	1994(1)	1994(1)	Hayed	Periodic census
Minnesota	Clay	Riverton 15	8	1	251A	private	1993(8)	1994(5)	Unknown	
Minnesota	Clay	Ulen WMA	3	0	251A	ROW	1990(3)	1994(0)	None	Periodic census
Minnesota	Dodge	Sargeant	1	6	222M	MN DNR	1982(1)	1992(0)	Burned	
Minnesota	Kittson	Lake Bronson Parkland	7	6	251A	MN DNR	1992(7)	1992(0)	None	Periodic census
Minnesota	Kittson	Lake Bronson Parkland SNA	159	9	251A	MN DNR	1991(300)	1994(159)	None	Demographic
Minnesota	Kittson	Lake Bronson Parkland	300	1	251A	private	1991(300?)	1992(300)	Grazed	
Minnesota	Mower	Leroy/Rose CRK ROW NHR	38	6	222M	MN DNR	1980(34)	1991(0)	Burned	
Minnesota	Norman	Agasco Dunes SNA	1	9	251A	MN DNR	1980(34)	1991(0)	Burned	
Minnesota	Norman	Dalby WMA	102	6	251A	MN DNR	1994(4)	1995	Unknown	Periodic census
Minnesota	Norman	Syre WMA	30	6	251A	MN DNR	1994(30)	1994(30)	Unknown	
Minnesota	Norman	Flaming	1	1	251A	ROW	1975(1)	1991(0)	None	
Minnesota	Norman	Strand	5	1	251A	ROW	1975(3)	1994(5)	None	Periodic census
Minnesota	Norman	Rockwell 11	13	0	251A	private	1995	1995	None	
Minnesota	Pennington	Goose Lake Prairies	100	6	251A	MN Trust	1993(83)	1994(?)	None	Demographic
Minnesota	Pennington	Goose Lake Prairies	8	0	251A	private	1992(8)	1992(8)	Grazed	

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STATE	COUNTY	SITE NAME	POP. I ZE ¹	PROTECTION LEVEL ²	ECO REGION ³	OWNERSHIP	1ST SEEN	LAST SEEN	PRE- DOMINANT MANAGEMENT	MONITORING
Minnesota	Pennington	Goose Lake Prairies	71	0	251A	private	1992(71)	1994(?)	Grazed	Periodic census
Minnesota	Pipestone	Pipestone Natl. Monument	37	6	251B	US NPS	1980(2)	1994(9)	Unknown	Periodic census
Minnesota	Pipestone	Pipestone Natl. Monument	1	6	251B	US NPS	1984(1)	unknown	Unknown	Periodic census
Minnesota	Polk	Pembina Trail	300	9	251A	TNC	1990(50)	1994(1001)	Burned	Periodic census
Minnesota	Polk	Pembina Trail	1381	9	251A	TNC	1990(135)	1994(1381)	Burned	Periodic census
Minnesota	Polk	Pembina Trail	1	9	251A	TNC	unknown	unknown	Burned	Periodic census
Minnesota	Polk	Pembina Trail	13	9	251A	TNC	1990(1)	1994(13)	Burned	Periodic census
Minnesota	Polk	Pembina Trail	43	9	251A	TNC	1982(43)	unknown	Burned	
Minnesota	Polk	Pembina Trail	75	9	251A	TNC	1984(75)	1991(2)	Burned	Periodic census
Minnesota	Polk	Pembina Trail	4792	9	251A	TNC	1976	1990(4792)	Burned	Periodic census
Minnesota	Polk	Pembina Trail	326	9	251A	TNC	unknown	1994(326)	Burned	Periodic census
Minnesota	Polk	Pembina Trail	79	9	251A	TNC	1990(5)	1994(79)	Burned	
Minnesota	Polk	Burnham WMA	1	6	251A	MN DNR	1991(1)	1991(1)	Burned	Demo- graphic census
Minnesota	Polk	Burnham WMA	78	6	251A	MN DNR	1971(1?)	1990(78)	Burned	Periodic census
Minnesota	Polk	Burnham WMA	15	6	251A	MN DNR	1990(15)	1990(15)	Burned	Periodic census
Minnesota	Polk	Dugdale WMA	14	6	251A	MN DNR	1991(14)	1991(14)	Burned	Periodic census
Minnesota	Polk	Dugdale WMA	5	6	251A	MN DNR	1993(5)	1993(5)	Burned	
Minnesota	Polk	Dugdale WMA	15	6	251A	MN DNR	1993(15)	1993(15)	Burned	Periodic census
Minnesota	Polk	Foxboro Prairie SNA	20	9	251A	MN DNR	1983(20)	1990(9)	Burned	
Minnesota	Polk	Godfrey WMA	100	6	251A	MN DNR	1993(100)	1993(100)	Burned	Periodic census
Minnesota	Polk	Pembina Trail	104	9	251A	MN DNR	1976(1)	1994(104)	Burned	
Minnesota	Polk	Tympanuchus Prairie	8	9	251A	MN DNR	1979(1)	1994(8)	Burned	Periodic census

Table 3.

Extant populations of Platanthera praecleara (reconfirmed or 1st observed after 1970).

STATE	COUNTY	SITE NAME	POP. I ZE ¹	PROTECTION LEVEL ²	ECO REGION ³	OWNERSHIP	1ST SEEN	LAST SEEN	PRE- DOMINANT MANAGEMENT	MONITORING
Minnesota	Polk	Tympanuchus Prairie	2	9	251A	MN DNR	1979(2)	1993(0)	Burned	
Minnesota	Polk	Godfrey Prairie	5	0	251A	private	1993(5)	unknown	Grazed	Periodic census
Minnesota	Polk	Grove Park 20	111	1	251A	private	1993(1)	1994(111)	None	
Minnesota	Polk	Marcoux	15	0	251A	ROW	1991(15)	1993	None	Periodic census
Minnesota	Polk	Marcoux	50	0	251A	ROW	1991(20)	unknown	None	
Minnesota	Polk	Marcoux Corners Prairie	12	0	251A	ROW	1993(12)	1993(12)	None	
Minnesota	Polk	Onstad 26	370	1	251A	private	1976(370)	1991(44)	Hayed	Periodic census
Minnesota	Polk	Onstad 3	237	1	251A	private	1991(115)	unknown	Hayed	Periodic census
Minnesota	Polk	Onstad 3	106	1	251A	private	1990(2)	1991(24)	Grazed	
Minnesota	Polk	Tilden 20	2	0	251A	private	1990(2)	1993(1)	None	
Minnesota	Polk	Benoit Station	130	1	251A	ROW	1990(34)	1993(130)	None	Periodic census
Minnesota	Polk	Marcoux	1	0	251A	ROW	1990(1)	1991(0)	None	Periodic census
Minnesota	Polk	Marcoux Corners Prairie	12	0	251A	ROW	1993(12)	unknown	None	Periodic census
Minnesota	Rock	Blue Mounds State Park	275	6	251B	MN DNR	unknown	unknown	Burned	Periodic census

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Extant populations of Platanthera praeclara (reconfirmed or 1st observed after 1970).

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Missouri	Atchison	Tarkio Prairie NA	17	8	251C	MO DOC	unknown	unknown	Hayed/ burned	Periodic census
Missouri	Harrison	Helton Prairie Natural Area	15	9	251C	MO DOC	unknown	1994(15)	Burned	Periodic census
Missouri	Holt	Little Tark Prairie	5	0	251C	private	unknown	unknown	Hayed	
Nebraska	Cherry	Valentine NWR	77	6	332C	USFWS	1990	1995	Grazed	Periodic census
Nebraska	Cherry	Valentine NWR	123	6	332C	USFWS	1994	1995	Grazed	Periodic census
Nebraska	Cherry	Valentine NWR	2	6	332C	USFWS	1979	1995	Grazed	
Nebraska	Cherry	Road Side Park	2	0	332C	private	1993	1993	Grazed	Periodic census
Nebraska	Cherry	CNW-Arabia	22	0	332C	private	1985	1994	Hayed	
Nebraska	Cherry	Watts Lake	21	0	332C	private	1993	1994	Hayed	
Nebraska	Cherry	Duck lake	6	0	332C	private	1986	1994	Hayed	Periodic census
Nebraska	Hall	Mormon Island Crane Meadows	50	8	332E	ICF	1978	1995 (5)	Burned	Periodic census
Nebraska	Lancaster	Nine Mile Prairie	176	8	251G	NE	1984	1995 (0)	Burned	Demographic
Nebraska	Lancaster	Lancaster #2	2	0	251G	private	1994	1994	Hayed	
Nebraska	Otoe	Dicken Prairie	12	0	251G	private	1995	1995	Hayed	
Nebraska	Sarpy	Krebs Prairie	60	2	251C	private	1993	1994(9)	Hayed	Periodic census
Nebraska	Seward	Twin Lakes WMA	50	8	251G	NE Game & Parks	1982	1994	Burned	

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N. Dakota	Ransom	North S Allotment	73	6	251A	USFS	1985	1993	Grazed	Periodic census
N. Dakota	Ransom	Venlo Allotment	364	6	251A	USFS	1982	1994	Grazed	Periodic census
N. Dakota	Ransom	Berg Allotment	232	6	251A	USFS	1982	1994	Grazed	Periodic census
N. Dakota	Ransom	McLeod Allotment	137	6	251A	USFS	1981	1994	Grazed	Periodic census
N. Dakota	Ransom	A Annex Allotment	1140	6	251A	USFS	1982	1994	Grazed	Demo- graphic census
N. Dakota	Ransom	Bjugstad Allotment	328	6	251A	USFS	1982	1994	Grazed	Demo- graphic census
N. Dakota	Ransom	Brown Allotment	24	6	251A	USFS	1984	1994	Grazed	Periodic census
N. Dakota	Ransom	Braaten Allotment	43	6	251A	USFS	1984	1994	Grazed	Periodic census
N. Dakota	Ransom	Sagvold Allotment	526	6	251A	USFS	1982	1994	Grazed	Periodic census
N. Dakota	Ransom	Olerud Allotment	561	6	251A	USFS	1979	1994	Grazed	Demo- graphic census
N. Dakota	Ransom	Hanson Allotment	54	6	251A	USFS	1984	1994	Grazed	
N. Dakota	Ransom	Griggs Allotment	7	6	251A	USFS	1984	1994	Grazed	Periodic census
N. Dakota	Ransom	S Brown	11	6	251A	USFS	1993	1993	Grazed	Periodic census
N. Dakota	Ransom	North Durler Allotment	347	6	251A	USFS	1982	1991	Grazed	Periodic census
N. Dakota	Ransom	South S East Allotment	27	6	251A	USFS	1982	1993	Grazed	Periodic census
N. Dakota	Ransom	Owego Allotment	73	6	251A	USFS	1982	1990	Grazed	Periodic census
N. Dakota	Ransom	LX Allotment	167	6	251A	USFS	1982	1994	Grazed	Periodic census
N. Dakota	Ransom	Penberty Allotment	185	6	251A	USFS	1982	1994	Grazed	Demo- graphic census
N. Dakota	Ransom	Wall Allotment	436	6	251A	USFS	1979	1994	Grazed	Periodic census

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N. Dakota	Ransom	Code 6, pasture	5	0	251A	private	1992	1993	Grazed	Periodic census
N. Dakota	Ransom	Code 5, prairie	7	0	251A	private	1982	1987	Grazed	Periodic census
N. Dakota	Ransom	Code 22	4	0	251A	private	unknown	unknown	Grazed	Periodic census
N. Dakota	Ransom	Hakanson Allotment	9	6	251A	USFS	1987	1993	Grazed	Periodic census
N. Dakota	Ransom	Milton Sr. Allotment	56	6	251A	USFS	1982	1994	Grazed	Periodic census
N. Dakota	Ransom	South Durler Allotment	51	6	251A	USFS	1976	1993	Grazed	Periodic census
N. Dakota	Ransom	Northrop Allotment	53	6	251A	USFS	1984	1994	Grazed	Periodic census
N. Dakota	Ransom	Code 3, pasture	27	0	251A	private	1991	1994	Grazed	Periodic census
N. Dakota	Ransom	East S	12	6	251A	USFS	1993	1993	Grazed	Periodic census
N. Dakota	Ransom	Code 1, pasture	36	0	251A	private	1984	1993	Grazed	Periodic census
N. Dakota	Ransom	J Allotment	7	6	251A	USFS	1981	1994	Grazed	Periodic census
N. Dakota	Ransom	Code 25	3	0	251A	private	unknown	unknown	Grazed	Periodic census
N. Dakota	Ransom	Code 2, dunes	26	0	251A	private	1991	1994	Grazed	Periodic census
N. Dakota	Ransom	Code 15, pasture	25	0	251A	private	1982	1984	Grazed/ hayed	
N. Dakota	Ransom	Code 8	2	0	251A	private	1982	1984	Grazed/ hayed	
N. Dakota	Ransom	Code 7, ditch	2	0	251A	unknown	1992	1992	Hayed	Periodic census
N. Dakota	Ransom	Highway 27B Ditch	34	0	251A	unknown	1993	1993	Hayed	
N. Dakota	Ransom	Code 24, ditch	75	0	251A	unknown	unknown	unknown	Hayed	Periodic census
N. Dakota	Ransom	Code 14, ditch	3	0	251A	unknown	1982	1984	Hayed	Periodic census
N. Dakota	Ransom	Code 4, prairie ditch	3	0	251A	unknown	1992	1993	Hayed	Periodic census
N. Dakota	Ransom	Code 13, ditch	18	0	251A	unknown	1987	1993	Hayed	

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N. Dakota	Ransom	Highway 53B Ditch	46	0	251A	unknown	1992	1994	Hayed	Periodic census
N. Dakota	Ransom	Code 11, ditch	5	0	251A	unknown	1991	1993	Hayed	
N. Dakota	Ransom	Code 10, ditch	1	0	251A	unknown	1992	1992	Hayed	Periodic census
N. Dakota	Ransom	Highway 53C Ditch	17	0	251A	unknown	1993	1993	Hayed	Periodic census
N. Dakota	Ransom	Highway 27A Ditch	44	0	251A	unknown	1987	1987	Hayed	
N. Dakota	Ransom	Highway 53A Ditch	10	0	251A	unknown	1990	1994	Hayed	
N. Dakota	Ransom	Code 19, prairie	4	0	251A	private	unknown	unknown	Hayed	
N. Dakota	Ransom	Code 21, meadow	1	0	251A	private	unknown	unknown	Hayed	Periodic census
N. Dakota	Ransom	Code 20	35	0	251A	private	unknown	unknown	Hayed	
N. Dakota	Ransom	Code 12, prairie	2	0	251A	private	1991	1992	Hayed	Periodic census
N. Dakota	Ransom	Code 17, prairie ditch	28	0	251A	unknown	1992	1992	Unknown	Periodic census
N. Dakota	Ransom	Railroad ROW	100	0	251A	private	unknown	unknown	Unknown	
N. Dakota	Ransom	Code 9	17	0	251A	private	1984	1984	Unknown	Periodic census
N. Dakota	Ransom	Code 26	1	0	251A	private	unknown	unknown	Unknown	Periodic census
N. Dakota	Ransom	Code 18, prairie	23	0	251A	private	1984	1984	Unknown	Demographic
N. Dakota	Ransom	Code 23, prairie	2	0	251A	private	unknown	unknown	Unknown	Periodic census
N. Dakota	Ransom	Code 16	13	0	251A	private	1984	1984	Unknown	Periodic census
N. Dakota	Richland	R Allotment	74	6	251A	USFS	1984	1984	Grazed	Periodic census
N. Dakota	Richland	Code 27	5	0	251A	private	unknown	unknown	Grazed	Demographic
N. Dakota	Richland	Jordheim	40	6	251A	USFS	1987	1987	Grazed	Periodic census
N. Dakota	Richland	Code 35, road ditch	1	0	251A	unknown	unknown	unknown	Grazed	Periodic census
N. Dakota	Richland	Code 32, pasture	3	0	251A	private	unknown	unknown	Grazed	Periodic census
N. Dakota	Richland	King Allotment	1	6	251A	USFS	1991	1991	Grazed	Periodic census
N. Dakota	Richland	Code 29, prairie	8	0	251A	private	unknown	unknown	Grazed	Demographic

Table 3.

Extant populations of *Platanthera praecleara* (reconfirmed or 1st observed after 1970).

STATE	COUNTY	SITE NAME	POP. I ZE ¹	PROTECTION LEVEL ²	ECO REGION ³	OWNERSHIP	1ST SEEN	LAST SEEN	PRE- DOMINANT MANAGEMENT	MONITORING
N. Dakota	Richland	Code 33, pasture	9	0	251A	private	unknown	unknown	Grazed/ hayed	Periodic census
N. Dakota	Richland	Code 30, ditch	3	0	251A	unknown	unknown	unknown	Hayed	Periodic census
N. Dakota	Richland	Code 31, ditch	1	0	251A	unknown	unknown	unknown	Hayed	Periodic census
N. Dakota	Richland	Code 36, haymeadow	7	0	251A	private	unknown	unknown	Hayed	Periodic census
N. Dakota	Richland	Highway 1B Ditch	14	0	251A	unknown	unknown	unknown	None	Periodic census
N. Dakota	Richland	Code 34, pasture ditch	1	0	251A	unknown	unknown	unknown	Unknown	Periodic census
N. Dakota	Richland	Code 28, ditch	10	0	251A	unknown	unknown	unknown	Unknown	Periodic census
TOTAL KNOWN FLOWERING PLANTS IN RANGE			15172							
TOTAL NUMBER OF KNOWN POPULATIONS			175							

Table 3.

Extant populations of Platanthera praeclara (reconfirmed or 1st observed after 1970).

- ¹ Maximum number of flowering plants documented at the site.
- ² Protection status of The Nature Conservancy 1996.
- ³ Ecoregions of Bailey et al. (1994)

The Nature Conservancy's 10 levels of protection:

- 0 No protection
- 1 Notification -- Landowner or site manager notified of the species presence
- 2 Voluntary protection provided by landowner or site manager
- 3 Bequest - Will, right of first refusal, or other landowner/agency commitment
- 4 Lease, license, or management agreement
- 5 Undivided or remainder interest conveyed to a conservation entity
- 6 Public land designation
- 7 Conservation easement
- 8 Fee title or beneficial interest with management control
- 9 Dedication

Habitat type of Platanthera praeclara in each state and province of occurrence.

Table 4.

STATE/PROVINCE	HABITAT TYPE
UNITED STATES	
IOWA	wet-mesic to mesic tallgrass prairie
KANSAS -- eastern	mesic to wet-mesic upland prairies
-- northeastern	wet-mesic to mesic tallgrass prairie
MINNESOTA -- southern	wet-mesic to mesic tallgrass prairie
-- central	interbeach lacustrine plain
-- northern	discontinuous interbeach areas
MISSOURI -- western sect., glaciated plains natural div.	mesic prairie
-- Grand River sect., glaciated plains natural div.	mesic prairie
NEBRASKA	tallgrass prairies or sedge meadows in swales among eolian dune sands
NORTH DAKOTA	sedge meadow and tallgrass prairie
OKLAHOMA (extirpated)	mesic to wet-mesic upland prairies
SOUTH DAKOTA (extirpated)	wet-mesic to mesic tallgrass prairie
CANADA	
MANITOBA	wet prairie to meadow

Table 5. Associated plant taxa occurring at selected extant *Platanthera praeclara* sites.

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SCIENTIFIC NAME	COMMON NAME	A ^{1,2}	B ²	C ³	D ³	E ^{4,5,7,6}	F ⁸	G ⁸	H ⁸	I ⁸	J ⁸	K ^{8,9,10}	L ¹¹
<i>Achillea millefolium</i>	common yarrow	X ⁶					X			X		X	
<i>Agalinis tenuifolia</i>	slender false foxglove												
<i>Agoseris glauca</i>	prairie dandelion											X	
<i>Agropyron caninum</i> var. <i>majus</i>	cutting wheatgrass												
<i>Agrostis stolonifera</i>	spreading bentgrass			X					X			X	X
<i>Alisma triviale</i>	water plantain												X
<i>Allium canadense</i>	wild onion						X						
<i>Allium stellatum</i>	wild onion						X		X				
<i>Amaranthus rudis</i>	water-hemp												X
<i>Ambrosia artemisiifolia</i>	common ragweed			X			X						
<i>Ambrosia psilostachya</i>	western ragweed					X							
<i>Ammania robusta</i>	toothcup												X
<i>Amorpha canescens</i>	leadplant	X				X	X	X					
<i>Amorpha fruticosa</i>	false indigo												X
<i>Amorpha nana</i>	fragrant false indigo									X			
<i>Andropogon gerardii</i>	big bluestem	X				X	X	X	X	X	X	X	
<i>Andropogon scoparius</i>	little bluestem	X				X			X				
<i>Anemone canadensis</i>	meadow anemone					X			X	X	X		

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<i>Antennaria neglecta</i>	pussytoes					X						X	
<i>Apocynum cannabinum</i>	Indian hemp							X	X	X			X
<i>Artemisia ludoviciana</i>	white sage					X							
<i>Asclepias incarnata</i>	swamp milkweed				X				X				X
<i>Asclepias speciosa</i>	showy milkweed								X				
<i>Asclepias sullivantii</i>	prairie milkweed		X										
<i>Asclepias tuberosa</i>	butterfly-weed	X											
<i>Asclepias verticillata</i>	whorled milkweed	X											
<i>Asclepias viridiflora</i>	green milkweed		X										
<i>Asclepias viridis</i>	green-flowered milkweed		X										
<i>Aster ericoides</i>	heath aster	X				X	X		X	X		X	
<i>Aster junciformis</i>	rush aster								X				
<i>Aster laevis</i>	smooth aster	X					X						
<i>Aster novae-angliae</i>	New England aster							X	X	X			
<i>Aster oblongifolius</i>	aromatic aster						X			X			
<i>Aster oolentangiensis</i>	azure aster							X					
<i>Aster sericeus</i>	silky aster						X						
<i>Aster simplex</i>	panicked aster					X			X	X	X	X	

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<i>Aster umbellatus</i>	flat-top aster							X	X		X		
<i>Baptisia australis</i>	blue wild indigo		X										
<i>Baptisia bracteata</i> var. <i>glabrescens</i>	plains wild indigo		X					X					
<i>Baptisia lactea</i>	white wild indigo							X					
<i>Betula pumila</i>	dwarf birch								X		X	X	
<i>Bidens cernua</i>	nodding beggar-ticks												X
<i>Bidens frondosa</i>	beggar-ticks												X
<i>Bidens vulgata</i>	tall beggar-ticks												X
<i>Bouteloua curtipendula</i>	side-oats grama	X				X	X						
<i>Bromus ciliatus</i>	Canada brome grass								X				
<i>Bromus inermis</i>	awnless brome grass	X											
<i>Bromus japonicus</i>	Japanese chess	X											
<i>Calamagrostis canadensis</i>	bluejoint grass				X						X		
<i>Calamagrostis stricta</i>	narrow-spike small-reedgrass					X			X	X			
<i>Campanula aparinoides</i>	marsh bell-flower				X				X		X		
<i>Carex amphibola</i> var. <i>turgida</i>	sedge												X
<i>Carex aquatilis</i>	sedge			X									

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<i>Carex aurea</i>	sedge											X	
<i>Carex bicknellii</i>	sedge						X						X
<i>Carex brevior</i>	sedge	X		X		X							
<i>Carex buxbaumii</i>	sedge								X	X	X	X	
<i>Carex crawei</i>	sedge											X	
<i>Carex granularis</i>	sedge					X							
<i>Carex gravida</i>	sedge												X
<i>Carex hallii</i>	Hall's sedge								X				
<i>Carex heliophila</i>	sedge					X							
<i>Carex hystericina</i>	sedge												X
<i>Carex laeviconica</i>	sedge												X
<i>Carex lanuginosa</i>	sedge				X	X				X			X
<i>Carex praegracilis</i>	sedge								X	X			
<i>Carex sartwellii</i>	sedge										X		
<i>Carex scirpiformis</i>	sedge								X				
<i>Carex scoparia</i>	sedge			X				X					
<i>Carex stipata</i>	sedge												X
<i>Carex stricta</i>	sedge												X

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<i>Carex tetanica</i>	sedge								X	X	X		
<i>Carex viridula</i>	sedge											X	
<i>Carex vulpinoidea</i>	fox sedge			X									X
<i>Cirsium flodmanii</i>	Flodman's thistle												X
<i>Cicuta maculata</i>	water hemlock								X	X	X	X	X
<i>Cirsium muticum</i>	swamp thistle								X				
<i>Coreopsis palmata</i>	prairie coreopsis						X						
<i>Cornus drummondii</i>	rough-leaved dogwood	X											
<i>Cornus stolonifera</i>	red osier dogwood									X		X	
<i>Cyperus odoratus</i>	fragrant sedge												X
<i>Cyperus strigosus</i>	umbrella sedge							X					
<i>Cypripedium candidum</i>	small white ladyslipper								X				X
<i>Dalea candida</i>	white prairie clover	X						X					
<i>Dalea purpurea</i>	purple prairie clover	X						X		X	X	X	
<i>Delphinium virescens</i>	prairie larkspur	X											
<i>Deschampsia cespitosa</i>	tufted hairgrass								X	X	X	X	
<i>Desmodium illinoense</i>	Illinois tick-trefoil	X											

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<u>Dichanthelium acuminatum</u> var. <u>acuminatum</u>	panic grass						X		X			X	
<u>Dichanthelium wilcoxianum</u>	Wilcox dichanthelium					X							
<u>Echinacea angustifolia</u>	purple coneflower	X					X						
<u>Echinochloa crusgalli</u>	barnyard grass												X
<u>Echinochloa muricata</u> var. <u>microstachya</u>	barnyard grass												X
<u>Echinodorus rostratus</u>	burhead												X
<u>Eclipta prostrata</u>	yerba-de-tajo												X
<u>Eleocharis elliptica</u> var. <u>compressa</u>	spikerush			X		X			X	X	X		
<u>Eleocharis erythropoda</u>	spikerush			X									X
<u>Eleocharis macrostachya</u>	spikerush			X									X
<u>Epilobium coloratum</u>	willow-herb												X
<u>Equisetum arvense</u>	field horsetail												X
<u>Equisetum hyemale</u>	tall scouring-rush												X
<u>Equisetum laevigatum</u>	scouring-rush				X	X			X	X			
<u>Erechtites hieracifolia</u>	fireweed												X
<u>Erigeron strigosus</u>	daisy-fleabane	X					X						

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<i>Eryngium yuccifolium</i>	rattlesnake master							X					
<i>Eupatorium perfoliatum</i>	boneset												X
<i>Euthamia graminifolia</i>	grass-leaved goldenrod					X			X	X	X	X	
<i>Fragaria virginiana</i>	wild strawberry					X		X	X	X	X	X	
<i>Galium aparine</i>	goosegrass										X		
<i>Galium boreale</i>	northern bedstraw								X	X	X		
<i>Gentiana alba</i>	pale gentian							X					
<i>Gentiana andrewsii</i>	closed gentian										X		
<i>Gentiana puberulenta</i>	downy gentian	X					X						
<i>Gentianopsis crinita</i>	fringed gentian								X				
<i>Geum triflorum</i>	prairie avens								X				
<i>Glyceria striata</i>	manna grass								X				X
<i>Glycyrrhiza lepidota</i>	wild licorice				X	X							
<i>Habenaria leucophaea</i>	prairie fringed orchid												X
<i>Helenium autumnale</i>	autumn sneezeweed					X			X	X			
<i>Helianthus maximiliani</i>	Maximilian's sunflower								X	X			
<i>Helianthus mollis</i>	downy sunflower		X										
<i>Helianthus nuttallii</i>	Nuttall's sunflower				X								

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<i>Helianthus occidentalis</i>	western sunflower						X						
<i>Helianthus rigidus</i>	prairie sunflower	X							X	X			
<i>Heliopsis helianthoides</i>	false sunflower						X						
<i>Heuchera richardsonii</i>	prairie alumroot						X						
<i>Hieracium longipilum</i>	hairy hawkweed		X										
<i>Hypoxis hirsuta</i>	yellow stargrass											X	
<i>Juncus alpinus</i>	rush								X			X	
<i>Juncus balticus</i>	rush			X		X			X	X			
<i>Juncus dudleyi</i>	rush			X									X
<i>Juncus interior</i>	rush	X		X									X
<i>Juncus longistylis</i>	rush								X			X	
<i>Juncus nodosus</i>	rush								X				
<i>Juncus torreyi</i>	rush	X		X									X
<i>Koeleria cristata</i>	June grass	X					X						
<i>Kuhnia eupatorioides</i>	false boneset												
<i>Lathyrus palustris</i>	marsh vetchling								X	X	X		
<i>Leersia oryzoides</i>	rice cut-grass												X
<i>Leersia virginica</i>	white-grass												X

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<i>Leptochloa fascicularis</i>	bearded sprangle-top grass												X
<i>Lespedeza capitata</i>	round-headed bushclover							X					
<i>Liatris ligulistylis</i>	blazing-star								X				
<i>Liatris punctata</i>	blazing-star	X											
<i>Liatris pycnostachya</i>	blazing-star		X						X				
<i>Lilium philadelphicum</i>	wood lily								X				
<i>Linum sulcatum</i>	flax	X											
<i>Lippia lanceolata</i>	northern fog fruit												X
<i>Lithospermum canescens</i>	hoary puccoon						X						
<i>Lithospermum incisum</i>	narrow-leaved puccoon	X											
<i>Lobelia kalmii</i>	Kalm's lobelia	X							X			X	
<i>Lobelia siphilitica</i>	big blue lobelia												X
<i>Lobelia spicata</i>	spiked lobelia	X		X					X				
<i>Lycopus americanus</i>	common water horehound								X	X	X	X	X
<i>Lysimachia ciliata</i>	fringed loosestrife			X									X
<i>Lysimachia quadriflora</i>	loosestrife								X	X	X	X	
<i>Lythrum alatum</i>	loosestrife												X
<i>Mentha arvensis</i>	field mint			X							X		X

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<i>Mimulus ringens</i>	monkey flower												X
<i>Muhlenbergia glomerata</i>	muhly grass								X				
<i>Muhlenbergia richardsonis</i>	muhly grass								X	X	X	X	
<i>Oenothera parviflora</i>	evening primrose						X						
<i>Panicum dichotomiflorum</i>	fall panic grass												X
<i>Panicum virgatum</i>	switchgrass	X				X			X	X			
<i>Parnassia glauca</i>	grass-of-parnassus								X				
<i>Parthenium integrifolium</i>	American feverfew							X					
<i>Pedicularis lanceolata</i>	swamp wood betony								X	X		X	
<i>Penthorum sedoides</i>	ditch stonecrop												X
<i>Phalaris arundinacea</i>	reed canary grass										X		X
<i>Phlox pilosa</i>	downy phlox						X						
<i>Poa compressa</i>	Canada bluegrass	X					X						
<i>Poa pratensis</i>	Kentucky bluegrass	X		X		X	X		X	X			
<i>Polygonum amphibium</i>	water smartweed					X							X
<i>Polygonum punctatum</i>	dotted water smartweed												X
<i>Populus tremuloides</i>	quaking aspen									X			
<i>Potentilla anserina</i>	silver-weed								X		X	X	

Sites:

A. Glaciated KS, NE.
 B. Unglaciated eastern KS.
 C. Mormon Island, NE.

D. Valentine National Wildlife Refuge, NE.
 E. Shyenne National Grassland, ND.
 F. Blue Mounds, MN.

G. Mower County, MN.
 H. Pembina Trail, MN.
 I. Pennington County, MN.

J. Kittson County, MN.
 K. Vita, Manitoba, Canada.
 L. Nine Mile Prairie, NE.

Table 5 (continued). Associated plant taxa occurring at selected extant Platanthera praeclara sites.

PLANT TAXA		SITES (See bottom of page for site names and end of table for notes.)											
SCIENTIFIC NAME	COMMON NAME	A ^{1,2}	B ²	C ³	D ³	E ^{4,5,7,6}	F ⁸	G ⁸	H ⁸	I ⁸	J ⁸	K ^{8,9,10}	L ¹¹
<u>Potentilla arguta</u>	tall cinquefoil				X								
<u>Potentilla fruticosa</u>	shrubby cinquefoil								X		X	X	
<u>Potentilla norvegica</u>	rough cinquefoil												X
<u>Potentilla rivalis</u>	brook cinquefoil												X
<u>Potentilla simplex</u>	old-field cinquefoil		X										
<u>Prenanthes aspera</u>	rattlesnake root						X						
<u>Prenanthes racemosa</u>	glaucous rattle-snake root							X					
<u>Prunella vulgaris</u>	heal-all								X			X	
<u>Prunus besseyi</u>	sand cherry										X		
<u>Psoralea tenuiflora</u>	scurf-pea	X											
<u>Pycnanthemum tenuifolium</u>	slender mountain mint		X										
<u>Pycnanthemum virginianum</u>	common mountain mint								X	X			
<u>Ranunculus scleratus</u>	cursed crowfoot												X
<u>Rhus glabra</u>	smooth sumac	X											
<u>Rorippa palustris</u>	bog yellow grass												X
<u>Rosa woodsii</u>	wild rose								X	X			
<u>Rudbeckia hirta</u>	black-eyed Susan	X							X			X	
<u>Rumex altissimus</u>	pale dock												X

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SCIENTIFIC NAME	COMMON NAME	A ^{1,2}	B ²	C ³	D ³	E ^{4,5,7,6}	F ⁸	G ⁸	H ⁸	I ⁸	J ⁸	K ^{8,9,10}	L ¹¹
<i>Rumex crispus</i>	curly dock												X
<i>Sagittaria brevirostra</i>	arrowhead												X
<i>Sagittaria calycina</i>	arrowhead												X
<i>Salix bebbiana</i>	Bebb's willow					X			X		X		
<i>Salix discolor</i>	pussy willow								X	X	X		
<i>Salix exigua</i> var. <i>interior</i>	sandbar willow					X			X				X
<i>Salix eriocephala</i>	diamond willow												X
<i>Salix petiolaris</i>	meadow willow								X	X	X		
<i>Salvia azurea</i>	blue sage		X										
<i>Scirpus americanus</i>	three-square			X	X								X
<i>Scirpus atrovirens</i>	green bulrush												X
<i>Scirpus pallidus</i>	dark green bulrush												X
<i>Scirpus validus</i>	soft-stem bulrush												X
<i>Scutellaria galericulata</i>	marsh skullcap									X			
<i>Scutellaria lateriflora</i>	side-flowering skullcap												X
<i>Scutellaria parvula</i>	small skullcap	X											
<i>Senecio aureus</i>	golden ragwort										X		
<i>Senecio pauperculus</i>	northern ragwort								X				

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<u>Senecio plattensis</u>	prairie groundsel	X										X	
<u>Senecio pseud aureus</u>	western golden ragwort								X	X			
<u>Silphium integrifolium</u>	rosinweed	X											
<u>Silphium laciniatum</u>	compass-plant	X					X						
<u>Sisyrinchium angustifolium</u>	blue-eyed grass				X								
<u>Sisyrinchium campestre</u>	blue-eyed grass	X								X			
<u>Solidago canadensis</u>	tall goldenrod	X		X		X			X	X			
<u>Solidago gigantea</u>	giant goldenrod								X				
<u>Solidago missouriensis</u>	Missouri goldenrod	X				X	X			X			
<u>Solidago nemoralis</u>	grey goldenrod								X				
<u>Solidago ptarmicoides</u>	white goldenrod								X			X	
<u>Solidago riddellii</u>	Riddell's goldenrod								X		X		
<u>Solidago rigida</u>	rigid goldenrod						X	X	X	X		X	
<u>Solidago speciosa</u>	showy goldenrod							X					
<u>Sonchus arvensis</u>	field sowthistle									X			
<u>Sorghastrum nutans</u>	Indian grass	X				X	X		X				
<u>Spartina pectinata</u>	cord grass			X		X			X	X	X	X	
<u>Sphenopholis obtusata</u>	wedge grass				X				X				

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<i>Spiraea alba</i>	white spiraea								X	X	X		
<i>Spiranthes cernua</i>	nodding ladies'-tresses							X					
<i>Sporobolus heterolepis</i>	prairie dropseed	X	X				X			X		X	
<i>Stachys palustris</i>	woundwort					X			X		X		X
<i>Stipa spartea</i>	porcupine grass						X						
<i>Thalictrum dasycarpum</i>	purple meadow-rue								X				
<i>Thelypteris palustris</i>	marsh fern				X								
<i>Tofieldia glutinosa</i>	false asphodel								X				
<i>Tradescantia bracteata</i>	prairie spiderwort	X											
<i>Triglochin maritima</i>	arrow-grass				X					X			
<i>Triodanis perfoliata</i>	Venus' looking-glass	X											
<i>Typha angustifolia</i>	narrow-leaved cattail												X
<i>Typha latifolia</i>	broad-leaved cattail												X
<i>Urtica dioica</i>	stinging nettle												X
<i>Valerianella radiata</i>	corn salad		X										
<i>Verbena hastata</i>	blue vervain						X						
<i>Vernonia</i> sp.	ironweed			X									
<i>Veronicastrum virginicum</i>	Culver's-root								X	X			

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<i>Viola nephrophylla</i>	northern blue violet								X		X		
<i>Viola pedatifida</i>	prairie violet	X					X						
<i>Zigadenus elegans</i>	white camas								X			X	
<i>Zizia aptera</i>	heart-leaf meadow-parsnip						X			X			
<i>Zizia aurea</i>	golden alexanders								X		X		

- 1 Sheviak and Bowles 1986
 2 Freeman and Brooks 1987
 3 Nebraska Game and Parks Commission, Natural Heritage Program 1995
 4 Manske 1980
 5 Sieg and Bjugstad 1994
 6 Wolken 1995
 7 Sieg and King in press
 8 Minnesota Department of Natural Resources 1979
 9 Brownel 1984
 10 Collicutt 1992
 11 Kaul and Rolfsmeier 1987

Sites:

- | | | | |
|----------------------------|--|---------------------------|----------------------------|
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Table 6. State and provincial protection status of Platanthera praeclara.

STATE/ PROVINCE	PROTECTION STATUS	COMMENTS
UNITED STATES		
IOWA	Listed threatened	Reclassified from Endangered to Threatened in 1994. These two classifications receive equal protection under Iowa law. (John Pearson, Iowa Department of Natural Resources, personal communication (pers. comm. 1994)
KANSAS	Not protected	Listed as rare (McGregor 1977) as <u>Platanthera leucophaea</u> . The Kansas Nongame and Endangered Species Conservation Act does not provide protection for plants.
MINNESOTA	Listed endangered	Listed in Coffin and Pfanmuller (1988). Protected by the Minnesota Endangered Species Act.
MISSOURI	Listed endangered	Listed and protected under the Missouri Endangered Species Act.
NEBRASKA	Listed threatened	Listed as a rare native vascular plant by the Committee on Endangered and Threatened Plant Species of Nebraska (Michael Fritz, Nebraska Game and Parks Commission, pers. comm. 1989). Protected by the Nebraska Endangered Species Law.
NORTH DAKOTA	Not protected	North Dakota has no native plant protection law, but most individuals of <u>P. praeclara</u> are subject to U.S. Forest Service guidelines for the species (Charles Umbanhower, North Dakota Parks and Recreation Board, pers. comm. 1992).
OKLAHOMA	Not protected	Oklahoma has no plant protection law. The State Heritage Program lists the species as historical.
SOUTH DAKOTA	Not protected	South Dakota has a native plant protection law, but it lists no plants. The species is listed as historically known from South Dakota (Houtcooper <u>et al.</u> 1985) as <u>P. leucophaea</u> .
CANADA		
MANITOBA	Listed endangered	Proposed for protected status.

V. FIGURES

Figure 1. Illustration of *Platanthera praeclara* Sheviak and Bowles. Copyright, Marlin Bowles.



Figure 2. Present and historical distribution of *Plantanthera praecleara*. Data from state Natural Heritage Program databases. Ecoregions follow Bailey 1994.

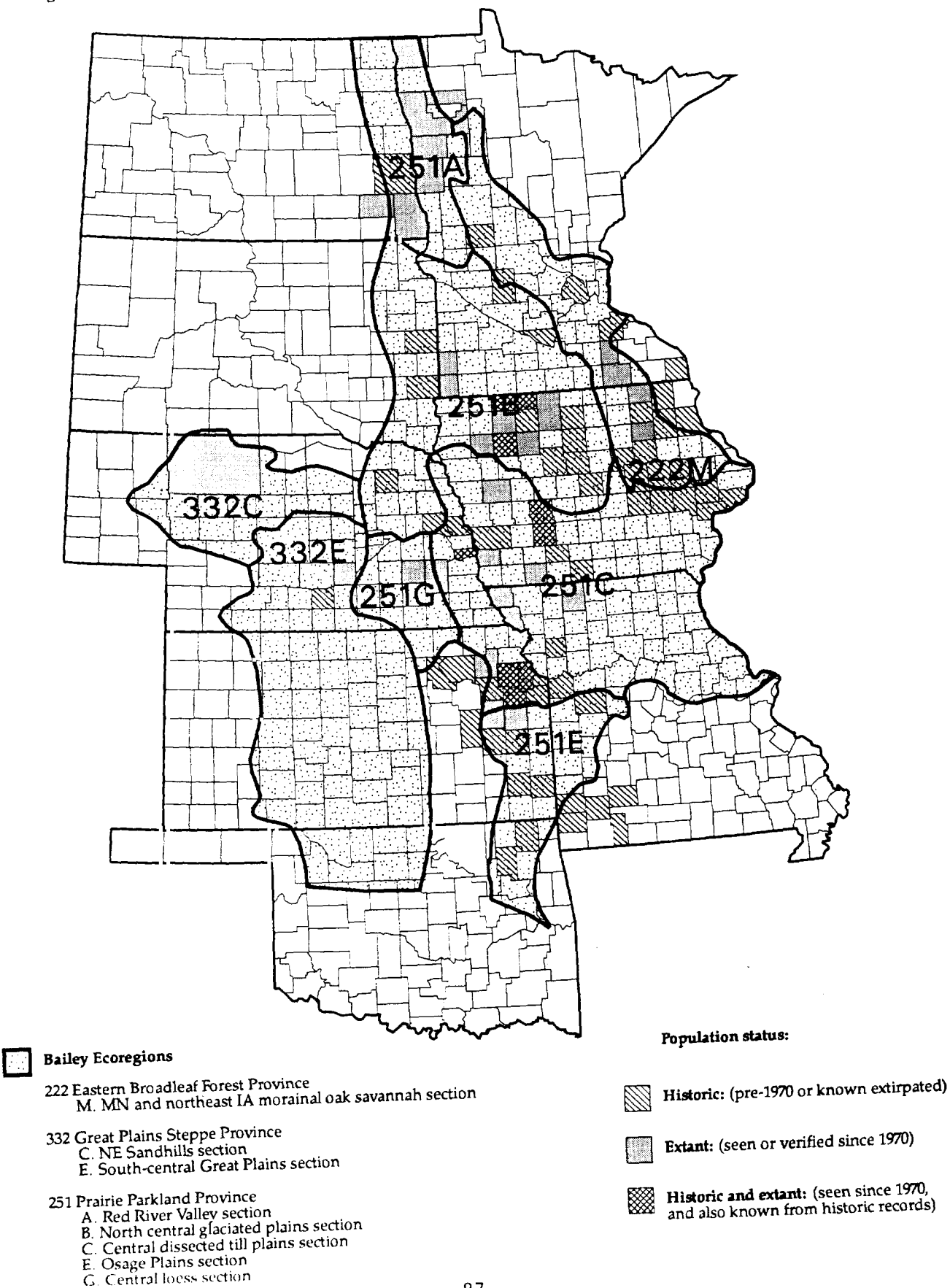


Figure 3. *Platanthera praeclara*
 Number Plants by State in Ecoregions

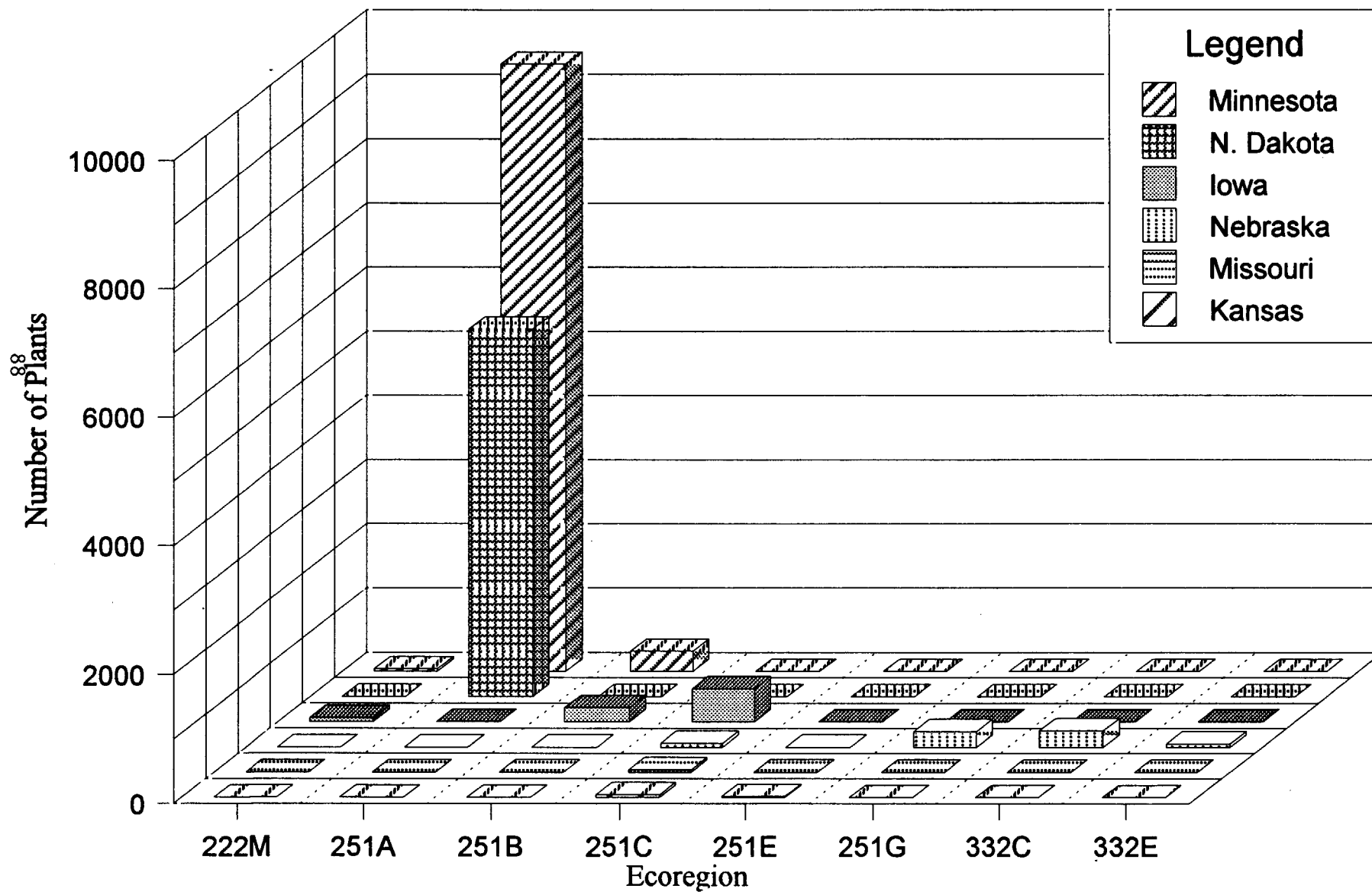


Figure 4. *Platanthera praeclara*
 Management by Ecoregion

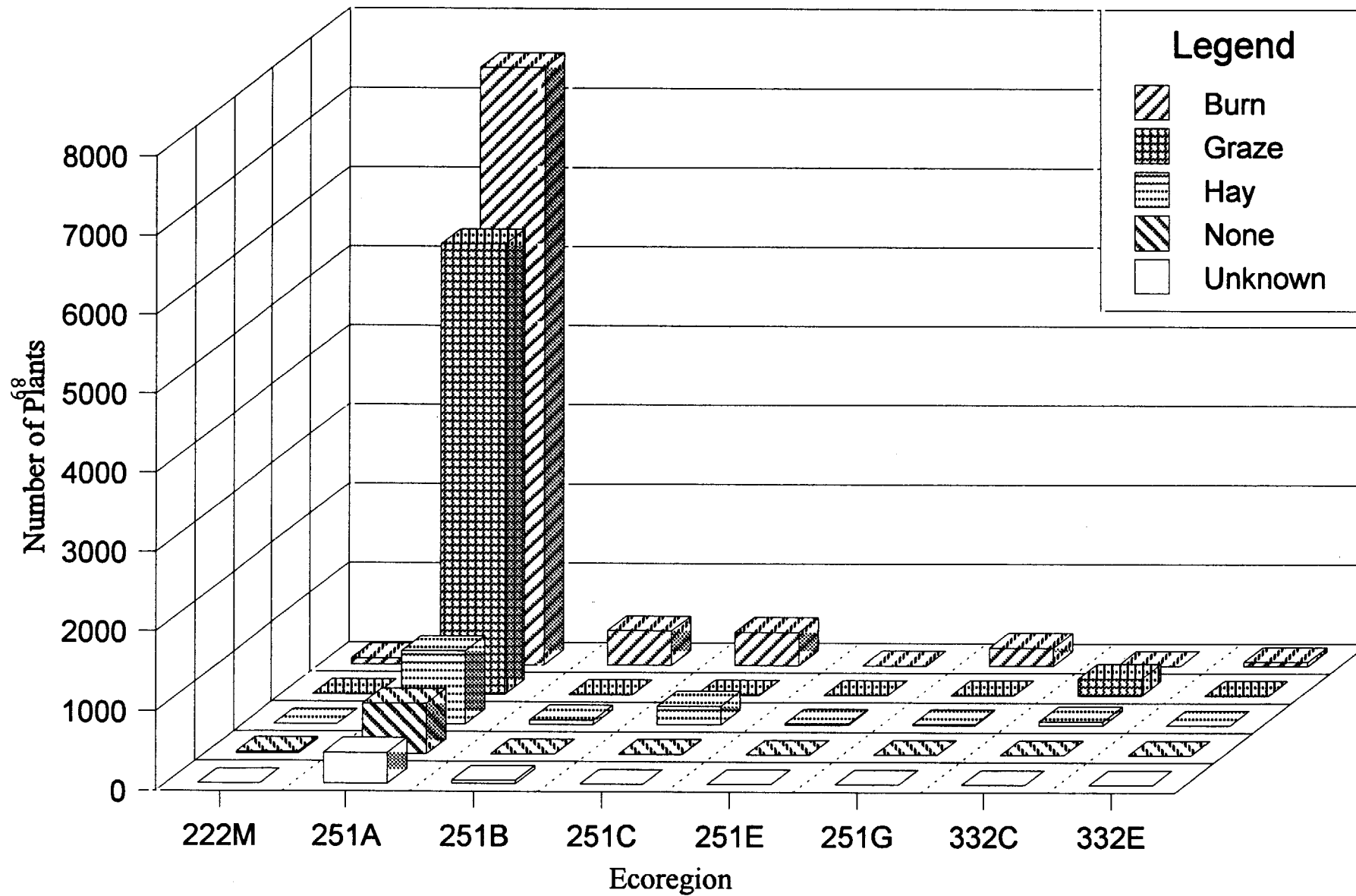


Figure 5. *Platanthera praeclara*
 Management within States

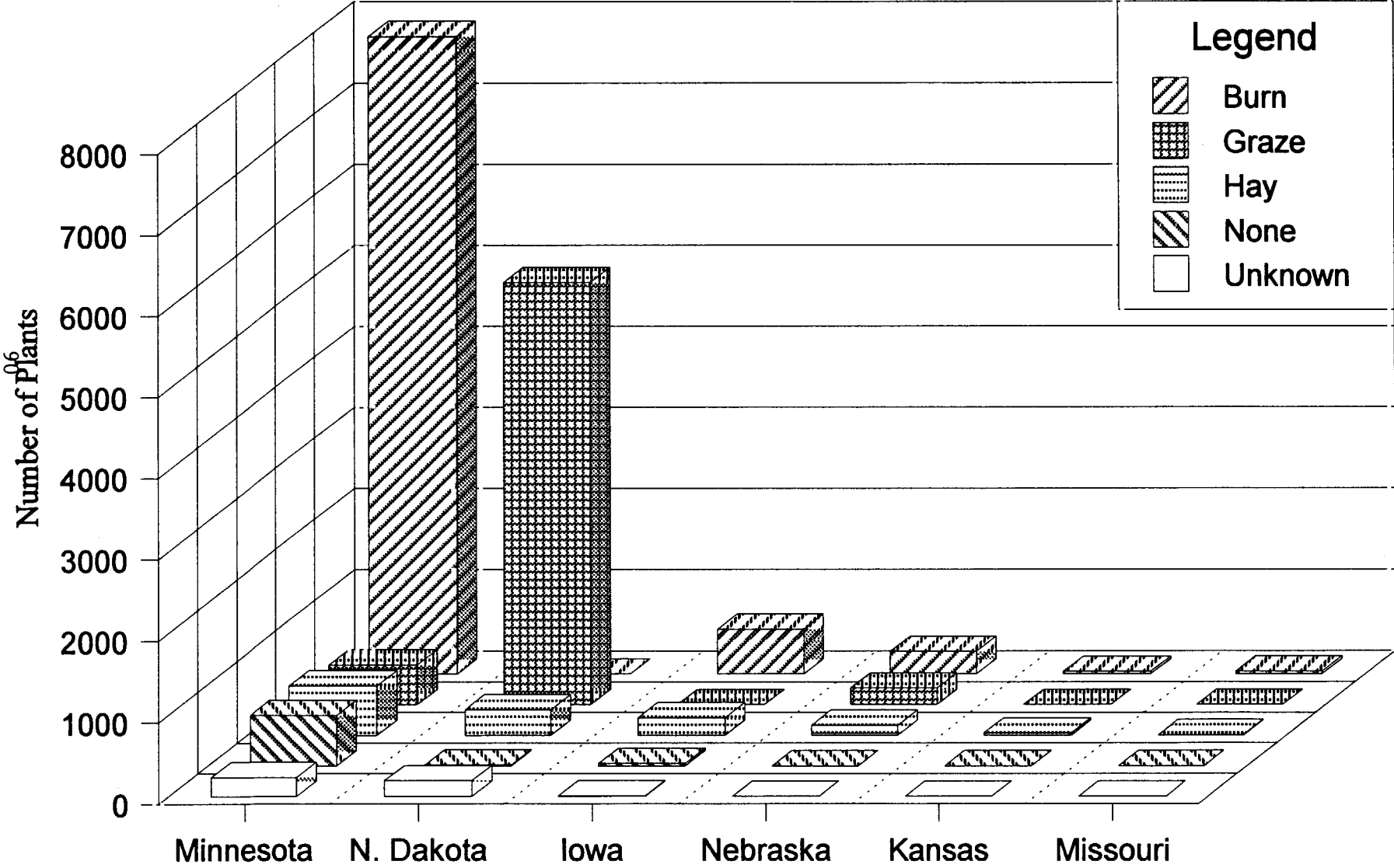


Figure 6. *Platanthera praeclara*
Ownership in Ecoregions

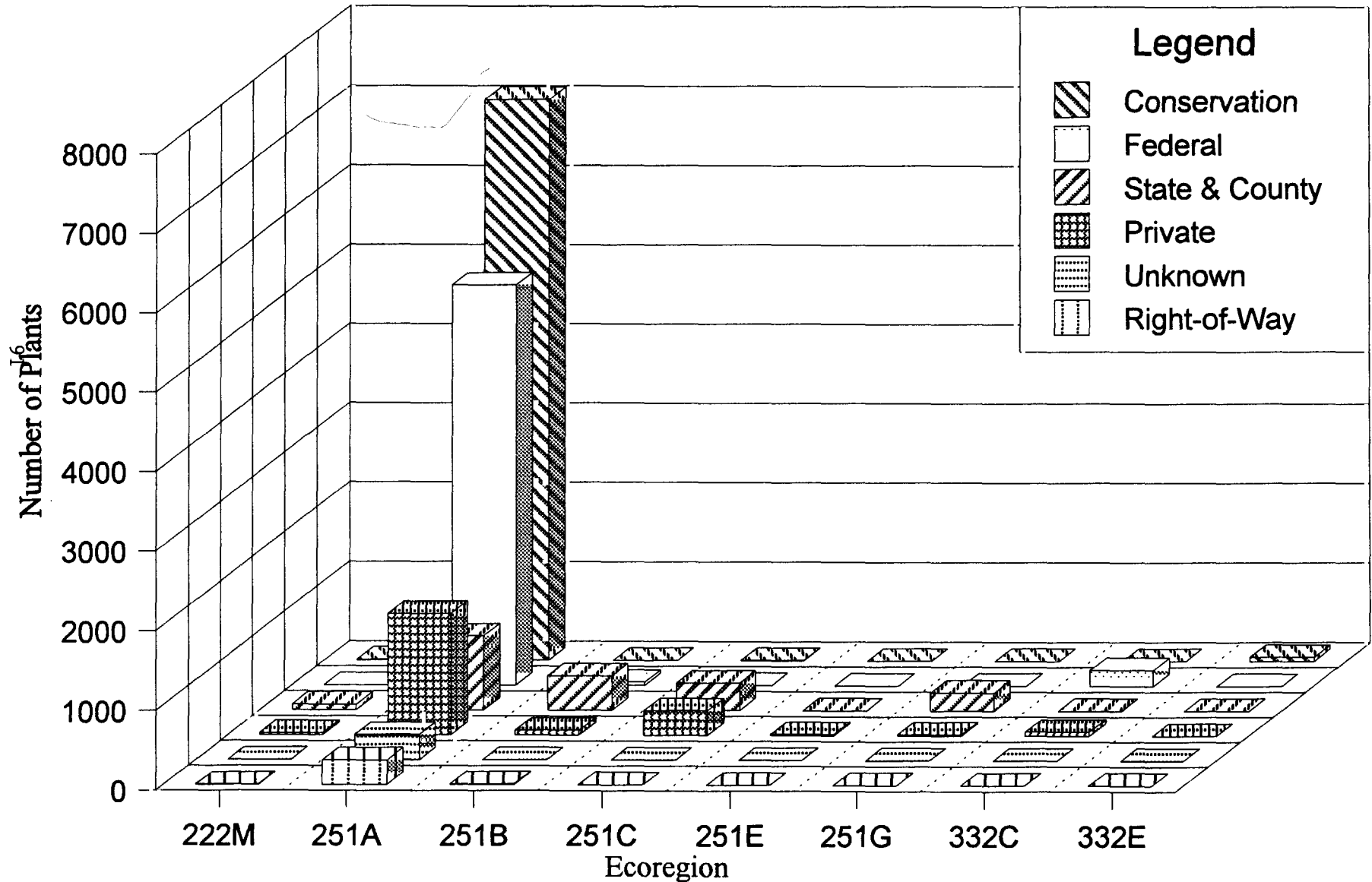
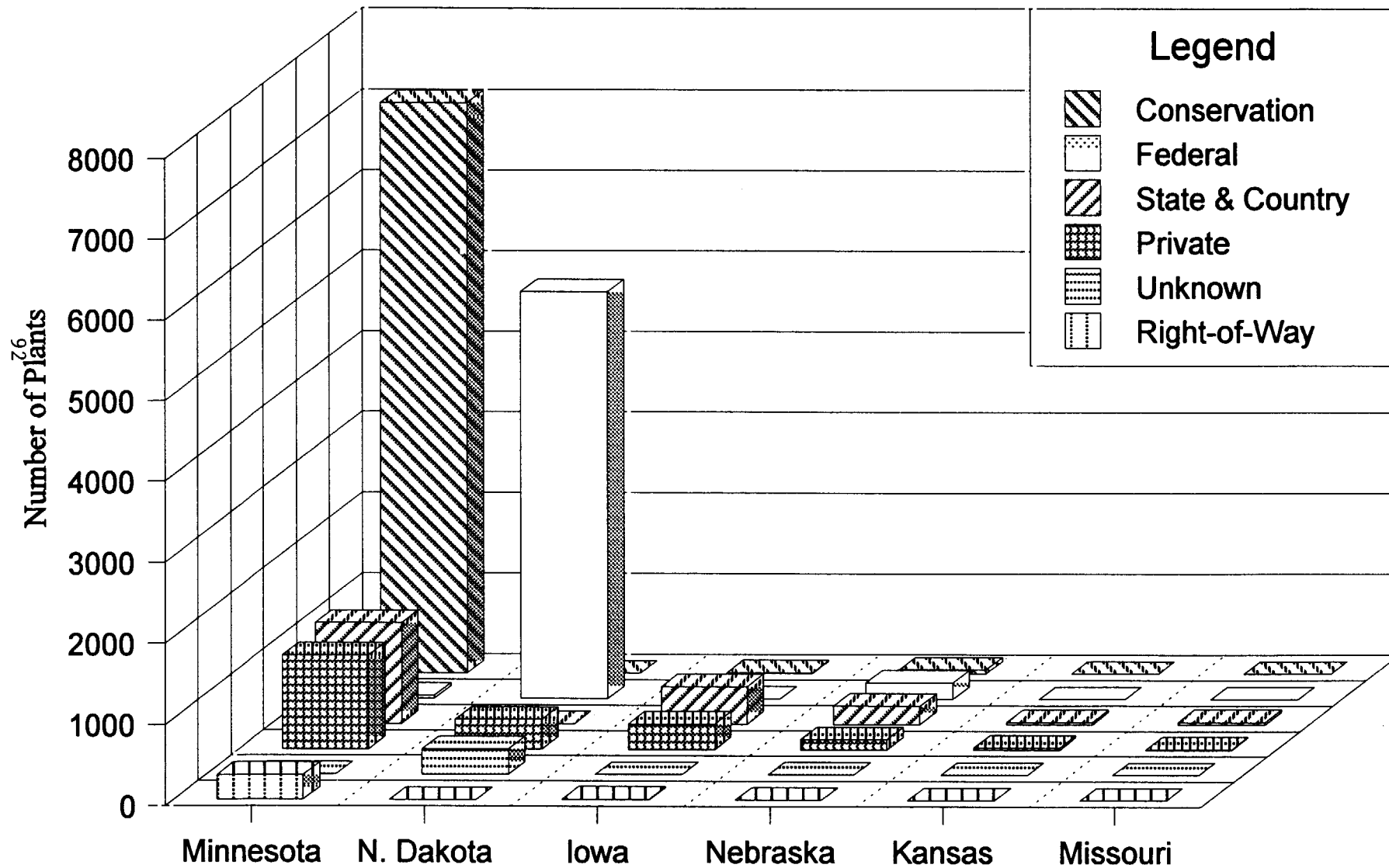


Figure 7. *Platanthera praeclara*
Ownership Within States



APPENDIX A.

PRIORITY SEARCH SITES AND POTENTIAL HABITATS OF *PLATANHERA PRAECLARA*.

UNITED STATES

IOWA

Prairie remnants and rights-of way in northwest counties.

KANSAS

Priority survey efforts should focus on the following counties where extant populations are located and most of the post-1960 observations were made:

Anderson	Franklin	Johnson	Miami
Coffey	Jackson	Leavenworth	Osage
Douglas	Jefferson	Linn	Shawnee

Survey work also is needed in the mesic and wet-mesic prairies in the Glaciated Region and Osage Cuestas of eastern Kansas.

MINNESOTA

Rights-of-way and privately-owned prairie remnants within the following counties:

Clay	Houston	Marshall	Pennington
Douglas	Kandiyohni	Mower	Pipestone
Fillmore	Kittson	Nicollet	Polk
Freeborn	Lyons	Nobles	Red Lake
Hennepin	Mahnomen	Norman	Rock

MISSOURI

Atchison County, Tarkio Prairie Natural History Area (T66N, R38W, Section 28, Blanchard Quadrangle): There is high probability of occurrence here, with 17 plants located in 1985, but none in 1989 and 1990.

Holt County, Little Tark Prairie (T62N, R39W, Section 8, Craig Quadrangle): There is moderate probability of occurrence here with five plants seen in 1985. Some herbicide use has been documented at this unprotected site. No orchids were located in 1989 and 1990.

APPENDIX A (continued). PRIORITY SEARCH SITES AND POTENTIAL HABITATS OF *PLATANThERA PRAECLARA*.

The following sites need additional survey work because they contain suitable habitat in counties with historical occurrences. There is a good chance that at least one site contains *Platanthera praeclara* populations, but the probability for any one site to contain orchids is low.

Quadrangle Legal Description

Lawrence County

Aurora (T26N, R25W, Section 10, E $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$)
 Chesapeake (T28N, R26W, Section 36, NW $\frac{1}{2}$ SW $\frac{1}{2}$)

Newton County

Fidelity (T27N, R31W, Section 20, SE $\frac{1}{2}$ SE $\frac{1}{2}$)
 Fidelity (T27N, R31W, Section 28, N $\frac{1}{2}$ SW $\frac{1}{2}$)

Vernon County

Bronaugh (T34N, R32W, Section 27, NW $\frac{1}{2}$ SE $\frac{1}{2}$)
 Deerfield (T35N, R33W, Section 10, NE $\frac{1}{2}$ NE $\frac{1}{2}$)
 Horton (T36N, R30W, Section 6, NW $\frac{1}{2}$ NW $\frac{1}{2}$)
 Horton (T36N, R31W, Section 6, NE $\frac{1}{2}$ NE $\frac{1}{2}$)

Harris County

Mount Moria (T63N, R26W, Section 16, W $\frac{1}{2}$ E $\frac{1}{2}$ SW $\frac{1}{2}$)

Holt County

Craig (T62N, R39W, Section 19/20/29)

Jasper County

Jasper (T29N, R31W, Section 15, S $\frac{1}{2}$ SW $\frac{1}{2}$)
 Joplin East (T27N, R32W, Section 15)

Quadrangle Legal Description

Stotts City (T28N, R27W, Section 29)
 Stotts City (T28N, R27W, Section 29, E $\frac{1}{2}$)

Joplin East (T27N, R32W, Section 36)
 Joplin East (T27N, R32W, Section 26, N $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$)

Horton (T37N, R31W, Section 31/32, S $\frac{1}{2}$)
 Nevada (T35N, R31W, Section 33, SE $\frac{1}{2}$ SE $\frac{1}{2}$)
 Richards (T36N, R33W, Section 6, SW $\frac{1}{2}$ SW $\frac{1}{2}$)
 Sprague (T37N, R32W, Section 1, N $\frac{1}{2}$ NE $\frac{1}{2}$)

Craig (T62N, R39W, Section 29, NWS $\frac{1}{2}$)

Webb City (T28N, R32W, Section 15, S $\frac{1}{2}$ SW $\frac{1}{2}$)

APPENDIX A (continued). PRIORITY SEARCH SITES AND POTENTIAL HABITATS OF *PLATANATHERA PRAECLARA*.

NEBRASKA

Valentine National Wildlife Refuge and adjacent sandhill habitats in Cherry County, where four extant populations exist and others are likely to occur.

Elkhorn River floodplain from Bassett, northeast to Valley, northeast in the following counties:

Antelope	Douglas	Madison	Stanton
Cuming	Holt	Rock	Washington
Dodge			

There are numerous historical records from this area and much suitable habitat remaining in the form of mesic to wet hay meadows.

Platte River floodplain from Kearney, Nebraska, to Omaha, Nebraska, in the following counties:

Colfax/Butler	Douglas	Hamilton	Merrick
Dodge/Saunders	Hall	Kearney/Buffalo	Polk

There is one extant population near Grand Island and several historical records for the area.

Sizeable areas with numerous tracts of suitable habitat and scattered historical records in other areas of the sandhills and along the floodplains of the Cedar, Calamus, and Loup Rivers.

NORTH DAKOTA

Suitable habitats within the Glacial Lake Dakota Delta in southern Sargent County.

Suitable habitats within the Sheyenne Delta geologic formation in the following counties:

Ransom	Richland	Sargent
--------	----------	---------

The Sheyenne National Grassland is within the Sheyenne Delta.

Historic Lake Agassiz beachline where suitable habitat exists in the following counties:

Cass	Ransom	Sargent	Trail	Pembina
Grand Forks	Richland	Steele	Walsh	

APPENDIX A (continued). PRIORITY SEARCH SITES AND POTENTIAL HABITATS OF *PLATANThERA PRAECLARA*.

OKLAHOMA

White Oak Prairie in Craig County and Foyil Prairie in Rogers County are sites where *P. praeclara* was located by Dr. Lawrence Magrath in 1975. No reoccurrence has been documented following surveys of these sites in 1978, 1983, 1985, and 1988 to 1990.

Areas of potential habitat identified as needing additional survey work in the following northeastern counties:

Craig	Muskogee	Pawnee	Wagner
Delaware	Nowata	Payne	Washington
LeFlore	Osage	Rogers	
Mayes	Ottawa	Tulsa	

SOUTH DAKOTA

Roberts County: Red River Valley.

The eastern edge of the Prairie Coteau in the State's east-central and southeastern counties.

The Heckla Sandhills in parts of the following counties:

Brown	Marshall
-------	----------

CANADA

MANITOBA

All aspen parkland sedge meadows and wet mesic prairies in the Gardenton-Vita area.

APPENDIX B.

PRINCIPLE FEDERAL AND STATE LAWS OF CURRENT OR POTENTIAL APPLICABILITY TO THE PROTECTION OF *PLATANThERA PRAECLARA* AND ITS HABITAT.

International Treaty

Convention on International Trade in Endangered Species of Wild Fauna and Flora. 27 U.S.T. 108. (CITES)

Established a system of import/export regulations to prevent the over-exploitation of plants and animals listed in the Convention.

Federal (United States) Laws

United States. Endangered Species Act of 1973 (PL 93-205, 81 Stat.884, Dec. 28,1973; current version at 16 U.S.C. 1531-1543). As amended.

Administered by the U.S. Fish and Wildlife Service. *Platanthera praeclara* is listed as a threatened species under the Act.

United States. Federal Environmental Pesticide Control Act of 1972. 7 USC 136 to 136y, P.L. 92-516, October 21, 1972, 86 Stat. 973). As amended.

This was originally the Federal Insecticide, Fungicide, and Rodenticide Act. Administered by the U.S. Environmental Protection Agency (EPA). The EPA must register pesticides before they may be used, and the EPA must comply with the Endangered Species Act and insure that no listed species is put in jeopardy of extinction by the registration.

United States. International Environment Protection Act of 1983. 22 USC 3151q; 97 Stat. 1045.

Authorizes, among other provisions, the President to assist other countries in wildlife and plant protection efforts to preserve biological diversity; authorizes exchange of U.S. and other countries' scientists and other experts in environmental science and management.

United States. National Environmental Policy Act of 1969. P.L. 91-190, 42 USC 4321 to 4347, January 1, 1970, 83 Stat. 853. As amended.

Requires all Federal agencies prepare environmental impact statements for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment." Species protected by the Endangered Species Act must be considered.

United States. National Wildlife Refuge System Administration Act of 1966. 16 USC 668dd to 668ee.

Provides guidelines and directives for administration and management of all areas in the National Wildlife Refuge system.

United States. Tax Deductions for Conservation Easements. 26 USC 170.

Defines the deductibility of contributions of conservation easements.

State Laws

Iowa

Administrative Code, Chapter 19, Section 290-19.1. (November 21, 1984, and updated periodically).

Lists protected animals and plants.

Management and Protection of Endangered Plants and Wildlife. Iowa Code Ann., Title V. Chapter 109A, Sections 109A.1 to 109A.10. 1975.

Authorizes the State Conservation Commission to list rare species and establish conservation programs, including land acquisition. Prohibits taking, possession, transport, or sale of listed plants. *Platanthera praeclara* is listed as endangered in Iowa.

State Preserves Act. 1965, amended 1987 to include technical updates.

Authorizes the Natural Resources Commission to dedicate natural areas as State Preserves. Proceeds from the State lottery may be used for acquisition.

Kansas

Natural and Scientific Areas Law. 1985. Kansas Stats. Ann., Sections 74-6607 to 74-6609.

Creates a Natural and Scientific Areas Board as part of the State Biological Survey to adopt rules for creating preserves and creates and administers policies in the reserve system. There is no endangered plant law in Kansas.

Minnesota

Conservation of Certain Wildflowers (1935), Minn. Stats. Ann., Agriculture, Sections 17.23 to 17.34.

Prohibits sale of selected plants gathered from the State without a permit and without the written permission of the landowner. This is administered by the Department of Agriculture, and all orchids are included under the law's protection.

Protection of Threatened and Endangered Species, Minn. Stats. Ann., Section 97.488 (amended 1981).

Prohibits take or sale of protected species without permit except through actions necessary for agriculture or accidental taking. *Platanthera praeclara* is listed as endangered in Minnesota.

Regulations for the Issuance of Special Permits for the Taking, Possession, Importation, Transportation, Purchase, Sale, and Disposal of Endangered and Threatened Species of Plants, Animals and Insects. Commissioner's Order No. 2204, June 1985. Department of Natural Resources. Permits are available for scientific and educational purposes.

Missouri

Endangered Species Act. Amended 1986. Revised Stats. of Missouri Sections 252.240.

Prohibits export or sale of listed plants without a permit and prohibits taking without the permission of the property owner. *Platanthera praeclara* is listed as endangered in Missouri.

Regulations. Rules of the Conservation Commission (issued January 1, 1987), Sections 3 CSR 10-4.111 and 252.240 (appendix).

Prohibits export or sale of protected species.

Nebraska

Nongame and Endangered Species Conservation Act. 1975 (amended 1987). Revised Status of Nebraska, Sections 37-430 to 37-438.

Prohibits the sale or possession of listed plants and sets up procedures for the reintroduction of any species extirpated from the state. Includes powers to study and conserve, including land acquisition. *Platanthera praeclara* is listed as a rare native vascular plant in Nebraska and is protected by this law.

North Dakota

Nature Preserves Act, 1975. North Dakota Century Code, Sections 55-11-01 to 55-11-13.

Authorizes North Dakota Parks and Recreation Department to acquire and maintain a system of nature preserves by gift or purchase (with approval of the legislature) or by dedication of private or public lands. There are no endangered plant laws in North Dakota.

APPENDIX C

Peer Review and Peer Contributors

The U.S. Fish and Wildlife Service extends special thanks to various experts, in addition to the experts on the recovery team, who reviewed drafts and/or provided their information or expert recommendations for the *Western Prairie Fringed Orchid Recovery Plan*. This peer input was invaluable in bringing current biological information on the species and ecosystem management concepts to the final plan.

The following expert peers provided review and/or scientific information to the recovery team:

Marlin Bowles, Morton Arboretum, Lisle, Illinois

Rochelle Bjugstad-Porter, University of Wyoming, Laramie

Daniel Cuthrell, North Dakota State University, Fargo

Michael Fritz, Nebraska Game and Parks Commission, Lincoln

Karen Johnson, Manitoba Museum of Man and Nature, Winnipeg

Lisa Mueller, Minnesota Department of Agriculture, St. Paul

John Pearson, Iowa Department of Natural Resources, Des Moines

John Pleasants, Iowa State University, Ames

Paige Wolken, University of Wyoming, Laramie

Carla Zellmer, University of Saskatchewan, Saskatoon

APPENDIX D

Technical/Agency Draft Review

The Service transmitted the technical/agency review draft of the plan to involved technical and agency reviewers in May 1994; notice of availability of the draft plan for public review was published in the May 9, 1994, *Federal Register*. The Service and individual members of the Western Prairie Fringed Orchid Recovery Team received substantial formal and informal response addressing a variety of format, content, and organization points of the technical/agency draft. The team carefully considered all comments its members and the Service received. As a result of the technical/agency draft review response, the recovery team was able to substantially improve the final plan in its incorporation of the latest available biological information on the species and the measurement of its recovery, and in the flexibility and practicality of the plan's tasks and recovery criteria.