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**Report on the Status of *Platanthera praeclara*
(Western Prairie Fringed Orchid)
on the Platte River in Nebraska from Phillips to Lewellen
and on Federal Energy Regulatory Commission (FERC)
Projects 1835 and 1417**

Report submitted on August 19, 1991 to:

**Nebraska Public Power District,
Columbus, Nebraska
and**

**The Central Nebraska Public Power and Irrigation District,
Holdrege, Nebraska**

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Taxon: *Platanthera praeclara* Sheviak & Bowles

Common name: Western Prairie Fringed Orchid

Location of study: Floodplain of the Platte River in Nebraska from Phillips west to Lewellen and Ogallala and Federal Energy Regulatory Commission Projects No. 1835 and No.1417.

Current federal and Nebraska status: Threatened.

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Date of report: August 19, 1991

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PURPOSE OF THE STUDY

The Western Prairie Fringed Orchid has probably always been an uncommon component of the prairie ecosystem. Human impact in the midwest has altered its ecosystem to such an extent that the plant has become exceedingly rare and is now afforded legal protective status by both state and federal governments. In accordance with the FERC Data Request of April 12, 1991, the Nebraska Public Power District and The Central Nebraska Public Power and Irrigation District initiated a study to determine, with a reasonable degree of confidence, to what extent this plant may occur in areas potentially affected by the continued operation of FERC projects Number 1835 and Number 1417. This study included a literature review, site visits to the extant population in the Platte River Valley, selection of potential Western Prairie Fringed Orchid sites in consultation with U. S. Fish and Wildlife and Nebraska Game and Parks personnel, and a field survey of such sites.

BIOLOGY OF WESTERN PRAIRIE FRINGED ORCHID

Classification and Nomenclature:

Platanthera praeclara Sheviak & Bowles (1986), Western Prairie Fringed Orchid.

This is a monocot in the family Orchidaceae. This taxon had long been considered a member of *Platanthera leucophaea* (Nutt.) Lindl., also known as *Habenaria leucophaea* (Nutt.) A. Gray. Some taxonomists doubt the validity of dividing *Platanthera leucophaea* into two species, citing only quantitative differences and the overlap of many characters (Sutherland, pers. comm.). However, Sheviak and Bowles (1986) feel that consistent differences in column structure result in genetic isolation between the two taxa due to different pollination vectors.

Non-technical Description:

An herbaceous perennial orchid. The non-flowering plant presents only one or two narrow leaves above ground, each leaf about 6 to 8 inches long and grass-like, but slightly thickened, with a smooth, waxy surface. Main leaf veins are prominent. Each leaf tip is acute to obtuse. The flowering plant has a single stem with two to five alternate leaves which partially surround the stem. These leaves become reduced in size and increasingly pointed higher on the plant. Plants may grow 3 to 4 feet high, but generally match the height of surrounding vegetation (Currier, pers. comm.) and so may be much shorter. The five to twenty-five 1.5 to 3-inch white flowers are conspicuous. The upper petals form a hood covering the column. The trilobed lower petal protrudes forward and down and is prominently fringed. The long, narrow, tubular spur which projects back toward the stem aids in identification of both flowers and flower buds.

Technical description:

Herb erect, stout, 38-85 cm tall, glabrous throughout. Leaves lanceolate to ovate-lanceolate, ascending, the bases sheathing the stem, up to 26 cm long, 5 cm wide. Raceme large, showy, 4.8-11.6 cm long, 5.5-9.0 cm wide. Flowers creamy white, very large. Ovaries slender, up to 27 mm long. Sepals ovate to suborbicular, the lateral obliquely asymmetrical, 9.0-14.1 mm long, 6.9-10.0 mm wide. Petals flabelliform, truncate, often emarginate, the apical margin lacerate, 9.0-16.5 mm long, 6.5-13.5 mm

wide. Lip deeply three-lobed, the lobes narrowly to broadly flabellate, the lateral sometimes very broad and overlapping the median, deeply incised and fringed, 17-32 mm long, 20-39 mm wide. Spur slender, curving, clavellate, 36-55 mm long. Column broad, the rostellum two-lobed, the lobes triangular, wide-spreading, the viscidia 6-7 mm apart. Chromosome number $2n = 42$. (Sheviak & Bowles 1986)

Similar species:

Platanthera leucophaea has been reported once from Nebraska. It can be distinguished from *P. praeclara* by the latter's larger, more cream-colored flowers, and fewer-flowered inflorescence. Certain floral measurements also distinguish between the species, as shown in Table 1 below.

Table 1. Characteristics of the Prairie Fringed Orchids, *Platanthera praeclara* and *P. leucophaea*. Mean dimensions in millimeters, with the standard deviation in parentheses (Sheviak and Bowles, 1986).

Characteristic	<i>P. praeclara</i>	<i>P. leucophaea</i>
*Column height	6.5 (0.8)	3.9 (0.4)
Lateral sepal length	12.0 (1.1)	8.1 (1.2)
*Lateral sepal width	8.3 (1.0)	5.0 (0.6)
Lip length	25.6 (3.4)	18.0 (2.3)
Lip width	30.0 (5.0)	20.5 (2.9)
Spur length	45.7 (5.9)	35.6 (4.8)
Spur max. diameter	2.7 (0.5)	1.8 (0.3)
Petal length	13.1 (1.8)	9.6 (1.3)
Petal width	9.5 (1.9)	5.8 (1.2)
Flower number	12.6 (4.5)	19.4 (7.9)
Range	western	eastern
Lip and Petal color	creamy white (fading to white)	pure white (claws green)
Sepal color	creamy, suffused with a faint greenish cast	wholly green
Petal shape	nearly triangular in outline, very broad, truncate, and often somewhat emarginate	Obovate, occasionally varying toward the shape of <i>P. praeclara</i>
Height	shorter	taller

* = especially useful for distinguishing the species.

Geographical Range:

Historically, this species was distributed throughout the western tall-grass prairie, being replaced eastward by *P. leucophaea*. "The species is found from the north Red River Valley of western Minnesota, south to northeastern Oklahoma, and from eastern Iowa and southeastern Minnesota, west to eastern Kansas, central Nebraska, and the extreme eastern portion of the Dakotas. One record from Wyoming also exists" (Freeman and Brooks, 1990).

In Nebraska, the orchid was once widely distributed in the eastern portion of the state (Aughes, 1873, note on herbarium specimen at University of Nebraska at

Lincoln, cited in Freeman and Brooks, 1990), and occurred at sites along the Platte River and also in the Sandhills. Its current range is much reduced. Populations still exist at Nine-Mile Prairie in Lancaster County; Twin Lakes Wildlife Management Area in Seward County; Mormon Island Crane Meadows in Hall County; and at Sweetwater Marsh, Center Lake, Duck Lake, all at Valentine National Wildlife Refuge (NWR) plus the Chicago Northwestern Railroad Arabia site in Cherry County.

Western Prairie Fringed Orchid populations which previously existed at the following sites may be extirpated: Rathgen Prairie, Washington County; Dewey Lake, Valentine NWR; Lone Tree Lake, Cherry County; Unnamed Prairie, Greeley County. The orchid population on the Union Pacific Railroad at Section 8, T17N, R6E, has apparently been extirpated by degradation of the prairie at that site (Freeman and Brooks, 1990).

General Habitat Requirements:

The Western Prairie Fringed Orchid is dependent on adequate sunlight, mycorrhizal fungal associations, and sufficient microhabitat disturbance within the intact plant community for seedling establishment. In addition, it would appear from the surviving populations that this species requires a considerable amount of subsurface moisture and may need above-average precipitation in order to bloom. These conditions can be found in mesic to wet mesic tall-grass and Sandhill prairie and subirrigated meadows. Succession to thickets or forests creates shade conditions that are detrimental to the orchid's survival (Bowles and Duxbury, 1986). Other threats to orchid populations include plowing, altered drainage patterns, and continued heavy grazing. Mowing on an annual or more frequent basis may also adversely affect orchid populations but further research is needed to determine the effect of this practice.

Habitat Description in Nebraska:

The surviving Nebraska orchid populations occupy markedly different habitats but all are mesic to wet mesic and are relatively intact native ecosystems. One habitat, as typified by Nine-Mile Prairie, is tall-grass prairie dominated by Bluestems, Switchgrass, and Indian Grass. Here the orchids are found in a shallow draw which may supply them with needed moisture. Another habitat type is the prairie swales and subirrigated meadows of the Nebraska Sandhills region. The third is floodplain prairie and/or sedge meadows typified by the Mormon Island site.

The frequently associated species listed by Freeman and Brooks (1990) are of limited value as indicators for Western Prairie Fringed Orchid habitat as they encompass the entire spectrum of typical tallgrass and sedge meadow plants. However, these lists do indicate an association with intact native plant communities of mesic to wet mesic sites.

Life History:

The tiny seeds of the Western Prairie Fringed Orchid are released from capsules in early fall, as the plant becomes dormant (Bowles and Duxbury, 1986). Seeds are anemophilous (wind-dispersed), but may also be moved through the soil by water (Bowles, 1983, cited in Freeman and Brooks, 1990).

Seeds of Western Prairie Fringed Orchid have received little study, but those of the Eastern Prairie Fringed Orchid contain a minute undifferentiated embryo and lack

endosperm. They germinate in dark conditions, presumably deep in the soil (Stoutamire, 1974, cited in Freeman and Brooks, 1990), in the presence of soil fungi with which they can form associations (Cronquist, 1981, cited in Freeman and Brooks, 1990). They are dependent upon such mycorrhizal fungi and upon conditions favorable for fungal survival, and seem to germinate best in somewhat disturbed locations (Bowles and Duxbury, 1986).

Western Prairie Fringed Orchids spend much of their life cycle as non-blooming plants consisting of one or two leaves. They perenniate by tubers. These plants may survive for decades and may become dormant, presumably due to adverse environmental factors such as prolonged drought (Freeman and Brooks, 1990). Tubers regenerate during the growing season and form a perenniating bud that initiates the next year's growth. Occasional plants may form multiple tubers which can become isolated to form new plants. Such asexual reproduction appears rare, however (Bowles, 1983, cited in Freeman and Brooks, 1990).

Plants may initiate flower stalk formation the year prior to flowering, perhaps in response to above-average rainfall or to burning that removes shading thatch (Bowles, 1983 cited in Freeman and Brooks, 1990; Currier, 1984). Flower stalk formation may impose a considerable drain on the orchids' stored food reserves, and some have hypothesized that the plants may die after flower formation (Currier, pers. comm.).

Flowers generally bloom during a three week period that includes the last two weeks of June and the first week of July. In 1991, blooming began June 12 at Nine Mile Prairie and were in bloom on June 17 at Mormon Island (pers. obs.). Flowers are pollinated at night by moths of the family Sphingidae (Sheviak and Bowles, 1986).

Legal Status:

The Western Prairie Fringed Orchid is considered Threatened by both the U.S. Fish and Wildlife Service and the Nebraska Game and Parks Commission.

METHODS

This orchid survey was conducted within a mile of the Platte River in Nebraska, from 6 miles northeast of Phillips westward to Lewellen on the North Platte and to Ogallala on the South Platte, and on and along Federal Energy Regulatory Commission Projects 1835 and 1417 (Figure 1). The survey was conducted during the projected flowering period from 17 June to 9 July, 1991 by the authors, Phillip Moore, and Gerald Toll.

Through consultation with Dr. David Sutherland of the University of Nebraska at Omaha, Dr. Ann Antlfinger of the University of Nebraska at Omaha, Mike Fritz of the Nebraska Natural Heritage Program, Paul Currier, botanist, Platte River Whooping Crane Habitat Maintenance Trust, and recent published literature, the most likely habitats for Western Prairie Fringed Orchid were determined to be wet prairie, subirrigated sedge meadows and the transition zone between wet and dry prairie.

Study sites were chosen by examining Geographic Information System maps of the Platte River (Johnson, 1990a and 1990b) and false-color infrared satellite images taken in 1983 and supplied by Nebraska Public Power District and The Central Nebraska Public Power and Irrigation District. Using the maps and photographs, the

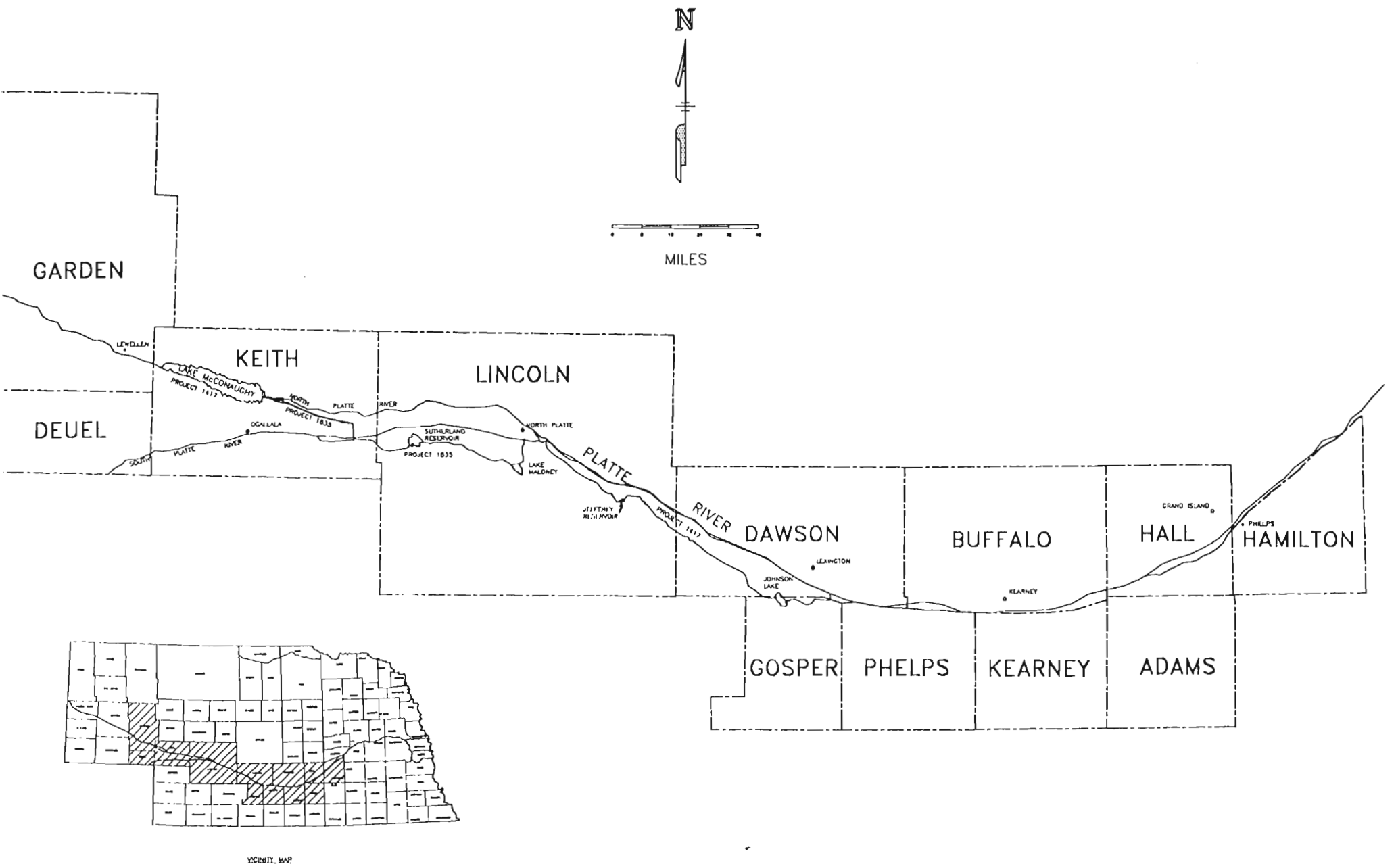


FIG. 1) WESTERN PRAIRIE FRINGED ORCHID SURVEY STUDY AREA

authors identified the target habitat types within a mile of either side of the Platte River and adjacent to the reservoirs and canal systems of FERC Projects 1835 and 1417 belonging to Nebraska Public Power District and The Central Nebraska Public Power and Irrigation District, respectively. The habitats selected were those identified on the maps as "wet meadow" and "wet meadows with scattered trees." Information regarding potential orchid habitat from the Geographic Information System maps and satellite images was transferred to U.S. Geological Survey 7.5 minute series topographical maps. Sites to be surveyed were selected from the topographical maps by the following criteria: 1) survey sites had the appropriate habitat type; 2) access to sites appeared adequate; 3) special attention was given to areas showing scour marks or old channels since it was felt these would contain mesic to hydric ecotones.

In a 12 June 1991 meeting in Lincoln, Nebraska, the authors, along with John Shadle of Nebraska Public Power District and Mark Peyton of The Central Nebraska Public Power and Irrigation District, discussed the identification of the target habitat types and the criteria for selecting potential sites with United States Fish and Wildlife Service representative Wally Jobman and with Mike Fritz and Gerry Steinauer of the Nebraska Game and Parks Commission. Their input was solicited and potential sites were added and/or deleted on their advice. In addition, other sites were added after consulting with Paul Currier on 17 June 1991.

Selected sites were generally numbered consecutively from east to west. However, there are no sites numbered 273 to 299. The field teams surveyed additional sites when appropriate; these sites were given decimal numbers corresponding to the nearest site previously assigned an identifying integer. Locations of study sites and maps are given in Appendix A.

In order to become familiar with the morphology of living Western Prairie Fringed Orchids at various stages in their growth and with the topography and species composition of orchid habitats, the authors visited Nine-Mile Prairie in Lancaster County with Mike Fritz on 12 June 1991 to observe the Western Prairie Fringed Orchid population established there. One plant was in bloom at the time of the visit and several vegetative plants were also seen. The habitat and environmental factors pertaining to this population were noted. In addition, all four field researchers, along with John Shadle of Nebraska Public Power District and Mark Peyton of The Central Nebraska Public Power and Irrigation District, accompanied Paul Currier on 17 June 1991 to observe the orchids and their habitat at Mormon Island Crane Meadows in Hall County. Seven orchids were found in bloom or in bud at this site. Special attention was paid to the orchid habitat there, since it was considered to be more typical of suitable Platte River sites than was the upland, tall-grass prairie ecosystem at Nine-mile Prairie.

Species thought to indicate potential orchid habitat were noted. These included *Amorpha canescens*, tall wetland-inhabiting *Carex* species such as *C. emoryii* and *C. lanuginosa*, *Calamagrostis stricta*, *Cicuta maculata*, *Glycyrrhiza lepidota*, and *Scirpus pungens*, as well as such faunal species as *Speryeria idalia* (Regal Fritillary), Bobolink, and Upland Sandpiper. It was noted that orchids grew in disturbed microhabitats within this wet meadow, in areas of transitional moisture content, between wet, *Carex*-filled swales and the zone of *Calamagrostis* in slightly drier locations.

The crew was divided into two teams of two researchers. Study sites were apportioned to each crew on a daily basis, generally with each crew working a single side of the Platte River. The potential for having an orchid population was visually accessed

from the road at each site. Data for obviously unsuitable habitats such as cropland, alfalfa fields, or other heavily impacted areas was recorded but no further attempt was made to search for orchids at such sites. If indicator species were present or the habitat appeared suitable for Western Prairie Fringed Orchid (moist to wet relatively undisturbed sedge or grassland), parallel transects were walked by the crew members. Observers deviated from straight or parallel transects to follow ecotones at the edge of scour marks and/or swales.

Data regarding land usage, topography, moisture, and floral and faunal species were recorded on data sheets. Each site's potential as orchid habitat was also evaluated. Photographs of representative habitats were taken. Each crew's route was recorded on the topographical maps.

Recognizing that the orchid may not have been in bloom even if present during the first visit to suitable habitat, crew members selected those sites that seemed to have the highest potential to support orchid populations (those combining moist areas with native prairie vegetation), and 26 such sites were re-visited at the end of the survey.

Nomenclature for birds, plants, and butterflies listed on site summaries in Appendix A follows Bray et al., 1986; Great Plains Flora Association, 1986; and Pyle, 1981, respectively.

RESULTS

Three hundred seventy sites were surveyed for Western Prairie Fringed Orchids. Descriptions of the surveyed sites are found in Appendix B. No Western Prairie Fringed Orchids were found.

Most of the sites (222, or 60%) were evaluated from the roadside and not surveyed further because they were clearly unsuitable for Western Prairie Fringed Orchids or had been hayed at the time of the survey. One hundred forty two (38%) of the sites were surveyed on foot. A number of these sites were found on closer examination to be xeric, heavily disturbed by grazing, formerly cultivated fields, or recently sprayed with herbicides; such fields were observed only briefly. Any field showing potential to provide orchid habitat was canvassed more thoroughly. In six cases (2%), there was no access to the field and it could not be seen from the road.

Sites were evaluated as potential orchid habitat, marginal orchid habitat, unknown, or unsuitable habitat for orchids (Table 2). Sites considered potential orchid habitat were those combining moist areas with suitable ecotone and a diversity of native prairie species. Those considered marginal were somewhat wet but contained few native species or had very limited ecotone. Only 14 (4%) of the sites were judged as good habitat, and 5% were marginal; thus only a total of 9% offered any significant potential for orchids.

Due to problems of access or because the field had been hayed at the time of the survey, at 24 sites (6%) the quality of the habitat could not be adequately judged.

The most suitable habitats for orchids were located in clusters in a few places, mainly north of the North Platte River, as can be seen in Table 3.

Table 2. Sites that have potential, marginal, or unknown orchid habitat. Sites not listed in the table below are considered unsuitable for orchids.

Evaluation	Site number
Potential orchid habitat:	2.5, 13, 13.1, 54, 146.5, 162, 162.5, 163.5, 175, 214.4, 238.2, 238.5, 238.8, 246.5
Marginal orchid habitat:	2.1, 16, 16.5, 22, 43.5, 45, 120, 121, 139.6, 162.2, 184, 191, 214, 214.8, 238.1, 256.5, 258.1, 267, 315, 317
Unknown habitat quality:	26.5, 27, 32, 38, 49, 79, 115, 136, 139.7, 149, 155, 161, 163, 177, 180.5, 196, 197, 198, 211, 213, 229, 257, 265

Table 3. Locations of sites judged with most potential for Western Prairie Fringed Orchids.

Site#	County	Location	Habitat
2.5	Merrick	5 miles north and 2.5 miles east of Phillips	Floodplain tallgrass prairie
13	Merrick	2.5 miles west of Phillips	Floodplain tallgrass prairie
13.1	Merrick	2.75 miles west of Phillips	Floodplain tallgrass prairie
54	Buffalo	1.5 miles south and 5 miles east of Odessa	Disturbed floodplain tallgrass prairie
146.5	Lincoln	2 miles east and North Platte	Sedge meadow
162	Lincoln	0.75 miles north of North Platte	Sedge meadow
162.5	Lincoln	1 mile north of North Platte	Sedge meadow
163.5	Lincoln	1 mile north of North Platte	Sedge meadow
175	Lincoln	3.5 miles west and 2.25 miles north of North Platte	Wet meadow
214.4	Lincoln	2.5 miles west and 3 miles north of Sutherland	Wet prairie meadow
238.2	Keith	6.25 miles east of Keystone	Wet prairie with sedges
238.5	Keith	6. miles east of Keystone	Wet prairie with sedges
238.8	Keith	6.5 miles east of Keystone	Wet prairie with sedges
246.5	Keith	4.5 miles west and 1 mile south of Paxton	Floodplain tall-grass prairie

DISCUSSION

No orchids were found during this survey. Many factors may contribute to the lack of sightings of Western Prairie Fringed Orchids in the Platte River Valley in 1991.

First, aspects of the growth pattern and life history of Western Prairie Fringed Orchid make the plant difficult to detect. These plants spend much of their life cycle in dormant and/or vegetative condition, and such plants are difficult to find unless near flowering individuals. Even the most intensive survey is unlikely to report vegetative plants, and dormant plants would be impossible to detect visually. In addition, the populations of Western Prairie Fringed Orchid are known to have a patchy distribution (Antlfinger, per. comm.) even in the most suitable habitat. Thus even a large population could easily be overlooked.

Second, it appears that weather affects the likelihood that this species will flower. A drought began along the Platte in 1987, with 1988 and 1989 being exceptionally dry. In 1990, precipitation returned to near-normal levels, and 1991 to date has a surplus of moisture (Nebraska State Hydrologist Roy Osugi, pers. comm.). If the orchid indeed initiates the flowering stem in the fall of the year preceding flowering as a response to high moisture conditions (Bowles and Duxbury, 1986), precipitation the previous year might have an important influence upon flowering. Drought-stressed orchids would likely remain dormant or produce only one or two leaves. However, Freeman and Brooks (1990) found five flowering plants at Mormon Island Crane Meadows in 1989, an exceptionally dry year following two previous dry years. The effects of the higher precipitation during 1990 and 1991 upon flowering frequency are difficult to estimate.

Most significantly, suitable habitat for the Western Prairie Fringed Orchid in the Platte River valley appears severely limited. Since the mid-1800's this river valley has been a major conduit for human migration. Early writers report the floodplain denuded of vegetation by grazing livestock and wagons traveling west. The Platte River floodplain was the first large area of Nebraska converted to agriculture, with white settlers first breaking ground there in 1853 (Sutherland, 1974). Soon after settlement, irrigation and drainage of fields began changing the moisture regime in the floodplain. The subsequent century has seen increasingly intensive agriculture and drainage. Consequently, very little habitat remains that would be appropriate for Western Prairie Fringed orchid.

Nine percent of the sites surveyed during this study contained potential or marginal habitat for Western Prairie Fringed Orchid. However, this figure overstates the amount of orchid habitat remaining along the Platte River as this survey concentrated on floodplain meadows, the habitat most likely to contain orchids. Most of the floodplain consists of cropland, alfalfa fields, towns and other developed areas totally unsuitable for Western Prairie Fringed Orchid populations. The lack of orchids along the Platte is reiterated by the failure of a second, independent study to find the species along the proposed GGS Rail Spur Area (EA #11579.01) near Sutherland Reservoir (Zlotsky, 1991).

Examining habitat maps or driving casually along the Platte River suggests that many wet meadows are available for orchids, but in fact, most uncultivated fields are completely unsuitable for Western Prairie Fringed Orchids. Meadows with native vegetation are few and most show signs of major disturbance such as plowing or heavy grazing.

Most of the floodplain meadows are pastures or hayfields planted to introduced Eurasian species such as *Bromis inermis*, *Festuca arundinacea*, *Medicago sativa*, *Melilotus alba*, *Melilotus officinalis*, *Trifolium hybridum*, or *Trifolium pratense*. Such planted fields most likely have a history of plowing and cultivation. Therefore native vegetation has been largely extirpated.

In addition, the wet meadows and non-native pastures often show indications of herbicide applications. The Western Prairie Fringed Orchid, a monocot, would be unlikely to succumb to 2,4-D or the other most commonly used pasture herbicides, if these were applied at recommended concentrations. However, certain herbicides do kill monocots and a few of the fields surveyed had received herbicide applications that browned even such non-grass monocot species as *Smilacina stellata* and *Scirpus* species. At these application rates, any orchids present would be damaged or killed as well.

Many meadows in the floodplain of the Platte, whether native pasture or planted to introduced species, are overgrazed; those managed more carefully at present have probably undergone episodes of overgrazing in the past, particularly during drought years. Heavy grazing has favored species inedible to cattle, such as *Verbena stricta*, *Cicuta maculata*, *Rumex crispus*, and thistles of the genera *Carduus* and *Cirsium*, at the expense of edible perennial species such as orchids and many other native forbs. Trampling of soil and vegetation by cattle has eliminated perennials in areas where cattle congregate and favored quick-growing annual species like *Hordeum jubatum*, *Bromus tectorum*, *Bromus japonicus*, *Ambrosia artemisiifolia*, *Helianthus annuus*, and *Iva xanthifolia*. Such trampling was most evident in the transition zone between wet and dry areas, the very habitat preferred by the Western Prairie Fringed Orchid.

Uncultivated fields not grazed by livestock are usually maintained as hayfields and mowed each year. While the orchid is known to persist for decades in annually mowed meadows (Freeman and Brooks, 1990), mowing prevents seed set and thus the dispersal of orchids to adjacent suitable habitat. Due to heavy precipitation this year, plants grew more quickly than normal and farmers were mowing many meadows early with the intention of obtaining two crops of hay this season.

This orchid is naturally limited to a narrow range of moisture conditions needing sufficient subsurface moisture but unable to withstand flooding for more than a month (Currier, pers. comm.). Therefore it is limited to the ecotone between wet and dry areas, a habitat that is now generally scarce along the Platte River. In many of the fields visited, this transition area was very narrow or non-existent due to the fact that the wetlands occurred in areas of sandy, well-drained soil. Draining of wet meadows by ditching has also reduced the area of ecotone available to orchids.

Woody vegetation has developed along the river channel. Since the Western Prairie Fringed Orchid is shade-intolerant, this successional change would have extirpated it from the channel, assuming it were once present.

Historical records of this orchid along the Platte upstream of Kearney County are lacking (Freeman and Brooks, 1990; Sutherland, 1974). The orchid may never have occurred in this area because sandy or alkaline soils lack sufficient available moisture. Therefore the range of this plant may never have extended west of Kearney County along the Platte River.

Western Prairie Fringed Orchid populations expand into such once-disturbed habitats as roadsides and unused sandpit areas near existing populations that could serve as

seed sources (Freeman and Brooks, 1990). This ability to colonize disturbed areas could allow the species to grow in the wide areas of the Platte floodplain now occupied by grassy meadows, pastures, or roadsides -- if seed sources were available. However, with the exception of the population at Mormon Island Crane Meadows, no seed source is known.

CONCLUSIONS

No orchids were found in the area surveyed for this study in 1991. Possible orchid habitat, probably always limited in extent, was found to be very rare. Failure to find the orchid may be the result of the plant's inconspicuousness during much of its life cycle or the rainfall patterns of recent years. However, the lack of suitable habitat suggests that the orchid may have been extirpated from the portion of the Platte River surveyed, except for the population now existing at Mormon Island.

LITERATURE CITED

- Bowles, Marlin L. 1983. The tall-grass prairie orchids *Platanthera leucophaea* (Nutt.) Lindl. and *Cypripedium candidum* Muhl. ex. Willd.: some aspects of their status, biology, and ecology, and implications toward management.
- Bowles, Marlin L. and Alexis Duxbury. 1986. Report on the status of *Platanthera praeclara* Sheviak and Bowles in Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota. Unpublished report submitted to the U.S. Fish and Wildlife Service by the North Dakota Parks and Recreation Department.
- Bray, Tanya E., Barbara K. Padelford, and W. Ross Silcock. 1986. *The Birds of Nebraska: A Critically Evaluated List*. Published Privately. Bellevue, Nebraska.
- Cronquist, Arthur. 1981. *An integrated system of classification of flowering plants*. Columbia University Press: New York.
- Freeman, Craig C. and Ralph E. Brooks. 1990. Status report on *Plananthera praeclara* Sheviak and Bowles (Western Prairie Fringed Orchid) in Kansas, Nebraska, and South Dakota. Unpublished report submitted to U.S. Fish and Wildlife Service, Dr. James L. Miller, Regional Listing Coordinator, Denver, Colorado, by Kansas Biological Survey.
- Great Plains Flora Association. 1986. *Flora of the Great Plains*. University Press of Kansas. Lawrence, Kansas.
- Johnson, W. Carter. 1990a. Quantification of land/water cover associated with FERC projects 1835 and 1417 and the adjacent Platte River using a Geographic Information System. Unpublished report submitted to the Nebraska Public Power District.
- Johnson, W. Carter. 1990b. Quantification of roosting habitat area for cranes in the Platte River, Nebraska, using a Geographic Information System. Unpublished report submitted to the Nebraska Public Power District.
- Pyle, Robert Micheal. 1981. *The Audubon Society Field Guide to North American Butterflies*. Alfred A. Knopf: New York.
- Sheviak, C. J. and M. L. Bowles. 1986. The prairie fringed orchids: a pollinator-isolated species pair. *Rhodora* 88: 267-290.
- Stoutamire, W. P. 1974. "Terrestrial Orchid Seedlings" in *The Orchids: Scientific Studies*. C. L. Withner, ed. John Wiley and Sons: New York. Pages 101 to 128.
- Sutherland, David M. 1974. Identification and evaluation of present vegetative resources -- Nebraska Midstate Division, Pick-Sloan Missouri Basin Program and Associated Areas. Unpublished report prepared for the U.S. Department of the Interior, Bureau of Reclamation, Lower Missouri Region.
- Zlowsky, Amy. 1991. Unpublished letter to Mark Czaplewski of Nebraska Public Power District, regarding field survey for the Western Prairie Fringed Orchid in the proposed GGS Rail Spur Area.