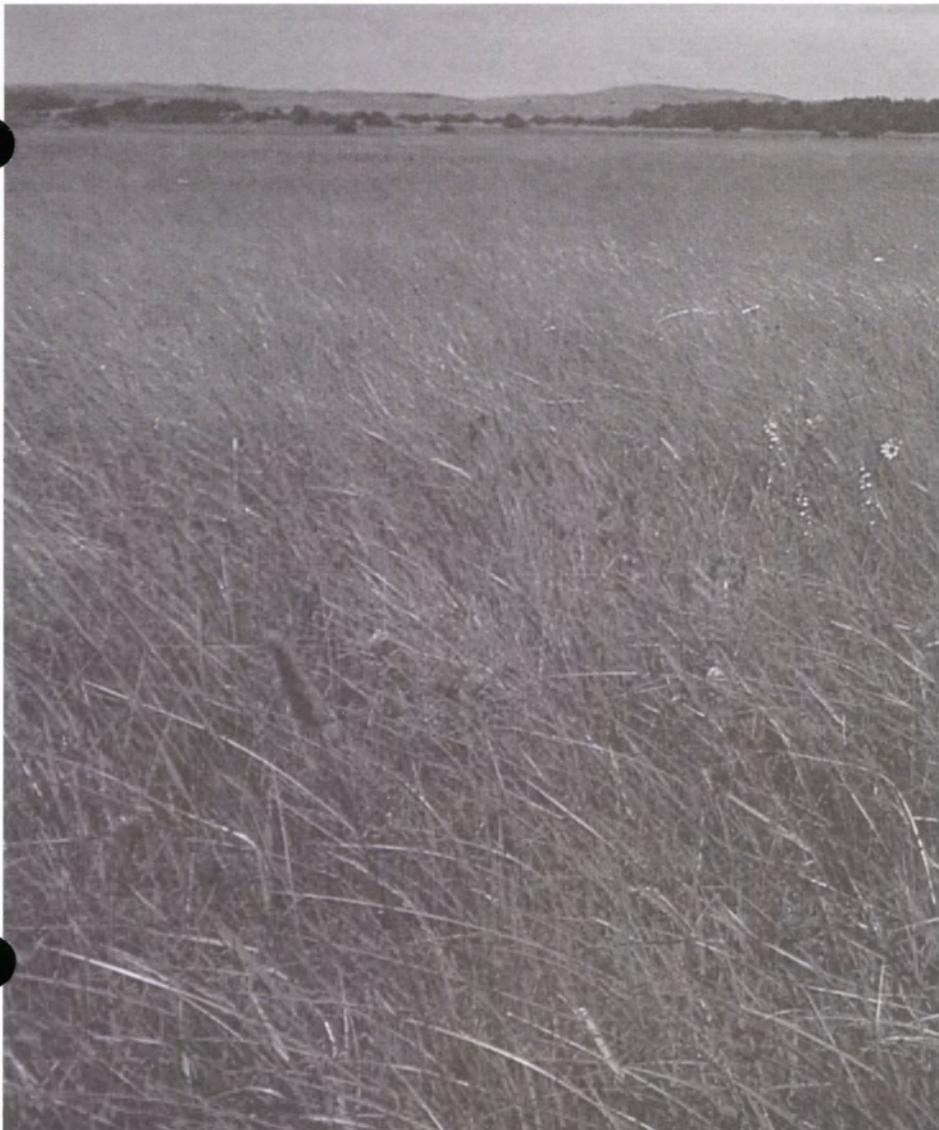


E N D A N G E R E D

Species

B U L L E T I NU.S. DEPARTMENT OF THE INTERIOR
JULY/AUGUST 1997FISH AND WILDLIFE SERVICE
VOL. XXII NO. 4

*When European explorers moving westward across North America first emerged from the forests of the east, they encountered a spectacle they had never seen before: a seemingly endless "sea" of grasses and wildflowers. Some of the plants stood taller than the settlers themselves. Searching for a term to describe the sight, they adopted the French word "prairie," meaning meadow. At first, the prairie's thick sod resisted their plows, but advances in farming machinery eventually turned the grasslands into croplands. Today, much of our native prairie—especially mid- and tallgrass prairie—has been lost, but the remaining areas reveal a surprising diversity of plant and animal life. This edition of the **Endangered Species Bulletin** takes a look at efforts to protect and restore the last of our Nation's grasslands.*



U.S. Fish & Wildlife Service

Ted Thomas©

WASHINGTON D.C. OFFICE *Washington, D.C. 20240*

Jamie Rappaport Clark, *Director*
Sam Hamilton, *Acting Assistant Director for Ecological Services*

F. LaVerne Smith, *Chief, Division of Endangered Species* (703)358-2171
Ren Lohofener, *Deputy Chief, Division of Endangered Species* (703)358-2171
Lesli Gray, *Acting Chief, Branch of Information Management* (703)358-2171
Jay Slack, *Chief, Branch of Conservation and Classification* (703)358-2105
Richard Hannan, *Chief, Branch of Recovery & Consultation* (703)358-2106

REGION ONE *Eastside Federal Complex, 911 N.E.11th Ave, Portland OR 97232*

*California, Hawaii, Idaho, Nevada, Oregon,
Washington, American Samoa, Commonwealth
of the Northern Mariana Islands,
Guam and the Pacific Trust Territories*

Michael J. Spear, *Regional Director* (503)231-6118
<http://www.r1.fws.gov>

REGION TWO *P.O. Box 1306, Albuquerque, NM 87103*

Arizona, New Mexico, Oklahoma, and Texas

Nancy Kaufman, *Regional Director* (505)248-6282
<http://sturgeon.irm1.r2.fws.gov>

REGION THREE *Federal Bldg., Ft. Snelling, Twin Cities MN 55111*

*Illinois, Indiana, Iowa, Michigan,
Minnesota, Missouri, Ohio, and Wisconsin*

William Hartwig, *Regional Director* (612)725-3500
<http://www.fws.gov/~r3pao/r3home.html>

REGION FOUR *1875 Century Blvd., Suite 200, Atlanta, GA 30345*

*Alabama, Arkansas, Louisiana, Georgia, Kentucky,
Mississippi, North Carolina, South Carolina, Florida,
Tennessee, Puerto Rico, and the U.S. Virgin Islands*

Noreen Clough, *Regional Director* (404)679-4000
<http://www.fws.gov/~r4eao>

REGION FIVE *300 Westgate Center Drive, Hadley, MA 01035*

*Connecticut, Delaware, District of Columbia,
Maine, Maryland, Massachusetts, New Hampshire,
New Jersey, New York, Pennsylvania, Rhode Island,
Vermont, Virginia, and West Virginia*

Ronald E. Lambertson, *Regional Director* (413)253-8659
<http://www.fws.gov/~r5fwo>

REGION SIX *P.O. Box 25486, Denver Federal Center, Denver CO 80225*

*Colorado, Kansas, Montana, Nebraska, North
Dakota, South Dakota, Utah, and Wyoming*

Ralph O. Morgenweck, *Regional Director* (303)236-7921
<http://www.r6.fws.gov/www/fws>

REGION SEVEN *1011 E. Tudor Rd., Anchorage, AK 99503*

Alaska

Dave Allen, *Regional Director* (907)786-3542
<http://www.fws.gov/~r7hpirm>

ENDANGERED Species BULLETIN

Telephone: (703)358-2390

Fax: (703)358-1735

Internet:

R9FWE_DES.ESB@fws.gov

<http://www.fws.gov/~r9endspp/endspp.html>

Editor

Michael Bender

Acting Associate Editor

Martha Balis-Larsen

Editorial Consultant

Jennifer Greiner

Art Director

David Yeargin

Contributors

Jane West

Ted Thomas

Noreen E. Walsh

Karen Kreil

Kristine Askerooth

Carolyn Hull Sieg

Michael F. Delany

Mary Jennings

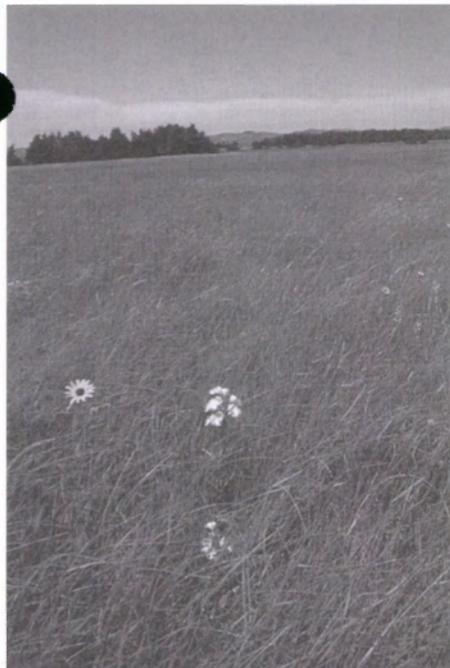
Art Anderson

Lori Pruitt

Kelly Strigley Werner

Randy Matchett

Julia Bumbaca



On the Cover

**Valentine National Wildlife
Refuge in north-central
Nebraska contains important
habitat for the western prairie
fringed orchid and other
grassland species.**

Photo by John & Karen Hollingsworth©

IN THIS ISSUE

4 A Vanishing
Ecosystem

5 Prairie
Restoration
in Western
Washington

8 Creating a
High Plains
Partnership



Ted Thomas©

10 North Dakota's Tallgrass Prairie



John & Karen Hollingsworth©

12
The
Mysteries
of a
Prairie
Orchid

14
Florida's
Prairie



Barry Mansell



P. Stephen Corn

16
The
Wyoming
Toad

18 From Bombs to Birdsongs

20 On the Fringe of the Prairie

Departments

22 Spotlight on Refuges:
Charles M. Russell / UL Bend
National Wildlife Refuges

25 Regional News and
Recovery Updates

26 On the Web

27 Listing Actions

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery, habitat conservation plans, and cooperative ventures. Please contact the Editor before preparing a manuscript. We cannot guarantee publication.

The Fish and Wildlife Service distributes the Bulletin primarily to Federal and State agencies, and official contacts of the Endangered Species Program. It also is reprinted by the University of Michigan as part of its own publication, the Endangered Species UPDATE. To subscribe, write to the Endangered Species UPDATE, School of Natural Resources, University of Michigan, Ann Arbor, MI 48109-1115; or call 313/763-3243.



Printed with vegetable-based ink on recycled and recyclable paper. If you do not keep back issues, please recycle the paper, pass them along to an interested person, or donate them to a local school or library.

by Jane West

A Vanishing Ecosystem

America's native grasslands are a vanishing ecosystem, and evidence indicates that many species are disappearing as fast as the prairie habitats on which they depend. Few other ecosystem types have experienced as great a degree of loss and alteration. In Minnesota and Iowa, for example, the native northern tallgrass prairie has declined to less than 1 percent of its original 25 million acres (10.1 million hectares).

Many people now realize that maintaining biological diversity is the key to the health of Earth's ecological systems. Native prairies are excellent examples of biodiversity with their complex webs of plants, mammals, birds, reptiles, amphibians, insects, and microscopic organisms. But despite a broad consensus supporting the conservation of biological diversity, the status of our native prairies is often overlooked. Fifty-five animals and plants are listed as threatened or endangered grassland species in the United States. Grassland birds in particular have shown steeper,

more consistent, and more widespread declines than any other group of North American birds.¹

The conservation community has recognized the need to preserve native prairies with new approaches that encourage compromise and a true balance between people and nature. One way in which the Fish and Wildlife Service (FWS) is responding is a new approach called the Northern Tallgrass Prairie Habitat Preservation Area. Within this area, which encompasses 77,000 acres (31,160 ha) within 85 counties in western Minnesota and northwestern Iowa, the FWS plans to work closely with individuals, groups, and governmental entities to preserve remnant tracts of northern tallgrass prairie. To help accomplish this goal, the FWS proposes to participate in public and private partnerships at many levels, complementing other prairie projects such as those of the Iowa County Conservation Boards, Iowa and Minnesota Departments of Natural Resources, The Nature Conservancy, and others. Through an integrated ecosystem approach, protection and restoration of representative native tallgrass prairie habitats can be accomplished. The draft environmental impact statement for this project will be released within the next several months. To obtain a copy, contact Jane West, Project Manager, Ascertainment and Planning, U.S. Fish and Wildlife Service, Bishop Henry Whipple Federal Building, 1 Federal Drive, Fort Snelling, Minnesota 55111; telephone 612-725-3306 (toll-free 1-800-247-1247).

Monarch butterflies gather nectar by feeding on a blazing-star (*Liatris*), a native prairie forb.

Photo by Bernie Angus



¹Knopf, F.L. 1994. Avian assemblages on altered grasslands. *Studies in Avian Biology* 15: 247-257.

Prairie Restoration in Western Washington

by Ted Thomas

An unusual landscape feature is found at the southern tip of Puget Sound in western Washington. The dense conifer forests that dominate most of western Washington yield to a broad, open landscape of grasslands and sparse oak woodlands. The term "prairie" was applied to these treeless grasslands by European settlers in the mid-1800's and continues to be used today. The settlement of the region, however, brought changes to the landscape (land clearing, agriculture, and fire suppression) that reduced the amount of prairie habitat by promoting the encroachment of woody shrubs and trees.

A cooperative effort between the U.S. Fish and Wildlife Service (FWS) and the Washington Department of Natural Resources' Natural Heritage Program has implemented a plan to restore native grasslands and improve the habitat of a threatened species, the golden paintbrush (*Castilleja levisecta*). It is the first effort of this type in western Washington designed specifically to restore prairie habitat and a component plant species.

Prairie and grassland habitats of western Washington and Oregon are being diminished rapidly by urban development, agriculture, other land uses, and the encroachment into prairies of native and non-native vegetation. These grassland habitats are found at low elevations in the Willamette Valley of Oregon and extend north to the Puget Trough in Washington; they are also found on grassy headlands along the coast and on the islands of Puget Sound to southeastern Vancouver Island. Historically, western Washington prairies covered more than 200,000 acres (81,000 hectares). Today, these prairies cover less than 15,000 acres (6,070 ha).



The lowland grasslands of the Puget Sound region were formed roughly 12,000 years ago by the deposition of outwash material from the retreating Vashon Glacier, and by subsequent erosion and the action of rivers. These native prairies are typically dominated by grasses and forbs such as Idaho fescue (*Festuca idahoensis*) or red fescue (*Festuca rubra*). Non-native, weedy grass species including velvet-grass (*Holcus lanatus*) and orchard grass (*Dactylis glomerata*) may also occur in this habitat, especially in areas degraded by past disturbances. With fire suppression, prairies have been colonized by the native tree Douglas fir (*Pseudotsuga menziesii*), the native shrub Nootka rose (*Rosa nutkana*), and the aggressive, non-native scot's broom (*Cytisus scoparius*). When these species encroach upon the prairies, native grasses and forbs are displaced. Ultimately, the prairies are replaced by Douglas fir forests.

The restoration of prairies requires the manual or mechanical removal of invasive plants and active management

Douglas fir and prairie come together at the southern tip of Puget Sound, Washington.

Photo by Ted Thomas©

Golden paintbrush is the focus of a native grassland habitat improvement effort in Washington state.

Photo by Jon Gilstrom





Golden paintbrush
Photo by Jon Gilstrom

to restore ecosystem processes such as fire. Fire was vital to the maintenance of prairies, and was probably used by Native Americans to increase the production of edible plant foods, improve forage production for deer, and possibly herd deer for hunting. After Europeans came onto the scene in the mid-1800's, fire was all but eliminated. Restoring the use of fire will be among the management activities required to enhance and maintain prairie habitat.

In the Puget Sound region, where vegetation is dominated by coniferous forests, prairies provide a unique habitat for rare plant and animal species. One rare plant, the golden paintbrush, is a perennial forb that was historically more common on prairies but is now restricted to 10 populations in western Washington and southwestern British Columbia, Canada. It was last observed in Oregon more than 50 years ago; despite exhaustive searches, it is presumed to be extirpated from that State. The species was listed on June 11, 1997, as threatened. Recovery efforts are being conducted on two grasslands in western Washington: Rocky Prairie Natural Area Preserve near Olympia and Fort Casey State Park on Whidbey Island. Funding for these projects came from the Washington State Ecosystems Conservation Program and technical assistance was provided by the FWS Olympia, Washington, Field Office.

At Fort Casey State Park, the grassland-dominated habitat has been seriously invaded by shrubs, particularly Nootka rose and snowberry (*Symphoricarpus albus*). Restoration activities involved manually removing invasive shrubs in the spring of 1995, aerating trails that had been formed through the golden paintbrush population, and erecting a split-rail cedar fence as a barrier to prevent further damage and allow the plants to recover from years of trampling. Signs were also placed at the fence line to educate the public about the habitat restoration.

Management activities at the Rocky Prairie Natural Area Preserve have involved the harvesting of Douglas fir and revegetation of the exposed, bare ground with native forbs and Idaho fescue seedlings. The tree harvesting, removal, and prescribed burning was completed during January and February 1996, when the golden paintbrush was dormant. Loggers used directional felling to lessen the impact on the prairie. Entire trees were removed from the site by helicopter to avoid disturbing the soil and vegetation.

The succession of Douglas fir onto prairies threatens the golden paintbrush and other native species by shading and by competing for the limited resources available for plant growth on these glacial outwash prairies. The native prairie vegetation beneath the trees disappears because of the lack of light and a heavy accumulation of needle litter. However, when the Douglas fir are harvested and removed, seeds of a variety of plants that have been stored in the soil for decades are able to flourish in the clear, sunlit environment. Another threat to the native vegetation comes from the germination and growth of non-native species like scot's broom, a nitrogen-fixing plant that grows vigorously in open, bare soil conditions. Timing of the prairie restoration project will be crucial to its success. The bare ground must be revegetated with native forbs and grasses as quickly as possible after the trees have been harvested.

During the summer of 1995, the seeds of several native grass and forb species were collected from other parts of the Rocky Prairie to be propagated and replanted onto the site. They include Idaho fescue, California oat-grass (*Danthonia californica*), woolly sunflower (*Eriophyllum lanatum*), sickle-keeled lupine (*Lupinus albicaulis*), showy fleabane (*Erigeron speciosus*), cinquefoil (*Potentilla gracilis*) and cut-leaved microseris (*Micoseris laciniata*). Idaho fescue seeds were propagated as plugs in foam blocks at the IFA Nursery in Nisqually, Washington. Seeds from the forbs were propagated by students at Cascades High School in Everett, Washington, and were planted at Rocky Prairie in the spring of 1996.

Early reports from Fort Casey State Park have shown a slight increase in the number of flowering golden paintbrush on the restored habitat. This increase may be due to the natural variation associated with plant populations or it may be due to the restoration efforts. Future monitoring will be required to indicate if these efforts have improved the population over the long-term. The jury is still out on the Rocky Prairie restoration project. Invasive species filled in some of the open ground before the planted grasses and forbs fully occupied the site. Survival of the Idaho fescue was high, while the forbs suffered about 30 percent mortality. However, the removal of trees will improve the chances of the golden paintbrush and the associated prairie plants to reclaim former habitat.

Botanists, plant ecologists, and conservation groups like The Nature Conservancy continue to seek ways of restoring western Washington's prairies to their original structure, composition, and function. It will be a difficult task, but the return on this investment should be worth the effort.

Ted Thomas is a Plant Ecologist with the Endangered Species Program in the North Pacific Coast Ecoregion, Western Washington Office in Olympia.

After invasive shrubs were removed from this site at Rocky Prairie Natural Area Preserve, prompt revegetation with native grasses and forbs was crucial to prevent the seeds of non-native species from germinating in the bare soil. Here, plugs of the native Idaho fescue, propagated at the IFA nursery, are being planted at a cleared site.

Photo by Ted Thomas©



by Noreen E. Walsh

Creating a High Plains Partnership



Mountain plover

Photo by John Shackford

Lesser prairie-chicken

Photo by John Shackford



Although the intent of the Endangered Species Act (ESA) is to conserve the ecosystems upon which threatened and endangered species depend, and we are making progress in incorporating an ecosystem approach into our activities, more needs to be done. Listing species under the ESA remains a priority for species that are, or may soon be, in imminent risk of extinction. But as we continue to employ the ESA for species in crisis, we are also looking for ways to reduce the number of crises we face.

Over the past century, historical changes in land use patterns in the Great Plains have produced a highly altered landscape. Several species are showing

the effects of these changes through declines in population abundance, distribution, and habitat use. Some Great Plains species, such as the black-footed ferret (*Mustela nigripes*), have had a high profile for years, but concern has been growing about a host of others, such as the swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), Arkansas River shiner (*Notropis girardi*), and lesser prairie-chicken (*Tympanuchus*

pallidicinctus). Biologists are also becoming concerned about a suite of grassland nesting birds, including declining species like the Cassin's sparrow (*Aimophila cassini*), lark sparrow (*Chondestes grammacus*), grasshopper sparrow (*Ammodramus savannarum*), and long-billed curlew (*Numenius americanus*).

As a result, the Fish and Wildlife Service (FWS) is cooperating in an initiative called the *High Plains Partnership for Species at Risk*, which addresses issues in the southern Great Plains of Texas, New Mexico, Oklahoma, Colorado, and Kansas. While identifying the values and goals common to all stakeholders, the initiative will work cooperatively with a broad spectrum of partners to solve problems of declining wildlife species before they become critically endangered. The *High Plains Partnership* is focusing initially on the lesser prairie-chicken and other species sharing the same habitat. An integral partner in this effort is the Lesser Prairie-chicken Interstate Working Group, which is composed of representatives from the five State wildlife agencies. Other

partners include the FWS, Western Governors' Association, American Farm Bureau Federation, U.S. Forest Service, Bureau of Land Management, and Natural Resources Conservation Service.

The project is beginning with the development of a process for public involvement. Demonstration areas are planned on both public and private lands to showcase healthy rangelands and the native biodiversity they support. The status of grassland birds will be monitored to determine the results of any changes in land management. These "working research areas" will provide private landowners information about range management practices that benefit wildlife as well as ranchers. A large part of the *High Plains Partnership* involves establishing a fund to provide technical assistance and to share the cost of range management practices with private landowners. In addition, the Lesser Prairie-chicken Interstate Working Group has been coordinating with the Natural Resources Conservation Service to implement relevant conservation provisions of the recent Farm Bill. Several programs, such as the Environmental Quality Incentive Program and the Wildlife Habitat Incentive Program, have the potential to enhance habitat for declining wildlife in the region.

How is the *High Plains Partnership* different from most previous large-scale efforts to conserve species at risk? First, the focus of this initiative is on cooperative solutions that might preclude the need for additional listings in the future. Second, the initiative focuses on private land and landowners. Although many western States contain significant amounts of federally-managed property, more than 95 percent of Texas, Kansas, and Oklahoma lands are in private ownership. Third, the *High Plains Partnership* is focused on a region defined by broad vegetation community types, making it necessary for the partners to work across traditional boundaries. Coordinating among the five State wildlife agencies, two FWS regions, three U.S. Forest Service regions, three

Natural Resources Conservation Service regions, and innumerable private groups and landowners may prove to be our biggest challenge!

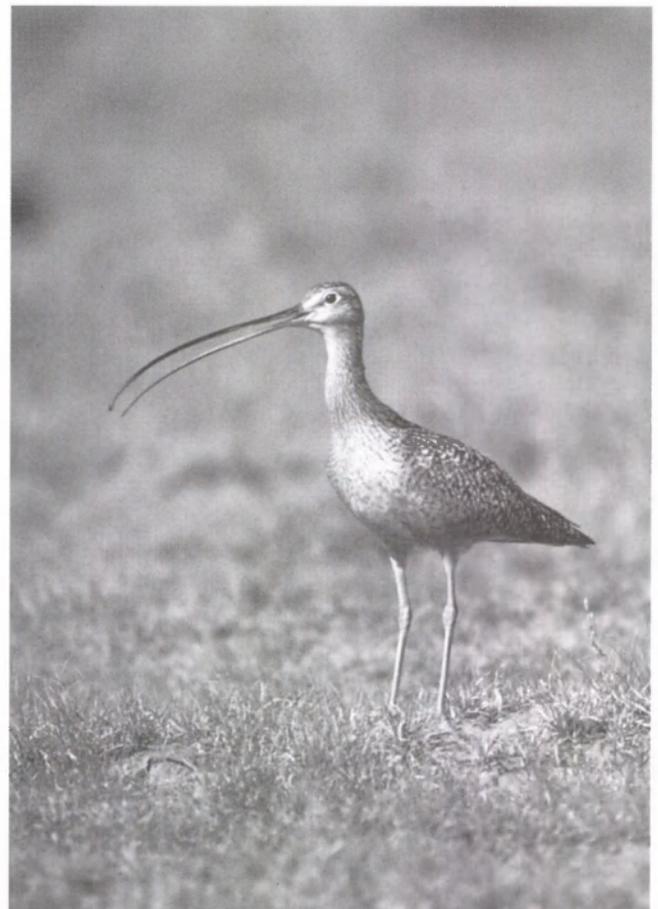
Endangered species biologists from FWS Regions 2 and 6 met recently to discuss cooperative strategies for conserving Great Plains grasslands. Region 6 is working to implement a Memorandum of Agreement (MOA) between the Department of the Interior and the State of Colorado. This MOA is intended as a vehicle for demonstrating that the flexibility of the ESA can be used to 1) find practical solutions that will reduce the need to list species, 2) consider social and economic issues, and 3) implement an ecosystem approach to conservation. The Department hopes that such agreements will be explored in other regions, especially for species that range over several States.

People often liken the endangered species program to an "emergency room" for wildlife. But the *High Plains Partnership* and the Department's MOA with the State of Colorado are more analogous to "preventative health care." Such an approach requires close working relationships with private landowners and the States, which retain responsibility for non-listed species. It recognizes that those people who live and work on the land not only must be a part of the solution, but in States like Texas and Oklahoma, where wildlife depends primarily on private land, they are the *most important* part.

Noreen E. Walsh is a Wildlife Biologist with the FWS Oklahoma Ecological Services Office in Tulsa.

The long-billed curlew is usually found in grasslands where there is bare ground and abundant invertebrate prey. Nests generally are built in short- and midgrass prairies near wet areas.

Photo by John Shackford



North Dakota's Tallgrass Prairie

Women's Group Spreads the Word About Prairie

by Kristine Askerooth

Tewaukon National Wildlife Refuge in North Dakota has joined forces with a small but ambitious group of 20 women to help preserve one of the largest remnants of tallgrass prairie in eastern North Dakota. Stacks Slough Waterfowl Production Area, administered by the refuge, contains 1,000 acres (405 hectares) of tallgrass prairie. Among the biological resources it supports are more than 300 species of prairie plants and 4 rare species of butterflies. The Hankinson chapter of the General Federation of Women's Cultura Club, a neighboring civic group, has embraced the challenge of promoting this unique tract of prairie by raising funds to put interpretative panels in the area. The panels will provide information on the tallgrass prairie ecosystem and the unique plants and animals found there.

Getting people out to the area so that they can learn, appreciate, and enjoy the prairie and wildlife for themselves can be a challenge. To stimulate interest, the Hankinson Women's Club is organizing several wildflower and butterfly

The Great Plains prairie, once the continent's most extensive ecosystem, is now considered by some people to be the rarest and most fragmented. Within it, tallgrass is the most endangered *type* of prairie. Only about 4 percent of presettlement tallgrass prairie survives; most has been plowed under for agricultural purposes. The situation is even more serious in North Dakota, where less than one percent of the original tallgrass prairie remains. It, too, is threatened with conversion to cropland.

Tallgrass prairies have a biological importance that is not widely recognized. This diverse system supports 40 neotropical migratory birds, 12 species of waterfowl, 30 State-classified rare species, such as federally-listed species as the western prairie fringed orchid (*Platanthera praeclara*), and another estimated 300 plant and 1,500 insect species. Forty-two species of plants and insects of the tallgrass prairie are designated as sensitive species by the U.S. Forest Service.

Making Prairie a Priority

In the book, *Prairie Conservation: Preserving North America's Most Endangered Ecosystem*,¹ Fred Samson and Fritz Knopf wrote, "In the larger context of conserving biological diversity in ... natural ecosystems in North America, prairies are a priority, perhaps the highest priority." The Fish and Wildlife Service (FWS) is taking this message to heart. In North Dakota, along with partners such as The Nature Conservancy and the North Dakota Parks and Recreation Department's Natural Heritage Program, the FWS is making progress in ranking the remaining prairie tracts for attention. With landowner cooperation, inventories

are being conducted by The Nature Conservancy and North Dakota Natural Heritage program on private and public land, including FWS properties. From these inventories, land managers will be able to focus on the areas needing the most immediate attention.

Protection

Protecting the remaining tallgrass prairie tracts from conversion to cropland is a FWS priority. Tewaukon National Wildlife Refuge in southeast North Dakota acquired a 1,600-acre (647-hectare) parcel, now called the Stacks Slough Waterfowl Production Area (WPA), which contains 1,000 acres (405 ha) of excellent tallgrass prairie. The refuge also received funding for grassland easements and fee acquisition as part of a North American Wetland Conservation Act grant. Interest in the grassland easement program has been high, with more landowner interest than available money, but additional funding is becoming available. The FWS Ecological Services Division in Bismarck received a FWS "ecosystem team" grant to work with the Forest Service and/or private landowners to benefit tallgrass prairie and, along with The Nature Conservancy, it also received a Director's Challenge Grant for easement or fee acquisition of other tallgrass prairie.

Management of the tallgrass prairie at Stacks Slough WPA includes prescribed burning to control invasive plants, providing nectar sources for three rare species of butterflies, improving habitat for two rare orchids, and enhancing native vegetation. Refuge staffers conduct biological and chemical weed control. Plans are also underway by refuge staff to restore 300 acres (120 ha)

of cropland at Stacks Slough to tallgrass prairie by planting the appropriate native grasses and forbs.

Education and Outreach

Relatively few people have had the opportunity to appreciate the prairie, but the FWS and our partners are trying to change that. The importance of prairie restoration efforts will be promoted at Stacks Slough through interpretive panels at the site and tours. (See sidebar.) The FWS Bismarck Office is also working on a prairie display for use throughout Region 6 at a variety of events. In addition, the Bismarck Office has received a National Fish and Wildlife Foundation grant to develop three "Prairie Discovery Trunks" that contain hands-on, interactive materials for grades K-8. The trunks are shipped throughout the State and are already booked a full year in advance.

In another chapter of *Prairie Conservation*, Ernest Steinauer and Scott Collins stated, "Though the prairie lacks the mass appeal of more spectacular ecosystems such as temperate or tropical rain forests, there are fortunately many prairie enthusiasts. Perhaps with dedicated efforts we can preserve the tallgrass prairie so that those who come after us can marvel at its many wonders." The FWS and its partners are working to conserve this rare ecosystem and "its many wonders."

Karen Kreil is a Fish and Wildlife Biologist with the FWS Bismarck, North Dakota, Field Office.

¹ *Prairie Conservation: Preserving North America's Most Endangered Ecosystem*, edited by Fred Samson and Fritz Knopf, published by Island Press, 1996.

walks throughout the summer months. The walks, which are open to everyone in the community, provide a great opportunity to show off the incredible and changing beauty of the tallgrass prairie. The Hankinson Women's Group would also like to involve local schools, Boy and Girl Scout troops, and other civic organizations in their promotional campaign.

As part of the effort to restore historic prairie on the refuge, 300 acres (120 ha) of cropland in the Stacks Slough Waterfowl Production Area will be seeded with native grasses and forbs from existing sites. The Hankinson Women's Club has agreed to donate their time to help Tewaukon Refuge staff harvest some of the more rare and difficult seeds by hand. These seeds will then be hand-sown into the restored sites.

When asked why the Hankinson Women's Club wanted to be involved in the prairie, one member explained, "Many people don't realize what a treasure they have here in their own backyard....it is a place of tremendous beauty and a look into what was once here....If we don't show them and tell them about the prairie, tomorrow it could be gone and no one would even know what a wondrous thing has been lost."

Kristine Askerooth is a Biologist with Tewaukon National Wildlife Refuge.



A katydid perches on the petals of a tiger lily, one of the few orange-red flowers found in the prairies of North Dakota.

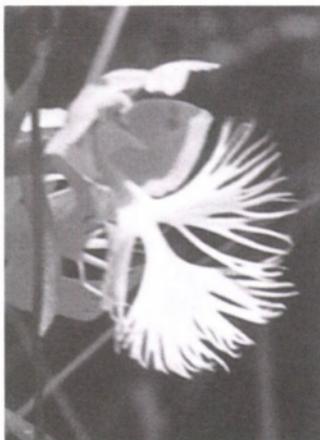
Photo by Harold Umber

The Mysteries of a Prairie Orchid



This attractive but rare wild orchid is named for its flower's deeply fringed, three-part lower lip, as shown in below.

Photos by John & Karen Hollingsworth©



The western prairie fringed orchid (*Platanthera praecleara*) is a showy wildflower that was once widespread throughout the tallgrass prairie west of the Mississippi River. Today, however, the plant is largely confined to two metapopulations (groups of smaller populations) in the United States. One of these is found in southeastern North Dakota on the Sheyenne National Grassland, which is managed by the Custer National Forest.

This species was listed in 1989 as threatened due to concerns over the limited number of populations and their relative isolation. The decline of the western prairie fringed orchid parallels the almost complete loss of tallgrass prairie habitat in the central United States and Canada. Research on the orchid focuses not only on understanding its life history and habitat needs, but also on strategies for restoring the tallgrass prairie ecosystem and its associated wetland habitats.

The western prairie fringed orchid, a perennial with two distinct life states, has many attributes that make it difficult to study, and significant questions remain about its life history. In some years, a given plant will remain vegetative throughout the growing season, and in other years it will flower. The vegetative form usually consists of two basal leaves up to 6 inches (15 centimeters) long. The inflorescences have 20 or more attractive, cream-colored flowers arranged on a spike up to 3 feet (0.9 meter) tall. The flowers produce a fragrance at night that attracts hawkmoths, which pollinate the orchid. In years when extensive flowering occurs and pollination is successful, thousands of dust-like prairie orchid seeds are produced.

At the end of the growing season, plants produce a new bud and tuber that develop into the new root system and shoot for the following growing season. In this manner, populations may persist for some time. However, seed establishment is required for recruitment of new individuals. Almost nothing is known about the species' germination ecology, and efforts to germinate seeds in the laboratory have been mostly unsuccessful. It is very likely that some species of mycorrhizae (fungi growing on plant roots that promote the absorption of nutrients) is required for germination. The absence of this beneficial fungus makes germination and seedling survival very unlikely.

The orchid is thought to be long-lived, and to have periods of dormancy when tubers persisted underground for a growing season or more. However, long-term data, involving permanently marked plants monitored over 10 years or more, are needed to confirm these aspects of prairie orchid biology.

Given the many questions surrounding this species, the Forest Service's Rocky Mountain Research Station (RMRS) collaborated with Custer National Forest in 1987 to establish permanent transects in areas of orchid concentrations and marked a total of 160 individual plants. By 1994, only 4 percent of the originally marked orchids were observed above ground. Plants may live up to eight years, but most of the monitored plants were present only one or two growing seasons. Further, once an orchid disappeared, it rarely reappeared. The question now is whether the drought conditions in the first four years of our monitoring, followed by flooding in 1993, may have reduced survival and/or increased

dormancy rates beyond levels that could be expected in more normal times.

Data collected from these transects and additional research plots have also provided the foundation for examining other questions, such as the role of soil moisture and the effects of various management activities. The most significant factor influencing orchid numbers is soil moisture. During the drought of the early 1990's, numbers dwindled and the orchid could only be found in the deepest swales (a type of lowland). Flooded swales in 1993 supported high numbers of orchids, but vegetative plants that remained submerged throughout the summer did not survive through the growing season. However, new orchids have appeared on sideslopes above the wetlands.

The transects established on the National Grassland in 1987 encompassed a variety of management regimes, including grazing, burning, a combination of grazing and burning, and neither burning nor grazing. The number of orchids has varied dramatically by year and location. However, the RMRS has not been able to detect any consistent effects of these management regimes on orchid populations. Studies of the impacts of fire, grazing, and mowing will continue.

Research on the Sheyenne National Grassland has also helped the RMRS to characterize the plant community that supports orchids and develop a model for managers to use in identifying suitable habitat for reintroduction. Baltic rush (*Juncus balticus*), woolly sedge (*Carex lanuginosa*), and northern reedgrass (*Calamagrostis stricta*) commonly occur in orchid concentration areas on the Sheyenne Grassland.

Unfortunately, some swales have been invaded by a noxious weed, leafy spurge (*Euphorbia esula*). Unless effective control methods are developed, orchid habitat on the Sheyenne National Grassland remains at risk of being taken over by this invasive species. Current efforts to curb leafy spurge include herbicides, biological control, and herbivores such as goats and sheep. We

are collaborating with universities and other agencies to overcome the severe obstacles of controlling leafy spurge without severely impacting the orchid and other components of this already imperiled prairie ecosystem.

Dr. Sieg is with the Forest Service's Rocky Mountain Research Station in Rapid City, South Dakota.

The flowers of a western prairie fringed orchid beginning to open.

Photo by John & Karen Hollingsworth©



Florida's Prairie



The Florida grasshopper sparrow is an isolated subspecies endemic to the prairie region of south-central Florida.

Photo by Barry Mansell

Florida's prairie is dominated by bunch grasses, saw palmetto, and shrubs.

Photo by Barry Mansell



In an eastern State known for its wetland plant communities, the prairie region of south-central Florida seems strangely out of place. Its vast grasslands and disjunct populations of typically western birds make this an intriguing ecosystem.

Landsat satellite data used to map vegetation cover types indicate that about 2,000 square miles (5,180 square kilometers), or 4 percent of the State, is classified as "dry prairie." The most extensive prairies are located north and west of Lake Okeechobee. These scattered grasslands occur on acidic, sandy soils and are dominated by bunch grasses, such as wire grass (*Aristida* spp.) and bluestems (*Andropogon* spp.). Forbs are abundant and include yellow-eyed grass (*Xyris* spp.), polygala (*Polygala* spp.), and meadow beauty (*Rhexia* spp.). Saw palmetto (*Serenoa repens*), dwarf live oak (*Quercus minima*), and fetterbush (*Lyonia* spp.) are the dominant shrubs. The prairies are often intermediate between pine forests

and freshwater marshes, and are interspersed with cypress domes, cabbage palms, and hardwood hammocks.

Despite an average yearly rainfall of over 50 inches (127 centimeters), which is adequate moisture to support a forest, prairie grasslands in Florida owe their existence to a mixture of natural and human-related factors. Frequent lightning fires, prescribed burning, cattle grazing, and mechanical clearing have changed many areas that were once open canopy pinelands to a landscape that now resembles prairies.

Geologic and climatic changes during glacial periods may have allowed an eastward extension of grasslands and their associated western fauna into peninsular Florida. Insular bird populations associated with this plant community include Audubon's crested caracara (*Caracara plancus audubonii*), the Florida burrowing owl (*Speotyto cunicularia floridana*), the Florida sandhill crane (*Grus canadensis pratensis*), and the Florida grasshopper sparrow (*Ammodramus savannarum floridanus*). After the changes that have occurred since the last ice age, the Florida prairie region appears to be a "stranded" ecosystem.

Because of their restricted distribution, habitat loss, and declining populations, the Fish and Wildlife Service listed the grasshopper sparrow as endangered and Audubon's crested caracara as threatened. The Florida sandhill crane is listed by the Florida Game and Fresh Water

Fish Commission as a threatened species and the Florida burrowing owl is considered a species of special concern. Further fragmentation of the prairies will make isolated populations occurring there even more vulnerable to extinction. Florida's prairies also appear to be important for wintering grassland birds.

Cattle ranching is the primary land use in south-central Florida. Prairie rangelands provide low-maintenance pastures that are burned by ranchers every 2 to 3 years to enhance forage production. Low-density grazing (1 animal per 20 acres or about 8 hectares) and short pasture rotation (up to 21 days, followed by longer periods of exclusion) seem to be compatible with a viable prairie ecosystem in Florida. However, mechanical clearing and planting with non-native grasses to improve cattle grazing or for sod production has greatly reduced native prairie habitat. Conversion to cropland and citrus production also have caused some loss.

Some remnants of prairie habitat are preserved and managed on the Florida Game and Fresh Water Commission's Three Lakes Wildlife Management Area (Osceola County), the Avon Park Air Force Range (Highlands and Polk counties), the National Audubon Society's Kissimmee Prairie Preserve, Kissimmee Prairie State Park (Okeechobee County), and Myacca River State Park (Sarasota County). However, very little is known about the ecology of Florida's prairie, and less than 17 percent of the ecosystem is protected. To properly care for what remains, managers will need additional information on such influences as cattle grazing and the seasonality of fire.

Michael Delany is a Wildlife Biologist with the Florida Game and Fresh Water Fish Commission's Wildlife Research Laboratory in Gainesville, Florida.

The Florida burrowing owl is considered a species of special concern by the Florida Game and Fresh Water Fish Commission.
Photo by Steve Nesbitt



by Mary Jennings
and Art Anderson

The Wyoming Toad

Out on the high, windy prairie of Wyoming's arid Laramie Basin, not only do the deer and the antelope play, but Wyoming toads (*Bufo hemiophrys baxteri*) struggle to avoid extinction. Discovered in 1946 by University of Wyoming biology professor Dr. George Baxter, the Wyoming toad subspecies was probably separated from the others of its species more than 10,000 years ago. It once inhabited the floodplains of the Big and Little Laramie Rivers and the margins of ponds and small seepage lakes throughout the basin. Common from the 1950's through the 1970's, the Wyoming toad became extremely rare by 1980 and was listed in 1984 as endangered. A recovery plan was approved in

1991. Like many other amphibians declining across the globe (including leopard frogs and boreal toads, which are also declining in southern Wyoming), suspected causes for the decline of this tiny amphibian are numerous, including disease, habitat change, pesticide use, and other man-made hazards.

Conditions in the Laramie Basin can be harsh and life there for an amphibian is fast-paced. Adult Wyoming toads do not appear at breeding sites until May, after daytime temperatures reach 70 degrees. The toads breed in shallow water, such as irrigated meadows and the vegetated margins and bays of lakes and ponds, which are often difficult to find in a mostly arid environment. Breeding

FWS photo



takes place from mid-May to mid-June, depending on the weather. Eggs typically hatch in less than one week, and tadpoles transform into toadlets in about three to five weeks. The toads then have until late August or early September to put on weight before going into hibernation to escape the frigid winter weather.

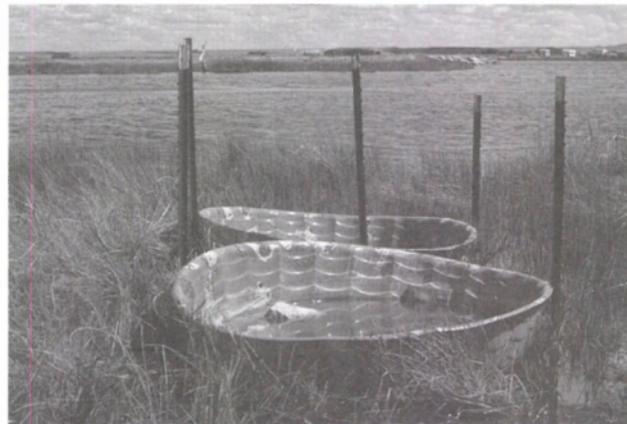
The only true toad in the Laramie Basin, the Wyoming toad is now known to exist only in an area south and west of Laramie. Sightings of wild toads since 1987 have been limited to a two square mile area containing picturesque Mortenson Lake. The Fish and Wildlife Service (FWS), with the assistance of The Nature Conservancy, has acquired most of the existing toad habitat at Mortenson Lake. Nearly surrounded by working cattle ranches, Mortenson Lake also provides refuge to antelope, foxes, and a variety of waterfowl and shorebirds. The recovery plan outlines measures to protect the Wyoming toad population and habitat at the Mortenson Lake site through the cooperative efforts of the FWS, Wyoming Game and Fish Department, and private landowners. Additional captive-reared Wyoming toads have been released at Mortenson Lake to supplement the few wild toads thought to survive there.

The recovery plan also calls for the establishment of viable populations at five other locations, with approximately 100 adult Wyoming toads at each site. Reintroduction efforts were initiated in 1992 to reestablish a Wyoming toad population at Lake George on Hutton National Wildlife Refuge, a haven for many wildlife species in the Laramie Basin. Additional sites for future reintroductions will be evaluated soon.

The art of reintroducing the Wyoming toad has been a work in progress. Survival of reintroduced animals is usually quite low and efforts to improve the survival rate have met with limited success. However, the use of "head-start tanks" has shown promise. This tank is nothing more than a child's wading pool with screened portals to allow water circulation and a screen cover to allow

air circulation while keeping out predators. The pool is then placed in shallow water at the release site, allowing tadpoles and/or toadlets to acclimate to the release area while also being protected from predation.

The captive-rearing program, also identified in the recovery plan, was initiated in 1988 at the Wyoming Game and Fish Department's Sybille Wildlife Research Unit to ensure against a catastrophic crash of the wild population and to facilitate the reintroduction of the toad back into native habitat. The captive program has expanded to include an additional 12 facilities, supported almost entirely by private funds. It produced 15 egg masses during 1996, and more than 6,000 tadpoles and toadlets were released to the wild at Mortenson Lake and Lake George. Although survival of reintroduced amphibians is often quite low, these reintroduction efforts can be considered successful to date and a great first step toward recovery. Further identification and elimination of threats to the Wyoming toad are necessary, however, to move closer to recovery.



A child's wading pool takes on a new role as a "head-start tank" for reintroduced Wyoming toads.

Photo by Art Anderson

Mary Jennings is a Fish and Wildlife Biologist in the FWS Wyoming Ecological Services Office in Cheyenne and serves as the Recovery Coordinator for the Wyoming toad. Art Anderson retired from the FWS in 1996, after serving as Wyoming Toad Recovery Coordinator for many years, but he continues to volunteer time to the recovery effort.

From Bombs to Bird Songs

*T*hroughout North America, grassland birds are experiencing the most consistent, widespread, and steepest population declines of any avian group. This is not surprising in light of the fact that approximately 99 percent of U.S. tallgrass prairies that existed prior to European settlement have been lost. Much of the prairie was converted to agriculture or lost to development. Other areas silently slipped from prairie to forest when the wild fires, which maintained native grasslands by preventing trees and shrubs from taking hold, were no longer allowed to burn. With the loss of native prairie, many grassland bird species adapted as well as they could to breeding in agricultural habitats, particularly hayfields and pastures. However, farming practices have become progressively more intensive, and most modern-day farms provide little or no productive breeding habitat for grassland birds.



In Indiana, over 7 million acres (2.8 million hectares) of tallgrass prairie stretched across the State prior to the arrival of the first settlers 200 years ago. Today, less than 1,000 acres (400 ha) remain, and these are in scattered patches. Restored prairies and non-prairie grasslands, on which grassland-dependent species now depend, also tend to be relatively small, scattered patches. Small patches of grassland are of limited habitat value for species that need extensive grasslands to flourish. The largest unfragmented grassland remaining in Indiana occurs on Jefferson Proving Ground (JPG), a 55,000-acre (22,250-ha) Army ammunition testing facility that closed in 1995. JPG contains approximately 5,000 acres (2,020 ha) of

grassland, in patches ranging from 10 to 500 acres (4 to 200 ha) in size. JPG was never a native prairie, but over the past 50 years, periodic burning on the test ranges to reduce wildfire threats from exploding ordnance mimicked the natural fires that prevent trees and shrubs from overtaking native prairies. As a result, JPG's grasslands have become an oasis of habitat for many species of grassland birds and plants.

One prominent inhabitant of JPG's grasslands is the Henslow's sparrow (*Ammodramus henslowii*). Henslow's sparrow is considered a Migratory Nongame Bird of Management Concern by the U.S. Fish and Wildlife Service (FWS) and an endangered species by the State of Indiana. Research indicates that the Henslow's sparrow needs grasslands in excess of 200 acres (80 ha) to support persistent populations, and few suitable grasslands of this size remain within the species' breeding range. Once common, Henslow's sparrow has declined by over 90 percent during the past 30 years, one of the most drastic declines estimated for any North American breeding bird. JPG supports one of the four largest known populations of Henslow's sparrow; over 900 pairs were present during the 1996 breeding season.

Henslow's sparrow shares JPG's grasslands with a host of other species that have suffered population declines due to loss and fragmentation of grassland habitat. Five other species of Nongame Birds of Management Concern are found breeding in JPG's grasslands: the grasshopper sparrow (*Ammodramus savannarum*), field sparrow (*Spizella pusilla*), eastern meadowlark (*Sturnella magna*), sedge wren (*Cistothorus platensis*), and northern harrier (*Circus cyaneus*). The sedge wren and the northern harrier are also listed as endangered by the State of Indiana. The State-listed Kirtland's snake (*Clonophis kirtlandii*) is also found in the grasslands of JPG, as are a number of rare plants.

With the closure of JPG as an active military base in 1995, the future of its grasslands was uncertain. There was no



longer a military need to maintain the burning program, and thus the grasslands, on the base. However, the Army and the FWS recognized that JPG is clearly an important site relative to the conservation of native ecosystems. In addition to JPG's grassland community, the area also supports one of the largest blocks of unfragmented mature forest in the lower Midwest. The Army also recognized that the re-use options for the base were very limited. Almost half of the base, including virtually all of the grasslands, is restricted. No human access is allowed due to safety concerns associated with an estimated 1.5 million rounds of unexploded ordnance. JPG's exceptional natural resource values, coupled with limited reuse options, led the Army and the FWS to the forge a partnership for protecting and enhancing the grassland and forest ecosystems on the base.

Over the next 3 years, the FWS and the Army will work together to manage the wildlife resources on JPG and develop long-term management plans. While an active base, JPG served a vital military mission. Now it will focus on another vital mission: providing habitat for a host of increasingly rare creatures.

Lori Pruitt is a Wildlife Biologist in the FWS Bloomington, Indiana, Field Office.

The field sparrow, above, and eastern meadowlark, opposite page, are two of the bird species known to breed at Jefferson Proving Ground, the largest unfragmented grassland area remaining in Indiana.
Corel Corp. photos

On the Fringe of the Prairie



Missouri bladder-pod
Photo by Kelly Srigley Werner

Due to fire suppression and the invasion of non-native plants, glades have become an imperiled habitat. The FWS is working to restore limestone glades through the Partners for Wildlife Program for the benefit of the bladder-pod, and to protect a special component of our native prairie ecosystem.

Limestone glades are an unusual type of habitat occurring like a ribbon along the fringes of the tall grass prairie in widely scattered parts of the Midwest. As one travels from southeastern Kansas to southwestern Missouri, for example, the glades can be found in the transition zone between the prairie and the mature oak forests of the mountainous Ozarks. Often referred to as “barrens,” limestone glades have shallow soils with large expanses of exposed bedrock. Because their vegetation is typically sparse with scattered, stunted, often gnarled trees, they are considered by some people as wastelands. With a closer look, however, one can find that limestone glades contain significant natural treasures. One of these, a plant called the Missouri bladder-pod (*Lesquerella filiformis*), was listed in 1987 as endangered due to the destruction of prairie habitat, the species’ low numbers, and its restricted distribution on limestone glades, which also are imperiled.

Glades occur in many regions of southeastern and central North America but are not abundant. With over 400,000 acres (160,000 hectares) of different glade communities, Missouri may contain the most diverse system of glades of any region. These habitats generally occur as long, narrow ribbons of transitional habitat between prairie and forest or savannah and forest, and were formed by natural forces on parent bedrock material. Glades are named after their predominant parent material (e.g., limestone), and are usually located in mountainous to hilly terrain or on medium to steep slopes of deep river drainages. Limestone glades, which are

extremely uncommon in Missouri, comprise less than 1 percent (about 3,000 acres, or 1,200 ha) of the State’s different kinds of glade habitat.

Missouri’s limestone glades are known as mid-grass glades and are dominated by little bluestem (*Andropogon scoparius*) and sideoats gramma (*Bouteloua curtipendula*). In addition to the Missouri bladder-pod, other characteristic plants include big blue stem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), Missouri orange coneflower (*Rudbeckia missouriensis*), rose verbena (*Verbena canadensis*), rattlesnake master (*Eryngium yuccifolium*), and lichens (*Lecanora*

muralis, *Dermatocarpon lachneum*, *Psora russellii*). These habitats also support a wide variety of animals, from small invertebrates like the Missouri tarantula (*Dugesia hentzi*) to such large mammals as the red fox (*Vulpes vulpes*), bobcat (*Felis rufus*), and white-tailed deer (*Odocoileus virginianus*).

As with most prairie systems, limestone glades have also been significantly altered from presettlement conditions due to fire suppression and subsequent conversion to woody vegetation. One major threat is the adaptive nature of the eastern red cedar (*Juniperus virginiana*) which is extremely invasive and is frequently found growing in pure stands on glade areas. Plants which have adapted to the climate and substrate of limestone glades cannot compete with these thick, tall stands because of shading.

The Missouri bladder-pod is a prime example of those species that are sensitive to slight, local climatological changes and are also poor competitors. This plant grows in the winter when other vascular plants are senescent and when precipitation is greatest. As a winter annual, plants germinate in the fall and grow as tiny rosettes through winter. In the spring, several branches bolt from the rosette, and the plants blossom between mid-April and early May with many bright yellow, four-petaled flowers. Its common name comes from the characteristic spherical fruit, which is first a translucent light green and then turns light tan as the plant ages. Four seeds are released from each fruit in the summer and the plant lies dormant until the next cycle.

One way to improve habitat for Missouri bladder-pod and other native glade species is to remove eastern red cedar stands which would enhance the micro-climate by allowing the sun to shine directly on the rocky substrate year round. It is also important that fire be returned to these landscapes to bring them back to presettlement conditions.

In 1995, the Fish and Wildlife Service (FWS) began working closely with The Nature Conservancy (TNC), who in turn

partnered with the Missouri Department of Conservation (MDC), and others through the Partners for Wildlife Program. Our goal was to develop and implement habitat restoration practices which would benefit the bladder-pod. TNC owns 90 acres (36 ha) of land directly adjacent to the MDC's Rocky Barrens Natural History Area. Glade habitat on both of these sites was highly degraded due to cedar invasion and overgrowth of annual grass species. Both cedar removal and burning were needed to restore the habitat. The restoration was organized by TNC and MDC. Monies were used to pay volunteers from Southwest Missouri State University's (SMSU) Student Chapter of the Sierra Club to cut trees and perform prescribed burns on the areas.

Through their efforts, an immediate response was noted in the spring of 1997 when areas cleared and burned in 1996 turned bright yellow with a profusion of Missouri bladder-pod. Nothing can capture the spirit of this cooperative venture more than overhearing Shannon Bigham, vice president of the SMSU chapter of the Sierra Club, explain during the tree removal phase that, "It's the only world we've got; we can't afford to just let it go."

Kelly Werner is a Wildlife Biologist with the FWS Columbia, Missouri, Ecological Services Office.



The red fox is one of the many creatures that inhabit limestone glades.
Corel Corp. photo

As ecological equivalents of tallgrass prairies, the inherent characteristics of glades add to the diverse bounty of prairie ecosystems. The FWS is indebted to The Nature Conservancy, the Missouri Department of Conservation, and the students of SMSU for their hard work, dedicating themselves as true partners for wildlife and beginning the restoration for an important component of our natural heritage.

Photo by Tim Smith



by Randy Matchett

Charles M. Russell / UL Bend National Wildlife Refuges

Charles M. Russell National Wildlife Refuge (NWR) is located in north-central Montana and encompasses 1.1 million acres (0.4 million hectares) of native prairie and rangeland around Fort Peck Reservoir and the Missouri River. Known popularly as "CMR," it was established as a Game Range in 1936, primarily for sharp-tailed grouse (*Pedioecetes phasianellus*) and antelope (*Antilocapra americana*), and it became a refuge in 1976. UL Bend NWR is surrounded by

CMR and was originally established as a migratory waterfowl refuge, but is now essentially managed as part of CMR. Both refuges provide habitat for a variety of prairie wildlife, including endangered species.

This installment of "Spotlight on

Refuges" really means spotlighting when it comes to one of the prairie's most endangered species: the black-footed ferret (*Mustela nigripes*). Spotlighting at night is the main method used to locate and monitor this rare and elusive species, which is most active during the wee hours. Black-footed ferrets have a bright emerald green eye-shine, easily seen by spotlight when they come above ground. They spend most of their time in the

underground burrow systems created and maintained by prairie dogs (*Cynomys* spp.). Ferrets also rely on prairie dogs as their main food.

In the 1980's, the last wild black-footed ferrets were captured in Wyoming for protection and propagation. By 1991, enough kits had been produced to attempt reestablishing the animal into former habitats in the wild. The first reintroductions took place in Wyoming, followed by others in Montana, South Dakota and Arizona. Additional reintroductions into Colorado and Utah are under consideration.

The first reintroductions of black-footed ferrets at UL Bend took place in the fall of 1994 on black-tailed prairie dog (*C. ludovicianus*) colonies. Additional releases in 1995 and 1996 totaled 119 ferrets. Five wildborn kits from 2-3 litters were observed during the summer of 1995, and at least 18 wildborn kits from 7-8 litters were observed in 1996. The 1997 spring population included at least 22 individuals, of which 12 were female. Around 25 wildborn kits are expected this summer, and the release of another 24 captive-bred ferrets is scheduled for fall 1997. Our ultimate hope for this population is that it becomes self-sustaining and capable of producing surplus kits for establishing populations at other sites.

In addition to high-quality habitat, one of the keys to successful ferret reintroduction is how young kits are



This black-footed ferret faces a biologist's spotlight on a snowy Montana prairie.
Photo by Randy Matchett

SPOTLIGHT ON REFUGES



declines not only in prairie dogs but also a wide variety of other wildlife species that depend on prairie dogs and their habitats.

Wild black-footed ferrets live exclusively on prairie dog

reared from birth to the time of release (about 4 months). Ferret kits that are born and grow up in dirt-filled pens with prairie dog burrows and live prairie dogs survive better upon release than cage-reared counterparts.

Some kits are born in sterile cage environments and then transferred within 2 months to pre-conditioning facilities with prairie dogs in dirt-filled pens. These "pre-conditioned" kits also survive better in the wild than cage-reared kits, but apparently not quite as well as pen-reared kits. Pre-conditioned and pen-reared kits have essentially been the only reintroduced ferrets to survive in the wild through the breeding season of the following year. Virtually the entire current population consists of ferrets reared with at least some preconditioning or the wild-produced offspring of preconditioned ferrets. As many kits as possible will be pre-conditioned prior to release in the future, but rearing facilities currently are limited.

Black-tailed prairie dogs, like those found on UL Bend and the surrounding area, exist in relatively high densities compared to other species of prairie dogs. Prairie dogs are an integral component of grassland and prairie ecosystems, but their numbers and distribution have been reduced to about 2 percent of historic levels. Widespread prairie dog eradication programs and conversion of native prairie to cropland throughout the Great Plains caused

colonies. Mountain plovers (*Eupoda montana*) and burrowing owls (*Speotyto cunicularia*) depend on prairie dog towns for breeding habitat, while swift fox (*Vulpes velox*) and ferruginous hawks (*Buteo regalis*) may rely heavily on prairie dogs for food. In fact, prairie dog colonies have been called the "supermarkets of the prairies," supplying food and shelter to a variety of animals ranging from tiger salamanders (*Ambystoma tigrinum*) to golden eagles (*Aquila chrysaetos*). Even the great herds of bison (*Bison bison*) once foraged on the nutritious plant communities associated with prairie dog colonies.

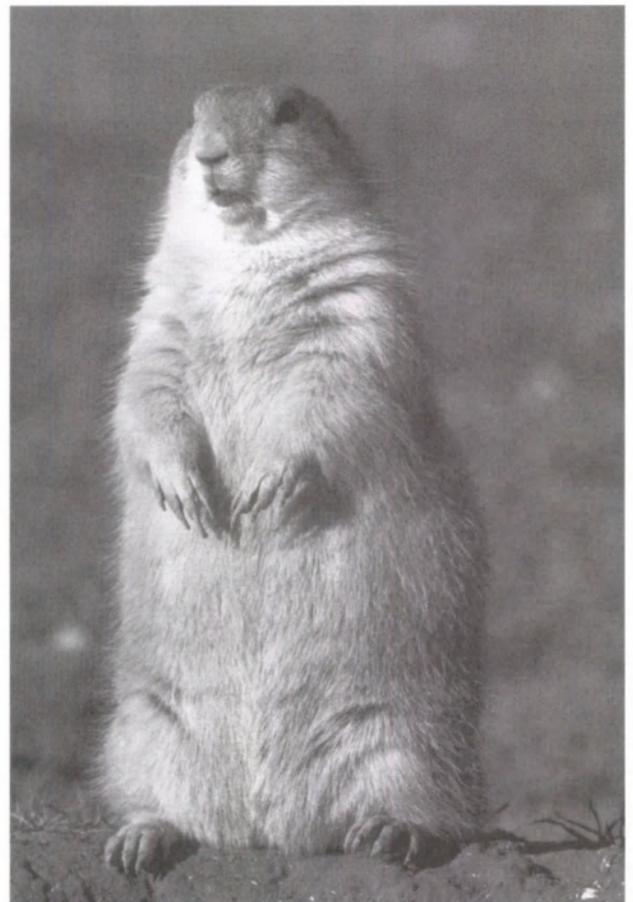
While humans continue to eliminate prairie dogs in some areas, perhaps a more menacing threat is sylvatic plague. Plague is caused by the bacterium *Yersinia pestis*, introduced to North America from Asia in the early 1900's. Plague is spread by fleas and is fatal to many rodents and black-footed ferrets. This disease is present in the UL Bend area and it can eliminate entire prairie dog colonies within a few weeks. Our understanding of plague dynamics in prairie dog communities is limited.

A captive-reared ferret leaves its transport container for freedom at a prairie dog colony on the UL Bend Refuge.

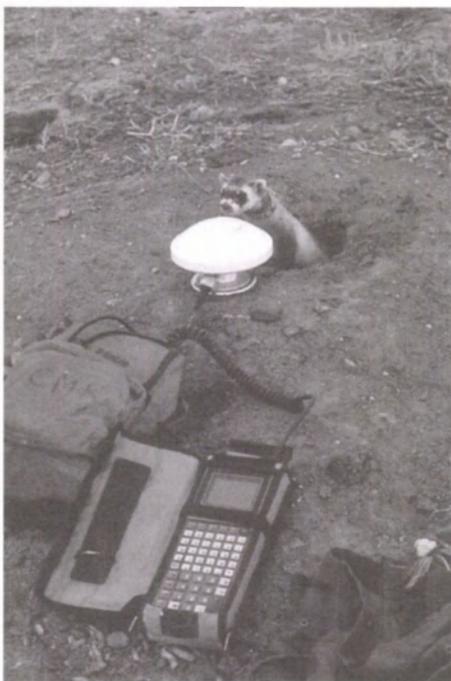
Photo by Randy Matchett

Prairie dogs provide food not only for ferrets but also a number of raptors and other predators. Their burrows also serve as shelter and hibernation chambers for many species of reptiles and amphibians.

Corol Corp. photo



SPOTLIGHT ON REFUGES



Wildlife biologists at UL Bend use the latest high-tech gear to monitor ferrets at the refuge. Each released ferret carries a radio collar. This individual seems curious about a global positioning system (GPS) unit, which uses satellite signals to determine a precise location. GPS technology has been an integral part of the ferret reintroduction program. It is used to map release sites, ferret movements, prairie dog colonies, and radio-telemetry stations. Biologists sit in trailers (above right) all night long while the ferrets are active, listening to the radio-telemetry and triangulating the signals to pinpoint ferret locations for GPS mapping.

All photos by Randy Matchett

Methods to manage plague are few, and technique effectiveness is not well documented, but efforts to devise useful management strategies are proceeding.

One strategy involves spraying permethrin flea powder dust into prairie dog burrows in order to reduce flea populations, a vector for plague. About 2,600 acres (1,000 hectares) of prairie dog colonies on and around UL Bend were dusted in 1993 and again in 1996 and 1997 in an effort to prevent plague from impacting prairie dogs and black-footed ferrets. This involved dusting over 65,000 individual prairie dog burrows—a significant undertaking!

Prairie dog relocations on the refuge are ongoing in an attempt to restock prairie dogs at colonies that were recently eliminated, presumably by plague. Maintaining large complexes of prairie dogs will be a determining factor for reestablishment of viable black-footed ferret populations in the wild and the abundance and diversity of other wildlife on these prairie refuges.

Randy Matchett is a Wildlife Biologist at Charles M. Russell NWR in Lewistown, Montana.



Charles M. Russell NWR, located in north-central Montana, welcomes visitors to enjoy its rich blend of wildlife, history, and scenic vistas. For information, write to the Headquarters Office, P.O. Box 110, Lewistown, Montana 59457, or call (406)538-8706.





Region 1

Salton Sea Workshop The Salton Sea, the largest inland body of water in California, was created in the early 1900's when the Colorado River temporarily changed course. Living up to its name, the Salton Sea is currently saltier than the ocean, but it supports large numbers of fish and provides habitat for diverse populations of waterfowl, shorebirds, herons, and other birds, including endangered species like the brown pelican (*Pelecanus occidentalis*). State, Tribal, and Bureau of Land Management property, as well as a National Wildlife Refuge, are part of the Salton Sea area.



Brown pelican
Photo by B. "Moose" Peterson/WRP©

As a result of water quality problems associated with increasing salinity, agricultural irrigation return flows, and point sources of pollution, the aquatic ecosystem at Salton Sea has been tipped out of balance, resulting in frequent fish and bird die-offs, fish consumption advisories, and other human health alerts. For example, in the fall of 1996, over 10,000 pelicans -- including over 1,200 of the endangered species *P. occidentalis* -- died from an unusual case of botulism. Two other endangered species, the Yuma clapper rail (*Rallus longirostris yumanensis*) and desert pupfish (*Cyprinodon macularius*), are also at risk if the aquatic ecosystem continues to deteriorate.

A multi-agency, multi-disciplinary workshop will be conducted August 4-8, 1997, to identify the most important natural and cultural resource investigation needs of the Salton Sea ecosystem and the cost to complete these studies. The information will aid scientists, natural resource agencies, and Congress in making informed decisions regarding actions to be taken to address the threats to the Salton Sea.



Yuma clapper rail
FWS photo

Region 4

Leatherback Sea Turtle (*Dermochelys coriacea*) Record numbers of nesting leatherback sea turtles have been reported at Sandy Point National Wildlife Refuge on St. Croix in the U.S. Virgin Islands and at two of the most important leatherback nesting beaches in Puerto Rico (Brava and Resaca Beaches on Culebra Island). The Leatherback Turtle Research Project at Sandy Point began in 1981 and is a joint effort between the FWS and the U.S. Virgin Islands Department of Planning and Natural Resources. The St. Croix beach supports the largest nesting population of leatherback sea turtles in the United



Leatherback sea turtle hatchling
FWS photo

States. During the years of consistent night patrols and a saturation tagging program, 18 to 55 individual female turtles per season were reported. However, since the 1997 nesting season began in February, more than 100 female turtles have been tagged, and more than 600 attempted nestings have been documented.

The FWS has conducted the Culebra Leatherback Project at Brava and Resaca Beaches since 1984. The Culebra population is considered the largest female leatherback population in Puerto Rico and the second largest in the U.S. In past years, 12 to 42 individual females per season have been reported from the two beaches. The 1997 saturation tagging program with the nightly patrols began on April 1. Since the project started, 81 female turtles have been tagged, and more than 300 attempted nestings have been documented.

Region 5



Roseate tern
Photo by Mike Bender

Roseate Tern (*Sterna dougallii dougallii*) After years of searching in Latin America, the roseate tern's wintering grounds have been located. Helen Hayes of the American Natural History Museum found thousands of the birds along the Brazilian coast this past winter, where she spent time with Brazilian scientists gathering banding information. Apparently all of the nesting colonies in the northeastern U.S. are represented in this wintering population, so we can now better assess possible sources of winter mortality.

by Julia Bumbaca

Let's face it--this is the information age, and a great wealth of scientific information is available on the Internet. You can access anything from a book at the Library of Congress to a map of your neighborhood. In that light, the *Endangered Species Bulletin* is announcing a new feature to help its readers tap into this vast electronic resource by regularly providing information on web sites that relate to the focus of each edition. While we will not be able to provide an exhaustive list of sites, we will do our best to select a handful of government and educational sites that compliment the articles in each issue.

To kick off this new feature, we would like to highlight our own Endangered Species Homepage. Its address is <http://www.fws.gov/~r9endspp/endspp.html>. Here is a look at our site:

As you can see, our homepage provides a great deal of information on the Fish and Wildlife Service's endangered species program, such as the Endangered Species Act itself, program policies, contact information, and sample articles from the *Bulletin*. Under the "Species" section, we provide information on listed, proposed, and candidate species. The second item under "Listed Species," called "The Lists of Endangered and Threatened Wildlife and Plants in PDF format," provides a copy of the endangered and threatened species list as it appears in the *Federal Register*. You can also download the species lists for use in your own database systems. The "What's New" section contains, among other things, the latest "Box Score" of species listings and recovery plans. You can go to the "Frequently Asked Questions" section to for answers to questions on petitions, recovery, section 7 consultations, habitat conservation planning, and other activities of the endangered species program.

U.S. Fish and Wildlife Service

PROGRAM

- Program Overview
- Program Implementation Summary
- Endangered Species Act (140K file)
- Map of Regions
- Contact Information
- Policies
- Endangered Species Bulletin
- Guide to Related Information
- A Gallery of Ecosystem Exhibits
- Slide show "Endangered Means There's Still Time!"

▲ [TOP]

SPECIES

Recovery

- Questions and answers
- Activities

Listed Species

- Information Central
- The Lists of Endangered and Threatened Wildlife and Plants in PDF format
- Boxscore
- State Counts
- State Lists
- U.S. Species Indices (further linked to Species Profiles, Citations, Images, and Other Links)
 - U.S. Vertebrate Animals
 - U.S. Invertebrate Animals
 - U.S. Flowering Plants
 - U.S. Non-Flowering Plants
- Foreign Species Index (further linked in Species Profiles and Citations)

Proposed and Candidate Species Information

▲ [TOP]

WHAT'S NEW?

- INTERIOR SECRETARY APPLAUDS CHOICE OF JAMIE RAPPAPORT CLARK AS DIRECTOR OF THE U.S. FISH AND WILDLIFE SERVICE
- Boxscore
- Focus, Contents - January/February 1997 *Endangered Species Bulletin*
- Regional Endangered Species News
- New Listing Final Rules
- Access The Lists of Endangered and Threatened Wildlife and Plants in PDF format
- New Policy Documents
- Slide show "Endangered Means There's Still Time!"

▲ [TOP]

FREQUENTLY ASKED QUESTIONS

- General Statistics
- Petition Management
- Listing Process
- Recovery
- Section 7 Consultation
- Habitat Conservation Planning
- Private Landowners
- Candidate Notice of Review
- American Indian Tribal Rights and the ESA

▲ [TOP]

While our web site contains regulatory information for all listed species, we also try to include images and life history information for these species, and are working to complete our image and life history library. If you have any images or life history information that we could include, please let us know. Also, if you have any questions, comments, or suggestions regarding the homepage, you may contact us via the site's e-mail address.

Let us hear from you. If you have any sites you would like to recommend or comments regarding our homepage, please send an e-mail message to Julia_Bumbaca@fws.gov.

Julia Bumbaca is a Computer Specialist with the FWS Division of Endangered Species in Washington, D.C.

The Internet has many prairie-related web sites for you to browse. Here are some sites to get you started, and there are many others available. Happy surfing!

**Northern Prairie Science Center,
Jamestown, ND**

<http://www.npsc.nbs.gov/>

A science center operated by the Biological Resources Division of the U.S. Geological Survey.

**U.S. Fish and Wildlife Service
Mountain-Prairie Region (Region 6)**
<http://www.r6.fws.gov>

Provides information on Service activities in Colorado, Kansas, Montana, North Dakota, Nebraska, South Dakota, Utah, and Wyoming.

**U.S. Fish and Wildlife Service Prairie
Pothole Joint Venture 1996 Annual
Report**

<http://www.fws.gov/r9awwo/pp95.html>
Describes a banner year for ducks due to wet weather, Joint Venture habitat work, and the Conservation Reserve Program.

**U.S. Fish and Wildlife Service
National Wildlife Refuge System**
<http://bluegoose.arw.r9.fws.gov>
This site has information on prairie refuges and others.

**Missouri Botanical Garden,
Grasslands Biome**
<http://www.mobot.org/mbgnet/vb/>
Select "grassland" to get a good overview of grassland types, plants, and animals.

**Natural Heritage Network Central
Server**
<http://nris.mt.gov/mtnhp/>
Central access to standard databases for endangered plants, animals, and ecosystems throughout most of the western hemisphere.

During May 1997, the Fish and Wildlife Service added one plant to the U.S. List of Threatened and Endangered Species and proposed to list an additional 10 plants.

Listing Proposal

The following 10 plants, all endemic to the Hawaiian Islands, were proposed in the May 15 *Federal Register* for listing as endangered:

- *Clermontia samuelii*, or 'oha wai in Hawaiian—a shrub in the bellflower family (Campanulaceae) that grows up to 16 feet (5 meters) tall;
- *Cyanea copelandii* ssp. *haleakalaensis*, or haha—a vine-like shrub, also in the bellflower family, with pale flowers 1.5 inches (3.8 centimeters) long;
- *Cyanea glabra*, or haha—a branched shrub distinguished by over 2-inch (5-cm) long pale lilac flowers;
- *Cyanea hamatiflora* ssp. *hamatiflora*, or haha—a palm-like tree reaching up to 26 feet (8 m) in height, with 3-inch (7.6-cm) long magenta flowers;
- *Dubautia plantaginea* ssp. *humilis*, or na'ena'e—a small, yellow-flowered shrub related to silverswords in the aster family (Asteraceae);
- *Hedyotis schlechtendablana* ssp. *remyi*, or kopa—a small, creamed-flowered shrub in the coffee family (Rubiaceae), reduced to only six known individuals;
- *Kanaloa kaboolawensis*, or kohe malama malama o Kanaloa—a densely-branched shrub in the legume family (Fabaceae), discovered in 1992 at a single location on the island of Kaho'olawe and known from the pollen record to have been a dominant lowland shrub over 800 years ago;
- *Labordia timifolia* var. *lanaiensis*, or kamakahala—a shrub or small tree in the family Loganiaceae known from a single population;
- *Labordia triflora*, or kamakahala—a climbing shrub reduced to only 10 known surviving individuals; and
- *Melicope munroi*, or alani—a sprawling shrub in the citrus family (Rutaceae) known from one population.



***Cyanea copelandii* ssp.
*haleakalaensis***

Like many other native Hawaiian species, these plants are at risk of extinction due to the extensive effects of non-native plants and animals. Pigs, goats, deer, and rats introduced intentionally or accidentally into this island ecosystem have fed directly on the Hawaiian plants and reduced their habitat by causing heavy erosion. All 10 of the proposed species also are threatened by competition from the numerous introduced plants that are spreading throughout the islands.

Final Listing Rule

On May 22, Eggert's sunflower (*Helianthus eggertii*) was listed as a threatened species. This wildflower, a perennial in the aster family, grows up to 8 feet (2.5 m) in height and produces large yellow flowers. It is found at scattered sites in Alabama, Tennessee, and Kentucky. In some areas, the open barrens habitat needed by Eggert's sunflower is being developed for farming and other uses. Other areas are being overtaken by vegetative succession, which shades or crowds out the sunflowers. Active management will be needed to restore and maintain the open habitat of this species.

BOX SCORE

Listings and Recovery Plans as of June 30, 1997

GROUP	ENDANGERED		THREATENED		TOTAL LISTINGS	SPECIES W/ PLANS
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	56	252	7	16	331	39
 BIRDS	75	178	15	6	274	72
 REPTILES	14	65	18	14	111	30
 AMPHIBIANS	9	8	7	1	25	11
 FISHES	67	11	41	0	119	74
 SNAILS	15	1	7	0	23	18
 CLAMS	56	2	6	0	64	44
 CRUSTACEANS	15	0	3	0	18	6
 INSECTS	24	4	9	0	37	21
 ARACHNIDS	5	0	0	0	5	4
ANIMAL SUBTOTAL	336	521	113	37	1,007	319
 FLOWERING PLANTS	500	1	111	0	612	313
 CONIFERS	2	0	0	2	4	1
 FERNS AND OTHERS	26	0	2	0	28	19
PLANT SUBTOTAL	528	1	113	2	644	333
GRAND TOTAL	864	522	226	39	1,651*	652**

TOTAL U.S. ENDANGERED: 864 (336 animals, 528 plants)

TOTAL U.S. THREATENED: 226 (113 animals, 113 plants)

TOTAL U.S. LISTED: 1090 (449 animals***, 641 plants)

*Separate populations of a species listed both as Endangered and Threatened are tallied once, for the endangered population only. Those species are the argali, leopard, Stellar sea lion, gray wolf, piping plover, roseate tern, chimpanzee, green sea turtle, saltwater crocodile, and olive ridley sea turtle. For the purposes

of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**There are 454 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

***Five animal species have dual status in the U.S.

ENDANGERED *Species* BULLETIN

*U.S. Department of the Interior
Fish and Wildlife Service
Washington, D.C. 20240*

**FIRST CLASS
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
PERMIT NO. G-77**