Chapter 4
Current Refuge Management and Programs

Habitat Management

Management of DeSoto's range of habitats requires a variety of techniques to preserve, restore, and enhance habitat conditions. Both active and passive management are used to provide the required conditions for resting, feeding, and reproduction for a diverse complex of fish, wildlife, and plant species.

DeSoto Lake

The water level of DeSoto Lake fluctuates with the weather, runoff, and flow of the Missouri River. Inlet and outlet structures control flows from the river to the lake and vice-versa. The ideal water level in the lake ranges from a minimum elevation of 986.5 ft. msl to a not-to-exceed level of 989.5 ft. msl, which are consistent with bank protection and access to facilities. The ability to regulate the lake's water level seasonally is crucial to different functions. Fall drawdown is made to provide for waterfowl use, growth of littoral vegetation, and enhanced predation on forage fish. Full pool elevations in winter are needed to reduce the probability of fish winterkills. Early spring drawdown is made to accommodate spring runoff from the refuge's contributing drainage area.

At present, however, the ability to regulate water level is seriously limited both by Missouri River water levels, governed by releases from Gavins Point Dam upstream, and inflows from four drainage ditches carrying water from the approximately 12,000 acres of largely agricultural lands in the watershed. When the river is running high, the lake cannot be lowered. In recent years, excessive lake levels in the summer months have sharply interfered with fishing, boating, certain parking lots and use of lakeside trails.

DeSoto Lake was "renovated" in 1985 (chemically treated with 9,000 gallons of Rotenone) to eliminate rough-fish and improve aquatic habitat. In the years since, numerous efforts have been undertaken to enhance water quality in the lake and improve aquatic habitat. These include installing an artificial aeration system with 16 helixers (to raise dissolved oxygen levels), dropping Christmas trees into the lake to provide bottom structure and cover for fish, and placing riprap (large rocks) to stabilize banks to prevent erosion, turbidity, and sedimentation. The once popular recreational pursuits of high-speed boating and water skiing on the lake were banned in the 1980's in part because of the waves and subsequent bank erosion they caused.

Looking south along DeSoto Lake from near the Missouri Meander Trail (note exposed bank)
credit: Leon Kolankiewicz

DeSoto management's efforts have been only partially successful. While this oxbow lake is still an outstanding asset for the refuge, providing sanctuary for migratory waterfowl as well as sport fishing opportunities, it has declined in value over time. In the forty years since its creation from the DeSoto Bend of the Missouri River, the lake has gradually become shallower. In addition, muddy, silt-laden eutrophic (low oxygen, high nutrient) conditions tarnish the lake's beauty, water quality, habitat, and sport fishery potential.

The refuge recently cooperated with Dr. Carla DeLucci and her undergraduate biology students from Dana College in Blair, Nebraska in a DeSoto Lake water quality monitoring project. This study indicated that water quality conditions in 1997 and 1998 improved over those reported in 1979 and 1994. Nevertheless, possible contaminant issues (primarily with excessive quantities of the nutrients phosphorus and nitrogen) exist due to the application of sewage sludge by the Blair, NE sewage treatment plant and from waste by-products from a nearby corn processing plant onto farmlands within the DeSoto Lake watershed. Use of both materials is increasing. Ongoing monitoring is needed.

Wetlands and Moist Soil Units

At present, DeSoto NWR actively manages approximately 100 acres as wetlands and moist soil units. Pumping is typically required in the fall to recharge these units with water in time for fall waterfowl migration. These wetland areas are heavily used by waterfowl. Because beavers and muskrats occasionally damage the moist soil unit levees, regular maintenance and repair is required.

Aquatic vegetation in DeSoto wetland
credit: staff photo

There is a need to prepare a wetland/moist soil unit management plan to specify water depths and seasonal regimens that will support target aquatic plants and invertebrates important to waterfowl and other aquatic habitat users.

Grasslands

The acreage of grasslands on DeSoto has been increasing since the 1980's as croplands are gradually retired. Approximately 1640 acres of the refuge are presently managed as grasslands in more than 40 different units with varying soils properties that affect the types of grasses that do best on those sites. Extensive records are maintained of grassland management history, unit by unit. Overall, soil fertility is good, climatological conditions supportive, and topographic features conducive to intensive management of high-quality grasslands composed primarily of native species.

DeSoto NWR has two step-down management plans that are used in managing grasslands — the *Grassland Management Plan* and the *Fire Management Plan*. Grassland management objectives are to: provide habitat for grassland-loving birds; maintain and enhance bald eagle and other raptor feeding habitat; provide nesting habitat for waterfowl and resident game birds; improve overall habitat diversity on the refuge; protect water quality and soils from erosion; and provide unique public use and interpretive opportunities to create an appreciation and knowledge of grasslands and their uses by wildlife. Management actions related to stand establishment, vigor, maintenance and weed control are conducted with these objectives in mind.

Actions taken for vigor and maintenance usually require manipulation and have centered around mowing, haying, and prescribed burning. Grazing has not been conducted. In recent years the refuge has contracted with a local farmer to harvest fields of alfalfa twice annually and smooth bromegrass once annually. (The bromegrass is managed for snow goose green browse near the Bob Starr Overlook.) Harvest dates are delayed to avoid disturbing nesting birds.

In FY 1997 fifteen grassland units totaling 229 acres were prescription burned. In FY 1998, nine units totaling 94 acres were burned. DeSoto also recently participated in studies by Professor Fred Van Dyke of Northwestern College, Iowa, on the comparative responses of avian communities to prescribed burning versus mowing on the fragments of warm-season, tallgrass prairie found on the refuge. Preliminary findings suggest that prescribed burning may be preferable to mowing for prairie conservation and rejuvenation. Both techniques succeed in deterring encroachment by woody vegetation, but burning appears to stimulate greater short-term

primary productivity and higher habitat quality. However, overall community diversity of plants and birds appears to be more sensitive to size and shape of the area than to either burning or mowing. These results underscore the importance of assembling larger and less fragmented blocks of prairie habitat.

Daisy Fleabane
credit: George Grube

Croplands

Cultivated acreage has been declining as croplands are gradually reverted to grasslands and woodlands. Almost 2,000 acres (about one-quarter) of the refuge are presently managed as croplands. Several cooperative farmers from the local community work this land on a two-thirds/one-third crop-share lease: one-third of the harvest is allocated to the refuge. The cropland provides food and loafing areas for migrating waterfowl, and food, cover, and edge for other species. Crops grown include corn, soybeans, sweet clover, milo, alfalfa, and hay grass.

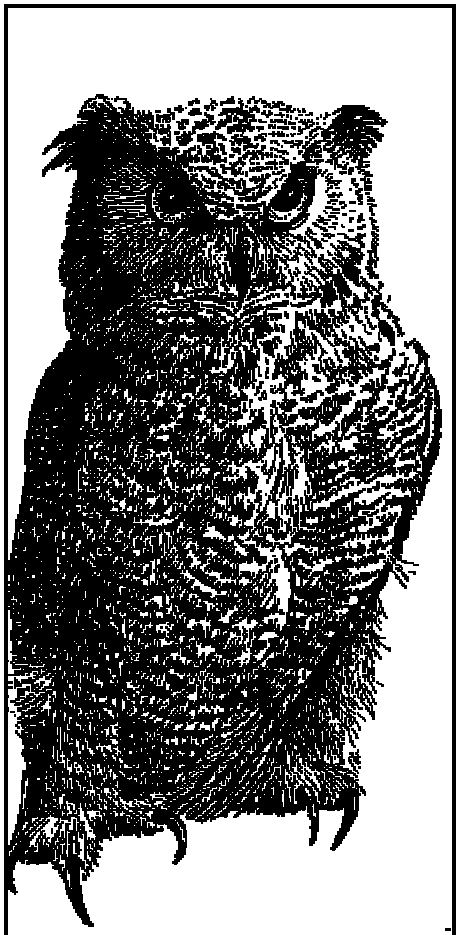
In recent years, both a biological crop rotation and a conventional crop rotation have been used. The biological rotation depends on minimal use of inputs such as fertilizers and pesticides. Integrated pest management is also employed. The acreage in conventional crop rotation has steadily declined, and stood at 12.5 percent of total cropland in 1998.

For a number of years, small wildlife food plots ranging in size from 10 to 24 acres were scattered throughout the refuge in isolated areas within larger non-crop habitats. However, in 1997 the only farmer with farm equipment small enough to operate efficiently declined to continue, precipitating the abandonment of the food plots. Plots were either incorporated into adjacent cropland, reverted to grasslands and incorporated into adjacent grasslands, or reverted to stand-alone grasslands. Production of milo was continued, but it was planted along the edge of existing corn fields.

Woodlands

Approximately 3345 acres of DeSoto Refuge are under forest cover at present. This acreage has gradually increased over the last two decades with the reversion of croplands. About 650 acres of woodlands have been added in the last ten years alone. Management of woodlands generally involves less frequent manipulation than with wetlands and grasslands, because of the slower succession of forest communities.

Management of woodlands at DeSoto is under the general guidance of two step-down management plans — the *Forest Management Plan* and the *Bottomland Reforestation Plan*. Forest management objectives include: providing roosting and sanctuary for bald eagles and other raptors; providing diversity of habitat types to benefit a wide range of wildlife species; providing cavities for other species like owls, wood ducks, woodpeckers, squirrels and raccoons, which use them for cover or nesting; and providing forested habitat for environmental education, public interpretation, and wildlife-viewing opportunities for visitors.



Great Horned Owl
credit: Robert Savannah

As mentioned in the previous chapter, cottonwood is the dominant forest canopy species in these bottomland or riparian forests. The majority of cottonwoods appear to be between 50 and 70 years of age and were likely established naturally when the Missouri River was actively flooding, scouring, and depositing sediments. Cottonwoods are a pioneering species and they are not long-lived. Extensive mortality has been occurring over the last two decades with minimal regeneration. This raises concerns about the species' future in DeSoto forests, and in turn, about the functions it serves for wildlife, such as for bald eagle roosting and cavity nesting. Old cottonwoods are being replaced by more shade-tolerant species that do not depend on flooding for site preparation, like hackberry, mulberry, green ash, and most noticeably, roughleaf dogwood.

Flooding of appropriate sites to promote cottonwood regeneration has been tried on a limited basis with some success. The most feasible management technique for regeneration of cottonwoods is intermittent flooding of ground disked when the mature cottonwoods are dropping their seed during the summer.

Another forest management technique used elsewhere is prescribed burning, both to regenerate fire-dependent species, avoid the build-up of combustible fuel, and control undesirable underbrush. However, DeSoto's bottomland forests are not prescription burned because the sites are generally too wet to carry a fire.

In 1972 a 320-acre Research Natural Area was established adjacent to the Missouri River and the southeastern arm of DeSoto Lake. It consists of an overstory of mature cottonwoods, a midstory of roughleaf dogwood, and an understory of poison ivy and horsetail species. This area has historically been used as a roosting site by bald eagles and is currently the primary eagle roosting site on the refuge. No manipulation or management activities have been permitted in this area. Research is encouraged, but to date no studies have been conducted.

Plant Pest Control

DeSoto NWR practices the judicious mechanical and chemical control of weeds. Weeds are plants that are "out of place" or undesirable because they are noxious, invasive, exotic (non-native or alien), or simply over-abundant to the extent that they interfere with habitat or wildlife objectives.

Exotic plant species, which often aggressively invade new habitats, are of particular concern and are receiving more management attention from public land management agencies. The Department of Interior has published a list of plant species considered to be exotic, invasive or a nuisance species. The following plant species on the Interior's "hit list" have been observed at DeSoto NWR.

Plant pest species of significance are:

< Yellow sweet clover (*Melilotus officinalis*) - A biennial routinely planted as a single-year green manure crop in the refuge's biological crop rotation. Also, it was planted as a nurse crop (i.e., a nitrogen source) with newly seeded warm-season grasses until 1994. If it is allowed to produce seed, it can be a significant problem since the seed can remain viable in the soil profile for decades.

< Reed canary grass (*Phalaris arundinacea*) - Common floral under story component in riparian corridors along the Missouri River.

< Smooth bromegrass (*Bromus inermis*) - Refuge personnel routinely planted it to establish permanent ground cover in the early history of the refuge. It has been planted in more recent history as a living firebreak. Currently, there are several fields in the refuge being managed as cool-season grass habitat.

< Purple loosestrife (*Lythrum salicaria*) - It was first observed in 1998 in a former river chute on the refuge near the Missouri River. This chute is frequently flooded during moderate to high water levels. Scattered individual plants have been observed throughout this area and hand weeded in both 1998 and 1999. Infestations are likely coming from established sites upstream.

< Common reed (*Phragmites australis*) - This has been present within the refuge in small isolated sites along drainage ditches and DeSoto shoreline for many years. Annual application of glyphosate has steadily reduced the infestation level.

< Musk thistle (*Carduus nutans*) - This weed is the most common invasive species on the refuge. There are several widely scattered infestations. Some infestations are significant. The musk thistle seed head weevil was released in 1996. Its establishment and population level has been monitored ever since. The number of seed heads infested with this insect has steadily increased over the years. However, musk thistle population has not yet been affected.

< Velvet leaf (*Abutilon theophrasti*) - This is a very common species in cropland habitats and disturbed sites. It is rarely observed in well-established permanent vegetation.

Other plant pest species observed on the refuge, but in isolated sites and very low population levels are: autumn-olive (*Elaeagnus umbellata*), Canada thistle (*Cirsium arvense*), cats claw vine (*Macfadyena unguis-cati*), cotoneaster (*Cotoneaster* sp.), crown vetch (*Coronilla varia*), dame's rocket (*Hesperis matronalis*), tall fescue (*Festuca elatior*), henbit (*Lamium amplexicaule*), common mullein (*Verbascum thapsus*), multiflora rose (*Rosa multiflora*), Canada thistle (*Cirsium arvense*), and tree of heaven (*Ailanthus altissima*).

Other species of concern are Chinese elm (*Ulmus parviflora*), roughleaf dogwood (*Cornus drummondi*), and smooth sumac (*Rhus glabra*). Chinese elm is an exotic while roughleaf dogwood and smooth sumac are native species. All three species, particularly roughleaf dogwood, are encroaching on grasslands throughout the refuge.

In the last several years, the following weed management has taken place:

- The herbicide glyphosate was applied to small portions of DeSoto Lake (5-10 acres) and several acres of moist soil units to control the aquatic weed phragmites.
- Glyphosate was also applied to under one acre of buffalograss turf to control invasive Kentucky bluegrass.
- The herbicides 2,4-D + dicamba were applied to five acres of turf grass around the Visitor Center to control a variety of broadleaf turf weeds.
- 15 acres of agricultural levee were subjected to treatment by 2,4-D + dicamba one year and mowing the next to control roughleaf dogwood and smooth sumac.
- 60 acres of woody vegetation along the refuge boundary were mowed.
- 154 acres of grasslands were mowed to control encroaching roughleaf dogwood and Chinese elm.
- 4000 lineal feet of a variety of grass and broadleaf weeds along the Wood Duck Pond Trail were treated with the herbicide bromacil.

Habitat Restoration

Natural habitats in the Midwest have been altered drastically over the last century. Agreeable topography, soil fertility, and settlement patterns (if not climate) have rendered such habitats far more vulnerable to modification by humans and machines than other parts of the country that are more remote or rugged. In most instances, it is agriculture that has replaced native plant communities. Restoration is the process, science and art of trying to recreate some semblance of the living communities that once were.

DeSoto staff work on wetland and upland habitat restoration projects both on and off-refuge. The DeSoto NWR Private Lands Program embraces an 18-county management district. In 1999, a total of 358 acres of wetland and upland habitat were restored.

Wetlands Restoration — Off Refuge

In a partnership with a host of agencies and individual landowners known as Partners for Fish and Wildlife, DeSoto NWR carries out wetlands restoration on private lands. In 1998 ten habitat projects in seven different counties totaling 264 acres were completed. Some of these were joint wetland/upland projects, such as the 130-acre Kirby Robert's habitat project. This one consisted of approximately 25 acres of palustrine emergent and open water wetland, 100+ acres of native grasses, and nesting structures for Canada geese and wood ducks.

Upland Restoration — Off Refuge

DeSoto staff also restore upland habitat off-refuge, seeding native grasses on private lands under easement. In 1998, six projects totaling 124 acres were completed.

Upland Restoration — On Refuge

As croplands on the refuge are retired, those lands are reverted to managed grasslands emphasizing native prairie plants. Refuge staff restored 63 acres in 1997 and 60 acres in 1998. The major categories planted are sandy warm-season, mesic warm-season, and cool-season grassland communities. The grass seed mix used for sandy warm-season consists of sand lovegrass, sand bluestem, switchgrass, and sideoats grama. For mesic warm-season it includes big bluestem, little bluestem, Indiangrass, switchgrass, needlegrass, and Virginia wildrye. The cool season mix is intermediate wheatgrass and tall wheatgrass.

Warm-season grasses are planted in the summer months and cool-season grasses in the spring and fall. Mechanical tilling is used to prepare the seedbed and control emerged vegetation, which is then controlled with periodic mowing. When grass stands do not become well-established or decline over time, staff may attempt to renovate them through a combination of prescribed burning, herbicide treatment, and interseeding.

Fish and Wildlife Management

Monitoring and Studies

DeSoto NWR's *Wildlife Inventory Plan* provides guidance on monitoring the refuge's wildlife. Refuge staff and volunteers currently monitor wildlife numbers and activity throughout the year through a number of surveys. Some species are counted daily while others perhaps only biannually. The surveys provide information for refuge management, and they support state and national efforts. Data from the surveys are maintained in the refuge files and forwarded to others when appropriate. Regular surveys and samples are conducted for:

- Bald eagles

- Snow geese
- Canada geese
- Ducks (broken down by species)
- White-tailed deer (pre-hunting season spotlight count and yearly aerial surveys)
- DeSoto Lake fish populations

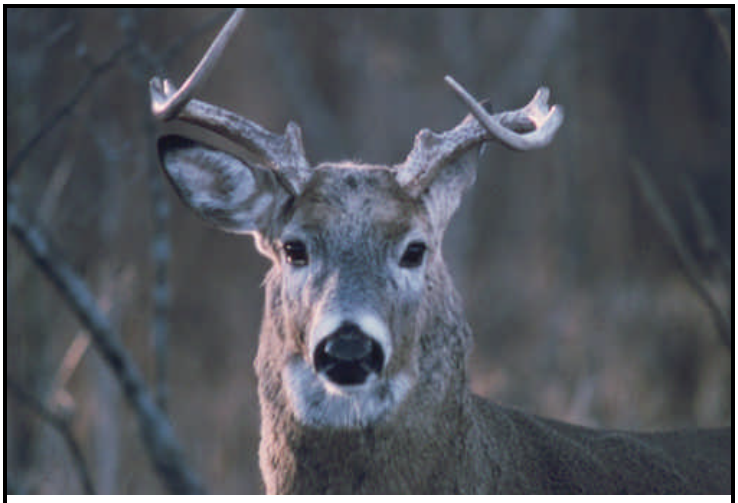
In addition, staff monitor for the presence of rarer visitors, such as least terns, piping plovers, trumpeter swans and golden eagles. Also, the refuge cooperates with the Omaha Chapter of the Audubon Society to conduct annual Christmas and Spring Bird Counts. The 1997 Spring Bird Count, for instance, observed 102 bird species on the refuge in a single day. Refuge staff occasionally conduct or participate in other surveys, such as a 1997 national census checking for deformities in amphibians (no deformed frogs were found on the refuge).

Surveys and monitoring are also conducted for fish populations in DeSoto Lake, including sportfish and rough-fish. Electroshocking surveys provide estimates of species composition, age class, diversity, size and health indicators. In recent years, these surveys have tracked a dramatic increase in the gizzard shad population of the lake.

Over the years, DeSoto NWR has also been the site of a number of studies and investigations related to fish and wildlife populations. These have been carried out both by refuge staff and college-affiliated researchers. One mentioned previously concerned the response of grassland bird communities to different management techniques. Other recent studies include a seven-year telemetry study of white-tailed deer movement and vulnerability in and around the refuge and a three-year survey gauging the response of waterfowl foraging to fall tillage of corn residue.

Game Management

Controlled hunting is conducted on DeSoto NWR for white-tailed deer, ducks and geese. Two step-down management plans — the *Refuge Hunting Plan* and the *Snow Goose Hunting Plan* — provide guidance to staff for managing these hunts. Objectives specified in the *Refuge Hunting Plan* are to manage game animals as a renewable resource with sound management principles, provide high-quality hunting opportunities to refuge participants, promote the value of hunting as a sound wildlife management technique, and promote hunter education and ethics.



White-tailed deer at DeSoto NWR
credit: John Jave

There are actually three deer hunts — one muzzleloader and one archery hunt in the Nebraska portion of the refuge, and one archery hunt in the Iowa portion. The muzzleloader, bows and arrows are considered primitive weapons that present more of a challenge to hunters but are also safer in a heavily-visited refuge. An earlier high-powered rifle hunt was allowed for seven years but was discontinued in 1975 due to the hazards it presented. The muzzle-loader hunt began in 1976 and is conducted on the "Center Island" portion of the refuge in cooperation with Nebraska Game and Parks. Approximately 200 permits are issued each year. The Iowa archery hunt began in 1968 on 660 acres of cropland and timber in the southeastern portion of the refuge. Bow-hunting in the Nebraska portion of the refuge west of the Missouri River started in 1972. These three hunts have successfully met the population management objective of maintaining a post-hunt, winter herd of between 330 and 380 deer on DeSoto Refuge.

DeSoto's controlled waterfowl hunt was established in 1974 in cooperation with the State of Iowa. The hunt aimed to fulfill a demand for quality snow geese field shooting that was not readily available in the area. Other migratory waterfowl, such as mallards, wood ducks, and Canada geese are also occasionally harvested during this hunt, but the numbers tend not to be large.

Snow geese over DeSoto Refuge
Credit: staff photo

The original hunting plan was part of a snow goose corridor plan that included coordination with Sand Lake, DeSoto and Squaw Creek National Wildlife Refuges. The controlled hunt was planned so that it would be compatible with three state-run programs along the Missouri River south of DeSoto Refuge. DeSoto serves as a mid-latitude staging area for about half-a-million fall-migrating lesser snow geese. In the 1970's and 1980's the annual snow goose harvest at DeSoto averaged several hundred birds, a small fraction of the total kill through its range. In the 1990's the annual harvest declined for several reasons.

The *Snow Goose Hunting Plan*, prepared in 1998, set the following objectives:

- Maximize the on-refuge harvest of adult, mid-continent snow geese.
- Disrupt historic refuge feeding patterns and disturb the snow geese enough to force them afield off-refuge, hopefully, increasing that harvest as well.
- Provide quality snow goose hunting not readily available in this portion of the Midwest.
- Promote hunter education, hunter ethics, and value of hunting as a wildlife management tool.

In response to the growing urgency of the mid-continent snow goose overpopulation problem — and the hope of DeSoto staff to contribute to solutions — the refuge adopted a change of strategy in the fall 1999 hunt. The snow goose hunt became a guided hunt. Staff believe that the presence of expert guides will enable hunters to kill more geese. The fall '99 guided hunt had a modest beginning with a harvest of 60 snow geese. While this take was not any better than the fixed blind hunts of previous years, it was on a par with generally poor waterfowl hunting throughout the region, which biologists attribute in large part to mild weather.

1984-85 Duck Stamp — American wigeon
Credit: W.C. Morris

DeSoto wildlife biologists strategically coordinate hunting to minimize conflicts with the high level of non-consumptive public use (primarily viewing snow geese and touring the Visitor Center) that occurs at the same time on the refuge. In order to minimize potential conflicts between refuge waterfowl hunters and the visiting public, areas open to hunting are physically separated from areas open to the general public.

Only rarely have confrontations between anti-hunting groups and hunters occurred over the years.

DeSoto Lake Fishery Management

DeSoto Lake can be extremely productive and fishery biologists believe it has the potential to sustain a quality, warmwater sport fishery. Yet at present, as well as throughout most of the lake's history, it has not approached that potential. Extensive fish stocking, surveys, regulatory restrictions, and even a massive chemical renovation in 1985 have failed to establish a stable recreational fishery of outstanding quality. Game fish do not seem to be able to hold their own in competition with the large biomass of prolific rough-fish (i.e. species undesirable as sportfish).

A *Fishery Management Plan* guides DeSoto Lake management efforts. DeSoto staff cooperate with the Iowa Department of Natural Resources, Nebraska Game and Fish, and the Columbia Fisheries Resource Office to manage fish populations in DeSoto Lake. Since there are no known threatened, endangered or rare species of fish in the lake, the thrust of management efforts is directed exclusively toward managing a long-standing oxbow lake recreational fishery. Techniques employed include stocking sportfish, monitoring populations and harvests by means of periodic electroshocking and creel censuses, controlling surging rough-fish populations through commercial harvesting, adding structures (i.e. trees, rocks, and pallets) to the lake, an electric fish barrier to prevent the intrusion of undesirable species from the Missouri River, and various kinds of aquatic habitat and water quality improvement initiatives.

Over the years, it is no exaggeration to say that millions of sportfish have been stocked in DeSoto Lake — 36-38 million since the 1985 lake renovation. In 1998 alone, for example, 400 twelve-inch white bass, 3,000 seven-inch channel catfish, and 2,000 six-inch walleye were stocked. These benefit recreational fishing and are intended to help control the increasing population of the rough-fish gizzard shad.

From April to October, permits are granted to private commercial harvesters to net buffalofish and carp, two of the rough-fish species that have come to dominate the lake. Recent harvests have ranged from about 7,000 pounds to 18,000 pounds a year.

Largemouth Bass
credit: Duane Raver, USFWS

Bird Banding

Bird banding means attaching a small, numbered metal ring to one leg of a bird. Banding has been used for decades by wildlife managers and scientists across North America to understand and track the movements of migratory birds. DeSoto staff cooperate with the Iowa Department of Natural Resources to band Canada geese during the summer. In 1997 and 1998, for example, 37 and 56 geese were trapped, respectively. Recaptures were noted and new bands were attached.

Disease Monitoring and Treatment

The large concentrations of waterfowl at DeSoto during the fall months expose huge numbers of ducks and geese to potential disease outbreaks, particularly avian cholera. A step-down management plan, the *Disease Plan*, outlines procedures for disease monitoring and treatment on the refuge. Rapid response is necessary to control the extent of an epidemic. One of the most critical procedures during a disease outbreak is to collect bird carcasses to prevent their accumulation and the spread of disease.

In 1997 a new bird carcass incinerator was purchased to safely destroy dead, disease-contaminated birds. That same year, an avian cholera outbreak began on December 11, lasting a week and a half, until lake freezing forced the flocks to move. A total of 75 birds, mostly snow geese, were incinerated.

Nest Structures

For years the refuge has mounted and maintained nest boxes for wood ducks. In recent years there have been about 60 such boxes that have been only moderately successful in attracting nesting pairs and hatching nestlings. The boxes have also proved very attractive to breeding screech owls. With the high mortality of DeSoto's soft-wooded, cavity-prone cottonwoods, there is at present an abundance of natural cavities in trees on the on the refuge. Evidently the wood ducks prefer these.

Other Wildlife Management Activities

Two other kinds of wildlife management efforts carried out at DeSoto on a less frequent basis are species reintroductions and control of exotic animal species and pests. Staff stay informed of the prospective threats from non-native or alien animal species such as the zebra mussel.

Resource Protection

The staff of DeSoto NWR recognize fully the obligation that has been entrusted to them — the care of valuable natural, cultural, and human resources — and they take this responsibility very seriously.

Law Enforcement

Law enforcement on the refuge is both a protection and a prevention function. Protection of the visiting public, staff, facilities and natural and cultural resources from criminal action, accidents, negligence and acts of nature such as storms. Prevention of incidents from occurring is the best form of protection and it requires a law enforcement presence established by frequent patrol and other visible activities of the law enforcement staff.

Incidents that require law enforcement responses include occasional poaching, runaways, and drug use, to vandalism and auto accidents. In any given year numerous violations occur resulting in hundreds of verbal warnings, scores of written notices, and several warrant arrests that have led to serious fines totaling as much as $10,000 in a single year.

Four step-down management plans -- the *Law Enforcement Plan, Safety Plan, Crowd Control Plan,* and *Traffic Control Plan* -- constitute the law enforcement guidelines at DeSoto. The latter two pertain primarily to the spectacular fall waterfowl migration and auto tour, which usually produces crowded conditions on refuge roads and at the Visitor Center. Traffic control during this time of very high visitation presents a special problem due to limited road and parking capacity. People want to enjoy the geese and observe the eagles. Some visitors become frustrated when the visitor parking lot is full; their reactions can complicate traffic flows to a point of chaos.

The DeSoto law enforcement staff is one full-time officer assisted by several other staff who have

collateral law enforcement duties. Collateral law enforcement duty is assigned via a three-month rotation schedule to cover the off-duty times of the full-time officer. Other collateral law enforcement assignments are made during heavy public use periods. This level of law enforcement staffing does not provide adequate protection and prevention in that most of the time only one officer is on duty per 24 hours; there are even some periods no officer is on duty. Collateral law enforcement duty is assigned to various staff specialists whose primary duties are slighted while they perform law enforcement duty.

A second full-time law enforcement officer is needed to provide dual coverage during parts of the work schedule and to allow other staff to focus more on their primary duties.

Cultural Resource Management

The Cultural Resource Management program at DeSoto NWR focuses primarily on the nationally-significant *Bertrand* Collection. Documentation, curation and preservation of the *Bertrand* Collection in the Visitor Center are not only major, long-term undertakings but a legal responsibility of the U.S. government through the Fish and Wildlife Service. Under Section 106 of the National Historic Preservation Act and regulations of the Advisory Council on Historic Preservation (Council), in 1991 the Service signed a Programmatic Agreement with the Council, the Iowa State Historic Preservation Officer (SHPO), and the Nebraska SHPO. The agreement stipulated a number of conditions, including implementation of a Comprehensive Conservation Plan for the *Bertrand* Collection, which guides all preservation efforts and initiatives, and the submission of annual progress reports to the Council and the two SHPOs.

Bertrand Collection management is guided by the Scope of Collections Document and also in part by the *Disaster Preparedness Plan for The Bertrand Collection* and the *Bertrand Laboratory Safety Plan*. These two step-down management plans specify a number of preventive measures and response procedures to protect this unique collection in the event of fires, storms, chemical spills, tornados and earthquakes. Yet the *Bertrand* artifacts also face more mundane threats, including insects, mice and the general, long-term “ravages of time.” Much of the *Bertrand* Collection, especially those items of organic origin, are in a constant state of deterioration, be it ever so slow. Application of evolving management and preservation techniques can nevertheless substantially extend the life of the collection, allowing it to yield perpetual dividends of appreciation and knowledge of our nation’s Western settlement history.

Museum staff utilize the services of both volunteers and qualified professionals under contract to ensure the proper documentation and preservation of *Bertrand* artifacts. A wide variety of objects continue to be treated and conserved. In 1998, for example, 536 objects were rehoused

Bertrand Collection artifacts
credit: Leon Kolankiewicz

in improved permanent storage conditions. In 1997, over 14,000 objects were treated. In recent years, the services and expertise of Dana College microbiology professor Larry Stone have been used to survey and treat foodstuffs and liquors. Housekeeping chores of cleaning and dusting exhibits and windows and rotating objects are also practiced routinely and diligently.

Environmental monitoring is a constant chore. Temperature, relative humidity and light levels are all closely regulated. Integrated Pest Management is practiced to control biological threats to the collection. This includes bug traps and mice traps, as well as ongoing efforts to identify and block ports of entry for mice. In general, catch numbers are low and there is no systemic infestation of the collection — a sign that preventive efforts are paying off.

Documentation efforts include upgrades to the museum's management software, cross-indexing the 12,000 photographs and negatives of *Bertrand* objects, inventorying information in the catalog archives, and continually adding relevant historic information to the files. In recent years for example, staff obtained copies of the journal of the captain of the steamboat that rescued *Bertrand* passengers and cargo at the time of the accident, and also established contact with a purported descendant of a Steamboat *Bertrand* passenger. The Museum Curator also works with visiting researchers, loans artifacts to other museums, writes articles for publication, and provides technical assistance in response to inquiries from government agencies, museums, journalists and individuals researchers from many states and Canada. In recent years, she has cooperated with the Mystic Seaport Museum in Mystic, Connecticut, the Western Heritage Museum in Omaha, and the Mark Twain Museum in Hannibal, Missouri on requests for artifact loans.

Compatibility Determinations — Through this CCP, the Service has determined that archeological research is an appropriate use on the Refuge and that issuing Archaeological Resources Protection Act (ARPA) permits and Antiquities Act permits by the Regional Director is compatible with the purposes for which the Refuge was established and acquired. The Refuge Manager will issue special use permits for permitted research to prevent conflict with Refuge management activity and with wildlife-dependent recreational use. Archeological collecting, testing, or excavation on Refuge land without a permit is not an appropriate use and is illegal.

Historic Preservation Procedures and Associated Concerns — Undertakings, that is projects or activities conducted by Service employees, contractors, volunteers, concessioners, or permittees that could affect historic properties, are subject to Sections 106 and 110 of the National Historic Preservation Act and 36 CFR Part 800. Undertakings include ground disturbing activities, changes or neglect to buildings and structures older than 50 years, and divesting land.

The Refuge Manager considers potential impacts of management activities on cultural resources. During project planning, and in any event prior to initiating an undertaking, the Refuge Manager will inform the Regional Historic Preservation Officer in a timely manner to allow analysis, evaluation, consultation, and mitigation as necessary. The Refuge Manager informs local government officials and the general public about planned undertakings.

The refuge has a museum as part of the visitor center for preservation and exhibition of the *Bertrand* collection, as described elsewhere in this document. In addition to these archeological materials, the refuge museum collection includes art, historical items, and zoological specimens. The majority of the zoological specimens are of endangered species and is on long-term loan to the Henry Doorly Zoo in Omaha, NE.

Refuge Cultural Resources Management Objective — The *Bertrand* Collection is the most important cultural resources management issue at the refuge. Existing guidance for the collection is the *Bertrand Collection Management Plan*, the Scope of Collection Statement, and the *Comprehensive Conservation Plan*.

The Programmatic Agreement between the Iowa and Nebraska State Historic Preservation Officers, the Advisory Council on Historic Preservation, and the U.S. Fish and Wildlife Service was accepted on October 22, 1991. The Agreement specifies alternative number 4 of the *Comprehensive Conservation Plan* that was proposed to reverse years of inadequate funding and staffing necessary to preserve the collection. The requirements of the Programmatic Agreement will be implemented in order for the Service to be in compliance with Section 106 of the National Historic Preservation Act and to protect the collection from continuing deterioration.

A cultural resources management plan is needed for the cultural resources on the Refuge. The bulk of the plan would address the *Bertrand* Collection and its discovery site. It would also establish a plan to fulfill requirements of Section 14 of the Archaeological Resources Protection Act for surveying lands to identify archeological resources; and Section 110(a)(2) of the National Historic Preservation Act for a preservation program. And it would address long-term problems identified by the Iowa State Historic Preservation Officer:(1) A good history of the Bertrand needs to be written; the archeological field notes having been lost by the Refuge. (2) Two homestead sites within the refuge are known. (3) Blakeslee's 1978 report lacks maps and sufficient coring sampling. While the river has meandered substantially, recent coring (geomorphological surveys) indicates potential for buried cultural resources strata.

Consultation with Interested Parties — Prior to final approval, the Comprehensive Conservation Plan will be made available to identified parties that could have an interest in cultural resources on the refuge. These parties include the ten Indian tribes (which must be contacted by the Regional

Director), the Iowa and Nebraska State Historic Preservation Officers, and the three local county historical and preservation organizations, and the Advisory Council on Historic Preservation (because of the *Bertrand* Collection).

Facilities Maintenance

Maintenance, repair, and upgrading of the Visitor Center and other refuge facilities like roads, the headquarters building, and equipment require constant diligence and expenditures. As the saying goes, "Rust Never Sleeps." Recent activities in the Visitor Center alone include replacing the HVAC (heating, ventilation, air conditioning) units in 1999, fixing plumbing and water supply problems, and ensuring proper functioning of the fire suppression system and building security system through evaluations and semi-annual checks.

Safety

Safety is important both for DeSoto's staff and visitors. Monthly safety meetings for staff and quarterly Safety Committee meetings are held. The intent of these meetings is to update and train personnel as well as to resolve any safety concerns that arise. Safety meetings are assigned to individual staff members who are then responsible for providing programs. Sample topics include stress management, defensive driving, CPR, RCRA, slips and falls, chain saws, methamphetamine, confined spaces, railroad crossing safety, hypothermia, and hazard communication.

Other safety-related activities at DeSoto include: an Annual Station Safety Inspection of equipment and facilities, an annual evacuation drill for the nearby Fort Calhoun Nuclear Power Plant (only 1.3 miles from the western edge of the refuge), checking, and if necessary, replacement of fire extinguishers, testing drinking water samples, and physicals for fire and law enforcement personnel.

Public Education and Recreation

The six priority public uses of National Wildlife Refuges established by statute are wildlife observation and photography, hunting, fishing, environmental education, and interpretation. All six uses are well-represented at DeSoto Refuge.

Public use activities at DeSoto Refuge are limited to sport and commercial fishing; waterfowl and deer hunting; picnicking; auto touring; wildlife observation and photography; canoeing, sailing and low speed (five mph - mostly anglers) power boating; hiking, walking and jogging; bicycling; berry, fruit and nut-picking; beekeeping; limited firewood cutting; farming and haying; and research. All public use activities at DeSoto Refuge are carried out in accordance with approved *Compatibility Determination Statements,* which are included in Appendix D. These statements are currently under review for revisions and updates, which will be completed and included in the Final CCP.

The National Wildlife Refuge System Improvement Act of 1997 (see Appendix F) requires all public use activities on national wildlife refuges to be justified and approved in accordance with an updated procedure. These updates will be completed within the next twelve months.

Refuge visitation numbers were provided in Chapter Three. Each year, DeSoto welcomes hundreds of thousands of visitors to its Visitor Center, viewing galleries, lake, woods, trails, and picnic tables. Extensive efforts are made to ensure they get the most out of their visits.

DeSoto's public use facilities are depicted on Figure 4.

Visitor Center Programs

DeSoto NWR's educational and interpretive missions were significantly enhanced with the 1981 opening of the Visitor Center on the northwest shore of DeSoto Lake. The Visitor Center is the permanent home of the *Bertrand* Collection. The five-million-dollar, 26,000-square-foot building contains exhibits interpreting the importance of the Steamboat *Bertrand* and the historical development and ecological changes that occurred within the Missouri River Basin during the steamboat era, and more broadly, the wave of western expansion in the 19th century.

The Visitor Center also provides exhibits depicting the natural history of the area and its wildlife. Expansive glass, indoor viewing galleries overlooking DeSoto Lake provide excellent opportunities to observe waterfowl and bald eagles during the spring and fall migration periods. Binoculars and spotting scopes are available free of charge. A theater and a variety of audiovisual equipment offer interpretation to an average of 134,000 visitors who pass through the Visitor Center every year.

DeSoto Refuge Visitor Center beside DeSoto Lake
credit: David Menke

FIGURE 4 INSERTED HERE

A large, multi-purpose room provides space for meetings and exhibits of art, photography, and educational materials. The information desk at the entrance to the Visitor Center is staffed by a knowledgeable and enthusiastic receptionist.

The various interpretation facilities and exhibits in the Visitor Center undergo continual renovation and rehabilitation to maintain their high visual appeal, accuracy, and relevance. In 1998, a Tallahassee, Florida-based company, Wilderness Graphics, Inc. was contracted to upgrade interpretive facilities, including a redesigned information desk, three life-sized dioramas, reconfigured steamboat exhibits, and an enlarged sales area. They also upgraded the audio interpretive system.

Either of two orientation films — "Seeds of Change" or "Off the Beaten Path" — are shown hourly during the week in the theater, and every half-hour on weekends and other heavy-use periods. The theater is also the site of the Weekend Wildlife Film Series, with showings on Saturday and Sunday during most of the year. The series includes special programs for Earth Day, Prairie Appreciation Week, and Lewis and Clark weekends. Two short videos of the Steamboat *Bertrand* excavation and DeSoto's wildlife (produced by volunteer Bob Horton) are viewed 15 to 20 times daily by visitors.

Each year a number of special events and exhibits are hosted in the DeSoto Visitor Center multi-purpose room. These include the Student Wildlife Art Show, Landscape Art of Jim Fox, National Wildlife Week Exhibit ("Suitcase for Survival"), Outdoor Writers of America Exhibit, Fantasy Insects, Prairie Appreciation Week, and Iowa's Wild Places Photo Exhibit. Other recent exhibits have included the Federal Junior Duck Stamp Exhibit, Lewis and Clark Exhibit Panels, Gary Tonhouse Photo Exhibit, and Wildlife Art Exhibit & Sale.

In addition to exhibits, the Visitor Center also sponsors occasional lectures and performances by local and nationally-known wildlife enthusiasts, scientists, and artists. Visitor Center staff give presentations and programs both to classes of students and a variety of organized groups. In 1999, for example, a total of 163 groups and bus tours, including almost 4,900 persons, visited the refuge. Groups such as these were the beneficiaries of programs presented by staff and volunteers on such topics as endangered species, wetlands, wildlife management, and the Steamboat *Bertrand*.

Entrance Fees and Permits

Entrance fees were implemented in 1987. The daily fee of $3 per vehicle is collected at convenient self-registration stations near both entrances to the refuge and the Visitor Center. A 12-month annual pass sells for $10. Compliance appears to be high, based on cursory checks. Other permits are also sold at the Visitor Center, such as Federal Duck Stamps and Golden Eagle Passports. Since its inception, an average of about $70,000 in entrance fees and permits has been collected annually. All entrance fees are remitted to the Service finance center and are then redistributed to the refuge to be used to pay administrative costs and to improve facilities and services for the public.

Interpretive Programs and Non-Consumptive Uses

Four nature trails are used by tens of thousands of visitors every year. Volunteers perform "trail patrol" — picking up litter, pruning intrusive branches, and periodically restocking interpretive brochures for the Wood Duck Pond and Cottonwood trails. Volunteers also provide guided tours for groups that request them ahead of time.

The Wildlife Auto Tour runs each year from October 15 to November 30. This coincides with the peak of the snow goose migration through DeSoto. The current route ends at the Bob Starr Wildlife Overlook and motorists return on the same seven miles of paved road. At this time of year, visitors are excluded from the unpaved gravel portion of the road that loops around Center Island, a restriction they generally seem to accept.

Other facilities include the Cottonwood Picnic Ground and other picnic sites and grills in several locations, Bertrand Excavation Site and Trail, Missouri River Overlook, Prairie Lane, Whitetail Drive, Lakeview Drive, and a number of interpretive signs aimed at motorists. In addition, boats may be launched into DeSoto Lake from several boat ramps. Motors are permitted, but boating is limited to no-wake speeds, not to exceed five miles per hour.

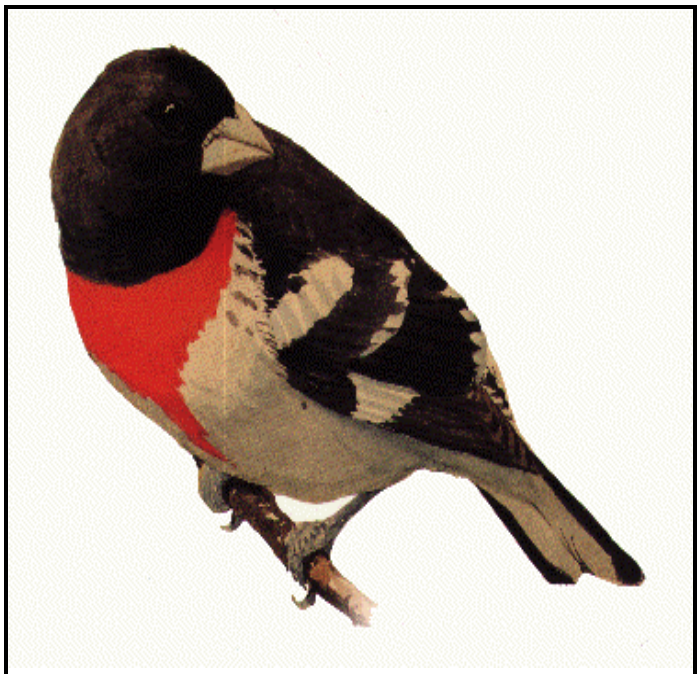
Environmental Education

Hundreds of area teachers utilize DeSoto NWR as an environmental education resource. In 1999 over 8,200 students from 475 classes visited DeSoto. Teachers supervise many of their own classes at the refuge and borrow films, slide shows, and videos to use back in their classrooms. The busiest months tend to be May and November. In the spring, most visiting classes work on the "Artifacts and Lifestyles" cultural resources packet provided by DeSoto. In the fall, most learn about "Birds in Migration." A number of students also participate in fall's "Prairie Appreciation Week." Colleges and universities in the region also use the refuge for educational purposes, including Creighton College, Clarkson College, Drake University, Dordt College, Westmar College, the University of Nebraska, Iowa State University, Iowa Western Community College, the University of South Dakota, Morningside College, Hastings College, and Northwestern College.

Consumptive Uses

Several consumptive uses take place on DeSoto National Wildlife Refuge: hunting for deer and waterfowl, fishing, and mushroom collection. Collecting morel mushrooms in designated areas of the refuge attracts several thousand visits in the spring.

Most of the white-tailed deer harvested at DeSoto are taken by the muzzleloader deer hunt, with much smaller numbers taken by bow hunters. In all, several hundred deer hunters participate. The annual waterfowl hunt attracts 250-300 hunters. In 1998, these outdoorsmen and women demonstrated the patience and persistence for which their pastime is famous by logging 28 hours and 18 shots for each bird harvested!



Rose-breasted Grosbeak painting
Louis Agassiz Fuertes (1874-1927)

DeSoto staff help conduct sport fishing tournaments and clinics on the refuge. In 1999 for example, six bass tournaments, one catfish tournament, and one archery fishing tournament were conducted. Fifty-two participating bow hunters in the 1999 annual "Carp-O-Rama" archery fishing tournament harvested 268 carp and buffalofish weighing 596 pounds. In recent years, in partnership with African-American churches in Omaha, Nebraska and the Omaha Indian Tribe, clinics have also been held to provide fishing opportunities for inner-city youth and Native American youngsters. A number of adult volunteers have assisted these events.

Emerging Service policy is expected to prohibit competitive events on refuges except when the following four conditions are met by the event:

1. It helps to build appreciation and understanding of fish and wildlife resources.
2. It directly involves a priority public use.
3. It does not unreasonably interfere with other refuge visitors.
4. When prizes are awarded, they are of nominal value.

For example, competitive fishing events may be allowed even though small prizes are awarded.

Outreach

DeSoto staff are very active in wide variety of outreach efforts. In a typical year, staff respond to 16,000 public inquiries over the phone and in writing. They send dozens of news releases to 225 newspapers, television and radio stations in Iowa, Nebraska, Kansas, Missouri, and South Dakota. They grant two dozen or more interviews to reporters, producers, and journalists. Most of the coverage, as might be expected, focuses on waterfowl.

Staff also assist and participate in special media events, such as a segment about DeSoto on the South Carolina Public TV program "Nature Scene," broadcast nationally in December, 1998, and a recent documentary film by Bruce Batt of Ducks Unlimited entitled "Snow Geese in Peril."

Staff respond to requests for programs and videos by civic clubs and organizations whenever asked. In recent years, DeSoto's staff have spoken to the Rotary Club, National Association of

Retired Federal Employees in Omaha, the Grange in Blair, and career days at Blair and Fort Calhoun High Schools. Staff have also presented an environmental education program at the Winnebago Indian Reservation for Earth Day.

Several members of the DeSoto staff are very actively engaged in Scouting both on and off the job, organizing and conducting orientations, fishing clinics, refuge projects, and nature badge activity. Two DeSoto biologists have each volunteered more than 500 hours a year with two separate Boy Scout troops in Iowa, doing camping trips, fundraisers, summer camps, and merit badge training.

Coordination and Partnering

The preceding pages have mentioned many instances of DeSoto Refuge's cooperative efforts with individuals and groups, both private and public, in pursuing the refuge mission. At the national and regional level, the Fish and Wildlife Service has a number of formal and informal relationships with scores of agencies and groups. With regard to DeSoto NWR in particular, over the years Refuge staff themselves have forged a number of mutually beneficial working relationships and agreements.

Interaction with other federal, state, county, and local governments continues to grow each year. Programs like the Private Lands Program, law enforcement coordination, land acquisition and operations for Boyer Chute National Wildlife Refuge, fishing clinics, research programs, and the farming program are some major examples that offer opportunities for productive interaction and cooperation.

DeSoto NWR maintains informal partnerships with the Iowa office of the Natural Resources Conservation Service, Midwest Regional Office of the National Park Service, the Iowa Department of Natural Resources, Nebraska Department of Game and Parks, Harrison County Conservation Board and other County Conservation Boards, Iowa State University Extension, Papio-Missouri River NRD, Midwest Interpretive Association, Ducks Unlimited, Pheasants Forever, Omaha Chapter of the National Audubon Society, local chapters of the Boy Scouts of America and Girl Scouts of America, certain African-American churches in Omaha, the Omaha and Winnebago Indian Tribes, and 4-H Clubs. Staff also cooperate with scores of educational institutions.

Also mentioned earlier was a Memorandum of Understanding between DeSoto and the national Advisory Council on Historic Preservation, and the State Historic Preservation Officers for Iowa and Nebraska regarding the preservation of the Steamboat *Bertrand* Collection. The Museum Curator has cooperated with museums from around the country exchanging information and providing loans of *Bertrand* artifacts.

DeSoto's partners in the Private Lands and Partners for Fish and Wildlife programs include dozens of private landowners, the Pottawattamie, Harrison, Woodbury, Sioux, Carroll, and

Monona County Conservation Boards, Golden Hills Resource Conservation and Development, Glenwood State Hospital, the federal Natural Resources Conservation Service, the Iowa Department of Natural Resources, and the conservation group Ducks Unlimited. Staff's work with each of these parties helps ensure that wildlife habitats are not confined strictly to National Wildlife Refuges.

DeSoto enjoys a special connection with the non-profit Midwest Interpretive Association (MIA), which operates its $110,000 business from a 361-square foot sales area in the DeSoto Visitor Center. From its DeSoto office, MIA also administers outlets at Mingo, Squaw Creek, Swan Lake, and Horicon National Wildlife Refuges, as well as Lewis and Clark Lake, an Army Corps of Engineers facility. MIA's annual sales of educational books, artwork, photographs, T-shirts, postcards, and posters from the DeSoto Visitor Center run about $80,000. In exchange for the space the refuge provides, MIA offers DeSoto visitors educational souvenirs and resources for purchase. It has also sponsored wildlife art shows at the Visitor Center, donated books to the Refuge library, and provided awards for a student art show. MIA's business manager also contributes to DeSoto's operational programs such as computer operations and interpretation.

Any discussion of partnering at DeSoto would be incomplete without commending its dedicated corps of volunteers. In recent years, 80-100 volunteers of all ages have helped refuge staff with tasks that include environmental education, wildlife surveys, trail maintenance, Visitor Center support, and library and museum conservation. Recruiting, training, and scheduling volunteers is challenging. In order to honor and encourage our volunteers, DeSoto Refuge has begun holding an annual volunteer recognition luncheon, at which highlights of the year and awards are presented. In a very real sense, DeSoto's volunteers and others like them across the country represent the conservation spirit of America.