Chapter 5
Planned Refuge Management and Programs

Introduction

As DeSoto National Wildlife Refuge embarked on its fifth decade, a team of staff members, Region 3 officials and biologists, consultants, academics, local farmers, representatives of other state and federal agencies, and other interested parties began a planning process intended to guide the refuge's management and programs into the new century. That planning process has led to the present document — DeSoto's Comprehensive Conservation Plan (CCP) — that will help orient, oversee and prioritize the refuge's activities over the next 15 years.

In the four decades since DeSoto's establishment, many things have changed: the natural and manmade worlds, conservation priorities, the science and practice of game and wildlife management, information technologies, and the Fish and Wildlife Service's orientation, to name a few. Forty years ago, there was no Endangered Species Act, no legal protection for wetlands, little or no emphasis on ecosystem management, no awareness of the plight of neotropical migrants. Rachel Carson had not yet written *Silent Spring* and DDT and its chemical relatives were seen as godsends by most Americans even as bald eagle, peregrine falcon, brown pelican, and osprey populations were mysteriously dwindling. Wildlife managers and biologists emphasized habitat edges and ecotones for their higher species diversity. The birth of Island Biogeography and Conservation Biology — two fields very much in the scientific vanguard nowadays — was still many years away.

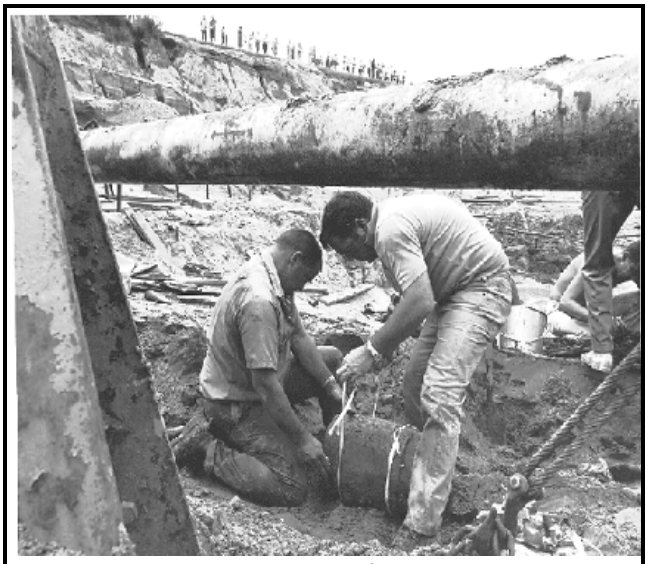
In light of all that has changed, the CCP planning process at DeSoto furnished an opportunity for some fundamental reassessment of the refuge's priorities and programs. The goals, objectives and strategies that emerged from that reassessment are presented in this chapter.

DeSoto National Wildlife Refuge, DeSoto Lake
and the Missouri River (land uses not current)

A total of seven meetings and work sessions were held at DeSoto NWR and the Service's Region 3 headquarters in Fort Snelling, Minnesota from the summer of 1999 through the winter of 2000 to explore issues and alternatives and hash out the goals, objectives and strategies which should guide management and programs at DeSoto.

The planning team formulated goals for DeSoto NWR and then devised and evaluated four management alternatives that represent different ways of meeting those goals: A) No Action (Current Management), B) Maximize Restoration and Conservation of Historical Natural Resource Conditions, C) Maximize Compatible Public Use Potentials, and D) Optimize Natural Resource Conditions and Public Use Potentials. The planning team opted for the last of these (D) as the Preferred Alternative, and then developed detailed objectives and strategies to go along with it. Both the form and the substance of the goals, objectives and strategies were the subject of considerable discussion, debate, and revision among DeSoto and Region 3 staff and officials.

The primary substantive issue was the role and extent of croplands on the refuge and how far to go in phasing them out. One of many organizational questions dealt with fish and wildlife population management versus habitat management. Because of the inseparability of habitat management from wildlife population management, ultimately the team decided to combine these two into one goal area: "Wildlife Population and Habitat Management." Because fisheries management at DeSoto Lake revolves around the recreational fishery rather than conserving native aquatic biodiversity, fish population management was placed under the "Public Education and Recreation" heading.



Excavating the *Bertrand* in the late 1960s
Credit: USFWS

In brief, our plans call for reversion of three-quarters of existing cropland on the refuge to grassland and woodland habitats over the next 15 years. Some cropland will be maintained in order to provide food for migrating waterfowl and game animals (particulary snow geese and white-tailed deer), especially in places that the public might see them. The retention of some cropland will help minimize habitat damage and crop depredation from deer. A more concerted effort will be made to hunt and otherwise disrupt snow geese during their fall migration, because of the severity of the mid-continent overpopulation problem, but taking precautions not to drive them out of the refuge altogether. The objective is to reduce snow goose numbers by approximately half.

Greater emphasis will be accorded non-game Trust bird species, including neotropical migrants and residents. Restoration of larger blocks of grassland and woodland habitat will be the primary means of accomplishing this goal. Water quality and physical changes in DeSoto Lake will be closely monitored and the option of reconnecting the lake or a portion of it to the Missouri River will be the subject of a feasibility study. The *Bertrand* Collection will continue to be preserved and studied, making even greater contributions to our understanding and interpretation of 19th century Western history. We will attempt even more than at present to maximize the potential of partnering on and off the refuge.

Figure 5 on the next page shows future desired land use conditions on DeSoto National Wildlife Refuge. The goals that follow are general statements of what we want to accomplish in the next 15 years. The objectives are specific statements of what will be accomplished to help achieve a goal. Objectives describe the who, what, when, where and why of what is to be accomplished. Strategies listed under each objective specify the activities that will be pursued to realize an objective. Strategies may be refined or amended as specific tasks are completed or new research and information come to light.

In the numbering scheme that follows, the first digit represents the number of the goal group. The second digit represents the goal within that group. The third digit represents an objective within that goal. The fourth digit represents a strategy within an objective. Thus, 3.2.1.4 represents the fourth strategy for the first objective within the second goal of the third goal group. This numbering scheme is used to index Refuge Operating Needs Projects in Appendix C and personnel needs in Chapter 6.

Beaver
Credit: Randy Lennon, USFWS National Image Library

Figure 5 --
DESIRED FUTURE LAND USE CONDITIONS MAP
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DESOTO NATIONAL WILDLIFE REFUGE

Goals, Objectives & Strategies

1. WILDLIFE POPULATIONS AND HABITAT MANAGEMENT

Vision: Contribute to conservation of the natural biological diversity and integrity of the Lower Missouri River Ecosystem through the active management of wildlife populations and their habitats. Restore, maintain, and protect a mosaic of habitat types representative of this ecosystem, benefitting non-game and neotropical migratory birds, waterfowl, and other Federal trust species. Increase "naturalness" as much as possible in the wider context of a heavily modified ecosystem by means of establishing the largest feasible blocks of native plant communities in order to minimize the negative effects of habitat fragmentation. Intervene in and manipulate natural processes such as plant community succession, lake evolution, and encroachment by established exotic species to achieve a mix of habitats and populations that best conserves native biological diversity.

1.1 ***Goal: Manage DeSoto Refuge habitat to be attractive and beneficial to migratory waterfowl, especially during migration seasons.***

1.1.1 Objective: Manage a diversity of habitats that provide sanctuary, open water, exposed shoreline and mudflats, shallow wetlands, and upland types traditionally preferred by geese, ducks and other waterfowl.

Strategies:

1.1.1.1 Manipulate DeSoto Lake levels to continue to attract migratory waterfowl in the fall, winter and spring seasons for social, feeding, and resting needs.

1.1.1.2 Maintain specific units of grasslands and croplands (grain fields) on the refuge to provide nearby food sources for waterfowl. By 2015, 475 acres of croplands and 2780 acres of grasslands will furnish on-refuge feeding opportunities for waterfowl.

1.1.2 Objective: Maintain current waterfowl use day levels, based on the most recent five-year average of 1,245,000 use days annually, excluding snow geese, which are specifically addressed in a subsequent goal.

Strategies:

1.1.2.1 Monitor arrivals and concentration buildups in accordance with the Wildlife Inventory Plan, with the specific intent to witness and record annual peak numbers, and date of occurrence, of special interest species.

1.1.2.2 Monitor waterfowl activity during migration periods in order to evaluate the use of various habitat types.

1.1.2.3 Monitor waterfowl concentrations for indications of disease and stress and be prepared to implement the Disease Plan.

1.1.2.4 When concentrations exceed objective levels to the extent the welfare of the waterfowl is at risk, implement sanctuary disturbance measures that result in concentration reductions.

1.2 ***Goal: Actively assist international efforts to reduce the mid-continent population of snow geese by at least 5% each year from the 1998 population of about 3 million, down to an eventual level of about half of that, in accordance with recommendations of the Arctic Goose Habitat Working Group.***

1.2.1 Objective: Attain and then maintain an average annual peak population of 150,000 to 250,000 snow geese (e.g. 4,000,000 goose use days) stopping temporarily at the refuge during the fall migration.

Rationale: Enhanced food supplies and winter survival have led to a mid-continent snow goose population exploding by 5% annually in recent years. Their numbers now far exceed the carrying capacity of their summer breeding range in the Arctic tundra of northern Canada. Consequently, the birds are causing extensive, long-term damage to tundra vegetation and soils, taking a toll on the entire ecosystem. The targeted numbers for DeSoto correspond to approximately a proportional reduction from recent peaks at the refuge. Through close monitoring, caution will be taken not to *drive snow geese out of the refuge altogether. Snow geese flocks every fall, after all, are DeSoto NWR's most spectacular wildlife phenomenon.*

Strategies:

1.2.1.1 Reduce acreage of cropland in increments down to 475 acres (from about 1990 acres in the year 2000) by 2015, in accordance with habitat management objectives, to reduce attractiveness of DeSoto as a feeding station.

1.2.1.2 Until overall population objective is achieved, increase number of snow geese harvested by at least 500% from the 1999 take of 60 birds through a guided hunt, larger bag limits, and use of liberalized hunting measures, in accordance with relevant laws. *Rationale for guided hunt: these are better received by the public than an open hunt, in addition to having a higher success rate.*

1.2.1.3 Until overall mid-continent population target is achieved, allow for greater access by visitors to concentrations of snow geese, reducing the sense of sanctuary they obtain in the refuge, in order to help destabilize and disperse them.

1.2.1.4 Intensify participation in public education campaign that communicates there are too many snow geese for their own good and the good of their tundra habitat and fellow Arctic wildlife. DeSoto and other Central and Mississippi Flyway wildlife refuges can play a key role in returning the snow goose population to an ecologically sustainable level.

1.2.1.5 Monitor the flock(s) very closely on a daily basis when snow geese are passing through DeSoto, to evaluate stress levels and avoid excessive disturbances.

1.3 ***Goal: Monitor the health, viability, and size of fish and wildlife populations on the refuge with enough accuracy to detect significant changes and take appropriate management actions.***

1.3.1 Objective: Obtain annual peak population counts and use days for bald eagles, snow geese, other waterfowl, piping plovers, interior least terns and other key species, as outlined in the Wildlife Inventory Plan. Ascertain nesting status of plovers and terns.

Rationale: Accurate information on wildlife populations and trends is a critical element of wildlife management and decision-making. Yet as the Fish and Wildlife Service Manual (Part 620 on habitat management practices) states: "The collection of survey data is usually so time-consuming that it is only worthwhile if the results have long-term significance. Survey data are useful only if the method of collection is clearly defined and repeatable and the methods are consistent. Too often, surveys are conducted in a haphazard manner and count or measure parameters of little significance to key species objectives."

Strategies**:**

1.3.1.1 Utilize procedures identified in the Wildlife Inventory Plan.
1.3.1.2 Strive to maintain consistency between survey methods; utilize the most efficient, state-of-the-art technologies and methods available.
1.3.1.3 Maintain a high level of disease monitoring of waterfowl and readiness to deal with a major outbreak.
1.3.1.4 Closely monitor any encroachment by non-native wildlife species to be able to effective implement control measures promptly.
1.3.1.5 Document the utilization of different habitats by key species to better predict effects of future natural and induced habitat changes on populations.
1.3.1.6 Conduct breeding bird surveys on an annual basis.
1.3.1.7 Revise Wildlife Inventory Plan every five years or as necessary.
1.3.1.8 Utilize skills and knowledge of local qualified volunteers to update the 1985 DeSoto bird list and inventory of avian populations within and around the refuge.

1.4 ***Goal: Augment opportunities on the refuge for nesting, resting and foraging of non-game and Trust bird species, in particular those songbird and neotropical species listed in Region 3's*** **Resource Conservation Priorities,** ***by gradually reverting cropland into other more natural habitats.***

1.4.1 Objective: Increase opportunities for woodland-dependent species such as the wood thrush, ovenbird, northern oriole, ruby-throated hummingbird, and American redstart by increasing woodlands from 3345 acres in 2000 to approximately 3700 acres by 2015.

Rationale: A number of woodland-dependent, migratory songbirds are rare or declining as a result of insufficient or fragmented habitat, both in their North American nesting grounds as well as in their wintering ranges in Mexico, Central America, the Caribbean, or South America. Protecting, restoring and

managing suitable habitat is one of the principal strategies for attaining more abundant populations of these birds.

Strategies:

1.4.1.1 Revert selected croplands to managed woodlands in such a manner as to maximize size of woodland blocks and minimize edge effect and fragmentation. Sites contiguous with existing woodlands would receive highest consideration.

1.4.1.2 Grasslands that require constant intervention to prevent succession to woodlands should be considered for reversion to woodlands.

1.4.1.3 Utilize a combination of natural or passive reforestation and active regeneration as appropriate. When planting or seeding, use species of native trees, shrubs and herbs that offer high habitat value to key species.

1.4.1.4 Add two seasonal field technicians to assist with restoration (0.7 FTE).

1.4.1.5 Update Forest Management Plan every five years.

1.4.2 Objective: Increase opportunities for grassland-dependent species such as the grasshopper sparrow, Henslow's sparrow, dickcissel, bobolink, eastern meadowlark, and loggerhead shrike by increasing grasslands from 1642 acres in 2000 to approximately 2780 acres by 2015. Maintain all native tall grass prairie species, including forbs, in a healthy, vigorous condition to increase overall biodiversity, indigenous bird nesting, and soil conservation.

Rationale: A number of grassland-dependent, migratory songbirds are rare or declining as a result of insufficient or fragmented habitat, both in their North American nesting grounds as well as in their wintering ranges in Mexico, Central America, the Caribbean, or South America. Protecting, restoring and managing suitable habitat is one of the principal strategies for attaining more abundant populations of these birds.

Strategies:

1.4.2.1 Revert selected cropland units, as designated in the cropland and grassland management plans, to managed cold and warm season grasslands, so that grassland blocks are maximized, and edge effects and fragmentation minimized. Sites contiguous with existing grasslands would receive highest consideration.

1.4.2.2 Study soil types and unit history to determine best mix of grassland species and seed application rates on any given unit. Use appropriate mixes of native tall grass prairie grass and forb species indigenous to this locality to re-seed areas and re-establish healthy stands, utilizing proven methods of site and seedbed preparation and planting.

1.4.2.3 In compliance with applicable Nebraska and Iowa burning laws, employ prescribed burns in the early spring or fall to help control encroaching woody vegetation and invasive exotics, release nutrients, and reinvigorate native, fire-dependent grasses.

1.4.2.4 Conduct haying, mowing, prescribed burns, and all other habitat management practices, so that nesting and reproduction are interfered with as little as possible.

1.4.2.5 Add one seasonal (4-month) field technician to assist with grassland restoration (0.35 FTE).

1.4.2.6 Update DeSoto Grassland Management Plan as needed, but no less frequently than every five years. Incorporate changes in management practices into the plan.

1.4.3 Objective: Increase opportunities for wetland or wet meadow-dependent species such as the sedge wren, American woodcock, rails, waterfowl, and to some extent, shorebirds and wading birds, by increasing wetlands through restoration from 101 acres in 2000 to 115 acres by 2015.

Rationale: Regionally and nationally, the area of wetlands has been reduced drastically over the past century. As a direct result of habitat loss, many wetland-dependent species are rare or declining. Wetland losses are due to a combination of draining, dredging and filling by agricultural, industrial and land development interests. At DeSoto, emphasis is on restoring wetland characteristics to low-lying sites that are believed to have been wetlands historically rather than creating new artificial wetlands out of uplands. Such sites are more likely to be low-maintenance and sustainable over the long run. The relatively modest increase of 14 acres targeted over the next 15 years represents the maximum acreage obtainable using this approach.

Strategies:

1.4.3.1 Utilize GIS in conjunction with field inspections and surveying to determine best location for new units.

1.4.3.2 Investigate sites where a modest amount of excavation to lower the grade could restore wetlands.

1.4.3.3 Switch from labor-intensive mobile mechanical water pumps to fixed-site electrical or diesel power wellheads.

1.4.3.4 Manipulate water depths to benefit targeted wildlife species and control aquatic plant growth – per Wetland Management Plan.

1.4.3.5 Update Wetland Management Plan every five years.

1.5 *Goal: Manage refuge croplands in a manner compatible with refuge purpose, mission, and identified wildlife habitat needs. Ensure that cropland acreage is at the minimum necessary to accomplish habitat and wildlife food objectives.*

1.5.1 Objective: Continue phased reductions in acreage of cropland on refuge from 1989 acres in 2000 down to 475 acres by 2015.

Rationale: In an effort to provide on-refuge food sources for migrating geese and ducks and economic benefits to the surrounding community and refuge system (via inter-elevator grain transfers), in the 1960s and 1970s the acreage of farmland on DeSoto NWR was expanded to the point where it encompassed almost half the area of the refuge. Now the situation has changed. There are too many, not too few, snow geese. Moreover, years of observation have revealed that most waterfowl feeding is done off-refuge anyway. Refuge

management now believes that, because DeSoto Lake is the primary attractant, the refuge will still serve as a temporary stopover and sanctuary for migrating waterfowl. Finally, reversion of cropland to more natural habitats will help Federal trust species, particularly those Region 3 non-game birds listed as "conservation priorities," that are dependent on native grasslands, woodlands, and wetland habitats.

Strategies:

1.5.1.1 To minimize impact on participating farmers, continue current practice of phase-outs through voluntary attrition of participating farmers. Nevertheless, keep all participants advised that their leases are short-term and will eventually be phased out.

1.5.1.2 Utilize the refuge cropland evaluation matrix (Appendix I, which rates the value of all cropland units as such) to decide the order of phase-out and which specific units should remain as cropland.

1.5.2 Objective: Manage 475 acres of cropland (6% of the refuge's total acreage) in a biological crop rotation which includes corn, soybeans, sweet clover, winter wheat and milo.

Rationale: Refuge habitat and adjoining private cropland will benefit by the refuge maintaining a portion of land in crops commonly grown in the Missouri River valley. This is needed for foraging activity by resident wildlife, particularly white-tailed deer. The refuge currently supports a white-tailed deer population of 330 to 380 animals (e.g., 30-35 deer per square mile). University and USDA deer biologists, with extensive research experience at DeSoto, have stated this population will not likely change significantly whether or not crops are grown within the refuge. The refuge is still within an agricultural landscape capable of supporting 30 to 35 deer per square mile or more regardless of the agricultural component within the refuge. Eliminating refuge cropland will increase browsing of other refuge habitat, particularly in the winter, and cause crop depredation along refuge boundaries during the summer growing season. The result will be a browse line and suppression or loss of some plant species due to preferential foraging, altering biological diversity within the refuge's timber understory. Also, adjoining landowners and farmers will suffer economic damage to their crops.

White-tailed deer consume an average of 2.2 lbs. of forage per animal per day. Crops, when available, compose up to 80 or 90 percent of the daily intake. The winter bottleneck (i.e., first killing frost in the fall to the last killing frost in the spring) is the most critical season relative to energy demand experienced by deer, increasing the intensity of their feeding activity on available forage. Some cropland needs to be maintained within the refuge to entice deer foraging away from non-cropland habitats during the winter to the greatest extent possible, and minimize summer foraging in crops along the refuge boundary. Accomplishing this will require 140 to 185 acres of crops strategically distributed throughout the refuge.

Additional crop acres will be needed to support the snow goose hunting program per Goal 1.2. The DeSoto staff's experience with snow geese feeding in refuge corn fields indicates geese will readily land and forage in corn fields as small as 25 acres provided the adjoining vegetation consists of other crops or grasslands, but not timber. Fields can be configured to maximize attractiveness to snow geese. The snow goose hunting program requires a minimum of three crop management units of 75 acres each totaling 225 acres.

Crop acreage can likely be reduced from 1989 acres to 475 acres without affecting Goals 1.2 or 1.9. Monitoring for habitat degradation due to excessive deer browse, by using exclosures in areas of high deer density, can provide insight for additional reduction in crop acres. All cropland will be managed as a 3-year biological crop rotation per U.S. Fish and Wildlife Service Refuge Manual under cooperative farming agreements with local farmers.

Strategies:

1.5.2.1 Select for management those units which have the highest intrinsic value as cropland (according to evaluation matrix), particularly those which have the greatest value for migratory waterfowl and research and extension purposes.

1.5.2.2 Continue annual cooperative farming agreements with local farmers to provide share-crop grain for wildlife and prepare refuge lands for reversion to grasslands.

1.5.2.3 Monitor utilization of croplands by all wildlife species to assess habitat benefits/costs of maintaining some refuge acreage in crops.

1.5.2.4 By means of seminars, workshops, conferences and publications, as well as one-on-one contacts, communicate results of research on low-input farming to agricultural extension agents, university agricultural departments and individual farmers.

1.5.2.5 Update Cropland Management Plan every five years.

1.6 ***Goal: Enhance the survival of indigenous threatened and endangered species.***

1.6.1 Objective: Maintain and enhance riparian habitat for **bald eagles** during the fall/winter seasons, in particular tall cottonwoods that stand out above the forest canopy and provide a view of the lake and the river, or other trees with snags, within 100 yards of the shoreline and at least 100 yards from intensive human disturbances (e.g. agricultural operations, roads, heavily used trails).

Rationale: While there is some disagreement among biologists as to the degree of disturbance from manmade structures, moving cars, or humans on foot bald eagles will tolerate at nest and roost sites, there is widespread consensus on the value of large trees with snags or exposed limbs located near water. Even though the Service may soon remove the bald eagle from the threatened list, its welfare will continue to be a special interest at the refuge.

Strategies:

1.6.1.1 Manage riparian forests to ensure survival of older cottonwoods and encourage

regeneration of these trees in designated areas.

1.6.1.2 Plan and manage people activities, projects, and facilities to minimize potential disturbances to areas of concentrated eagle utilization.

1.6.1.3 Manage DeSoto Lake's physical characteristics and water quality in a manner to be attractive to waterfowl and supportive of ample fish biomass; waterfowl and fish are major food sources for bald eagles.

1.6.2 Objective: Maintain approximately 40 acres of sand beaches and sandbars that have historically been attractive nesting environments for **least terns** and **piping plovers.**

Strategies:

1.6.2.1 Disc Sandbar Chute (about 35 acres) annually to prevent encroaching vegetation and maintain approximately 1,800 lineal feet (about 5 acres) of the former north beach in a sandy state..

1.6.2.2 Respond to and comply with any applicable conditions of species recovery plans.

1.6.2.3 Consult with specialists in the Service and other sources to obtain expert guidance on habitat requirements of the terns and plovers.

1.6.3 Objective: Identify any habitat restoration sites on the Missouri River within the boundaries of the Refuge, where modifications to an existing stream structure or shoreline may provide potential habitat for the **pallid sturgeon**, **sturgeon chub** and **sicklefin chub**.

Rational: Fisheries biologist have evidence that suggests that side-channels and scour holes with low velocity flows in the Missouri River *are attractive to these and other riverine species. Such areas can be created by modifying existing in-stream structures to divert sufficient flows into currently protected low areas. The Service's 2000 Biological Opinion on Missouri River Operations has recommended there be 30 acres per mile of this type of habitat*.

Strategies:

1.6.3.1 Consult with fisheries biologists to determine the characteristics of such potential sites.

1.6.3.2 Search for candidate sites along the river within the refuge boundary. One such site (though not within the Refuge boundary) might be Wilson Island Chute which is proposed to be studied as a possible high water outlet for DeSoto Lake in Goal **1.7** below.

1.6.3.3 Consult with the U.S. Army Corps of Engineers on the feasibility of implementing restoration on any candidate sites that might be identified.

1.6.3.4 Prepare a project plan for any sites that are determined to be feasible and submit for approval and funding for implementation.

1.7 ***Goal: Manage DeSoto Lake so that it makes the highest possible contribution to the Refuge's mission to "...preserve and restore indigenous biological communities..."***

1.7.1 Objective: Initiate by September, 2002, a comprehensive study to thoroughly examine the fish and wildlife benefits, with emphasis on trust resources, of the existing oxbow lake compared to the potential benefits of a lake reconnected to the Missouri River.

Rationale: DeSoto Lake is both a natural and manmade creation. The Missouri River originally fashioned DeSoto Bend, an oxbow on the river, in the natural fluvial process of meandering back and forth across its floodplain. The U.S. Army Corps of Engineers constructed a levee that cut off DeSoto Bend from the river in 1960 – forming an oxbow lake – as part of its larger re-engineering and realignment of the Missouri, for the sake of navigation, flood control, and reclamation. In keeping with basin-wide, inter-jurisdictional efforts at restoring wildlife and fisheries habitat on the river, it is worth examining closely the costs, benefits, and risks of reconnecting DeSoto Lake to the Missouri River.

Strategies:

1.7.1.1 Using an interdisciplinary team of experts, develop a decision matrix that compares critical biological properties and the probable aquatic community composition under each scenario. Examine how those factors relate to such trust resources as waterfowl, herons and other wading birds, pelicans, and cormorants; and to public use opportunities such as wildlife observation and recreational fishing.

1.7.1.2 Consult with Service engineers and biologists, the U.S. Army Corps of Engineers, and other sources of expertise in the areas of hydrology, hydraulics, sediment transport, floodplain management, and fish and wildlife management to develop a hypothesis on the predicted natural succession of each scenario.

1.7.1.3 Study environmental impacts and costs of alternative configurations of dikes/levees, inlet and outlet structures, and physical division of lake into two or more compartments.

1.7.1.4 Thoroughly examine the implications of reconnection on: Missouri River navigation, future habitat conditions of DeSoto Lake, future habitat conditions and opportunities throughout the refuge, and impacts on refuge facilities (in particular the Visitor Center), public use, Wilson Island State Park, and adjacent private lands.

1.7.1.5 Prepare a Refuge Operations Needs (RONS) project to implement a development/management program that supports the preferred scenario.

1.7.2 Objective: **Unless or until a decision is made in the future to reconnect DeSoto Lake with the Missouri River,** maintain its present size (788 acres) and configuration (shape and depth profile) in order to conserve this valuable aquatic habitat as a unique oxbow lake (jointly created by nature and man) indefinitely.

Rationale: Until a decision has been made on the advisability of reconnecting the lake to the Missouri River in some manner, it is important to conserve and enhance the existing features of this oxbow lake for fisheries, waterfowl, aesthetics and recreation. While the natural process of lake succession would ultimately lead to the filling-in of DeSoto Lake over a period of decades or

centuries with sediments and organic matter, refuge management will attempt to arrest this process at the current stage of succession in order to pursue DeSoto NWR's primary purpose and mission as a sanctuary for migratory waterfowl.

Strategies:

1.7.2.1 Conduct an engineering study of the most feasible, affordable methods of reducing agricultural runoff carrying silt and contaminants into the lake. These may include diversion of one or more channels into Wilson Island chute or the Missouri River, sediment traps, small detention basins, etc.

1.7.2.2 Continue armoring lakeshore with riprap where appropriate, to prevent bank erosion, which causes turbidity and reduces lake depth.

1.7.2.3 If lake depths decrease to unsatisfactory levels, or if shoreline encroaches as a result of ongoing sedimentation, consider dredging portions of lake in a phased fashion over the long-term to maintain depth, size, volume and lacustrine character of DeSoto Lake.

1.7.3 Objective: Maintain or improve water quality in DeSoto Lake by raising dissolved oxygen, reducing turbidity and sedimentation, reducing eutrophication from nutrients and organic compounds, and reducing toxins (primarily pesticide residues) in the water column and lake sediments.

Rationale: Clear, clean, well-oxygenated water is both helpful to fish and wildlife and aesthetically attractive to people. Excessive turbidity and low oxygen levels have both been problematic at one time or another over the years. Turbidity, caused primarily by bottom fish stirring up and resuspending sediments and secondarily by drainage ditch inflows, is believed responsible for the virtual disappearance of submerged and emergent aquatic vegetation from DeSoto Lake. (In the 1980's, for several years after the lake's renovation, water clarity was excellent and vegetation covered an estimated 700 acres of the lake bottom.) In turn, the loss of aquatic vegetation has harmed the lake's habitat structure and reduced dissolved oxygen levels. Low dissolved oxygen has been responsible for fish kills, which are now prevented by an artificial aeration system installed in 1985.

While there is some evidence from recent monitoring that water quality in DeSoto Lake may be improving (decline in algal populations and more favorable nitrogen to phosphorus ratios), it is still considered eutrophic. Furthermore, the presence of upstream agricultural land uses and such practices as spreading sewage sludge on lands within the drainage basin suggest a need for continual vigilance and monitoring.

Strategies:

1.7.3.1 Experiment with various methods for improving lake habitat structure for sport fish and improving water quality, such as re-establishing stands of submerged and emergent vegetation in designated sites.

1.7.3.2 Maintain existing aeration system (which includes 16 helixers) and utilize as needed to bolster dissolved oxygen levels.

1.7.3.3 Continue to communicate water quality concerns to all parties involved with non-point and point sources of pollution in the DeSoto Lake drainage basin, as well as recognize some wildlife conservation practices may also contribute to degradation of DeSoto Lake water quality.

- Reduce snow goose use of DeSoto Lake per Goal 1.2.
- Educate and encourage local farmers, generators of biomass waste (grain processing and sewage treatment plant byproducts), and land treatment contractors to use optimum crop fertilization practices (i.e. avoiding excessive fertilization) and land treatment techniques to reduce nutrient loading of cropland soils and off-target movement of nitrogen and phosphorus.

1.7.3.4 Carry out water quality monitoring at regular intervals in cooperation with local colleges or other qualified personnel. Monitoring should be carried out according to a sampling procedure identified in the DeSoto Lake Monitoring Plan, which will identify parameters to be monitored, locations, and frequency. Parameters monitored include at a minimum dissolved oxygen, orthophosphate, total phosphate, chlorophyll A, nitrates, ammonia, and organic nitrogen. Periodic sampling may also be conducted for pH, turbidity, BOD (biochemical oxygen demand), and pathogens (i.e. total and fecal coliform bacteria). Additionally, occasional sampling of the water column, bottom sediments, or fish tissue may also be conducted for selected toxic organic compounds (e.g. pesticides, PCBs), heavy metals (e.g. lead, mercury, cadmium, selenium), and any new substances of concern that may appear on the scene (e.g. endocrine disruptors).

1.7.3.5 Update DeSoto Lake Monitoring Plan every five years or more frequently if needed.

1.7.3.6 Assist Natural Resource Conservation Service and Extension programs encouraging establishment and maintenance of filter strips along ditches within the DeSoto Lake drainage area. This will reduce the transport of sediment from privately held cropland into these ditches and eventually DeSoto Lake.

1.7.4 Objective: Improve ability to manipulate DeSoto Lake water level from a minimum elevation of 986.5 ft. msl to a not-to-exceed level of 989.5 ft. msl. These elevations are consistent with bank protection and access to facilities.

Rationale: The ability to regulate the lake's water level seasonally is crucial to it's being able to serve different functions. Excessive lake levels in the summer months sharply interfere with fishing, boating, certain parking lots and use of lakeside trails. Fall drawdown is made to provide for waterfowl use, growth of littoral vegetation, and enhance 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, 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.

Strategies:

1.7.4.1 Study the possibility of modifying the lake outlet structure. (The existing outlet can only lower the lake level by 0.5 inch per day.) However, the function of any structure, regardless of design will likely be reduced when the Missouri River is higher than the lake.

1.7.4.2 Conduct a feasibility/engineering study evaluating opening Wilson Island chute and installing a water control structure in its lower end. Since the river is somewhat lower at the chute outlet downstream, this could potentially lower DeSoto Lake more than a larger outlet at the existing structure site.

1.7.4.3 Conduct a feasibility and cost study of re-routing lake inflows from the agricultural drainage ditches – Young, Rand, Cutoff, and Brown's – directly into the Missouri River, bypassing DeSoto Lake.

1.8 ***Goal: Control and reduce the presence of exotic, invasive, and nuisance species of plants and animals on the refuge.***

1.8.1 Objective: Over time, gradually reduce the presence of non-native or undesirable plants on the refuge, as measured by extent of acreage or habitat infested, severity of infestation, numbers of exotic or undesirable species, and estimated population sizes. For most problematic species, aim for 50% reduction in acreage infested in year 2000 by the year 2015.

Rationale: Control of exotic plants is a long-term challenge. Methods used will depend on particular species, severity of impact, and overall circumstances. Currently these plant species include common reed, purple loosestrife, musk thistle, Chinese elm, and roughleaf dogwood. Roughleaf dogwood, while a native species, so thickly dominates the forest understory that it may be choking out other more desirable species, such as the cottonwood. Even though Eurasion water millfoil has not been observed on the refuge it will be monitored.

Strategies:

1.8.1.1 Utilizing GIS (Arc-View) technology and visual field inspections, establish the year 2000 baseline against which to measure future levels of infestation. Develop a plot or grid system for assessing the magnitude of the problem using GIS technology.

1.8.1.2 Design a monitoring protocol incorporating most appropriate means of measuring or estimating infestation; this may use transects, plots, or some other sampling method, since it is not feasible to survey each and every acre. This "Invasive Species Monitoring and Control Plan" should be updated every five years, or less frequently, as appropriate.

1.8.1.3 Use appropriate integrated pest management techniques such as prescribed burning, judicious use of safe herbicides, mechanical controls and biological controls in a discriminating manner. Avoid making "the cure worse than the disease."

1.8.1.4 Involve volunteers, both individuals, and groups such as Boy Scouts, Girl Scouts, and local school classes, in habitat enhancement days. Under appropriate supervision, such groups can provide substantial labor in removing certain weedy species.

1.8.1.5 Fire is an important weapon in the arsenal for fighting weedy species. It will be used in compliance with local and state laws, in conjunction with habitat management efforts, and in such a manner as to avert any collateral damage.

1.8.1.6 Continue active monitoring to be able to: a) detect invasions promptly and prevent alien plants from becoming established, b) take preventive measures, and c) exercise damage control at an early stage of infestation.

1.8.1.7 Prepare and implement an invasive species monitoring and control plan.

1.8.2 Objective: Detect, monitor, report and control non-native, invasive, undesirable, or nuisance terrestrial and aquatic animal species before they become established on the refuge.

Rationale: Although non-native animal species are not a significant problem on DeSoto NWR at present, threats are looming on the horizon, such as the zebra mussel, that will require vigilance. Certain native wildlife, such as the cowbird, might someday require control because of their adverse effects on other priority species (in the case of cowbirds, parasitism of nesting songbirds).

Strategies:

1.8.2.1 Actively communicate with other state and federal resource agencies, as well as non-governmental conservation organizations to stay abreast of emerging exotic threats, as well as management strategies and techniques.

1.8.2.2 Coordinate control strategies with Regional Office and other state and federal agencies.

1.8.2.3 Prepare and implement an invasive species monitoring and control plan.

1.9 *Goal: Manage the size of the white-tailed deer herd on the refuge through controlled hunts to minimize over-browsing and complaints of crop damage while continuing wildlife-dependent, compatible uses of hunting and wildlife observation.*

1.9.1 Objective: Maintain a refuge deer herd at a post-hunt January population of 330 to 380.

Rationale: According to University of Nebraska deer biologists, 30-35 deer per square mile is the approximate carrying capacity of the kind of habitat found at DeSoto NWR. Thus, given the refuge's 12.2 square miles, 330 to 380 is considered a reasonable range for a sustainable winter population.

Strategies:

1.9.1.1 Continue muzzle-loader and archery hunts. Consider disabled and youth hunts.

1.9.1.2 Issue a specific number of permits, set length of season commensurate with need, and define method of take necessary to control population size.

1.9.1.3 Monitor size of herd through annual aerial survey and spotlight survey.

1.9.1.4 Monitor for signs of habitat damage such as browse lines and crop depredation on adjoining private land.
1.9.1.5 Evaluate health of animals and herd using standard techniques at hunter check stations.
1.9.1.6 Update sections related to deer of Refuge Hunting Plan every five years, or less frequently, as appropriate.

1.10 ***Goal: Conserve cottonwood dominance in the canopy of DeSoto NWR riparian forests for wildlife habitat value.***

Rationale: Cottonwoods are valuable both for bald eagles (as perches) and for cavity-nesting birds and mammals such as wood ducks, screech owls, woodpeckers, and squirrels. The goal is not necessarily to establish stands that are pure cottonwood, but to have this species well-represented along with other trees like hackberry, silver maple and ash.

1.10.1 Objective: Through active management efforts, increase recruitment of cottonwood seedlings and saplings over the next 15 years. In 2025 the overstory of DeSoto forests should still be dominated by cottonwood.

Rationale: The year 2025 is chosen as a benchmark rather than 2015 because 25 years is a significant portion of a cottonwood's lifetime. If the strategies below are succeeding in maintaining cottonwood dominance, by 2025 it should be quite evident (whereas by 2015 it still might not be).

Strategies:
1.10.1.1 Experiment with controlled flooding of tracts to aid cottonwood germination and regeneration.
1.10.1.2 Experiment with selective thinning of rough-leaf dogwood or other understory species that may crowd out cottonwood saplings.
1.10.1.3 Plant cottonwood seedlings or saplings

1.11 ***Goal: Evaluate opportunities and needs to acquire additional lands that would enhance accomplishment of refuge goals and objectives.***

1.11.1 Objective: Evaluate the potential contribution to the CCP goals and objectives of adding approximately 1,100 acres of private land and 850 acres of public land adjacent to the refuge.

Rationale: Adjoining private and public lands could substantially contribute to the Service's mission of restoring lands to more natural conditions and preserving natural habitats. Acquisition of adjacent lands, or interests in those lands, by the Service might be an acceptable alternative for the owners.

Strategies:
1.11.1.1 Review and define possible opportunities to improve or expand refuge habitat restoration programs by extending refuge boundaries.
1.11.1.2 Prepare a preliminary project proposal for acquiring interest in lands from willing sellers to include fee title, or less than fee title, as appropriate**.**

.2. RESOURCE PROTECTION

Vision: In order for DeSoto National Wildlife Refuge to achieve its purpose and mission, its natural and cultural resources must be protected. To the extent practicable, certain natural forces, both catastrophic disasters such as fire, flooding and tornados, and long-term processes like decomposition, weathering and erosion, will be controlled or mitigated to maximize the durability and life of valuable assets and irreplaceable artifacts. Finally, refuge facilities will be maintained in good operating condition to be safe for use by staff and visitors.

2.1 ***Goal: Adequately protect all natural and cultural resources, staff and visitors, equipment, facilities, and other property on the refuge from those of malicious intent in an effective, professional manner.***

2.1.1 Objective: Employ two full-time Natural Resource Law Enforcement Officers and supplement their duty schedules with collateral duty officers.

Strategies:

2.1.1.1 Ensure that all officers are fully trained, equipped, and prepared to perform preventative refuge law enforcement duties. Officers should receive in-service training on a regular basis.

2.1.1.2 Maintain an adequate law enforcement presence on a daily basis to ensure that violations are deterred or successfully detected and the violator(s) apprehended, charged, and prosecuted; all Visitor Center security and fire alarms are answered in a timely manner; and all persons on the refuge are reasonably protected from illegal activity and unsafe conditions; obtain one additional FTE.

2.1.1.3 Review the Law Enforcement Plan; update as needed.

2.2 ***Goal: Maintain and preserve, in perpetuity, the entire* Bertrand *Collection and associated records***.

2.2.1 Objective: Minimize effects of natural processes of deterioration and degradation of the *Bertrand* Collection.

Rationale: The Steamboat Bertrand *Collection is a national treasure. It comprises a unique time capsule of mid-nineteenth century objects and is the finest collection in the nation today. The Collection serves as a unique resource for national and international scholars, researchers, and historical interpreters. It is an unavoidable fact that the* Bertrand *Collection will deteriorate and degrade. Our purpose is to minimize and slow these processes as much as possible, to prolong the life of the collection.*

Strategies:

2.2.1.1 The programmatic agreement (PA) with the Advisory Council on Historic Preservation and the Nebraska and Iowa State Historic Preservation Officers has not been fully implemented due to shortages of staff and funds. The PA will be

revised in cooperation with those original parties to the agreement cited above. This will be done by 2003 to realistically reflect the Service's capabilities to preserve and maintain the *Bertrand* Collection.

2.2.1.2 Continue active conservation of *Bertrand* objects including condition surveys and treatments, as deemed necessary.

2.2.1.3 Control temperature, relative humidity, light levels, UV, and air quality in cargo storage areas to create uniform, stable environmental conditions at all times.

2.2.1.4 Upgrade storage conditions for *Bertrand* objects through replacement of acidified materials with new archival materials and encapsulation of individual objects.

2.2.1.5 Continually monitor, maintain, and upgrade environmental control and monitoring equipment as necessary. Work closely with refuge maintenance mechanic to ensure proper working condition of HVAC units.

2.2.1.6 Upgrade storage conditions for archival materials (paper and photographic) by removing acidic materials and rehousing objects.

2.2.1.7 Document condition of collection through continual monitoring and compile in annual reports.

2.2.1.8 Review and update "*Bertrand* Conservation Laboratory Safety Plan," "Disaster Preparedness Plan for the *Bertrand* Collection," and other management plans every two years and conduct plan familiarity and review workshops annually with refuge VC and LE employees.

2.2.1.9 Replace current Halon 1220 (an ozone-depleting gas), used in the fire suppression system with FM200, an environmentally-friendly product.

2.2.2 Objective: Maintain and expand documentation of *Bertrand* Collection and other closely associated topics.

Rationale: New information pertaining to the Steamboat Bertrand *and its cargo is constantly coming to light. This information should be actively gathered, curated, and made available to researchers. While maintaining and expanding documentation of the* Bertrand *Collection is important, priority must be given to maintenance and preservation of the Collection. Reflecting that priority, strategies under this objective will rely primarily upon non-museum staff for implementation. This can include other refuge staff, volunteers, cooperating organizations, and to some extent contractors.*

Strategies:

2.2.2.1 Continue research on the Steamboat *Bertrand*, its cargo and passengers, object manufacturers, consignors, and other associated topics.

2.2.2.2 Expand library holdings to include personal archives of individuals who have significant *Bertrand*-related research.

2.2.2.3 Expand *Bertrand* archives through reproduced or donated photographs, newspaper, and historic or other ephemera.

2.2.2.4 Transfer slide library into digital format to facilitate responding to research requests and in-house use.

2.2.2.5 Continue to catalog library holdings and create finding-aids for significant materials.

2.2.2.6 Upgrade *Bertrand* Collection management database to Re:discovery collections management software, the current standard for the FWS.

2.3 ***Goal: Provide for the safety of staff and visitors.***

2.3.1 Objective: Provide refuge facilities that are safe for public use through annual inspections and routine maintenance.

Strategies:

2.3.1.1 Administer and monitor required permits, licenses, and inspections on an annual basis under the Federal Facility Compliance Act and U.S. Fish and Wildlife Service policy.
2.3.1.2 Promptly replace, upgrade, or temporarily close any facility that through damage or long-term wear and tear compromises public safety.
2.3.1.3 Utilize temporary and permanent signage to inform public of any hazards.
2.3.1.4 Update Traffic Control Plan every five years.
2.3.1.5 Comply with the Crowd Control Plan, as outlined in the Law Enforcement Plan.

2.3.2 Objective: Through preventive measures, minimize injuries to staff and visitors, and be prepared to respond to injuries if they do occur.

Strategies:

2.3.2.1 Ensure that safety procedures, designated personnel, equipment, and supplies (e.g. first aid kits, fire extinguishers) are in place and kept current.
2.3.2.2 Conduct monthly safety meetings for DeSoto staff covering pertinent topics.
2.3.2.3 Train and refresh staff in CPR and first aid techniques.
2.3.2.4 Train selected personnel in boat operation.
2.3.2.5 Circulate annually, review and update refuge Safety Plan at a minimum of every two years.

3. PUBLIC EDUCATION AND RECREATION

Vision: Furnish opportunities for outstanding, compatible, wildlife-dependent public use and recreation, including environmental education, interpretation, observation, photography, hunting, and fishing. Keep local communities and officials aware of refuge events and activities.

3.1 ***Goal: Provide a variety of educational and interpretive opportunities for an increasing number and broad diversity of on-site visitors – including those from local communities, the region, the nation, and the world – about the natural and cultural resources of DeSoto NWR, the Lower Missouri River ecosystem, and the mission of FWS.***

3.1.1 Objective: Attract an increasing number of visitors by providing high-quality interaction with wildlife and nature, history and education. Aim to restore visitation so that it averages approximately 400,000 by 2015.

Rationale: In recent years, visitation at DeSoto NWR has declined appreciably, from a high of 473,000 in 1982 to approximately 263,000 in 1998. The earlier peak was realized during an era when the Visitor Center was a new regional attraction and when highly popular activities like swimming, water-skiing and high-speed boating were permissible on DeSoto Lake. These intensive uses were originally allowed because of commitments and compromises made at the time of the refuge's establishment. After a grace period, however, in the early 1980's, they were banned because of their essential incompatibility with the refuge purpose and mission. Nor are these uses wildlife-dependent, which is a new legal mandate for National Wildlife Refuges established by the National Wildlife Refuge System Improvement Act of 1997. Thus, several of the recreational activities that led to such high visitation figures are no longer permissible. Nevertheless, the refuge has the facilities and resources to support a moderate increase in public use over current levels, particularly if visitation can be increased at times other than the fall peak.

To some extent, the volume of visitation is influenced by external factors beyond the control of DeSoto managers, staff, and programs, such as weather and flooding of the river or the lake. In addition, it appears that the entrance fee system, implemented in 1987, caused a decline.

Strategies:

3.1.1.1 Provide interpretation for exhibits in the Visitor Center that is readable, up-to-date, factually accurate, and concise. Upgrade Visitor Center exhibits and texts as new techniques, technologies and interpretations become available.

3.1.1.2 Maintain Visitor Center audio-visual equipment using appropriate technology and keep it in workable condition. Review, remodel, and upgrade systems and messages as needed.

3.1.1.3 Provide visitor-interactive computer media in Visitor Center for the topics of "*Bertrand*" and "DeSoto activities."

3.1.1.4 Provide special exhibits and programs in the Visitor Center on regional natural history and cultural events, endangered plant and animal species, and the U.S. Fish and Wildlife Service's conservation mission.

3.1.1.5 Provide facilities and space in the Visitor Center for the Midwest Interpretive Association to sell educational and interpretive materials about the region and its natural history, and utilize profits to enhance DeSoto's interpretive programs.

3.1.1.6 Provide changing special exhibits in the multi-purpose room of the Visitor Center to encourage return visitation. Actively solicit loans of informative, graphic, and artistic materials from artists, photographers, museums, parks, other refuges, and institutions.

3.1.1.7 Maintain wayside exhibits along refuge roads and two trail fliers that answer principal questions people ask about refuge resources.

3.1.1.8 Provide personal interpretation using paid or volunteer staff in instances where

groups require special guidance, and where written interpretation alone is not adequate.

3.1.1.9 Develop interpretive and educational opportunities for an increasingly culturally diverse clientele. This includes bilingual, English-Spanish, printed and electronic interpretive aids of U.S. Fish and Wildlife Service and refuge information sources. Information sources could include U.S. Fish and Wildlife Service mission, refuge public-use regulations, interpretive pamphlets, interactive video display(s), and website.

3.1.1.10 Revise the RONS to add one full-time custodian, one museum technician and one environmental education specialist to the Visitor Center-based staff (3.0 FTE's).

3.1.2 Objective: Provide environmental education opportunities in the form of tours and written materials to a minimum of 8,000 school children annually, so they know of DeSoto's significance in the Central and Mississippi Flyways, the Missouri River watershed, and the Lower Missouri River ecosystem.

Rationale: Environmental education is one of the six primary, wildlife-dependent public uses of National Wildlife Refuges. There is a large school-age population within one hour of the refuge, including K-12 schools in Omaha.

Strategies:

3.1.2.1 Respond promptly and courteously to requests for tours.

3.1.2.2 Continually welcome teachers to encourage their colleagues to bring their classes to the refuge.

3.1.2.3 Existing written materials are dated; revise lesson outlines within two years of the approval of this CCP.

3.1.2.4 Utilize cadre of trained volunteers to provide tours.

3.1.2.5 Contact schools alerting them to refuge's facilities, resources and educational opportunities by means of fliers or letters to individual teachers. In the higher grades, science and history teachers should be targeted.

3.1.2.6 Develop written agreements with schools to provide more in-depth teacher training and internship opportunities.

3.1.3 Objective: Provide each refuge visitor with a variety of educational opportunities to learn about the history of the Steamboat *Bertrand*, its cargo, and its larger significance.

Rationale: Not all visitors learn in the same manner. Providing several different types of interpretation, aimed at difference levels, will increase the number of on-site visitors who grasp the basic significance of the Steamboat Bertrand *and its cargo.*

Strategies:

3.1.3.1 Through continued efforts and upgrades as necessary, interpret the *Bertrand* Collection at the Visitor Center through a variety of engaging media and exhibits in such a manner as to increase visitation and encourage repeat visitation. Expand interpretive themes to emphasize role of steamboats (and later, railroads,

which run very close to the refuge) in initial Westward expansion and subsequent, irreversible ecological and cultural impacts (e.g. decimation of bison herds and Native American way of life; wildlife impacts of engineering the Missouri River for the sake of navigation, irrigation, flood control, lake recreation, and power generation).

3.1.3.2 Increase availability of books and other related materials on the *Bertrand* at the Midwest Interpretive Association facility in the Visitor Center.

3.1.3.3 Upgrade trail, bridge, boardwalk, and parking area at the *Bertrand* Excavation Site. Add additional interpretive signage along trail about the *Bertrand*, the Missouri River, and its impact on steamboating.

3.1.3.4 Create new educational materials focused at three separate levels of sophistication (primary, middle and high school) to tell the *Bertrand* story and associated history.

3.1.3.5 Edit the rough areas and improve overall quality of touch-screen kiosk program.

3.2 ***Goal**: Provide and maintain a variety of sites and facilities, at a number of locations throughout the refuge, that encourage visitors to observe and photograph wildlife and other refuge resources and features, from their vehicles or on foot.*

3.2.1 Objective: Provide and maintain viewing and interpretive facilities and opportunities directed specifically at motorists and users venturing short distances from their vehicles.

Strategies:

3.2.1.1 Maintain the Visitor Center in top condition, by keeping windows clean and clear, spotting scopes and binoculars in working order, signage functional and informative, and encroaching outside vegetation pruned back to not interfere with viewing.

` 3.2.1.2 Maintain Bob Starr Wildlife Overlook in good condition.

3.2.1.3 Maintain Missouri River overlook and signs in good condition.

3.2.1.4 Provide at least six locations from which motorists can see DeSoto Lake without having to venture far from their autos.

3.2.1.5 Maintain all roads and signs so visitors can explore the refuge easily and find its major attractions.

3.2.1.6 Provide and maintain wildlife viewing overlooks so professional photographers and other visitors can observe the waterfowl without disturbing them.

3.2.1.7 Continue to provide a seasonal auto-tour route, with accompanying brochure, that interprets refuge resources and management practices. On an annual basis, consider appropriate expansions of auto-tour length and dates.

3.2.1.8 Provide boating facilities, such as ramps, so visitors can see and experience wildlife, signs of wildlife, and the natural environment from the vantage point of DeSoto Lake itself.

3.2.1.9 Maintain sufficient picnic tables on the refuge and provide for trash pickup.

3.2.1.10 Monitor wildlife-dependent recreational programs to ensure minimal disturbance to refuge wildlife populations.

3.2.1.11 On January 1, 2001, the price of a DeSoto annual pass rose from $10 to $15.

(Daily fees remain unchanged.) At a minimum of once every five years, evaluate the refuge entrance fee to determine if it should be lowered, raised, or left unchanged.

3.2.2 Objective: Maintain four, 6 to 8 foot-wide mowed or paved walking interpretive trails, which are debris and litter-free. These include the Missouri Meander Trail, Wood Duck Pond Trail, Cottonwood Trail, and Bertrand Trail.

Rationale: These trails furnish the opportunity for more "adventuresome" visitors to leave their cars behind and plunge into the natural habitats of DeSoto. Two of these trails have an interpretive pamphlet and stations with small wooden, numbered posts corresponding to numbers on the pamphlet, explaining some facet of natural history or ecology. At present, due to the inability to adequately control water levels in the lake, one or more trails can be rendered inaccessible for extended periods due to flooding. If water levels in the lake could be lowered more readily, these facilities could be used to their potential.

Strategies:

3.2.2.1 Ensure that pamphlets are always available in holder.

3.2.2.2 Ensure that trailhead signs along roads are prominent.

3.2.2.3 If inability to lower lake levels continues to be a problem, consider placing boardwalks on trail segments that are regularly flooded or re-routing particular segments to higher ground.

3.2.2.4 Ensure at least one refuge trail complies with the Americans with Disabilities Act in respect to appropriate grade, width, paving, interpretation and benches.

3.3 *Goal: Protect, restore, and manage sport fish habitat and populations in DeSoto Lake to provide quality recreational fishing opportunities for refuge visitors as long as the oxbow lake environment is maintained (See Objective 1.7.2).*

3.3.1 Objective: Provide 35,000 angler visits annually to DeSoto Lake over the next 15 years.

Rationale: Although sport fishery management may be considered a wildlife population program, its impetus at DeSoto is based on its value as a wildlife-dependent public recreation program. After the renovation of DeSoto Lake in the mid-1980s, the recreational sport fishery was substantially improved. For the last decade or more however, it has gradually declined to a comparatively mediocre level, in spite of substantial efforts on the part of refuge management and fisheries biologists to maintain the fishery by a variety of means. Refuge managers and fishery biologists believe that the lake is not performing at its productive potential, and that it may take rather drastic and expensive measures, such as lake renovation on a regular basis (once every 10 to 20 years) to restore a prime sport fishery to DeSoto Lake.

Strategies:

3.3.1.1 Monitor existing fish habitat structures in DeSoto Lake to determine extent

of use and future habitat enhancement requirements.

3.3.1.2 Continue existing stocking programs, using "adaptive management" and experimentation in cooperation with state and federal fisheries scientists to find what works best. Stocking will take place, as needed, for white bass, largemouth bass, black and white crappie, northern pike, walleye, catfish, and other suitable species.

3.3.1.3 Develop accurate map of DeSoto Lake bottom using GIS/GPS technology for use in future management decisions.

3.3.1.4 Undertake a renovation of the lake every 10 to 20 years, funds permitting. Such renovation may include use of approved chemicals and temporary drawdown to enable eradication of undesirable species and re-stocking of desirable species.

3.3.1.5 Continue experimenting with a variety of fish habitat enhancement techniques.

3.3.1.6 Maintain "no-wake" restriction on all power boats in lake to avoid shoreline erosion and resuspension of sediments, thereby reducing turbidity.

3.3.1.7 Implement additional size and harvest limit regulations of sport fish.

3.3.1.8 Add one additional summer temporary position to help manage recreational fishery (0.35 FTE).

3.3.2 Objective: Remove approximately 50,000 pounds of rough-fish (principally gizzard shad and buffalofish) from DeSoto Lake annually to reduce competition with sport fish.

Rationale: Harvesting the annual increase in biomass of rough-fish reduces competition for scarce space and resources with sport fish.

Strategy:

3.3.2.1 Continue current permits for commercial harvesting of rough-fish.

3.3.2.2 Promote sport angling for rough-fish.

3.4 *Goal: Provide opportunities for compatible consumptive uses of natural resources such as hunting waterfowl and deer.*

3.4.1 Objective: Provide quality recreational hunting opportunities for white-tailed deer and waterfowl (as populations permit) to help maintain healthy wildlife populations. Measure quality through 1) informal interviews with hunters and/or responses to questionnaire developed to facilitate feedback, 2) number of participating hunters, and 3) stable or increasing annual harvests.

Rationale: Hunting is one of the six wildlife-dependent public uses of National Wildlife Refuges and an important game management tool.

Strategies:

3.4.1.1 See strategies for white-tailed deer at 1.9.1 and snow geese at 1.2.1.

3.4.1.2 As refuge pheasant, turkey, and small game populations permit, consider youth/mentor waterfowl and/or pheasant hunts, and waterfowl and/or wild turkey hunts for disabled constituents.

3.4.1.3 Consider increasing areas available to hunters.

3.4.1.4 Manage hunts to minimize conflicts with other uses and resources.

3.5 ***Goal**: To raise the profile and visibility of DeSoto National Wildlife Refuge locally, regionally and nationally by maintaining an active public affairs program that keeps local communities and officials aware of refuge events and activities.*

3.5.1 Objective: Provide at least 25 news releases annually to newspapers, radio and television stations in time for them to publicize events; respond to queries from researchers, writers, and news media in a timely manner so they may accurately write about the refuge and the U.S. Fish and Wildlife Service.

Rationale: Frequent news releases familiarize the news media with the existence of this newsworthy resource of national and international significance. In order to be covered by the news media, it is critical to be very timely in responding to queries or requests for interviews.

Strategies:

3.5.1.1 Maintain current list of newspaper, radio and TV station addresses, fax numbers and e-mail addresses.

3.5.1.2 Maintain current list of addresses, fax numbers, and e-mail addresses of reporters and editors at newspapers and producers at radio and TV stations. Update list continually because of rapid turnover in the news media. News releases are more likely to be read when addressed to individuals.

3.5.1.3 Cultivate relationships with reporters, which can help interest them in covering the refuge.

3.5.1.4 Consider holding news conferences on the refuge for particularly newsworthy or noteworthy events.

3.5.1.5 Report significant events to the Regional public affairs staff promptly, so they may become involved or provide follow-up information.

3.5.2 Objective: By 2002, implement additional means of publicizing the refuge using broadcast and electronic technologies.

Strategies:

3.5.2.1 Enhance refuge website from a static display to a dynamic display to provide current public use information.

3.5.2.2 Develop updated version of "Off the Beaten Path" video.

3.5.3 Objective: Participate actively in regional initiatives commemorating the national bicentennial of the Lewis and Clark expedition, which has particular relevance for DeSoto NWR, since the expeditioneers camped on what is now the refuge in August, 1804.

Strategies:

3.5.3.1 Develop or obtain educational materials such as brochures and audio-visuals for dissemination to visitors.

3.5.3.2 Invite speakers or develop program to present in the Visitor Center auditorium.

3.5.3.3 Seek exhibits that could be displayed in the Visitor Center multi-purpose room.
3.5.3.4 Prepare and send press releases highlighting connection between DeSoto NWR and the Lewis and Clark Expedition.
3.5.3.5 Encourage the Midwest Interpretive Association to stock publications and merchandise commemorating the expedition over the next 5-10 years.

4. PARTNERSHIPS

Vision: *Foster mutually beneficial partnerships with individuals, researchers, private land-owners, other governmental agencies, and non-governmental organizations that can help DeSoto management with manpower, funding and education assistance, as well as in pursuing our larger, long-term goal of conserving biodiversity in the Lower Missouri River Ecosystem.*

4.1 *Goal: Augment DeSoto staff productivity through participation of volunteers in a variety of capacities at the refuge.*

4.1.1 Objective: Increase the number of volunteer hours by 50% above the year 1999 level of 4100 hours over the next ten years to serve both in the Visitor Center and around the refuge as interpretive and educational guides and in supervised habitat management projects.

Rationale: A dedicated corps of volunteers can significantly increase effects of refuge programming in a number of different areas, as well as foster positive interaction with the surrounding community and provide an additional pillar of support and pride.

Strategies:
4.1.1.1 Increase efforts at recruitment and training of volunteers through Visitor Center promotions, news releases, public service ads, the DeSoto website, and outreach to civic and educational groups.
4.1.1.2 Encourage formation of a "Friends of DeSoto" group that would serve as a nucleus for projects and provide organization and impetus for interested volunteers.
4.1.1.3 Create full-time volunteer coordinator position to pro-actively recruit, train, and mentor volunteers, and to work with supervisors to incorporate volunteers into all aspects of refuge programming (1.0 FTE).

4.2 *Goal: Actively encourage and provide assistance and logistical support to qualified researchers to support ongoing cooperative investigations of long-term management importance to the refuge, such as lake management, renovation and water quality, Missouri River issues, habitat utilization by wildlife, snow geese population management, grassland ecology, sustainable agriculture, Steamboat* **Bertrand** *artifacts preservation, and so forth.*

4.2.1 Objective: Encourage utilization of the refuge for wildlife and land management research

by public and private institutions.

Strategies:

4.2.1.1 Prepare letter describing research opportunities at DeSoto for distribution to wildlife, natural resources, environmental engineering, and biology departments of universities in the region and around the country.

4.2.1.2 Promote DeSoto research opportunities in a number of other forums and media, including the DeSoto website, conferences, and presentations to college and university faculty/student meetings, Wildlife Society and Fisheries Society chapters, etc.

4.2.1.3 If available, provide temporary housing for researchers conducting projects on the refuge.

4.3 ***Goal: Increase acreage of new and restored privately-owned wetland and upland habitat within the 18-county management district of the DeSoto NWR Private Lands program. This involves actively providing technical assistance to private landowners and habitat-related interagency coordination with other state and federal agencies and non-governmental organizations.***

4.3.1 Objective: Within the 18-county management district, increase the acres of off-refuge wetland and upland restoration by 20%, from 358 acres in 1999 to 430 acres by 2015. Continue to provide technical assistance to private landowners, and increase efforts by 20% over the next 15 years.

Strategies:

4.3.1.1 Approach farmers directly or with personal letters describing program and benefits they could realize from participation.

4.3.1.2 Learn of potential participants through word-of-mouth.

4.3.1.3 Work closely with Natural Resources Conservation Service CRP staff and state agencies to identify feasible sites for restoration projects and to improve surface water runoff quality into DeSoto Lake.

4.3.1.4 Increase inter-agency coordination with regard to swampbuster violations, Wetland Reserve Program, Conservation Reserve Program and any other habitat-related concerns where the U.S. Fish and Wildlife Service can assist.

4.3.1.5 Continue to work with non-governmental organizations for matching funds to restore and enhance wetland and upland habitat.

4.3.1.6 Interpret success and opportunities of the Private Lands program.

4.3.1.7 Add summer temporary position to assist with program (0.35 FTE).

4.4 Goal: ***Seek opportunities to partner with federal, state, and local resource management agencies to develop ecosystem protection and restoration projects that complement the programs of involved partners.***

4.4.1 Objective: Arrange at least one roundtable discussion per year for partners and other stakeholders to share status reviews of ongoing ecosystem projects and involvements.

Strategies:

4.4.1.1 Maintain good relations and open communication with partners.
4.4.1.2 Stay abreast of trends in ecosystem management.
4.4.1.3 Pursue opportunities to cost-share projects with other organizations.

4.5 ***Goal**: Increase level of active cooperation with NGO's (Non-Governmental Organizations) on different aspects of on-refuge and off-refuge management and educational efforts, both with greater number of NGO's as well as a greater level of effort.*

4.5.1 Objective: Increase level of effort at cooperating with NGO's in 2000 by 50% over the next 15 years.

Strategies:

4.5.1.1 Continue to work with Omaha Audubon adopt-a-refuge program.
4.5.1.2 Work with Boy Scouts and Girl Scouts on camporees and work projects that enhance the refuge, educate youth and their leaders.
4.5.1.3 Continue partnership with Midwest Interpretive Association and support growth of the association's activities.
4.5.1.4 Enhance cooperation with Nebraska and Iowa Historical Societies, specifically as it relates to the Steamboat *Bertrand* Collection.
4.5.1.5 Establish ventures with the Lewis and Clark Heritage Trail Foundation related to the bicentennial commemoration.
4.5.1.6 Actively look for partnering opportunities with local and regional hunting and fishing clubs, conservation groups, service organizations and educational institutions.
4.5.1.7 Continue to actively support the Loess Hills Alliance and its efforts to preserve Iowa's Loess Hills.
4.5.1.8 Cooperate with 4-H Club chapters, African-American churches in Omaha, and the Omaha Indian Tribe in providing fishing clinics for disadvantaged and minority youth.
4.5.1.9 Follow Marquardt Pond Environmental Learning Site Management Plan, which provides a 1.5 acre pond for environmental education including a catch-and-release fishing program.

4.6 ***Goal: Assist outside parties interested in research and study of the* Bertrand *Collection*.**

4.6.1 Objective: Provide technical assistance and research support to individuals, agencies, and other institutions interested in the *Bertrand* Collection, museum curation, or conservation issues in a timely and professional manner.

Rationale: The Bertrand *Collection is a unique public resource, and responses to outside requests deserve high priority. Quality customer service will result in increased demand for research services.*

Strategies:

4.6.1.1 Through diligent attention to "customer satisfaction" provide responses to

researchers within five working days or commensurate with the request.

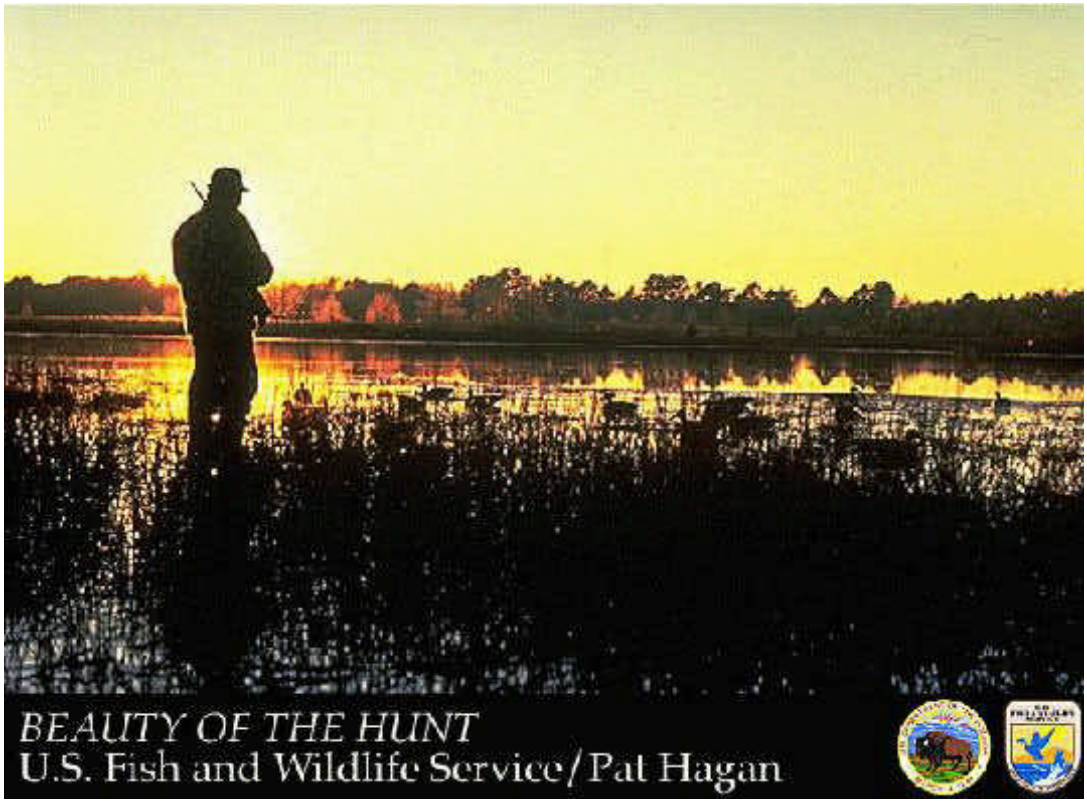
4.6.1.2 Within curatorial guidelines and discretion, provide object loans to qualifying institutions.

4.6.1.3 Place interactive program and searchable database of *Bertrand* Collection on Internet.

4.6.1.4 Transfer all paper-based catalog records into computerized database, which will enable better quality and faster research responses.

4.6.1.5 Purchase equipment to produce and develop protocol for creating a digital image library of *Bertrand* images.

Spigot from *Bertrand* Collection


BEAUTY OF THE HUNT
U.S. Fish and Wildlife Service/Pat Hagan