

**Action Plan EM-15:
Protection of Habitat for Migratory
and Resident Birds**

EM-15 Protection of Habitat for Migratory and Resident Birds

OBJECTIVES

1. To build a framework that encourages landowners to manage their land in a way that maximizes its suitability as habitat for migratory and resident birds.

DESCRIPTION

This action will devise a means for identifying important habitat and for restoring degraded habitat so that it can be available for birds. Once habitats have been identified, a framework for preserving and restoring them will be designed, and a program implemented that allows interagency cooperation among government entities to ensure that public agencies do not work at cross purposes, and that private individuals and corporations can voluntarily contribute to the effort by following the guidelines established. The actions with the broadest application for birds will be accomplished through freshwater and sediment diversions (Action Plan *EM-2*), hydrologic restoration (*EM-5*) and the preservation and restoration of barrier islands (*EM-1*). In addition to those fundamental basin-wide changes, however, smaller, specific actions can be taken which will enhance habitat for migratory and resident birds:

1. *Maintain large, unbroken tracts of forest and scrub communities.* The BTES still possesses large tracts of baldcypress-water tupelo swamp forest, most of it in private ownership. Most of the bottomland hardwood forests which once grew on the natural levees, on the other hand, are now gone, converted for agricultural, industrial or urban development. Threats to the remaining forests include subsidence, saltwater intrusion, and draining and clearing for development or agriculture, and in some cases, logging. More subtle threats include fragmentation by road building, canal dredging, levee building and clearing of pipeline and utility rights-of-way. While wholesale clearing of forests will render them uninhabitable for forest birds, fragmentation can also have a pernicious effect, by introducing avenues for the ingress of nest predators like crows and jays, and nest parasites like cowbirds. Some species of interior forest nesting birds can suffer serious declines in productivity in fragmented forests. Indeed, some forest fragments are so heavily subjected to nest parasitism and predation, that they actually become population sinks, contributing no new birds to the system, and requiring a continual recruitment of new breeding age birds from outside the fragment in order to maintain a population presence.

In addition to the importance of maintaining large unbroken tracts of forest for breeding birds, these forests are also very important staging areas for trans-gulf migrants. Gigantic concentrations of migrants accumulate in these woodlands under certain weather circumstances in the fall. In the spring, again under certain difficult weather conditions, a significant proportion of the daily trans-gulf flight, involving tens of thousands of individual birds, has been shown by radar studies to utilize these forests as a resting and feeding stop after crossing the gulf. But even small remnant woodlands, spoil banks, and narrow strips along natural levees near the coast, can provide critical resting and feeding areas for migrants that encounter adverse weather.

2. *Maintain and enhance barrier islands and beaches for use by migrants.* Nesting colonies of pelicans, terns, skimmers and other species on public land should continue to be posted, and, if necessary in heavy public use areas, fenced. This program should be expanded on public land, and agreements with private landowners should be sought to allow such posting on private property during the nesting season. Vehicular access to beaches should be prohibited or restricted. Where vehicles are allowed, they should be confined to identified "roads," and all vehicles kept off dunes, sandbars, spits and overwash fans. Even where no large nesting

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colonies are visible, Wilson's Plovers and Willets may nest, and Piping and Snowy plovers, as well as other shorebirds, may winter or use these areas during migration. Restricting vehicles will not only protect birds, it will protect the very structure of the barrier beaches and islands themselves.

Existing forest and scrub communities should be rigorously protected on barrier islands. Again, this is necessary not only for Neotropical migrants which depend upon these woodlands before or after the trans-gulf flight, but for maintaining the structural integrity of these crucial barriers that protect the seaward face of the estuaries. The existing chenier woodlands on Grand Isle and west of Chenier Caminada, and swamp and natural levee woods near the coast in lower Plaquemines, Lafourche and Terrebonne parishes, should be preserved through outright purchase, easements, or voluntary measures. Local governments, residents and camp owners in the two communities, and other communities near the coast, should be encouraged to plant trees and shrubs, primarily natives, rather than invasive exotics, by educating them about the benefits not only to trans-gulf migrants, but also to their property and their community in the event of a storm. The former chenier woodland on Grand Terre should be restored by removing or restricting the movements of goats and cows on the island. Barrier island restoration projects planned for the future should include provisions for birds. This should include creation of tidal mudflats, spits, and overwash fans, planting or encouragement of mangroves on the backs of islands for nesting of species requiring woody growth, bare shell flats for species requiring such habitat for nesting, and where practical, the establishment of higher ground behind the beach dune for the establishment of chenier scrub and woodland vegetation. The continued loss of the barrier island beach and intertidal habitat in the BTES would have grave consequences for many migratory shorebirds; islands such as Grand Terre provide stopover habitat for significant numbers of Whimbrels, Semipalmated Plovers, Red Knots, and Dunlin, among other species.

3. *Educate the public, both residents and users, about the ecotourism potential of birds and birders.* The BTES is an area of bird diversity and density comparable to the finest ecotourism destinations in the country, but its potential has been little tapped. Bird-oriented ecotourism has made a major economic impact on the Everglades, the Florida Keys, southeast Arizona, the lower Rio Grande Valley, and the upper Texas coast. The BTES is a natural destination for birders and other ecotourists, and has the advantage of being near a major tourist destination, New Orleans, and of containing other tourist attractions, like world-class fishing, historic plantations and the various cultural attributes of Acadiana. Already, Grand Isle and Fourchon attract hundreds, if not thousands of user days per year by mostly regional birders, but its potential is much greater. However, Grand Isle's greatest attraction, its tiny remnant chenier woods, enjoys no protection, and could be destroyed in a single day by a developer's bulldozer. Another major attraction, not only for birders but for casual nature tourists as well, are the estuary's vast flocks of colorful waders, from the abundant Snowy Egrets to the increasingly common Roseate Spoonbill. With the exception of the managed marshes along Fourchon Road, there are few places where the casual visitor has an opportunity to view this spectacle. Already, hunting of waterfowl and gamebirds provides important economic stimulus to the area's economy, but the continued availability of this resource to residents, and the continued growth of the industry, will require concerted effort.

Some other specific actions could include:

1. Provide tax incentives for landowners to maintain forests.
2. Encourage sustained-yield management practices where logging takes place.
3. Locate future utility and pipeline corridors in or immediately adjacent to existing corridors.
4. Maximize the potential of existing spoil banks to be utilized as stopover habitat. This is especially important in the near coastal areas, and might include planting trees such as Live Oak, Hackberry and Prickly Ash in saline

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- areas and the suppression, especially in freshwater areas, of Chinese Tallowtree monocultures.
5. Protect forested wetlands threatened directly or indirectly by publicly financed flood protection levee projects.
 6. Encourage future oil and gas exploration to take place from existing canals and access roads.
 7. Encourage maintenance of roadsides, levees, and utility corridors in other than a mowed grass condition. Brown-headed Cowbirds, perhaps the most serious threat to the productivity of many nesting Neotropical migrants, require short grass areas to feed, and have used mowed corridors to gain ingress deep into otherwise inhospitable forests, well outside their historic range on the Great Plains. The introduced European Starling, identified as the cause of decline in many cavity nesting species, is similarly dependent upon mowed grass as foraging habitat, and is absent from areas of unbroken native habitat in the BTES.
 8. Post tern, gull, heron, egret, and ibis rookeries and initiate a public education effort emphasizing the importance of these rookeries to the world population of many of these species.
 9. Continue to emphasize the several ongoing initiatives among private, state, and federal entities to protect and enhance habitat for ducks and geese.

BACKGROUND/MAJOR ISSUES

A body of scientific evidence has been accumulated over the last decade which indicates long-term declines in the populations of many species of birds. Species groups affected range from Neotropical migrant songbirds, to forest and marsh dependant residents, to Arctic nesting shorebirds and prairie nesting waterfowl. The causes of these declines are, of course, various, complex, and in many cases not completely understood. However, a common theme linking these various species is that they have suffered serious loss of habitat necessary to sustain them at some stage of the life cycle. Essential habitat for birds in the BTES is provided in three ways:

1. As wintering grounds for residents and species that breed to the north and migrate south along the Mississippi flyway to winter on the northern Gulf Coast. Included are huge concentrations of most species of dabbling duck, many diving ducks, White Pelicans, rails, shorebirds including the endangered Piping Plover, hawks including the endangered Peregrine Falcon, and songbirds including Tree Swallow, Yellow-rumped Warbler, and Swamp Sparrow, species which reach peak overwintering densities in the BTES. Approximately 190 species winter regularly in the estuary, including 130 species which migrate from the north and about 60 resident species.
2. As breeding grounds for residents and for species that winter in the tropics but return to the northern Gulf Coast each spring. The BTES provides important warm season habitat for Neotropical migrants including several species of heron and egret, shorebirds including Wilson's Plover and Black-necked Stilt, marsh birds including Least Bittern and Purple Gallinule, and birds that breed in forested wetlands including Mississippi Kite, Prothonotary Warbler, and Painted Bunting. Another migratory species that utilizes the BTES, Southern Bald Eagle, reverses the process, breeding in winter and dispersing to the north in the summer. The BTES is the most important area on the northern Gulf Coast for this recovering, formerly endangered population. About 100 species, including 40 species of Neotropical migrant, regularly breed in the BTES.
3. As stopover habitat in spring and fall for birds migrating across the Gulf of Mexico on their way between the tropics and North America. Stopover habitats include barrier beaches, tidal mudflats, marsh ponds, and woodlands ranging from coastal cheniers to the swamps and natural levees of the upper estuary. A significant portion of North America's breeding birds winter in the Neotropics. Many fly south each fall funneling along the Mississippi River and staging in the BTES, building up fat reserves to sustain them on the arduous 550-mile flight across the Gulf of Mexico. For birds returning across the Gulf in spring, the BTES can be a critical refueling stop, especially if adverse weather is encountered during the trans-gulf flight. Of the 90 species of Neotropical migrants which regularly utilize the estuary, 40 species remain to breed, while the remaining 50

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species utilize the BTES as transient migrants in fall and spring. The total number of birds moving through the BTES during migration is in the millions, with densities of 25,000-85,000 individual birds per mile of coastline arriving daily during peak spring flights.

Each of the BTES's habitats, natural levees, swamps, freshwater marshes, saline marshes, and barrier islands and beaches hosts characteristic resident species. Among the 60 or so resident species are the Brown Pelican, Louisiana's state bird. Brown Pelicans were virtually extirpated from Louisiana after World War II due to bio-accumulation of pesticides and the resultant reproductive failure of the Louisiana population. The banning of certain pesticides followed by the reintroduction of pelicans from Florida, coupled with aggressive management and protection by the Louisiana Department of Wildlife and Fisheries and the U.S. Fish and Wildlife Service, has led to a tremendous rebound of the Louisiana population. Nevertheless, most, if not all of the genetic diversity of the Louisiana population was lost when the population crashed. The BTES remains a stronghold and a repository of genetic diversity for other species now showing declines in other parts of their range such as White Ibis, Mottled Duck, Royal Tern, Red-shouldered Hawk, Loggerhead Shrike and Seaside Sparrow.

BENEFITS

One of the Programmatic Goals of the BTNEP is to "realistically support diverse, natural biological communities." Actions deriving from this goal are intended to "identify, manage, and preserve vulnerable habitat to sustain biodiversity." A second goal is to "preserve and restore wetlands and barrier islands." A third is to "promote environmentally responsible economic activities that sustain estuarine resources." All of these goals are addressed by this action. The long-term benefits of this plan include the following:

1. Preservation of BTES habitat. This will not only protect migratory and resident birds, but interdependent biological communities as well.
2. Protection of a nationally important resource. Few areas of the continent are as important to migratory and resident birds as the BTES. The continued deterioration of critical habitat could have devastating long-term consequences, especially for wintering waterfowl, pelicans, wading birds, nesting terns and trans-gulf migrants.
3. Protection of an important cultural resource. Part of the region's cultural identity is tied to the maintenance of natural habitats, and the living resources that depend upon them, from the vast flocks of waders that grace the region, to the ducks that are hunted and eaten.
4. Protection of an important economic resource. Ecotourism already plays an important role in the region, especially for hunting, fishing and sightseeing, but the potential exists for much greater utilization by those interested in wildlife viewing, especially of birds.

IMPLEMENTATION SCHEDULE

The Louisiana Department of Wildlife and Fisheries (LDWF) monitors eagle nests, tern colonies and heronries. The Louisiana Nature Conservancy is conducting an ongoing Monitoring Avian Productivity and Survivorship (MAPS) project. It is helping to sponsor a Breeding Bird Atlas project, and BTNEP is funding researchers to complete the atlas program in the more inaccessible areas of the BTES. The National Biological Service (NBS) is conducting research along the Gulf Coast concerning habitat utilization by migrants, as are researchers at LSU, the University of Southern Mississippi and Clemson. Jean Lafitte National Historical Park and Reserve is sponsoring research on habitat utilization by Neotropical migrants in the Barataria Preserve, setting up point count censuses for breeding birds, and landscape studies of habitat fragment utilization in the area of the preserve. The Gulf Coast Bird Observatory (GCBO) Network, an outgrowth of the Gulf Coast Conservation Initiative of the Nature Conservancy, in partnership with local Audubon Societies, the U. S. Fish and Wildlife Service (USFWS), the National Fish and Wildlife Foundation, private companies, state agencies, and Partners in Flight, is spearheading efforts to preserve

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critical coastal stopover habitat in the Chenier Plain and has plans to expand that effort into the delta region. Under separate contract with BTNEP, it is developing a detailed monitoring plan for Neotropical migratory birds in the estuary. The North American Waterfowl Management Plan, Gulf Coast Joint Venture, Mississippi River Coastal Wetlands Initiative, is an effort coordinated by the USFWS to preserve and enhance waterfowl habitat.

Short-term plans (0-1 year) are as follows:

- S 1.00 Facilitate creation of a partnership between estuary user groups (bird clubs, Audubon chapters) and the Gulf Coast Bird Observatory (BTMC; 1995).
- S 2.00 Include migrant bird information as part of the BTMC's education and outreach programs and literature (BTMC, SRCIA; 1995).
- S 3.00 Incorporate planning for habitat improvement in barrier island restoration projects (CWPPRA Task Force; 1995).
- S 4.00 Complete Breeding Bird Atlas and MAPS (Natural Heritage Program, Louisiana Nature Conservancy; 1996).
- S 5.00 Develop a long term monitoring strategy for breeding birds within the BTES. (GCBO, 1996)

Medium-term plans (1-5 years) include the following:

- M 1.00 Prioritize critical stopover chenier and coastal woodlands for suitability as refugia and degree of threat (NHP, LNC, USFWS; complete by December 1996).
- M 2.00 Acquire or enter into voluntary agreements (such as the Wetland Conservation Act Program) with landowners for the protection and enhancement of stopover habitat, especially chenier and coastal woodlands (GCBO, LNC, NHP, USFWS, NRCS; begin in January 1996).
- M 3.00 Continue to build CWPPRA and other coastal restoration projects, especially on barrier islands, with design modifications incorporated for the needs of birds (CWPPRA Task Force, LDNR; ongoing).
- M 4.00 Work with LDOTD, parish governments, local levee districts, and utility companies to modify greenspace maintenance, to de-emphasize short mowing cycles and the use of herbicides and emphasize the use of longer mowing cycles, wildflowers, and other alternative maintenance (BTMC, NHP, LGC; ongoing).
- M 5.00 Conduct public education campaigns, preferably using local volunteers, in coastal communities about the importance of trees and shrubs to migrants, and about the potential for ecotourism (BTMC; 1996, ongoing).
- M 6.00 Work with regulatory agencies so that they will modify permits in such a way as to reduce the continued fragmentation of existing forests (BTMC, USFWS, USACOE, EPA, LDNR; ongoing).
- M 7.00 Design an ecotourism package outlining destinations for birders, utilizing Grand Isle and Bayou Segnette State Parks, the Barataria Preserve of Jean Lafitte National Historical Park and Preserve, Fourchon pond and beach, Wisner Wildlife Management Area, private areas such as Elmer's Island, etc., that are made available for tourists. Coordinate these efforts with the state sponsored effort to join the Watchable Wildlife Program (LDCRT, LDWF; 1997).
- M 8.00 Post nesting colonies of colonial seabirds and wading birds (NHP, volunteers; 1996).

Long-term plans (5-10 years) are as follows:

- L 1.00 Once habitat has been secured and protected in coastal communities such as Grand Isle, implement a national awareness campaign for birders, encouraging tourism (LDCRT; 2000).
- L 2.00 Protect and monitor the long-term health of nesting colonies (LDWF; ongoing).
- L 3.00 Encourage the continued development of ecotourism in the BTES, and educate landowners about the income potential of managing their land for ecotourists (LDCRT; ongoing).
- L 4.00 Repeat Breeding Bird Atlas project and other one-time monitoring efforts to determine the success of the

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action plan (NHP; every ten years).

LEAD AND SUPPORT IMPLEMENTORS

The lead implementor of this action will be the Louisiana Department of Wildlife and Fisheries (LDWF), including the Refuge Division and the Natural Heritage Program. Support implementors will include the Barataria-Terrebonne Management Conference (BTMC), the U.S. Fish and Wildlife Service (USFWS), the National Biological Service (NBS), the Louisiana Department of Natural Resources (LDNR), the U.S. Army Corps of Engineers (USACOE), the Natural Resources Conservation Service (NRCS), the CWPPRA Task Force, local and parish governments, levee districts, the Louisiana Department of Transportation and Development (LDOTD), the Louisiana Department of Culture, Recreation and Tourism (LDCRT), the Louisiana Nature Conservancy, the Louisiana Forestry Association, private and corporate landowners, Partners in Flight, the Gulf Coast Bird Observatory (GCBO), the Louisiana Ornithological Society (LOS), the Terrebonne Bird Club, the Crescent Bird Club, public landowning agencies such as Louisiana State Parks, the National Park Service (USNPS), the Audubon Institute, the Wisner Foundation, universities, port commissions, and oil, pipeline and utility companies.

COSTS AND ECONOMIC CONSIDERATIONS

Table EM15-1. Estimated Costs.

	ACTION DESCRIPTOR	LEAD	EXISTING / NEW	SUBSUME	Y1 COSTS (Short Term)	Y2-5 AVG COSTS/YR (Medium Term)
EM-15					\$11,038	\$5,385
EM-15S1.00	<i>partnership creation: estuary user groups and GCBO</i>	BTPO-EQS	E		\$323	\$0
EM-15S2.00	<i>education/outreach</i>	BTPO-EQS	E		\$485	\$0
EM-15S3.00	<i>habitat improvement plans</i>	CWPPRA	E		\$1,615	\$0
EM-15S4.00	<i>Breeding Bird Atlas & MAPS</i>	private	E			\$0
EM-15S5.00	<i>monitoring strategy</i>	GCBO	E		\$7,000	\$0
EM-15M1.00	<i>prioritize critical habitat</i>	BTMC	E		\$1,615	\$0
EM15-M2.00	<i>protection of critical habitat</i>	private	N			\$0
EM-15M3.00	<i>continue CWPPRA projects</i>			EM-5		\$0
EM-15M4.00	<i>greenspace maintenance</i>					\$1,010
EM-15M4.01	<i>research; recommendations</i>	BTPO-EQS	E			\$202
EM-15M4.02	<i>workshop</i>	BTPO-EQS	E			\$81
EM-15M4.03	<i>workshop</i>	LDOTD	E			\$81
	ACTION DESCRIPTOR	LEAD	EXISTING / NEW	SUBSUME	Y1 COSTS (Short Term)	Y2-5 AVG COSTS/YR (Medium Term)
EM-15M4.04	<i>workshop</i>	Parish	E	Cost PER Parish	\$81	

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		Govt.				
EM-15M4.05	<i>workshop</i>	Levee Districts (7)	E			\$565
EM-15M5.00	<i>public education</i>	BTPO- EPS	E			\$81
EM-15M6.00	<i>permit modification</i>					\$606
EM-15M6.01	<i>meeting to modify permits</i>	BTPO- EPS	E			\$121
EM-15M6.02	<i>meeting to modify permits</i>	USACOE- NO	E			\$121
EM-15M6.03	<i>meeting to modify permits</i>	LDNR	E			\$121
EM-15M6.04	<i>meeting to modify permits</i>	LDEQ	E			\$121
EM-15M6.05	<i>meeting to modify permits</i>	USEPA	E			\$121
EM-15M7.00	<i>design ecotourism package</i>					\$3,688
EM-15M7.01	<i>Design ecotourism package</i>	LDCRT	E			\$1,750
EM-15M7.02	<i>Design ecotourism package</i>	BTPO- EPS	E			\$1,938
EM-15M8.00	<i>post bird nesting colonies</i>	volunteers				\$0

Table EM15-1 provides estimated costs for short- and medium term activities specified in this plan. It includes lead agencies and costs for short- and medium-term activities. Costs are broken down into those considered “new” (a direct product of CCMP recommendations) and “existing” (where plans coincide with existing responsibilities/activities). Acceptance of this plan by the agencies or entities listed as lead or support implementors does not commit that agency or entity to implement the plan. At a later date, parties identified as potential plan implementors will work with the Program Office, the BTMC and other plan implementors to formalize all commitments concerning implementation.

FUNDING STRATEGY

Total Funding Necessary (Years 1-5): \$32,600
 Total Funding Existing (Years 1-5): \$32,600
 Total New Funding Necessary (Years 1-5): \$0

Summary of new funding strategy: Existing funding for this action plan for the next five years has been identified and will come from department budgets, grants, and volunteer time. No new funding source is required.

EVALUATION METHODS

The following monitoring strategies are intended to serve as a statement of the most comprehensive and effective mechanisms to assess the effectiveness of projects implemented under the action plans. These strategies should only be used as a guide, not as a requirement. It must be recognized that the monitoring strategies outlined here will be expensive to implement and that, because all levels of government and much of the private sector currently have severe funding restraints, they may not be affordable without significant modification. It must also be recognized that these strategies are not intended to suggest that regulatory agencies require a higher level of monitoring by permit applicants than is currently required. The monitoring strategies outlined here do not override or replace

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project monitoring that would be done by an agency related to specific agency-sponsored projects.

Components of Plan

1. Maintain large, unbroken tracts of forest and scrub communities.
2. Maintain and enhance barrier islands and beaches for use by migrants.
 - a. Restrict access.
 - b. Purchase important tracts.
3. Educate the public about ecotourism potential of birds and birders.

N.B. The development of Monitoring Strategies for Neotropical Migrants and Shorebirds is being handled by a separate BTNEP contract. This monitoring strategy will not address the status of these groups specifically.

Interrelationships Among Components

Habitat enhancement can benefit from implementation of Action Plans for Hydrologic Restoration (EM-1), Freshwater and Sediment Diversion (EM-2) and Preservation and Restoration of Barrier Islands (EM-5). Public education and landowner co-operation is critical for effectiveness of all components.

Documentation of Plan Implementation and Effectiveness

Plan implementation

The following criteria will be used to determine if plan implementation steps were accomplished:

1. BTMC acts to create partnership between user groups and GCBO.
2. BTMC produces outreach literature concerning migratory and resident birds.
3. CWPPRA sponsored barrier island projects include consideration of bird habitat.
4. LNC completes Breeding Bird Atlas and MAPS.
5. GCBO develops long term monitoring strategy for breeding birds.
6. LNC and USFWS develop priority list of critical stopover habitat in chenier and coastal woodlands.
7. GCBO, LNC, USFWS and NRCS enter into voluntary agreements with landowners to protect and enhance critical stopover, nesting and wintering habitat.
8. CWPPRA projects are implemented with design modifications to incorporate needs of birds.
9. Green space maintenance programs of LDOTD, utility companies and local government agencies are modified to reduce short mowing cycles in favor of alternative strategies more favorable to nesting Neotropical Migrants.
10. Use volunteers to educate public about migratory bird habitat and ecotourism.
11. Regulatory agencies request modifications to reduce fragmentation of existing forests.
12. LDCRT and LDWF develop ecotourism package.
13. Nesting colonies of colonial seabirds and wading birds are posted annually.

Project effectiveness

For monitoring purposes, efforts will focus on the following groups of birds: Neotropical Migrants (developed under separate contract), Shorebirds (developed under separate contract), colonial nesting birds, wading birds and migratory waterfowl. The following criteria will be used to evaluate the effectiveness of the plan in protecting bird habitat. Specific criteria may vary depending upon the characteristics of individual projects.

1. Maintenance or increase in the number of colonies of colonial nesting birds and wading birds.
2. Maintenance or increase in the number of species present in colonies of colonial nesting birds and wading birds.
3. Maintenance or increase in the number of individuals per species in colonies of colonial nesting birds and wading birds
4. Maintenance or increase in the size of winter waterfowl habitat.
5. Maintenance or increase in the population of any Threatened and Endangered species present within BTES (i.e., Brown Pelican and Bald Eagle).

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Methods

Measurable parameters

Plan Implementation - The activities of the BTMC as outlined in the above criteria will be monitored by an independent Third Party. The measurable parameters are those outlined in the effectiveness criteria.

Project Effectiveness - The parameters to be measured to assess the criteria for effectiveness are:

1. The number of colonies of colonial nesting birds.
2. The number of colonies of wading birds.
3. The number of species present in these colonies.
4. The size of waterfowl populations.
5. The population of Threatened and Endangered species present in BTES.
6. The area of habitat for wintering waterfowl.

Data collection methods

Plan Implementation - The monitor will:

1. Attend relevant meetings of BTMC to document its actions.
2. Attend relevant meetings of CWPPRA Task Force and Technical Committee to monitor their actions.
3. Review relevant CWPPRA project descriptions to ensure bird habitat is considered in project design.
4. Contact GCBO, LNC, USFWS, NRCS, LDOTD regarding the development of voluntary agreements with landowners, prioritization of habitat and modification of greenspace management.
5. Review ecotourism package developed by LDCRT and LDWF.
6. Contact LDNR and USACOE regarding the issuance of permits and fragmentation of forest resources.
7. Visit road accessible nesting colonies of seabirds to inspect postings.

Colonies of Colonial Nesting Birds - LDWF currently conducts surveys of colonial nesting birds (Martin and Lester, 1990). Either LDWF procedures or those described here should be followed. Lane (1994) suggests the use of methods described by Slack et al. (1992) whereby surveys are conducted annually during a two-week period beginning in the last week of May as this corresponds to the incubation period of most colonial nesting birds. Surveys should be conducted from the ground using 2-4 people viewing the colony on foot or from a boat. The species composition of the birds in the colony is recorded along with an estimate of the size of the colony.

Colonies of Wading Birds - LDWF currently conducts surveys of wading birds (Martin and Lester, 1990). Either LDWF procedures or those described here should be followed. Loesch et al. (1994) indicate that the development of population survey methods is required before assessments can be made of wading bird utilization of wetland habitat. Similar methods employed for colonial nesting birds should be adopted for the CCMP. Aerial surveys may also be employed in remote areas. This may employ a stratified random sampling design (Dubovsky et al., 1988) if colonies are thought to be clustered.

Area of Waterfowl Habitat - As considerable effort is devoted to habitat mapping and monitoring in other Ecological Management Action Plans, this issue is not addressed directly here. Lane (1994) provides guidance on monitoring protocols for the assessment of colonial nesting waterbird habitat.

Threatened and Endangered Species - The population of Brown Pelicans will be assessed using the procedures for colonial nesting birds, described above. Aerial surveys and ground inspections will be used to assess the population of Bald Eagles, following the procedures of LDWF.

Sampling design and statistical methods

Plan Implementation - There are no relevant sampling design issues or statistical analyses for the evaluation of plan implementation.

Project Effectiveness - Slack et al. (1992) discuss the use of statistical techniques to describe the relationship

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between counts and years while accounting for as much unwanted variation as possible. Class variables were treated as blocks (e.g., transects) in their design and although individual regression lines were developed for each class, 'average' regression lines for all classes can be presented. Slack et al. (1992) describe the identification and removal of significant interaction terms from the models. An example of how these data may be applied to aerial transect data allows for the assumption of constant effort per transect among years (negating the need to include measure of effort in the statistical model), transects can be treated as blocks, and the number of individuals per year can be used as the response variable. The critical level of significance for all tests should be $p=0.05$.

Cost estimates

Plan Implementation - The cost estimate is based upon attendance at approximately 6 meetings per year, contacting agencies, review of documents, and appropriate reporting. The level of effort is estimated at 120 person-hours and costs including salary, fringe benefits, overhead and associated expenses are approximately \$6,000.

Project Effectiveness - It is estimated that ground surveys of colonial nesting birds would require at least two teams of two trained observers each and would take approximately two weeks per year. Estimated costs for this effort including salary, fringe benefits, boat costs and reporting are \$25,000 per year. Aerial waterfowl surveys are assumed to consist of transects approximately 5 km apart, flown at approximately 100 km/hr and would be completed within 4 flying days. Estimated annual costs including two trained personnel, flight time and reporting are \$15-18,000.

Recommendations and Feedback to Program/Implementor

Monitoring of plan implementation will be undertaken by an independent Third Party who will prepare semi-annual reports describing actions of the relevant agencies in relation to bird habitat issues. Evaluation of monitoring reports concerning project effectiveness will be conducted by qualified individuals representing organizations independent of any agencies or institutions funding the project implementation (such as the NBS). Semi-annual reports will be prepared. The monitoring reports will be submitted not less than 15 days prior to a regularly scheduled meeting of the BTMC and the parties responsible for monitoring will appear at the meeting to discuss the report. Monitoring reports concerning project effectiveness will also be provided to the agencies or institutions involved in project implementation, co-operating landowners, utility companies, etc.

Quality Assurance/Quality Control

Plan implementation

The Quality Assurance Plan involves the following components:

1. Clear identification of effectiveness criteria (as outlined above).
2. Use of qualified and experienced personnel to collect and report data (to be determined and assessed annually by BTMC).
3. Review of monitoring data and reports by BTMC (as outlined above).
4. Reporting of significant problems identified during the monitoring period to the BTMC before the next report is due.
5. Maintaining a semi-annual schedule for reporting on implementing agency activities (as outlined above).

Project effectiveness

The Quality Assurance Plan involves the following components:

Project Description - (as provided in Action Plan).

Project Organization and Responsibility - (to be prepared by monitor in association with relevant implementing agency).

Data Quality Objectives - For the measurable parameters recommended in this monitoring strategy, the main constraint on data quality is observer training and performance. It is recommended that anyone participating in bird surveys participate in taxonomic identification workshops before surveys.

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Sampling Procedures - The data collection methods are as described above. The sampling design for aerial transects will be determined for each bird group by a committee composed of BTMC representatives, the lead implementor, and the monitor.

Data Review, Validation and Verification - Data will be entered into a DIMS compatible database and statistical analysis will follow procedures agreed to by the BTMC, lead implementor and the monitor.

Problem Identification - Any significant problems identified during the monitoring period, either with monitoring procedures or project effectiveness, will be reported to the BTMC and lead implementor before the next regularly scheduled report is due.

Reporting - Semi-annual reports will be prepared. The monitoring reports will be submitted not less than 15 days prior to a regularly scheduled meeting of the BTMC and the parties responsible for monitoring will appear at the meeting to discuss the report. Monitoring reports will also be provided to the agencies or institutions involved in project implementation, co-operating landowners, utility companies, etc.