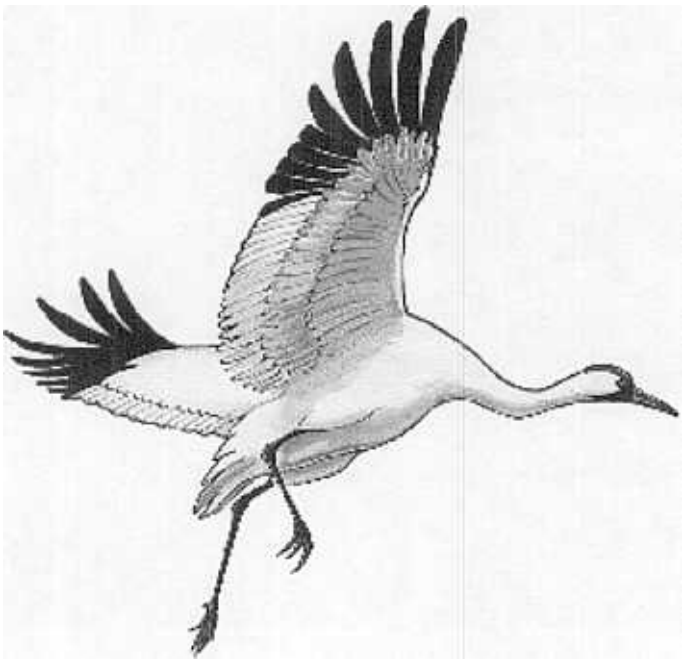
FINAL

ENVIRONMENTAL ASSESSMENT

PROPOSED REINTRODUCTION OF A MIGRATORY FLOCK OF WHOOPING CRANES IN THE EASTERN UNITED STATES

June 2001

U.S. Fish and Wildlife Service, Region 3
in cooperation with Regions 2, 4, 5, and 6



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June 2001

Authority: Endangered Species Act of 1973, as amended

Prepared by: U.S. Fish and Wildlife Service (Region 3),
in cooperation with:
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Abstract: This environmental assessment considers the biological, environmental, and socioeconomic effects of a proposal to establish a self-sustaining population of whooping cranes (*Grus americana*) separate from the two existing populations. This action has been recommended by the Whooping Crane Recovery Team to contribute to the long-term recovery of the endangered whooping crane. Alternatives considered in this environmental assessment include: (1) No Action; (2) establish a nonessential experimental migratory population of whooping cranes in the eastern United States with introduction of cranes to Wisconsin and migration to a wintering site at Chassahowitzka National Wildlife Refuge in Florida (Preferred Alternative); (3) establish a migratory population of whooping cranes, classified as endangered, in the same locations; (4) establish a nonessential experimental migratory population of whooping cranes with initial reintroduction to Seney National Wildlife Refuge in Michigan and migration to a wintering site at Chassahowitzka National Wildlife Refuge in Florida. Regions 2, 3, 4, 5, and 6 of the U. S. Fish and Wildlife Service are cooperating in this endeavor.

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

The whooping crane is an endangered species found only in North America. It was first listed as an endangered species in 1967, under the law that preceded the current Endangered Species Act (ESA)(32 FR 4001, March 11, 1967). Reasons for decline of the species and, ultimately, its listing included hunting and specimen collection, human disturbance, and conversion of the primary nesting habitat to hay, pastureland, and grain production (Allen 1952, Erickson and Derrickson 1981). A total of about 413 whooping cranes survive as of fall 2000, including 267 individuals in the wild in 3 populations and 146 individuals in captivity at 6 locations (T.Stehn, pers.comm.).

The whooping crane is still vulnerable to extinction in the wild. The species adheres to ancestral breeding areas, migration routes, and wintering grounds, leaving little possibility of pioneering into new regions. The existing wild populations can be expected to continue utilizing their present habitats with little likelihood of expansion, except locally.

The only self-sustaining, natural wild population nests in Canada and winters along the Texas Gulf Coast in and near Aransas National Wildlife Refuge (NWR). It is referred to as the Aransas/Wood Buffalo Population (AWP). In their restricted winter range distribution, they are vulnerable to annihilation by catastrophic events like a hurricane, red tide, or a contaminant spill which could destroy their habitat, eradicate their food resources or kill the birds directly as a result of ingestion of toxins. The principal threat to the wild population continues to be a contaminant spill along the Gulf Intracoastal Waterway that bisects the winter range. A spill could destroy and/or degrade habitat and affect the whooping crane adversely, perhaps even fatally.

A second wild population is found in central Florida. It is designated as a nonessential experimental population (NEP) and is part of an ongoing reintroduction effort. A third wild flock, low in numbers, remains from an effort to establish a migratory population in the Rocky Mountains. A captive breeding program has been built by taking eggs from nests of the wild population, and raising the resulting young in captivity. Cranes raised from these eggs form the nucleus of the captive flock, now located at three primary locations.

For further information on the status, history and ecology of the species, see Appendix 1.

1.2 Purpose

At the recommendation of the Whooping Crane Recovery Team, the U.S. Fish and Wildlife Service (Service) is considering whether to reintroduce a population of migratory whooping cranes (*Grus americana*) to the eastern United States (U.S.). The purpose of the reintroduction would be to implement a primary recovery action for the whooping crane.

Reintroduction of the proposed migratory population would help meet the objective of establishing two additional wild populations of whooping cranes within the species' historic range, with each population consisting of at least 25 nesting pairs. That objective must be met before any consideration could be given to downlisting the species to threatened. The new population may also serve as a source of donor animals to augment reintroduction at other sites.

1.3 Need

The vulnerability of the whooping crane in the wild illustrates the need for establishing additional self-sustaining wild populations which are isolated from the existing wild population.

The recovery plan for the whooping crane (USFWS 1994) identified a recovery objective of at least 40 nesting pairs in the only natural wild flock, plus the establishment of 2 additional wild populations of 25 nesting pairs each within the species' historic range, sustained for a minimum of 10 years, in order to downlist the species to threatened. To accomplish this, it will be necessary to reintroduce the species at an additional site. Since 1993, whooping cranes have been released in the Kissimmee Prairie area of central Florida in an ongoing reintroduction effort to establish a non-migratory flock. The Whooping Crane Recovery Team (Recovery Team) decided at its September 1999 meeting to proceed with planning for the establishment of a second additional population. The Recovery Team recommended that the new population be a migratory population located in the eastern U.S.; it would breed in Wisconsin and winter at the chosen wintering site, in and around Chassahowitzka National Wildlife Refuge in west central Florida. As migration is a learned behavior in cranes, the Recovery Team recommended that the migratory population be conditioned to follow an ultralight aircraft, which would be utilized, initially, to lead them to the wintering site.

1.4 Decision that Must be Made

The Service must decide whether to establish another population of whooping cranes, and if so, which alternative would best accomplish that objective. The Service's Regional Director of the Great Lakes/Big Rivers Region also must determine whether that alternative would result in a significant impact to the human environment, thereby requiring an Environmental Impact Statement or if a Finding of No Significant Impact (FONSI) is appropriate.

1.5 Issues and Concerns

Several issues of concern have been identified by the public, cooperating states, and groups potentially affected by the proposed reintroduction. These concerns fall mostly into two general categories: potential restrictions on agriculture or other business activities, and possible restrictions on sport hunting.

There are several separate areas of concern relating to agriculture interests. One concern is related to the ability of property owners and managers to conduct day-to-day management activities on their properties without the burden of restrictions that may be in place for most listed species. Depending upon circumstances, "take" in the form of harm, harassment or other disturbance could conceivably occur to many listed species as a result of normal and routine tasks. Some individuals would likely object to any new restrictions related to their routine activities.

Another concern is the ability of existing operations to expand. The presence of whooping cranes may somehow influence the review of any proposed project by a federal permitting or funding agency. Any restrictions on future use of lands adjacent to existing operations as a result of the presence of whooping cranes may be viewed as infringing upon an individual's right to conduct his or her business

An additional issue identified is the potential for crop depredation. There is evidence that some sandhill cranes have caused locally substantial losses of newly-planted corn in some areas in Wisconsin. Concern has been raised that whooping cranes could engage in this type of behavior as well.

The reintroduction of whooping cranes in Wisconsin could possibly affect sport hunting in at least two different ways. Some individuals have expressed concern that certain areas may be closed to hunting subsequent to release of whooping cranes in the area. They were concerned about certain areas being closed to hunting permanently, or more limited and short-term closures in response to the presence of individual birds wandering into an area where they are deemed vulnerable to accidental shooting.

Another issue relates to the amount of a fine imposed in the event of an accidental shooting. Significant penalties can be assessed as a result of illegal take under the ESA, and some individuals feel that this is an overly severe punishment in the event of an innocent misidentification.

1.6 Scoping

A series of public meetings was held in Florida in December 1997 and in Wisconsin in May of 1999 to determine public interest and concerns regarding the potential reintroduction of a migratory flock of whooping cranes to the eastern United States. In 1999, the Service, the Wisconsin Department of Natural Resources (DNR), and International Crane Foundation (ICF) representatives met to identify issues and concerns related to whooping crane reintroduction.

The Whooping Crane Recovery Team held their annual meeting in Baraboo, Wisconsin in September 1999. At that meeting, the Recovery Team made a recommendation to proceed with central Wisconsin as a reintroduction site for a migratory population of whooping cranes. Since that time, the Service has contacted numerous organizations and potentially affected interest groups, government representatives of states and tribes along the potential migration route, the Atlantic and Mississippi Flyway Councils and their Technical Sections, the Wisconsin Natural Resources Board, the Florida

Fish and Wildlife Conservation Commission (FWCC), and other interested agencies to obtain input on the potential for reintroduction of a migratory whooping crane population in the eastern U.S.

The Wisconsin and Florida informational meetings offered the general public an opportunity to comment on the possibility of a whooping crane reintroduction project. The majority of the public has appeared extremely supportive, provided the project does not interfere with existing lifestyles and current and potential income. Public comment received on the draft environmental assessment (EA) has been incorporated into the final EA. Additional opportunity for public review and comment was provided through proposed rulemaking notification published in the Federal Register as part of the process to decide whether to designate the reintroduced population as a nonessential experimental population. All known or determinable, directly affected parties and other interested agencies, groups and individuals were notified of the opportunity to comment on the draft EA and the proposed rulemaking. A number of public hearings were held during the public comment period on the proposed rule and draft EA as a further measure to obtain public input on the proposed reintroduction. Information and comments received were incorporated into the final EA.

2.0 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter first discusses the alternatives considered but not studied in detail, then describes the status of the whooping crane if no reintroduction action is taken (No Action Alternative). Alternative 2, reintroduction of whooping cranes to the eastern U.S. as a nonessential experimental population with initial releases in Wisconsin, is the Service's preferred alternative. Two additional alternatives are described, including Alternative 3, establishing a migratory population of whooping cranes in the eastern U.S. with initial releases in Wisconsin under full ESA protection, and Alternative 4, reintroduction of a migratory nonessential experimental population in the eastern U.S. with initial releases at Seney NWR in Michigan. Figure 1 shows the proposed NEP area, the approximate migration route for the cranes led by ultralight aircraft for each of the action alternatives, and the wintering location at Chassahowitzka NWR. Figure 1 also identifies the approximate migration route and wintering area of the natural wild AWP flock of whooping cranes and the location of the nonmigratory Kissimmee Prairie population.

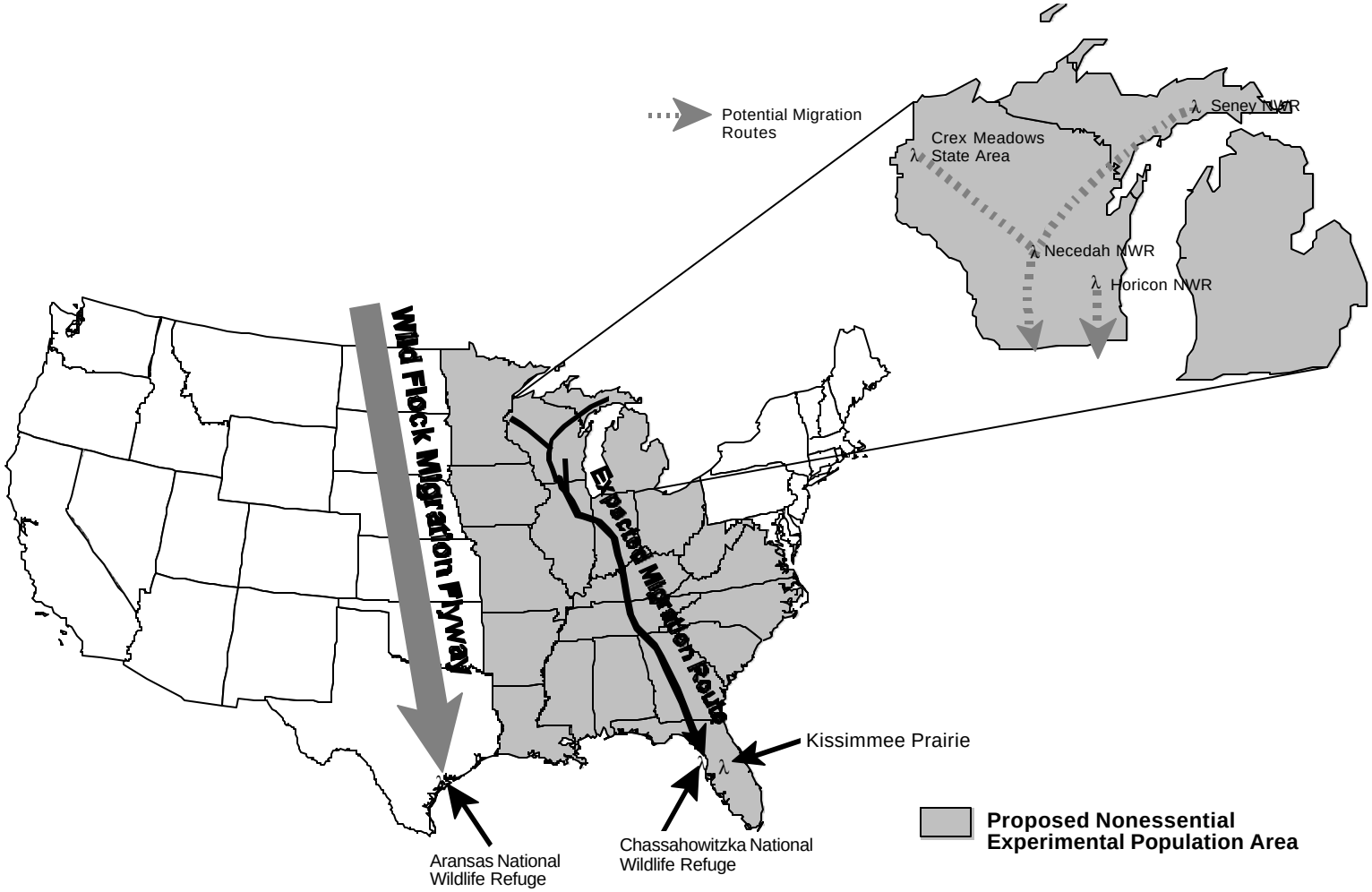

Figure 1. **Proposed Eastern United States Nonessential Experimental Population Area**, showing proposed alternate reintroduction sites, expected migration route to be led by ultralight aircraft, and proposed wintering site. Also shown is approximate migration route and wintering location of wild Aransas/Wood Buffalo Population of whooping cranes, and location of existing NEP at Kissimmee Prairie. The expanded view of Wisconsin and Michigan (top of figure) shows the specific locations of each of the alternate reintroduction sites.

2.1 Alternatives Considered But Not Studied In Detail

2.1.1 *Continue Reintroduction Experiments In the Rocky Mountains*

This option would reinstate the experimental project in Idaho using ultralight aircraft, trucking, guide bird(s), or some presently untested/unknown alternative technique to build a migratory self-sustaining population. Researcher Kent Clegg successfully did ultralight experiments with sandhill cranes in 1995 and 1996 in the Rocky Mountains. In 1997, he flew four whooping cranes between Idaho and New Mexico and successfully integrated them into the wild with established migration. Two of the whooping cranes survived the first winter, but only one was still alive in the fall of 1999.

From 1975 through 1988 as part of the cross-fostered reintroduction with sandhill cranes at Grays Lake NWR in Idaho, 289 eggs were transferred, 210 hatched, and 85 chicks fledged. The population peaked at 33 birds in 1985 and has declined since then to 2 birds. The average annual mortality rate among juveniles was 79 percent and 15.5 percent among adults compared to only 26.7 percent among juveniles and 7.3 percent among adults in the wild, self-sustaining Aransas/Wood Buffalo National Park population.

Dr. Edward Garton, biometrician at the University of Idaho, working with Dr. Rod Drewien the leader of the cross-fostering project, modeled the cross-fostered population to predict when it might become self-sustaining (Garton et al. 1989). In the model it was assumed: 1) the cross-fostered females would nest as early and at the same rate as the females in Canada, and 2) survival of birds in their first year would be similar to that of first-year birds in Canada. Despite these optimistic (and unrealized) assumptions, with the future transfer of 30 eggs per year, the population would only reach six breeding pairs after 50 years. Their final report concluded, "It is obvious from all scenarios modeled that egg transplants of less than 30 eggs per year will not suffice to establish a self-sustaining population in a reasonable period of time. Natural breeding will be essential to establish a self-sustaining population" (Garton et al. 1989). The Idaho project was phased out because the whooping cranes never bred (perhaps due to improper sexual imprinting) and the mortality rate in this population was too high to justify continuing egg transfers.

An alternative technique done in limited trials in Idaho was the release of captive-reared whooping cranes at Grays Lake NWR in a "guide bird" experiment. This approach had been tested by releasing captive-reared sandhill cranes at Grays Lake NWR (Bizeau et al. 1987) and in Michigan (Urbanek and Bookhout 1992), but had only partial success in Idaho with whooping cranes.

The Whooping Crane Recovery Team gave a qualified endorsement of continued experimentation of reintroduction techniques in the Rocky Mountains at the August 1998 team meeting. However, researchers had to be able to obtain the necessary approvals from natural resource agencies. The State of Wyoming and Pacific Flyway Council remain on record as opposed to any more reintroductions of whooping cranes in the Rocky Mountains. It would be very difficult to work on a long-range whooping

crane project in the Rocky Mountains without the full cooperation and enthusiasm from those resource bodies. Without that cooperation, the Recovery Team and the Service currently do not support continued experimentation in the Rocky Mountains.

The high mortality rate experienced by cross-fostered whooping cranes in the Rocky Mountains, with only two whooping cranes remaining in that population, indicates that recovery activities in the near future would have a greater chance for success in a less hostile environment. This alternative is currently unacceptable because of the low probability of success due to high mortality experienced by the migratory population. However, there are some aspects of reintroduction in the Rocky Mountain states which hold promise, such that the area will remain under consideration for a future reintroduction if conditions are more favorable for the effort.

2.1.2 *Reintroduce Whooping Cranes to Marsh Island Wildlife Preserve, Louisiana*

A nonmigratory population of whooping cranes historically occurred in southwestern Louisiana near White Lake (Allen, 1952). About 13 individuals survived in 1940, but a hurricane in the mid-1940s led to loss of half the population. The last individual was captured and moved to Aransas NWR in 1949.

Louisiana was proposed as an experimental release site in the late 1970s but the proposal was not supported by some State and Federal entities at that time. It is possible that consideration could be given to the area again in the future. In evaluating potential whooping crane reintroduction scenarios in 1998, Chassahowitzka NWR and Marsh Island were selected as the top two potential whooping crane wintering sites in the southeastern U.S. (Cannon 1998). In August 1998, the Recovery Team recommended Chassahowitzka NWR over Marsh Island as a wintering site because it was farther from the AWP population and was located on the route used by the eastern greater sandhill crane population. The Recovery Team has indicated that experiments should be done farther east of Louisiana to greatly reduce the chance of mixing an introduced population with the AWP population.

The Marsh Island habitat appears similar to salt marsh at the Aransas NWR and blue crabs, the primary food of wintering whooping cranes in Texas, are abundant (Cannon 1998). An extremely large block of habitat is available, and predation is anticipated to be less than that experienced by the nonmigratory whooping cranes in central Florida since bobcats are not present (Cannon, 1997). If the site was used, migratory whooping cranes could be led to Marsh Island by ultralight aircraft. It also would be possible to establish a nonmigratory population at Marsh Island using a gentle-release technique, whereby captive-reared cranes would be kept in open-topped enclosures (conditioning pens) at the release site as they gradually adjusted to their new surroundings. The birds' flight would be restricted using plastic brails to prevent them from fully extending their wings. They would be provided water and fed a combination of natural and commercial foods while held in the conditioning pens for several weeks until they could be allowed to fly from the enclosures.

Questions remain about the effects of hurricanes on a nonmigratory population at Marsh Island. A migratory population would not arrive to winter in the area until after the summer/fall hurricane season. Hunting issues would have to be resolved which are made more difficult by the large numbers of snow geese (*Chen cerulescens*), a look-alike species, in that flyway. There are concerns that the presence of the white endangered whooping crane would require constraints on hunting of migratory waterfowl, important game species in Louisiana, as well as concerns for survival of the released birds because shooting of a variety of wetland birds has been socially acceptable, locally, even though it was illegal to shoot them (Gomez, 1992).

There also are concerns about whether whooping cranes would nest successfully in the brackish habitat at Marsh Island. Historically, whooping cranes in Louisiana nested in freshwater prairies north of the coastal marshes, a habitat that has since been developed for agriculture. It is unknown what mortality rates chicks would experience in brackish marshes.

If whooping cranes were reintroduced in Louisiana, they could potentially have an impact on crawfish or other aquaculture facilities, since crawfish would probably be an attractive food item to whooping cranes. In the event that Louisiana is ever seriously considered for reintroduction, this potential conflict with aquaculture would need to be more closely examined.

Once more is known about movements and dispersal of introduced whooping cranes, Marsh Island could be an ideal area for expansion of introduced populations. Because of what looks like tremendous habitat, Marsh Island should receive future serious consideration for reintroduction of either migratory or nonmigratory whooping cranes.

2.1.3 *Reintroduce whooping cranes in Manitoba and/or Saskatchewan*

Biological theory holds that reintroductions will be more successful if done in the core historic range of a species. Studies have been done of potential whooping crane habitat in Saskatchewan (Lyon et. al 1995) and Manitoba ((Sommerfeld and Scarth 1998). The Recovery Team believes that because of the many unknown factors associated with a new reintroduction, initial releases should be done in areas which would result in a very low likelihood of contact between the new population and the AWP population. The Whooping Crane Recovery Plan calls for three distinct populations of whooping cranes. Also, designation of reintroduced populations as experimental nonessential require that they be separate from natural populations. Any population introduced into Manitoba or Saskatchewan would have a high likelihood of contact with the existing AWP population. Reintroduced cranes would have different behaviors, and are known to have different vocalizations than wild birds (Carlson 1991). Also, transmission of a disease from an introduced bird into the wild flock, although unlikely, cannot be ruled out.

A migration of cranes from Manitoba to the southeastern U.S. led by ultralight aircraft would be long and arduous and could be defeated by weather events. The Recovery Team believes that if a

population which nests in Wisconsin and winters in Florida can be successfully reintroduced, and shows acceptable behaviors, then further consideration should be given to an expansion of a whooping crane population into Manitoba.

2.1.4 *Establish an additional nonmigratory flock of whooping cranes in Florida*

Another possible alternative would be to establish a second nonmigratory flock of whooping cranes in Florida. Suitable habitat exists in the state, local attitudes are positive, and the State of Florida is a strong supporter of the ongoing reintroduction at the Kissimmee Prairie. However, several potential drawbacks to this possible alternative have been identified. The State of Florida has gone on record as not opposing the establishment of a second, migratory population of whooping cranes, provided that project does not adversely affect the ongoing Kissimmee project, or result in the need for any expenditure of resources beyond what the State already has committed. The State of Florida also might have difficulty in supporting another nonmigratory whooping crane population, due to the potential for competition for funding, and possible limitations of personnel.

The location of another flock of nonmigratory whooping cranes in such close proximity to the existing flock at the Kissimmee Prairie probably would not fully satisfy the objective for two additional self-sustaining flocks, as specified in the whooping crane recovery plan. Future population expansion would likely result in the two flocks becoming a single population, thereby defeating the purpose of the action. Even if they remain separate, due to their proximity, both populations would potentially be subject to the same catastrophic event, which would not give the margin of safety needed to ensure survival of the species.

2.2 Alternatives Studied in Detail

2.2.1 Implementation Techniques Common to All Action Alternatives

Studies of whooping cranes (Drewien and Bizeau 1977) and greater sandhill cranes (Nesbitt 1988a) have shown that migration is a learned rather than an innate behavior in these species. Captive-reared whooping cranes released in Wisconsin or Michigan, or other northern areas of suitable habitat, would need to be taught where to migrate in order to develop the habit of migrating to a suitable wintering area. At this time, the expected method to accomplish this objective is to train the young cranes to follow an ultralight aircraft, which would then be used to lead them to the chosen wintering site.

Captive-reared cranes would be conditioned for wild release through rearing in isolation from humans, by use of conspecific role models, puppets, and exercise by animal care personnel in bird costumes to avoid imprinting on humans (Ellis et al. 1992a; Horwich 1989; Urbanek and Bookhout, 1992). This technique has been successful in supplementing the population of endangered, nonmigratory Mississippi sandhill cranes *(Grus canadensis pulla*) (Zwank and Wilson 1987, Ellis et al. 1992b). The successful

establishment of a new population of whooping cranes may depend upon the reintroduced birds being wary of humans and avoiding contact.

To condition cranes to follow ultralight aircraft to the proposed wintering site, aircraft motor sounds are played to young crane chicks to acclimate them to engine noise. The "following" instinct of crane chicks is utilized to get them conditioned to walk behind motorized vehicles and/or aircraft. Once acclimatized, the cranes will follow the taxiing aircraft and soon learn to fly behind the ultralight. Using this technique (Clegg et. al. 1997, Lishman et. al. 1997), sandhill cranes were led in migration between Ontario and Virginia in 1997, and four whooping cranes and eight sandhills were taught a migration between Idaho and New Mexico in 1997. Cranes led south in the fall have returned north on their own the following spring.

Through the life of the project, several different strategies for accomplishing migration to the Florida wintering site may be utilized: 1) leading the cranes using an ultralight aircraft the birds have been conditioned to follow; 2) allowing the released birds to migrate guided by wild sandhill cranes (Urbanek and Bookhout, 1994), or after the first year, guided by whooping cranes; 3) the "stage-by-stage" trucking technique conducted by Dr. Ellis with sandhill cranes in the west which consists of transportation by truck throughout the migration, with stops every 50 miles or so to allow the birds to fly around to learn the landscape at each stop; or 4) some combination of these techniques. The rationale is to use the technique that is thought to have the highest probability of success, but to retain the option of using another potentially promising technique if conditions warrant. As the project proceeds, the intent is to use techniques that seem reasonable in light of the present understanding of whooping crane biology. However, for the first fall migration season, the primary technique is expected to be use of ultralight aircraft to lead whooping cranes to the chosen wintering site in Florida; birds not trainable to follow aircraft may be released with wild sandhill cranes and then relocated to the appropriate wintering area.

Final protocol for the ultralight portion of the project would be finalized following analysis of the results of a pilot study with sandhill cranes conducted in 2000. A cohort of locally obtained sandhill cranes was isolation-reared, and trained to follow ultralight aircraft. The experiment with sandhill cranes was conducted to determine whether a crane species can be led the long distance by ultralight aircraft between Wisconsin and Florida, to allow for the identification of a series of stopover areas for use during migration, and to refine techniques and procedures associated with successful use of ultralight aircraft in “teaching” a migration route to cranes. Eleven sandhill cranes were led, successfully, from Wisconsin to Florida by ultralight aircraft in the fall of 2000. At least nine of the eleven cranes returned on their own to the release site in Wisconsin in the spring of 2001. The status of the other two cranes is unknown; they had not been sighted, nor were their radio-transmitted signals recorded as of May 2001. They may have returned as well, but were undetected due to malfunction of their radio transmitters, or if they returned to an unmonitored, remote area.

In the event that whooping cranes are allowed to migrate guided by wild sandhill cranes, the birds would be monitored in migration, and once in Florida, the cranes would be led either via ultralight aircraft to the desired overwintering location, or captured and brought to the site. Under the latter scenario, gentle-release techniques would be used that retain birds in open-topped enclosures (conditioning pens) at the release site as they gradually adjust to their new surroundings. The enclosures would contain some natural foods and water. Data on survival of released birds, movements, behavior, causes of losses, reproductive success, and other information would be gathered throughout the project. Project progress would be evaluated periodically.

Past research (Horwich 1989; Urbanek and Bookhout 1992; W. Lishman and J. Duff, pers. comm. 1998) indicates that the reintroduced cranes should initiate and complete spring migration without assistance. All birds would be monitored by radio-tracking during spring migration. Yearlings not reaching locations in the northern one-third of the range of the eastern greater sandhill crane summer distribution (Jasper-Pulaski State Fish and Wildlife Area, Indiana, and northward) by June 1 would be retrieved and transported to the selected reintroduction area.

If previously used techniques are effective, a correctly migrating core flock of whooping cranes is expected to be present to lead subsequently released juveniles in migration. Procedures for associating juveniles with older whooping cranes would be similar to procedures used to associate captive-reared juveniles with wild sandhill flocks (Urbanek and Bookhout 1992).

Regardless of which method is chosen, facilities would be needed at the selected release site for rearing and training of young cranes, and would include an area suitable for taxi, takeoffs and landings by ultralight aircraft, large pens suitable to house the young cranes while providing protection from predators, nighttime enclosures, and, in the event that incubation and/or early rearing is conducted on site, small buildings suitable to house young chicks. Facilities used for a previous sandhill crane migration experiment at Necedah NWR are still present, and would be suitable for use in whooping crane reintroductions. In the event that an alternative is chosen which utilizes any of the other potential release sites, facilities suitable for rearing and training of young cranes would need to be constructed at whatever release location is utilized. At each location, disturbance of limited areas for construction of the above-described facilities would be required.

2.2.2 Alternative 1 - *No Action*

Under this alternative, an additional migratory population of whooping cranes would not be reintroduced into the eastern U.S. and whooping crane recovery would be delayed. The majority of recovery activities would be concentrated on releases in the Kissimmee Prairie experimental nonessential flock in central Florida while alternative recovery strategies were formulated and evaluated. The Service, the Wisconsin and Michigan DNRs and the Florida Fish and Wildlife Conservation Commission would continue managing wildlife on their respective management areas in accordance with their respective authorities.

2.2.3 Alternative 2 (Preferred Alternative) - *Establish a nonessential experimental migratory population of whooping cranes in the eastern United States with initial reintroduction of captive-reared cranes to Wisconsin and migration to a wintering site at Chassahowitzka National Wildlife Refuge in Florida*

The Service, in cooperation with partner agencies and organizations, would initially release captive-reared whooping cranes in Wisconsin under this alternative, provided young captive-reared birds are available and all issues identified by the Recovery Team have been fully resolved. The reintroduced whooping cranes, including offspring, would be designated a Nonessential Experimental Population in accordance with section 10(j) of the Endangered Species Act, as amended, and implementing regulations in 50 CFR 17.81. As such, the prohibitions and exceptions necessary and appropriate to conserve the species would be included in a special regulation to ensure that the population is protected and reintroduction is compatible with current or planned human activities throughout the project area. "Take" of a whooping crane from this population would be prohibited except when such take is accidental and not the purpose of carrying out an otherwise lawful activity. Examples of otherwise lawful activities include but are not limited to, agricultural practices, pesticide application, water management, construction, recreation, trapping, or hunting, when the activities are in full compliance with all applicable laws and regulations.

The proposed NEP area would involve a large part of the eastern U.S. including the States of Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, North Carolina, Tennessee, Virginia, West Virginia, and Wisconsin. All of these States are considered to be within the probable historic range of the species. It is expected that most whooping cranes would be concentrated within the States of Wisconsin and Florida, as well as adjacent States, and those States within the migration corridor.

It is understood that whooping cranes also occurred in or migrated through the remaining northeastern States not listed for inclusion in the potential NEP area, although that occurrence is not as well documented as for other eastern States. Given the propensity for whooping cranes to wander and potential future dispersal of the population, if this alternative is selected it may be appropriate to include the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, New Jersey, Pennsylvania, Rhode Island, and Vermont in an eastern U.S. NEP as well.

With this alternative, the Service would raise 10 to 25 juvenile, captive-reared whooping cranes and lead them to a wintering site at Chassahowitzka NWR in Florida. These birds would be captive-reared at the Patuxent Wildlife Research Center in Laurel, Maryland, the International Crane Foundation in Baraboo, Wisconsin, and other captive-rearing facilities. The cranes would be brought to the Wisconsin release site at between 15 and 30 days of age, and conditioned for wild release to increase post-release survival (Ellis et al. 1992b, Zwank and Wilson 1987) and adaptability to wild foods. The selected release site would be Necedah NWR, with the possibility of future use of either Crex Meadows State Wildlife Area (WA) or Horicon NWR (Figure 1). The birds would be radio-tagged at

release and monitored to discern movements, habitat use, other behavior, and survival. In the fall, the expected primary reintroduction technique would be leading the cranes with ultralight aircraft to a chosen wintering site in Florida. If results of the initial release are favorable, releases would be continued with the goal of releasing 20 to 25 birds annually for about 10 years.

Additional release sites may be selected later during the project life to increase potential breeding range. Multiple release areas may increase the opportunity for successful pairing because females tend to disperse from their natal site when searching for a mate. Males, however, have a stronger homing tendency towards establishing their nesting territory near the natal area (Drewien et al. 1989). When captive-reared cranes are released at a wild location, the birds may view the release site as a natal area. If they do, females would disperse away from the release area in their search for a mate. In such a circumstance it may be advantageous to have several release sites to provide a broader distribution of territorial males. Future release sites may be selected based upon the dispersal patterns observed from cranes released at the initial release site.

The locations of the proposed release areas were chosen to fulfill the criteria set forth by the Whooping Crane Recovery Team, i.e., to establish a new migratory flock in a location where there would be a minimal chance of contact with the existing natural wild flock. This criterion was established out of concern for adverse impacts to the wild flock due to exchange of disease or undesirable behavior between any newly established migratory flock and the existing wild flock.

The historic breeding range of the whooping crane in the U.S. included Illinois, Iowa, North Dakota, and Minnesota, with the largest number of confirmed nesting records in Iowa (Allen 1952). There are at least five reliable reports from Wisconsin, and although there are no confirmed records of nesting, there is a nesting record from Dubuque County, Iowa (Allen 1952), which is adjacent to Grant County, Wisconsin.

2.2.4 Alternative 3 - *Establish a migratory population of whooping cranes, classified as endangered in the eastern United States with initial reintroduction of captive-reared cranes to Wisconsin and migration to a wintering site at Chassahowitzka National Wildlife Refuge in Florida*

This alternative would be carried out in the same manner as Alternative 2, except that migratory whooping cranes introduced in the eastern U.S. would have full protection under the ESA. The whooping cranes in this population would have the full protection under the ESA against "take". Anyone who would "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct " against a whooping crane from this population would be violating the ESA, 16 USC sec.s 1532(19) and 1538. The only exceptions would be takings by special permit "for scientific purposes or to enhance the propagation or survival of the affected species," 16 USC sec. 1539(a)(1)(A). The Service would not prepare and issue a rulemaking to designate a NEP of migratory whooping cranes in the eastern U.S. under this alternative.

2.2.5 Alternative 4 - *Establish a nonessential experimental migratory population of whooping cranes in the eastern United States with initial reintroduction of captive-reared cranes to Seney National Wildlife Refuge in Michigan and migration to a wintering site at Chassahowitzka National Wildlife Refuge in Florida*

This alternative would be carried out in the same manner as Alternative 2 except that whooping cranes would be introduced at Seney NWR in Michigan rather than in Wisconsin (see Figure 1). The historic breeding range of the whooping crane in the U.S. included Illinois, Iowa, North Dakota, and Minnesota. There have been four whooping crane specimens collected from Michigan. Three are from 1882 near Brighton just west of Detroit, and one in 1887 from Washtenaw County near Ann Arbor (Allen 1952). Since the historic distribution of the whooping crane is believed to have been as far east and north as Hudson Bay in Canada, it is probable that the species once nested in the Upper Peninsula of Michigan and in the extensive adjacent wetland habitat in Ontario.

As indicated with Alternative 2, if this alternative is selected, it may be appropriate to also include the northeasternmost States in a proposed NEP area to account for the full dispersal potential of a migratory whooping crane population in the eastern U.S.

3.0 AFFECTED ENVIRONMENT

Except for Alternative 1, the No Action alternative, which has no specifically identifiable affected environment, the area involved in rearing, migration and wintering of the proposed migratory whooping crane population would include a large part of the eastern U.S. east of the Mississippi River for all of the alternatives. Reintroduced whooping cranes are expected to spend the majority of the year within the states of Wisconsin and Florida under Alternatives 2 and 3, and within the states of Michigan and Florida under Alternative 4; under Alternatives 2, 3 and 4, they are expected to migrate within a corridor through Illinois, Indiana, Kentucky, Tennessee, and Georgia.

There is every reason to believe that whooping cranes released in Wisconsin or Michigan would return to the vicinity of the release site in subsequent years (Urbanek and Bookhout 1994). Likewise, it is reasonable to assume that most birds in Florida would remain in the vicinity of the chosen wintering site. The description of Affected Environment in sections 3.1 through 3.1.5 is focused on the Potential Release Area in Wisconsin; sections 3.3 through 3.3.5 focuses on the Potential Release Area in Michigan. Sections 3.2 through 3.2.5 address the Primary Wintering Area in Florida which would be the same for either the Wisconsin or Michigan potential release areas described in Alternatives 2, 3 or 4.

3.1 Potential Wisconsin Release Areas

Potential Release Areas in Wisconsin include Necedah NWR, Horicon NWR, and Crex Meadows WA. Initial releases are planned for Necedah NWR in Juneau County; however, the location of future releases may depend upon the dispersal patterns exhibited by whooping cranes following release. To provide the flexibility which may be needed in the future, this EA analyzes the use of all three potential future release sites.

Necedah NWR

Necedah NWR is a 43,600-acre (17,644 hectare {ha}) refuge located in west-central Wisconsin that is managed primarily for waterfowl. Additional management actions are directed towards oak barrens restoration and management, and to benefit a number of federally-listed threatened and endangered species, such as the gray wolf, Karner blue butterfly, and bald eagle.

Compared to some other areas in Wisconsin, the area near Necedah NWR has experienced limited human population growth over the past 30 years due to its distance from major population centers and low suitability for most types of agriculture. The presence of large public land holdings is due, at least in part, to limited agricultural suitability of the area. A majority of the movements of the released cranes are expected to occur within the central Wisconsin area which comprises approximately 494,000 acres (200,000 ha) of similar habitats. Cannon (1999) has estimated that approximately 92,000 acres (37,000 ha) of suitable whooping crane habitat exists in this area.

Rearing facilities which include areas suitable for use with ultralight aircraft, were constructed at Necedah NWR for use in a previous migration experiment with sandhill cranes. These facilities are suitable for rearing and training whooping cranes, in the event that an alternative is chosen which utilizes Necedah NWR as a release site.

Horicon NWR

Horicon Marsh is a 32,000-acre (12,950 ha) cattail marsh located in east central Wisconsin which has been designated a "Wetland of International Importance" by the Ramsar Convention, an intergovernmental group formed as the result of a treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Horicon Marsh also has been designated a "Globally Important Bird Area" (IBA). The Important Bird Areas Program was started by BirdLife International, UK, in the mid-1980s. Since that time IBAs have been designated throughout Europe and the Middle East. The IBA Program has now spread throughout the world including the United States, Canada and Mexico. The Wisconsin DNR manages the southern third of Horicon Marsh as a WA, and Horicon NWR is a 22,287-acre (9,019 ha) Federal refuge located in the northern two-thirds of the marsh. Horicon Marsh is the largest freshwater cattail marsh in the U.S., and was formed from a lakebed created during the last glacial period. It provides

traditional habitat for many species of wetland birds including ducks, geese, cranes, herons, and shorebirds, including 300,000 Canada geese which stage on the Horicon NWR each October. All told, approximately 34,000 acres (13,760 ha) of suitable crane habitat is available in the vicinity.

Although a low diversity of different habitat types is present at Horicon Marsh, this site is well known for high concentrations of water, marsh and wading birds. Its strategic location in a well-used eastern Wisconsin flyway area also makes it likely that any whooping cranes introduced in the state would eventually visit this site. In addition, several other medium to large wetland sites are present in the vicinity, which may also prove suitable for occupation by whooping cranes. The large amount of land owned by the Service and the Wisconsin DNR would facilitate the establishment of rearing facilities.

Crex Meadows WA

The Wisconsin DNR's Crex Meadows WA encompasses 30,098 acres (11,115 ha), and additional habitat is present on two nearby Wisconsin WAs, Fish Lake (14,124 acres or 5,341 ha) and Amsterdam Sloughs (7,233 acres or 2,484 ha). The mix of open wetland and forested types in the Crex Meadows area is similar to the central Wisconsin release area. A total of approximately 60,000 acres (24,000 ha) of suitable wetlands are estimated to be present in Burnett County, including these three properties (Cannon, 1999). The location of this site in relation to the Mississippi Flyway area also increases the chances that any whooping cranes introduced in the state may eventually visit this site. In addition, extensive similar wetland areas are present in nearby Minnesota, which may also prove suitable for occupation by whooping cranes.

3.1.1 Physical Characteristics

Necedah NWR

The Necedah NWR is located in the western portion of central Wisconsin, in Juneau County. (Figure 1). The refuge is approximately 75 miles (120 kilometers {km}) northwest of Madison, 50 miles (80 km) east of La Crosse and 93 miles (150 km) northwest of Milwaukee, Wisconsin. The area is underlain by Cambrian sandstone, and the soils are primarily lacustrine and glacial outwash sands (Martin 1965). The refuge lies within the Driftless Area, a region unique in the Upper Midwest for having escaped the widespread continental glaciation. This area is characterized by gentle local relief, with scattered outcrops of resistant rock. The region is characterized by a cool continental climate with temperature extremes at the nearby Village of Necedah ranging from -46 to +105 Fahrenheit {F}) (-43 to +40 Centigrade {C}) with an average of 44.9 F (7.17 C). Annual precipitation at Necedah averages 31.53 inches (80 centimeters (cm)), which includes 32 inches (81 cm) of snow (Wisconsin State Climatology Office, 1999).

Horicon NWR

The Horicon NWR is located in the eastern portion of central Wisconsin, in Dodge and Fond du Lac Counties (Figure 1). The refuge is approximately 50 miles (80 km) northeast of Madison, and 50 miles (80 km) northwest of Milwaukee, Wisconsin. The area is underlain by primarily limestone bedrock, and the soils are primarily glacial tills in the form of clays, loams and gravels (Martin 1965). The area is characterized by gentle local relief, with several well-developed riverine drainage systems. The region is characterized by a cool continental climate with temperature extremes at the nearby City of Beaver Dam ranging from -36 to + 100 F (-38 to +38 C) with an average of 46.6 F (8.1C). Annual precipitation at Beaver Dam averages 31.73 inches (80.6 cm), which includes 34 inches (86.4 cm) of snow (Wisconsin State Climatology Office 1999).

Crex Meadows WA

The Crex Meadows WA is located in far northwestern Wisconsin, in Burnett County (Figure 1). It is approximately 65 miles (105 km) northeast of Minneapolis, Minnesota, and 90 miles (145 km) northwest of Eau Claire, Wisconsin. The area is underlain by sandstones and basalts, and the soils are primarily glacial outwash in the form of sands and gravels (Martin 1965). The area is characterized by gentle local relief, with several well-developed riverine drainage systems. The region is characterized by a cool continental climate with temperature extremes at the nearby City of Grantsburg, Wisconsin, ranging from -44 to + 100 F (-42 to +38 C) with an average of 41.1 F (5 C). Annual precipitation at Grantsburg averages 31.29 inches (79.5 cm), which includes 51 inches (129.5 cm) of snow (Wisconsin State Climatology Office 1999).

3.1.2 Biological Environment

Vegetation

Necedah NWR

The dominant vegetation of the central Wisconsin release area occurs on poorly drained, sandy soils. The area exhibits little change in local relief, yet due to the sandy nature of the soils, relatively small changes in elevation result in appreciable differences in vegetation types. In general, central Wisconsin vegetation is characterized by a mosaic of forest and open wetlands. Numerous small streams cut across the landscape, many of which have been ditched for purposes of agricultural drainage. Much of the landscape consists of mixed forests interspersed with open expanses of sedge and shrub wetlands, small streams and ponds.

The Necedah NWR is characterized by this type of interspersion. Approximately 44 percent (19,000 acres or 7,725 ha) of the Necedah NWR is suitable crane habitat. This habitat is either shallow open

wetlands dominated by sedges (*Carex spp*.), cattails (*Typha spp*.) and bulrush (*Scirpus spp*.) (17,000 acres or 6,860 ha), or one of several large, shallow open-water areas which are maintained through the use of water control structures (2,137 acres or 865 ha). Refuge lands also include 1,717 acres (695 ha) of shrublands, which includes both upland and wetland, 21,078 acres (8,530 ha) of various forest types, and 1,695 acres (686 ha) of grasslands. Forest types include dry oak forest and oak savanna remnants with northern pin oak, jack pine, shrubs, grasses and forbs, and lowland hardwoods of silver maple, ash and elm. Habitat on the adjacent Meadow Valley, Wood County and Sandhill WAs are similar in nature.

The Wisconsin River, with the associated manmade Petenwell and Castle Rock flowages, is located within 3 to 6 miles (5 to10 km) to the east of the initial release site. Numerous other small streams and rivers occur in the area.

Horicon NWR

The dominant vegetation of east central Wisconsin was historically mesic forest interspersed with numerous wetlands, which occurred on fairly well-drained soils of glacial till origin. This region of the state has numerous glacial remnant features such as kettle holes, kames and drumlins. The current landscape is largely agricultural in nature, with scattered upland wood lots, and various sized wetlands, both emergent and forested. Numerous small streams have been ditched, and wetlands drained, for purposes of agricultural drainage.

The Horicon NWR is composed of 15,573 acres (6,302 ha) of mostly open marsh dominated by cattails (Typha spp.) and bulrush (Scirpus spp.) with a number of large, shallow open-water areas maintained through the use of water control structures. Refuge lands also include 5,476 acres (2,216 ha) of uplands consisting of woodlands and grasslands. The south, east and west branches of the Rock River enter and flow through the marsh, and numerous other small streams and rivers occur in the area.

Crex Meadows WA

The dominant vegetation of northwestern Wisconsin was historically pine barrens interspersed with numerous wetlands, which occurred on pitted glacial outwash and hummocky sediments. The current landscape is largely a mix of forests and open wetlands, with relatively few developed agricultural areas.

The 30,098-acre (12,180 ha) State-owned Crex Meadows WA is composed of mostly open, sedge (*Carex sp*.)-dominated wetlands with a number of large, shallow open-water areas maintained through the use of water control structures. State lands also include uplands consisting of woodlands and grasslands. The nearby Fish Lake and Amsterdam Sloughs WAs contain a similar mix of shallow wetland and open water vegetation types.

Threatened, Endangered, and Candidate Species

Federally-listed species known to occur in the vicinity of the potential Wisconsin Release Areas include the bald eagle *(Haliaetus leucocephalus)*, gray wolf *(Canis lupus)*, and Karner blue butterfly *(Lycaeides melissa samuelis)*. The candidate species, eastern massasauga (*Sistrurus catenatus catenatus*), historically occurred in the vicinity of the Necedah NWR.

The bald eagle, a large fish-eating raptor, has been a federally-listed species since 1967 and is currently listed as threatened in Wisconsin. A dramatic recovery of eagle populations has led to the July 8, 1999 Service proposal to remove the species from the federal list of endangered or threatened wildlife. It is anticipated that this species will soon be removed from the list of federal threatened and endangered species. This species nests in the vicinity of all three potential release areas, is commonly found at all three sites during migration periods, and occasionally occurs during the winter.

The gray wolf is a large canid which was federally-listed in 1967. In Wisconsin, it is currently listed as endangered. Wisconsin populations have recovered from local extirpation to a point where they now have been proposed for downlisting to threatened in the state (FR 65:135, July 13, 2000). As of winter 1998-99, the central Wisconsin project area encompassed at least a portion of the territories of seven packs and one loner, totaling 23 to 26 wolves. Numerous wolf packs exist in northwestern Wisconsin, including one pack which utilizes the Crex Meadows WA for much of its activities (Wydeven, et. al. 1999). No suitable wolf habitat exists near the Horicon NWR, and no wolves have been documented to occur there. The principal prey items for gray wolves in Wisconsin are white-tailed deer and beaver.

The Karner blue butterfly is a small lycaenid butterfly which is dependant upon wild lupine as its exclusive larval food plant. Wild lupine occurs in sandy, open savannahs, barrens and prairies; it is dependent upon open sunny habitats which are maintained by periodic disturbance. Necedah NWR has some of the largest and healthiest populations of Karner blue butterflies in Wisconsin, and management actions on the refuge have been designed to favor this species. Karner blue butterflies occur in a restored savanna area adjacent to sandhill crane premigration training areas and rearing facilities at Site number 2 at the Necedah NWR. Karner blue butterflies also occur at Crex Meadows WA, where management actions are designed to benefit the butterfly (C.Carnes, pers.comm).

The eastern massasauga rattlesnake was elevated to candidate status as of October 25, 1999. The massasauga is a small to medium-sized, poisonous snake which inhabits various wetland types, as well as dry, well-drained sandy uplands. It feeds upon snakes, frogs, salamanders, toads, small mammals, birds, and young turtles. The species historically occurred in the vicinity of the Necedah NWR, but currently, natural populations are not thought to be extant (R.King, pers.comm).

Other Wildlife Species

All three of the potential Wisconsin release sites currently support a diversity of wildlife species typical of the local plant communities. Wisconsin is known to have a healthy and productive population of the greater sandhill crane, and the species nests at all three of the potential release sites. Marsh and lakeshore areas are used by the great blue heron (*Ardea herodias*) and other species of wading birds, e.g., egrets and bitterns. Other common wildlife species include white-tailed deer (*Odocoileus virginiana*), raccoon (*Procyon lotor*), coyote *(Canis latrans*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), gray and fox squirrels (*Sciurus carolinensis* and *S. niger*), eastern chipmunk (*Tamias striatus*), and numerous species of mice and shrews.

Reptiles and amphibians found at each of the sites are typical of most of the state. Common snakes include the eastern garter snake (*Thamnophis sirtalis*), fox snake (*Elaphe vulpina*), and smooth green snake (*Opheodrys vernalis*). The most common turtles present are the painted turtle (*Chrysemys picta*) and the snapping turtle (*Chelydra serpentina*). A number of frog species reside within the wetlands and water bodies of the area, the most common being the leopard frog (*Rana pipiens*), green frog (*R. clamitans melanota*), wood frog (*R. sylvatica*), gray tree frog (*Hyla versicolor*), and spring peeper (*H. crucifer*); the American toad (*Bufo americanus*) also is very common. A number of salamander species are present as well, the most common and widespread being the red-backed (*Plethodon cinereus*) and blue-spotted salamanders (*Ambystoma laterale*).

Disease

Epizootics in captive cranes have been a source of mortality in the past. Outbreaks of communicable diseases among the western U.S. whooping crane NEP that was cross-fostered with sandhill cranes, and among species with which they associate also have been of concern. Avian tuberculosis, avian cholera, mycotoxicosis (both acute and chronic), encephalitis and coccidiosis have been diseases of consequence to whooping cranes or sandhill cranes (J. Carpenter, pers. comm.). Parasites, especially *Haemoiproteus sp., Hexamita sp., Eimeria spp*., and *Leucocytozoon sp.* pose a threat.

3.1.3 Land Use

Necedah NWR

The principal private land uses in the area are forestry, cranberry culture and other agriculture, and recreational hunting. Upland forests are managed for sawtimber and firewood production, on either a clearcut rotational basis, or selective harvest, dependent upon forest type and management objectives. Wetland habitat utilized for cranberry culture is managed mainly through the manipulation of water

regime, in the form of seasonal flooding. The public lands are managed for wildlife values, recreation, water conservation, and to maintain natural habitat conditions.

On private lands, large amounts of historic wetland habitat have been converted to cranberry culture. Land ownership includes a number of large private holdings devoted to cranberry production and six large public ownerships totaling 205,651 acres (83,222 ha), including Necedah NWR, several State WAs, Black River State Forest, and Hardwood Air-to-Surface Gunnery Range. County-owned lands within Jackson, Juneau, Monroe and Wood counties are primarily devoted to forestry, totaling 162,624 acres (65,810 ha).

Horicon NWR

The dominant land use of Dodge County is agriculture. A number of State Fishery Areas and WAs occur in Dodge County, totaling about 59,589 acres (24,114 ha). The vast majority of the land surface area has been cleared for agriculture, and numerous wetlands have been drained. Forest areas are primarily composed of scattered small wood lots.

Crex Meadows WA

Approximately 16 percent of Burnett County comprises lands utilized for agriculture, and 65 percent is forested, of which over 95 percent is considered commercial forest land. The Wisconsin DNR owns 69,729 acres (28,218 ha), which is made up of State Forests, Parks, Natural Areas, Fishery Areas, and Wildlife Areas. There are 181,669 acres (73,517 ha) of County Parks and Forests (Legislative Reference Bureau, 2000).

Agriculture and Industrial Use

Necedah NWR

The principal private land uses in the general geographic area are forestry, agriculture, and recreational hunting. Principal agricultural crops include corn, oats, soybeans, hay, and cranberries. Upland forests are managed for sawtimber and firewood production, on either a clear-cut rotational basis, or selective harvest, dependant upon forest type and management objectives. Wetland habitat utilized for cranberry culture is managed mainly through the manipulation of water regime, in the form of seasonal flooding. The public lands are managed for wildlife values, recreation, water conservation, and to maintain natural habitat conditions.

Horicon NWR

Dodge County is a leading county in the production of cheese, barley, alfalfa, hay, and peas for canning. The area also is a major producer of dairy products, with the majority of milk production going to production of cheese. Industries include the manufacture of wood products, shoes, metal products, lawn care equipment, magazines, stainless steel equipment, and ice fishing equipment (Dodge County, 2000).

Crex Meadows WA

Forestry and recreation are the two most common forms of land use, and the primary sources of employment in Burnett County are service, manufacturing, and trade industries. The primary agricultural products of Burnett County are dairy products and livestock. (BCDA, 1999).

Residential Use

Necedah NWR

The total population for Jackson, Juneau, Monroe, and Wood Counties in Wisconsin is147,936 (1990 Census). The proposed project area represents approximately 33.6 percent of the areas for these four counties. Based upon the size of the Primary Release Area, approximately 49,687 individuals may reside within the project area. However, the actual density of human residents within this area is probably much lower, due to the large amount of publicly-owned and unoccupied lands. No large cities are present within this potential release area, the largest being Necedah with a population of 743.

Horicon NWR

The total population for Dodge, Fond du Lac and Washington counties in Wisconsin is 102,925 (1990 Census). No large cities are present within this area, the two largest being Fond du Lac with a population of 37,757, and Beaver Dam with a population of 14,196 (1990 Census).

Crex Meadows WA

The total population for Burnett County was estimated at 13,641 in 1995. No large cities are present within this area, the largest being Grantsburg with a population of 1,144. Population densities in Burnett County are 16.6 per square mile, much lower than the state average of 94 per square mile (UW-Extension, 1997).

Recreational Use

Necedah NWR

Much of the public land in the central Wisconsin area is open year round to public access. The area receives moderate use during fall and spring hunting (wild turkey, *Meleagris gallopavo*) seasons. Public use for fishing, hiking and birding is light. Area streams and rivers receive varying amounts of fishing activity. A small amount of waterfowl (duck) hunting occurs in the vicinity for modest numbers of waterfowl that migrate through the area. The general area receives some use for wildlife observation and berry picking.

Wildlife provide some economic return for the private farms that lease hunting rights to private individuals and clubs. Deer and turkey are the species which attract the greatest numbers of hunters. Many of the larger farms, however, only allow hunting by family and friends. Most farm owners take an active interest in wildlife, often planting food plots and maintaining feeders for turkey and deer. Limited numbers of ducks occur on lakes and ponds in the area. There are few geese in the area and sandhill cranes, herons, and pelicans are protected. The majority of the geese observed in the area are Canada geese (*Branta canadensis*), with snow geese being relatively rare.

Sport fishing activities are common on the larger lakes and flowages in the area. This activity benefits some service businesses (sporting goods supplies, restaurants, gas stations) in the area.
Water skiing and sailing occur on the larger, deeper lakes and flowages. These activities would not be affected by the reintroduction of whooping cranes.

Birding and nature viewing are currently limited in importance as an economic activity in the area. Opportunities are currently available and encouraged at Necedah NWR and at several Wisconsin WAs.

Horicon NWR

Most of the public lands in the Horicon area consist of wildlife areas managed for waterfowl use. Public use for fishing, picnicking, and hiking is light. A substantial amount of waterfowl hunting for both ducks and geese occurs in the vicinity for the large numbers of waterfowl that migrate through the area.

Wildlife provide some economic return for the private farms that rent or lease hunting blinds to goose hunters, and general hunting rights to individuals or hunting clubs. Deer and Canada geese are the species which attract the greatest numbers of hunters. The majority of the geese observed in the area are Canada geese (*Branta canadensis*), with snow geese being relatively rare.

Sport fishing activities are common on the lakes and streams in the area. This activity benefits some service businesses (sporting goods supplies, restaurants, gas stations) in the area. Birding and nature

viewing are an important economic activity in the area, the majority consisting of visitors to Horicon NWR to see Canada geese in the fall.

Crex Meadows WA

Much of the public land in northwestern Wisconsin is open year-round to public access. The area receives moderate use during fall hunting seasons. Public use for fishing, picnicking, and hiking is light. Area streams and rivers receive varying amounts of fishing activity. A small amount of waterfowl (duck) hunting occurs in the vicinity for modest numbers of waterfowl that migrate through the area. The general area receives some use for wildlife observation and berry picking. Birding and nature viewing are currently limited in importance as an economic activity in the area.

Deer and ducks are the species which attract the greatest numbers of hunters. There are limited numbers of geese in the area, most of which are Canada geese, with snow geese being relatively rare.

Sport fishing activities are common on the larger lakes and flowages in the area. This activity benefits some service businesses (sporting goods supplies, restaurants, gas stations) in the area.

Water Usage

Necedah NWR

There are five active drainage districts in Juneau County, encompassing approximately 30,000 acres (12,140 ha) (Dave Jelinski, DATCP, pers. comm). These drainage districts are special purpose districts formed for the purpose of draining land, primarily for agricultural purposes. Lands within a drainage district are drained by means of common drains that cross individual property boundaries. The county drainage board is responsible for maintaining functioning drains, keeping proper records (including proper maps), assessing maintenance costs, and educating landowners involved in the drainage district of their responsibilities.

While the primary purposes of existing drainage ditches is to make land more suitable for traditional agriculture, some cranberry operations also use these ditches as a water source for their beds, and to discharge water after use. Some of the water flowing into and through the Necedah NWR enters the refuge via drainage ditches. This water is used by the refuge for management of several impoundments for waterfowl and other water-dependant species.

Horicon NWR

There are no known active drainage districts in the vicinity of the Horicon NWR.

Crex Meadows WA

No drainage districts are known to be active in the area surrounding the Crex Meadows WA.

3.1.4 Cultural/Paleontological Resources

Necedah NWR

Historic and archaeological resources are limited in and around the Necedah NWR (J. Dobrovolny, pers.com.), with only a few archaeological sites, and very few historic structures.

Horicon NWR

Historic and archaeological resources in and around the Horicon NWR include 49 properties listed on the National Register of Historic Places, and six more that are eligible for listing, as of July 28, 1993 (USFWS, 1995). Additional properties also have been identified that have yet to be analyzed for eligibility. These sites consist of both homesites and farmsteads, and prehistoric and historic Indian sites.

Crex Meadows WA

Limited information is available regarding historic and archaeological sites in and around the Crex Meadows WA. Some Indian grave sites are known to be present on the property. There are undoubtedly other prehistoric and historic Indian sites present, but few surveys have been conducted.

3.1.5 Local Socio-economic Conditions

Necedah NWR

The Necedah NWR and associated State WAs are managed specifically for wildlife and recreational values. The surrounding area is generally rural. Agriculture, including cranberry production, and forestry are the dominant land uses. While the local economies are not exhibiting major growth, neither are they considered to be depressed. Agriculture is one of the dominant land uses, but most employment is in nonfarm industries. Major employers in the area include the light manufacturing and various service industries, and an appreciable amount of State and Federal government employment associated with the public properties.

Horicon NWR

The Horicon NWR is managed specifically for wildlife and recreational values. The surrounding area is generally rural, with agriculture being the dominant land use. While agriculture is the dominant land use, most employment is in nonfarm industries. Major employers in the area include the light manufacturing and various service industries, with some State and Federal government employment associated with the public properties.

Crex Meadows WA

The Crex Meadows WA and other associated State WAs are managed specifically for wildlife and recreational values. The surrounding area is generally rural. Agriculture and forestry are the dominant land uses. In Burnett County, most employment is in nonfarm industries. Major employers in the area include the light manufacturing and various service industries, and some State government employment associated with the public properties.

3.2 Primary Florida Wintering Area

The area proposed for the wintering site for the new migratory whooping crane population is in Citrus and Hernando Counties, Florida, along the Gulf Coast in the west-central part of the state (Figure 1). A large area of mostly contiguous wetland habitat is present on three adjacent public properties: Chassahowitzka NWR; and Florida State-owned areas, the 36,000-acre (14,575 ha) St. Martin's Marsh Aquatic Preserve and the 23,000-acre (9,312 ha) Crystal River State Buffer Preserve.

The primary proposed wintering site is on the Chassahowitzka NWR, of which 55 percent (17,070 acres {6,908 ha}) is suitable crane habitat. The refuge is comprised of over 31,000 acres (12,500 ha) of saltwater bays, estuaries and brackish marshes with a fringe of hardwood swamps along the eastern boundary. Dispersed throughout the salt marsh in a jigsaw puzzle fashion, are 10,000 acres (4,048 ha) of estuarine habitat in the form of shallow bays and tidal streams; the largest of the streams being the Chassahowitzka and Homosassa Rivers. Because of three transitional salinity stages (ranging from fresh spring water, to brackish, and then to the saline waters of the Gulf of Mexico), a wide range of aquatic plant and animal life flourishes within all parts of this system. Cannon's 1998 wintering site study rated Chassahowitzka NWR as an excellent site for wintering whooping cranes based on available habitat, adjacent expansion possibilities, good isolation, and abundant food resources. The adjacent State-owned St. Martin's Marsh Aquatic Preserve and Crystal River State Buffer Preserve contain habitat similar to Chassahowitzka NWR.

3.2.1 Physical Characteristics

The area proposed as a possible wintering site is located in the southwestern corner of Citrus County and the northwestern corner of Hernando County, approximately 65 miles north of Tampa, Florida.

Nearby towns include Chassahowitzka, Crystal River, Homosassa, Ozello, and Inglis. Long, relatively humid summers and mild, dry winters characterize the climate of Citrus County (USDA 1988). The average annual temperature is 71 F (22 C). The soils in this area are primarily of the Okeelanta-Lauderhill-Terr Ceia association, characterized as nearly level, very poorly drained, mucky soils in coastal swamps. Most of the area is less than 5 feet (1.5 m) above sea level and limestone bedrock is frequently within 80 inches (203 cm) of the surface layer (USDA 1988). Annual precipitation at Chassahowitzka NWR averages 56 inches (142 cm).

3.2.2 Biological Environment

Vegetation

The marshlands in the proposed wintering site are composed primarily of a dense mat of black needlerush ranging from about 2 to 4 feet (0.6 to 1.2 m) in height. Thick stands of sawgrass , intermittent patches of saltgrass and, to a lesser degree, salt marsh cordgrass border much of the needlerush marsh. Slightly elevated tree islands, covered with cabbage palms and eastern red cedar, are scattered throughout the salt marsh. An island suitable for introduction of the whooping cranes contains glasswort (*Salicornia sp.*) and sea ox-eye (*Borrichia frutescens*) over a limestone substrate bordered by needlerush. Beginning with the least saline headwater streams of the area, indigenous aquatic plants include such species as sago pondweed, Southern naiad, and coontail. In recent years, there have been substantial invasions of exotic species in these areas such as Eurasian watermilfoil and, to a lesser degree, *Hydrilla*. Wildlife such as waterfowl and other species, including the West Indian manatee, tend to prefer these exotics for food and cover in addition to the native aquatics.

Threatened, Endangered and Candidate Species

Federally-listed species known to occur within the Chassahowitzka NWR, Crystal River/St. Martin's Marsh area include several species of sea turtles (*Chelonia mydas, Lepidochelys kempii, Dermochelys coriacea, Caretta caretta*), eastern indigo snake (*Drymarchon corais couperi)*, alligator (*Alligator mississippiensis*), Florida scrub-jay (*Aphelocoma coerulescens*), bald eagle (*Haliaeetius leucocephalus*), wood stork (*Mycteria americana*), and West Indian manatee (*Trichechus manatus latirostris*).

The following state-listed plant and animal species are known to occur in the proposed wintering site area : *Centropomus undecimalis* common snook (species of special concern (ss))

Pteronotropis welaka bluenose shiner (ss)
Rana capito gopher frog (ss)
Gopherus polyphemus gopher tortoise (ss)
Pituophis melanoleucus mugitus Florida pine snake (ss)
Pseudemys concinna suwanniensis Suwannee cooter (ss)

Sceloporus woodi Florida scrub lizard (threatened)
Ajaia ajaja roseate spoonbill (ss)
Ammodramus maritimus peninsulae Scott's seaside sparrow (ss)
Aramus guarauna limpkin (ss)
Charadrius alexandrinus snowy plover (threatened)
Cistothorus palustris griseus Marian's marsh wren (ss)
Egretta thula snowy egret (ss)
Egretta tricolor tricolored heron (ss)
Eudocimus albus white ibis (ss)
Falco sparverius paulus southeastern American kestrel (threatened)
Haematopus palliatus American oystercatcher (ss)
Pelicanus occidentalis brown pelican (ss)
Rynchops niger black skimmer (ss)
Sterna antillarum least tern (threatened)
Podomys floridanus Florida mouse (ss)
Sciurus niger shermani Sherman's fox squirrel (ss)
Ursus americanus floridanus Florida black bear (threatened)
Asplenium auritum auricled spleenwort (endangered)
Glandularia tampensis Tampa vervain (endangered)
Lilium catesbaei pine lily (threatened)
Lobelia cardinalis cardinal flower (threatened)
Opuntia stricta prickly pear cactus (threatened)
Pinguicula lutea yellow-flowered butterwort (threatened)
Platanthera flava southern tubercled orchid (threatened)
Spiranthes laciniata lace-lip ladies'-tresses (threatened)
Spiranthes longilabris long-lip ladies'-tresses (threatened)
Spiranthes polyantha green ladies'-tresses (endangered)
Spiranthes tuberosa little ladies'-tresses (threatened)
Zephyranthes atamasco rain lily (threatened)

Other Wildlife Species

The marshlands, swamplands, shallow bays, and tidal streams of this area provide both the quantity and quality of aquatic plant and animal life required to support thousands of wintering waterfowl, marsh and water birds, shorebirds, and a variety of animal species that depend on a marine environment including the West Indian manatee, and bottlenosed dolphin. The marsh is inhabited by rails, gallinules, songbirds, smaller mammals, reptiles, amphibians, and arthropods. Elevated tree islands provide perching and resting areas for additional bird species that feed in the associated salt marsh and tidal habitats. The dominant waterfowl species in the marshlands include gadwall, American wigeon, pintail, scaup, red-breasted merganser, and hooded merganser. Other wildlife species that share the tidal areas include the brown pelican, white pelican, coot, cormorant, egret, heron, ibis, anhinga, tern, gull,

kestrel, hawks, osprey, as well as important local sport/commercial fishery species such as mullet, blue crab, sheepshead, and redfish. The mangroves provide protective barriers for the fragile estuarine habitat, serve as colonial bird rookery sites, and provide escape cover. Wildlife indigenous to the upland swamp area are gopher tortoise, white-tailed deer, eastern wild turkey, black bear, feral hogs, resident small mammals, neotropical migratory birds, raptors, reptiles, and amphibians.

Disease

Epizootics in captive whooping cranes have been a source of mortality in the past. Outbreaks of communicable diseases among the cross-fostered population and among species with which they associate also have been of concern. Avian tuberculosis, avian cholera, mycotoxicosis (both acute and chronic), encephalitis and coccidiosis have been diseases of consequence to whooping cranes or sandhill cranes (J. Carpenter, pers. comm.). Parasites, especially *Haemoiproteus sp., Hexamita sp., Eimeria spp*., and *Leucocytozoon sp.* pose a threat.

3.2.3 Land Use

Agriculture and Industrial Use

Census bureau data from 1992 indicate that 19 percent of the total land area in Citrus County is considered agricultural, with 288 registered farms. Watermelons are one of the main cultivated crops. Other crops grown include soybeans, corn, and grasses. Citrus, mainly for a fresh fruit market, is grown in a few areas in the eastern part of the county. Several large cattle operations that utilize native and improved pasture are in the northwestern, south-central, and eastern parts of the county (USDA 1988). There is little industrial activity in the area.

Land ownership includes a number of private holdings devoted to agriculture. State and federal public lands range from 5 to 41,018 acres (2 to 16,599 ha) and include Chassahowitzka NWR (30,889 acres or 12,500 ha), Chassahowitzka Wildlife Area (23,003 acres or 9,309 ha), Chassahowitzka Riverine Swamp (5,679 acres or 2,298 ha), St. Martins Marsh Aquatic Preserve (36,016 acres or 14,575 ha), Crystal River State Buffer Preserve (23,011 acres or 9,312 ha), Crystal River State Archaeological Site (57 acres or 23 ha), Yulee Sugar Mill Ruins State Historic Site (5 acres or 2 ha), Withlacoochee State Forest-Homosassa Tract (5,515 acres or 2,232 ha), and Citrus Tract (41,018 acres or 16,599 ha), Withlacoochee State Trail (37,966 acres or 15,364 ha), Homosassa Springs State Wildlife Park (183 acres or 74 ha), Fort Cooper State Park (709 acres or 287 ha), Potts Preserve Wildlife Area (9,388 acres or 3,799 ha), Flying Eagle Wildlife Management Area (10,250 acres or 4,148 ha), and Weeki Wachee Preserve (6,002 acres or 2,429 ha).

Residential Use

Total residential population for Citrus County (1995 Census data) is 107,333 with 31.5 percent of all residents over the age of 65. Adjacent Hernando County's population was estimated to be 138,500 for the same time period. Most of the land adjacent to the proposed wintering area is publicly-owned conservation lands or low-density residential. Development on any privately held land is restricted to 1 dwelling unit per 20 acres and subject to the County's Coastal and Lakes management plan (Citrus County, 2001).

Recreational Use

The Crystal River area is famous for its clear waters and excellent fishing. The Crystal and Homosassa Rivers are naturally spring-fed and provide a constant source of 72-degree F (22 C) water year-round. This area supports the largest concentration of wintering endangered manatees in the state. Over 600 million gallons of fresh water are released from over 30 natural springs in the area. The clear water and easy access to manatees makes Crystal River a popular spot for snorkeling and diving. Fresh and saltwater fishing, upland game and waterfowl hunting, and wildlife viewing are all popular activities in the proposed release area.

Water Usage

Water is an important resource in Citrus County. The major rivers in the county are the Homosassa, Halls, Chassahowitzka, Crystal, and Withlacoochee Rivers. The Withlacoochee River is one of the few rivers in the northern hemisphere that flows in a northerly direction. The Halls, Homosassa, Chassahowitzka, and Crystal Rivers originate from springs in Citrus County and are a major source of fresh water. Other sources of fresh water come from shallow ground water and deep aquifer wells. Most of the rainfall, which is about 56 inches (142 cm) annually in the county, infiltrates into the soil. Saltwater intrusion into the aquifer on the Gulf side of the county has been a problem during times of heavy water usage (USDA 1988).

3.2.4 Cultural/Paleontological Resources

Historical and archaeological resources exist within the proposed wintering area. Twelve archaeological sites have been documented within Chassahowitzka NWR. Adjacent to the proposed site is the Crystal River State Archaeological Site. The six-mound complex, built by the cultural group called pre-Columbian mound builders, is considered one of the longest continually occupied sites in Florida. For 1,600 years, beginning around 200 B.C., these 14 acres (5.67 ha) were an imposing prehistoric ceremonial center for Florida's Native Americans. It is estimated that as many as 7,500

Indians from throughout Florida visited the complex annually to bury their dead and participate in trade activities (FDEP 1999).

3.2.5 Local Socio-economic Conditions

Tourism and services catering to the area's large retired population make up the majority of jobs in Citrus County. Chassahowitzka NWR and nearby State WAs are managed specifically for wildlife and recreational values. The refuge is approximately 65 miles (104 km) north of Tampa/St. Petersburg and 80 miles (128 km) west of Orlando. The surrounding area is generally rural. Public lands including the refuge, aquatic preserves, state parks, forests, and wildlife management areas comprise approximately 45 percent of Citrus County. The largest employer in Citrus County is Florida Power. Businesses catering to divers and snorkelers make up numerous additional jobs in Citrus County. Commercial fishing, including crabbing, accounts for many jobs. In Hernando County, the major industries are limestone mining and cement production, tourism, dairy products, cattle production, citrus products, forest resources, construction, some non-pollutant manufacturing, and distribution. The South Florida Water Management District headquarters is located in Brooksville in Hernando County. A substantial amount of county, state, and federal government employment is associated with the public lands in both Citrus and Hernando Counties.

3.3 Seney National Wildlife Refuge Release Area

The Florida area proposed for the wintering site for Alternative 4 is the same as discussed in the preceding sections 3.2 through 3.2.5. The following discussion of Affected Environment focuses on the Potential Release Area at Seney NWR in Michigan.

Seney NWR is a 95,461-acre (38,631-ha) refuge in the east central Upper Peninsula of Michigan. The refuge is in an area locally know as the Great Manistique Swamp, with extensive wetlands and forests of hardwoods, spruce, pine, fir, and tamarack. Approximately 25,000 acres is designated wilderness, which contains a unique patterned "string" bog topography. The refuge provides habitat for wildlife typical of this ecosystem, including ducks, bald eagle, osprey, common loon, trumpeter swan, otter, beaver, black bear, moose, and gray wolf. Seney NWR is a major tourist attraction in the Upper Peninsula, with over 100,000 visitors annually.

Seney NWR contains a large block of wetland habitat sufficient in size to support 25 nesting pairs of whooping cranes and meet suitability criteria outlined by Cannon (1999). The habitat is similar in appearance to Wood Buffalo National Park, the nesting area in Canada for the only natural flock of whooping cranes. The Whooping Crane Recovery Team, in September 1999, discussed the possibility of a reintroduction at Seney NWR.

3.3.1 Physical Characteristics

Seney NWR is located in Schoolcraft County, west of the towns of Seney and Germfask and midway between Lakes Superior and Michigan. Refuge landforms were shaped by drainage from preglacial lakes that drained southward across the Upper Peninsula of Michigan between 10,000 and 10,500 years ago. Outwash channels are visible as linear peat-filled depressions trending northwest to southeast across Seney NWR. Since glacial times, the Seney area has been a site for marsh development. Currently 1 to 3 meters of peat blanket most of the area. Soils are generally level to somewhat sloping mucks, peats, and sands. Along the Manistique River valley, Driggs River, and the other tributaries draining the refuge, the soils are predominantly sands and sandy loams. Only small areas along the Manistique River are suitable for farming.

Temperature extremes range from -35 to 98 degrees F (-37 to 36.7 degrees C). Average monthly temperatures have been coldest in January at 16.8 degrees F (-8.4 degrees C) and warmest in July at 65.8 degrees F (18.8 degrees C). On average, June is the wettest month, and March the driest month. Average annual snowfall is 123 inches (312 cm). The annual growing season averages 120 days.

3.3.2 Biological Environment

Vegetation

Woodlands on Seney NWR are typified by coniferous species (red, jack, and white pines in uplands; black spruce, tamarack, and white cedar in lowlands), trembling aspen, and northern hardwoods (sugar maple, American beech, eastern hemlock, and yellow birch). Approximately 65 percent of Seney NWR is wetland, most of which is made up of palustrine habitats (Cowardin et al. 1979) without tree canopies. These wetlands are composed largely of cattail marsh, sedge marsh, and sphagnum bog. More than 6,919 acres (2,800 ha) of open water are contained in 26 major pools, 21 of which have water control structures. Several pools are normally drawn down during summer. The refuge also contains several isolated upland meadows.

Wildlife species in the region are typical of the species found throughout the boreal portion of the Great Lakes region. Historically, Michigan's Upper Peninsula was populated by large mammals such as the gray wolf, cougar, lynx, elk, and moose. Additionally, important furbearers such as the fisher and pine marten were common. Many of the species were extirpated, or nearly so, by the mid 1900s as a result of human pressures. However, other wildlife species including the white-tailed deer, beaver, otter, mink, muskrat, coyote, raccoon, and many others, have flourished as a result of human activities such as farming and logging. During the 1990s, the gray wolf, fisher, marten, and moose have repopulated the area, and the most successful reintroduction of trumpeter swans in the Midwest occurred on Seney NWR.

Threatened, Endangered, and Candidate Species

Federally-listed species known to occur on Seney NWR include the bald eagle (threatened, proposed for delisting) and gray wolf (endangered, proposed for downlisting to threatened). In recent years, three to four bald eagle pairs have nested on the refuge and numerous subadults were present in the pool system. In 1999, 174 gray wolves were counted in the Upper Peninsula of Michigan, and 12 wolves in 4 packs may have included part of the refuge within their territories.

State-listed animal species (all threatened) known to breed on Seney NWR include the yellow rail, merlin, common loon, and osprey. No state-listed plant species are known to occur on the refuge.

Other Wildlife Species

In addition to mammals and birds noted above, Seney NWR supports a diverse fauna including Canada goose, trumpeter swan, ducks, sandhill crane, great blue heron, American bittern, black tern, numerous northern passerine bird species, sharp-tailed and ruffed grouse, three species of turtles, and eight species of frogs and toads. Numerous fish species are present including brown bullhead, northern pike, yellow perch, and pumpkinseed in the pools and eastern mudminnow and brook stickleback in marshes.

Disease

Except for *Leucocytozoan* in goslings during the 1960s and 1970s, no avian diseases have been reported.

3.3.3 Land Use

The eastern Upper Peninsula of Michigan has a sparse human population and extensive tracts of public land. In addition to Seney NWR, the East/West Units of the Hiawatha National Forest and the Lake Superior State Forest account for 880,025 acres (356,127 ha) and 1,040,382 acres (421,020 ha), respectively. The large geographic area, sparse human population, and extensive wetlands make this site attractive for reintroduction efforts. Agricultural activity is minimal; the largest agricultural area is in the extreme eastern Upper Peninsula. Small agricultural areas, mostly hay fields with some small grains, are located southeast of the refuge.

Because of inaccessibility and closure of most refuge roads to non-refuge vehicles, public use during the breeding season is limited to dikes and hiking trails in a 3,385-acre (1,370-ha) area near the refuge headquarters, to a pool in the northwestern portion of the refuge, and to minor canoe routes. Some additional minor public use occurs as a result of opening most interior roads to bicyclists during the past decade. A federally-designated wilderness area of 25,151 acres (10,178 ha) occurs in the western part of Seney NWR. The greatest potential to study or manage cranes occurs on the remaining area of

about 66,720 acres (27,000 ha), where low public use and a good road network offer excellent conditions for research.

Agriculture and Industrial Use

Primary industry in the area consists of tourism and forestry. Agriculture played a major role in the region before World War II. Today, agriculture, mainly haylands and some small grains, occurs only in limited areas, and Schoolcraft County is particularly unsuited for agriculture.

Residential Use

Because of the predominance of public land, the area has a very low human population density and is relatively undeveloped. No large cities are present near Seney NWR. The largest city in the Upper Peninsula, Marquette, is 90 miles away and has a population of 28,000.

Recreational Use

In the region, sightseeing, wildlife observation, fishing, hunting, snowmobiling, and boating are important activities. On Seney NWR, predominant recreation includes wildlife observation, fishing, and upland game hunting.

Water Usage

No drainage districts are active in the area surrounding Seney NWR.

3.3.4 Cultural/Paleontological Resources

No prehistoric archaeological sites have been reported for the Seney NWR. There are some reported historic archaeological sites which consist of sparse remnants of old logging camps and homesteads.

3.3.5 Local Socio-economic Conditions

The Seney NWR is located in a relatively depressed economic environment. Tourism is by far the greatest part of the economy, with wood products second. Income levels are low in comparison to both state and regional levels, unemployment is prevalent, and poverty is high. In comparison with state averages, Schoolcraft County has an age composition high in older, retired persons, and low in younger, productive workers. The region has experienced a massive out-migration pattern for the 20-24 age group for much of the last half century. More recently in the 1990s, land development for summer homes and residences of retirees from other regions has rapidly increased land values.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Physical Characteristics

No effects are expected upon the physical characteristics of any of the potential release sites, or the proposed wintering area, as a result of implementation of any of the alternatives.

4.2 Biological Environment

4.2.1 Vegetation

With the exception of limited areas impacted by construction and use of rearing and training facilities, no detectable effects on vegetation at any of the potential release sites is expected as a result of implementation of any of the alternatives. Neither are there expected to be any detectable changes to vegetation within the Wisconsin, Michigan or Florida landscapes, or any of the states within the migration corridor.

At the rearing areas and release sites there likely would be some long-term impacts to vegetation within the footprint of any buildings constructed to house crane chicks, and within those areas cleared and graded for use as migration training areas using ultralight aircraft. However, the vegetation in these areas probably would revert to its former state at some time after the end of reintroduction activities and consequent removal of the facilities. In some cases, there may be a permanent change in vegetation at a site as a result of long term use of facilities, although any areas affected would be limited in size. There could be short-term impacts to vegetation mowed within the small (less than 5-acre) conditioning pens used by the cranes. Similar impacts also may occur at the wintering site if the birds are held in a conditioning pen after arrival, but before final release. Any impacts would be short-term in nature.

As mentioned above, there are existing support facilities at Necedah NWR. Therefore, the long-term impacts associated with the development footprint have already begun.

4.2.2 Threatened, Endangered, and Candidate Species

Alternative 1

This section addresses the only environmental consequences we have identified associated with Alternative 1; accordingly, Alternative 1 will not be addressed further under the subsequent headings pertaining to environmental consequences.

Under the No Action alternative, whooping cranes would not be reintroduced into the eastern U.S., and whooping crane recovery would be delayed while alternative recovery strategies were formulated

and evaluated. However, if recovery actions to establish a third flock of whooping cranes are not accomplished, the potential to jeopardize the continued existence of the species is increased..

Throughout its range, the only existing natural flock of whooping cranes faces many factors that could reduce suitability of its habitat. In the region of the Canadian nesting area, new mining operations could adversely affect water levels in the Wood Buffalo National Park nesting area. Acid rain may negatively impact the carrying capacity of this area for whooping cranes. Global warming may result in climate change that could reduce annual rainfall. This could reduce the carrying capacity of the nesting area and production of young, since production is directly correlated with water levels. In migration, whooping cranes face loss of wetland stopover habitat due to the continued loss of wetland habitat to agriculture and other development activities. As cranes and numerous other migratory bird species become concentrated in the remaining wetlands, there is an increased risk of disease adversely affecting the population. The increasing number of power lines, cellular towers, and aircraft traffic all elevate the threat of collisions of cranes with these hazards.

At Aransas NWR, chemical spills along the Gulf Intracoastal Waterway are a constant threat. The human population along the Texas coast is growing rapidly. Human consumption of fresh water over the next 50 years is projected to reduce freshwater inflows to the bays which will result in an 8 percent reduction in the numbers of blue crab, the primary food of the whooping crane. Red tide outbreaks, that could be lethal to whooping cranes, have become more numerous in recent years. The red tide kills many marine organisms and concentrates in clams. Although the whooping crane population, historically, has grown about 4 percent a year, this growth rate is expected to decline in the future as negative factors increase (T. Stehn, pers. comm). If conditions continue to worsen, the whooping crane could easily decline into extinction from the wild. Introducing additional populations could reduce this risk.

The benefits of no action would be: (1) an opportunity to build the size of the captive whooping crane flocks so they might be capable of producing greater numbers of birds for release, (2) a saving of funds otherwise raised for the reintroduction, and (3) an opportunity to assess more fully other areas in the eastern U.S. for suitability as a release site and, (4) time to develop alternative recovery strategies. However, all marshes thought to be suitable for potential whooping crane reintroduction nationwide were already considered in the Recovery Team's recommendation to reintroduce cranes to Wisconsin. Recovery strategies will continue to evolve as experiments are done and evaluated. No progress would be made if experimental reintroduction is not done.

The following sections discuss the expected impacts to federally-listed threatened and endangered species associated with each of the action alternatives. In the event that one of the action alternatives is chosen, a Section 7 intra-Service consultation would be completed prior to implementation.

Alternative 2 (Preferred Alternative)

This proposal represents a primary recovery task for the whooping crane. The whooping crane recovery plan (USFWS 1994) specifies a goal of establishing two additional, separate and self-sustaining populations consisting of 25 nesting pairs each in addition to maintaining the existing wild natural population at 40 nesting pairs. If successful, ongoing efforts with the Florida NEP could represent the first additional flock, and establishing the migratory eastern U.S. NEP could potentially represent the second. If reintroduction of this second population also is successful and it becomes self-sustaining, the first recovery goal could be met and downlisting the species to threatened could be considered.

Wisconsin Potential Release Areas

The bald eagle will sometimes use some of the same habitats as the whooping crane in seeking food but, in general, hunts in deeper and larger bodies of water. As the bald eagle also tends to select larger prey items, competition for food resources is not anticipated. Although general breeding locations may occur for both species in the same general area in the future, breeding sites are very different for the two species and would not result in competition or conflict. Bald eagles are large predators capable of capturing large prey items, but they feed primarily on fish, and are not expected to be an important predator on either adult or young cranes. Due to the types of habitats and food resources utilized by cranes, the reintroduction of whooping cranes into Wisconsin is not expected to have any substantial adverse impacts on the bald eagle.

Wolves are certainly capable of capturing cranes, and it is possible they could prey on whooping cranes if cranes were to be introduced into a wolf territory. However, since whooping cranes would most often be found within wetlands and aquatic habitats, habitats that wolves do not generally frequent, any depredation is expected to be infrequent. It also is unlikely the reintroduction of whooping cranes would have any adverse effects on wolves, or impede recovery of the species in Wisconsin.

Habitat management activities for the Karner blue butterfly at the Crex Meadows WA, Necedah NWR, and other occupied areas are conducted primarily on dry upland areas; accordingly, appreciable conflicts with whooping cranes for habitat needs are not likely to occur. Due to the small size of the butterfly and its larvae, they are not anticipated to be a substantial food source for whooping cranes, although it is possible that some adults and larvae would be eaten by crane adults and chicks. Construction and operation of premigration training areas and rearing facilities for a previous experiment with sandhill cranes at the Necedah NWR was determined to adversely affect the Karner blue butterfly to a limited extent. Similarly, a small number of butterflies may be killed as a result of collision with ultralight aircraft or vehicles, or incidental to whooping crane training and management activities. No significant population reduction is expected as a result of the anticipated limited Karner blue butterfly mortality. An intra-Service section 7 consultation would be conducted for this alternative, if selected, and a biological opinion prepared which would include a conclusion as to whether the proposed

whooping crane reintroduction would jeopardize the continued existence of the Karner blue butterfly. An incidental take statement would be included in the biological opinion that would specify reasonable and prudent measures that would minimize take of the butterfly and would be implemented in the event that whooping cranes are released at the Necedah NWR. Possible adverse effects to the Karner blue butterfly at the Crex Meadows WA would be analyzed in the event that a future introduction of whooping cranes is conducted at that site.

The introduced whooping cranes and young would likely use some of the same habitats as the eastern massasauga rattlesnake, feed upon some of the same kinds of foods used by this snake, and may occasionally eat this snake. Given the small number of whooping cranes planned for release, the effects on the species are expected to be minimal. Although the whooping crane would be an added snake predator, there is no anticipated competition for food between these two species. There is some possibility that a massasauga could cause the death of a whooping crane, but the probability is considered to be very low.

Of those state-listed bird species known to occur in central Wisconsin, the yellow-crowned night heron and great egret are the only species likely to compete in any way for food resources. Any competition between these species and whooping cranes is expected to be negligible.

Blanding's turtle, wood turtle, western slender glass lizard, and Blanchard's cricket frog are potential prey items for cranes, and the reintroduction of whooping cranes in the central Wisconsin area could have some impact on local populations of these species. Given the limited number of whooping cranes proposed for reintroduction, and the distribution of these potential prey items both within and outside of the central Wisconsin area, no appreciable adverse effects are expected to any populations of these species.

There are no recent records from the project area for redfin shiner, pallid shiner, gilt darter, river redhorse, and blue sucker, so none of these species is expected to be affected by the proposed action. The salamander and winged mapleleaf mussels also are known, historically, from this area, but no recent records are known, and no effects are anticipated.

Florida Wintering Area

The loggerhead, green and leatherback sea turtles all inhabit the coastal, off-shore waters of the central Florida Gulf Coast. The project area coastline is comprised of salt marsh habitat with little or no dune structures. Therefore, there is no sea turtle nesting along the central Florida Gulf Coast. Whooping cranes are expected to use salt marsh habitat and are not expected to come into contact with sea turtles. Therefore, the reintroduction of whooping cranes into the north central gulf coast area of Florida is not expected to have any appreciable adverse impacts to listed sea turtles.

The eastern indigo snake is a large, stout, black snake averaging 6 to 8 feet in length. Its primary habitat is high pineland, although it can occur in a variety of other habitats. It feeds primarily on small mammals and reptiles. Although the whooping crane would be an added snake predator, there is no anticipated competition for food between these two species. Therefore, it is not anticipated that the reintroduction of whooping cranes would have a substantial adverse impact on eastern indigo snakes or their habitat.

The American alligator is a large crocodilian which can reach up to 14 feet (4.3 m) in length (Florida FWCC, 2001). The species is listed only due to similarity of appearance with other, endangered crocodilians worldwide, and is recovered and delisted. Its primary habitat is freshwater swamps and marshes, but it also occurs in rivers, lakes and smaller bodies of water. The alligator can tolerate a reasonable degree of salinity, being found occasionally in brackish water. It feeds primarily on fish and other aquatic prey; large adults are capable of eating any other species they encounter. The alligator has been a predator of cranes in the ongoing reintroduction effort at the Kissimmee Prairie. It is expected that some level of losses will occur to the newly introduced flock as well. Although the whooping crane would be an added predator on young alligators, competition for food between these two species is not expected. Therefore, it is not anticipated that the reintroduction of whooping cranes would have a detectable adverse impact on alligators or their habitat.

The Florida scrub-jay is a small, crestless jay occurring exclusively in scrub and high pine habitat. Florida scrub-jays feed primarily on insects. Occupied scrub-jay habitat is not considered suitable habitat for whooping cranes and the proposed reintroduction is not expected to have an adverse impact on Florida scrub-jays or their habitat.

The bald eagle also occurs in the Citrus and Hernando County area. There are approximately 40 active nesting territories within 5 miles of the coast in the proposed wintering site. As in the Wisconsin release area, bald eagles are not expected to be an important predator on cranes (Florida FWCC, 2001) and the proposed reintroduction is not expected to have an adverse impact on this listed species.

The wood stork is a large, long-legged, wading bird with an unfeathered head, white body and black wing tips. It is a colonial nesting species that feeds in shallow water wetlands. It is the one species in Florida that most closely resembles the whooping crane. While wood storks are known to forage occasionally in estuarine habitats, they do not consume the same prey items as whooping cranes. The proposed whooping crane reintroduction is not expected to have an adverse impact on wood storks or their habitats.

The West Indian manatee is a massive, aquatic mammal with paddle-like forelimbs, no hind limbs and a horizontally flattened tail. Manatees occur throughout the gulf year-round and are winter residents of warm water springs in the Crystal and Homosassa Rivers. Manatees feed exclusively on aquatic

vegetation. Manatees do not use the same habitat as whooping cranes and, therefore, are not expected to be adversely impacted by the proposed reintroduction.

A nonessential experimental, nonmigratory population of whooping cranes exists in the Kissimmee Prairie area of central Florida. This area is located approximately 90 miles to the east of the proposed primary wintering area for the eastern migratory flock. The potential exists for occasional interaction between the established nonmigratory flock and the newly established migrating flock of whooping cranes. This interaction however, is not anticipated to adversely affect either experimental population. This assumption is based, in part, on the fact that nonmigratory Florida sandhill cranes (*G. canadensis pratens*) co-exist during the winter with migrating greater sandhill cranes throughout the state, yet the Florida sandhill cranes remain in Florida when the greater sandhills migrate north in the spring. Previous experiments by Nesbitt (1988b) found that greater sandhill cranes cross-fostered to Florida sandhill cranes remained in Florida and did not migrate. In testing a winter release of migratory greater sandhill cranes with wintering conspecifics in Texas, Nagendran (1992) found that these released birds did not successfully migrate northward in spring, and that even when captured and re-released in Nebraska, they returned to their release area in Texas the same spring. Based upon the best historical information, migratory and nonmigratory whooping crane flocks co-existed in coastal Louisiana, yet remained separate (Allen, 1952).

During the initial flock establishment, it is possible that some nonmigratory whooping cranes would attempt to migrate north with the migrating whooping cranes. The converse also is possible, that migratory whooping cranes would assimilate into the nonmigratory flock. Neither scenario is expected to occur to any great degree and would not adversely impact either experimental population.

None of the Florida state-listed species known to occur in the proposed wintering area are expected to interact with or be impacted by the presence of wintering whooping cranes.

Alternatives 3 and 4

Listed species which have the greatest likelihood of being affected by Alternatives 3 or 4 are the same as previously identified for Alternative 2. The low level of impacts described for Alternative 2 also would be expected to occur in the event of implementation of Alternatives 3 or 4, both at the Wisconsin or Michigan release sites, and at the Florida Wintering Area.

The full federal ESA protection under Alternative 3 would be likely to reduce or eliminate partnerships with states and private organizations that support voluntary recovery efforts. During early outreach contacts, strong interest was expressed by non-governmental organizations and other non-Federal entities to provide assistance, support or funding to a reintroduction project that is carried out through establishment of a nonessential experimental population. With greater regulatory restrictions under the full ESA protection alternative, some non-Federal funding support could be lost or reduced. Without

adequate partnership support from non-Federal sources, the Service is not likely to have sufficient funding or personnel to proceed with the project on its own.

4.2.3 Other Wildlife Species

Alternatives 2, 3 and 4

Knowledge of foods and feeding behavior of the whooping crane in other parts of its range do not suggest any obvious sources of competition with any of the resident species found in the potential release or wintering areas, or any appreciable adverse effects to potential prey populations. In addition to wolves, there is a potential risk of predation on adult cranes by coyotes and bobcats, and on chicks by great horned owls, raccoons, and red fox. Natural mortality from predators would be reduced through the use of electric fences around rearing facilities and through pre-release conditioning. Conditioning would include teaching cranes the habit of roosting in standing water which should help to reduce losses to wolves, coyotes and bobcats.

4.2.4 Disease

Alternatives 2, 3 and 4

In the potential release areas and at the proposed wintering site, the rate of occurrence and impact of many diseases is not fully known. However, cranes are not known to be important vectors of any diseases likely to pose a high level of risk to other wildlife species. Based upon post-release monitoring of whooping cranes in the ongoing Florida reintroduction, any cranes released could be expected to carry the same general types and levels of pathogens as do other local wildlife species. Captive whooping cranes have been known to carry certain pathogens which could have substantial adverse affects on wild crane populations. However, any birds released as part of a reintroduction effort would be screened for such diseases, and treated to ensure a low level of risk for disease transmission. Whooping cranes released in Florida undergo a 60-day quarantine period prior to release (Florida FWCC, 2001). For the current project, there are no plans for a strict quarantine period. However, a complete health screening will be conducted prior to shipment from the rearing facility at Patuxent Wildlife Research Center. In addition, scheduled health checks of the whooping crane chicks will be conducted upon arrival in Wisconsin, several weeks prior to departure from Wisconsin, and upon arrival in Florida. Cranes also will be reared

within a top-netted enclosure, with little opportunity for contact with wild birds, greatly reducing the potential for disease transmission. Therefore, the reintroduction of whooping cranes in the eastern U.S. is not likely to have any substantial disease ramifications to any wildlife or human populations.

4.3 Land Use

4.3.1 Agriculture and Industrial Use

Alternative 2 (Preferred Alternative)

Wisconsin Potential Release Areas

Special regulations pertaining to the NEP would allow incidental take of an NEP individual in situations where the take is accidental and occurs as a result of otherwise lawful activities, when such activities are in full compliance with all applicable laws and regulations. The exceptions regarding incidental take included in the special rule that would designate the NEP would ensure that reintroduction would be compatible with current or planned human activities including agriculture or other business operations. In addition, cranberry and other agricultural operations in the area may voluntarily schedule management actions to avoid adverse impacts to cranes using their properties. Design costs for cranberry facility expansions may increase slightly as a result of voluntary efforts to minimize or avoid impacts to whooping crane habitat.

Some transmission line rights-of-way on public lands may require additional planning to accommodate whooping cranes. Visual deterrent devices also may be recommended. Either of these measures could increase construction costs at an undetermined level. .

Florida Wintering Area

It is anticipated that wintering whooping cranes would use the brackish saltmarsh habitat of the Chassahowitzka/St. Martin's Marsh/Crystal River area. Whooping cranes are not expected to interact with any agricultural operations within the proposed wintering area.

Whooping cranes in the existing nonmigratory NEP in central Florida frequently utilize improved pasture for foraging. No restrictions are placed on private landowners as a result of the presence of these whooping cranes. The cranes have little to no impact to ranching operations. It is unlikely that wintering whooping cranes along the central Florida Gulf Coast would use improved pasture inland; however, should the whooping cranes utilize improved pasture lands on private property and be deemed unwelcome, project biologists would attempt to remove them.

Alternative 3

Under this alternative, protections of the ESA would probably require modification of management on private and state lands as a result of section 7 consultation on federal actions, such as Corps of Engineers wetland permit reviews (e.g., permits under section 404 of the Clean Water Act), highway or utility projects, etc. As the whooping crane population grows, and cranes establish breeding territories

on private lands, consultation could result in the denial of wetland fill permits or other changes in planned development actions, such as subdivisions, highways, utility corridors, etc. Permit applicants may modify development plans, either voluntarily or in response to recommendations received as a result of the consultation process. The need to complete consultation on projects with federal involvement could at times result in delays in implementation of plans. In some cases, projects could be canceled or have to be conducted in an alternate location due to the presence of whooping cranes.

Alternative 4

No impacts to land use are expected from the reintroduction of whooping cranes. Seney NWR is a large, mostly forested block of habitat set aside for wildlife refuge purposes that would not be changed by the presence of whooping cranes. Seney NWR includes a large acreage of crane habitat of sufficient size for the reintroduced population. Cranes that would summer off-refuge, also would not affect surrounding land uses. Whooping cranes do not form large social flocks and remain in small groups usually from one to five individuals. These small flocks would have little impact on agricultural fields located southeast of the refuge which are predominantly haylands.

4.3.2 Residential Use

Alternative 2 (Preferred Alternative)

No detectable effects to residential use in Wisconsin or Florida are expected as a result of whooping crane reintroduction. No additional restrictions on construction or establishment of residences would be associated with reintroduction efforts. It is possible there may be some increase in local residential dwellings, as a result of an increased desire to live in the region due to the presence of the species. No additional restrictions on construction or establishment of residences would be associated with reintroduction efforts.

Alternative 3

On both public and private lands, the presence of whooping cranes would probably require some modification of human activities. Landowner activities occurring near whooping crane territories may be affected, including agriculture, recreation, and property maintenance. However, the greatest impacts resulting from this alternative would probably be the protective measures mandated as a result of section 7 consultation on federal actions, such as Corps of Engineers wetland permit reviews (e.g., permits under section 404 of the Clean Water Act), highway or utility projects, etc. Such restrictions may impede residential development in those areas occupied by whooping cranes.

Alternative 4

No appreciable effects to residential use in either Michigan or Florida are expected as a result of whooping crane reintroduction. No additional restrictions on construction or establishment of residences would be associated with reintroduction efforts. It is possible there may be some increase in local residential dwellings, as a result of an increased desire to live in the region due to the presence of the species. No additional restrictions on construction or establishment of residences would be associated with reintroduction efforts.

4.3.3 Recreational use

Alternative 2 (Preferred Alternative)

Wisconsin Potential Release Areas

Existing recreational values within the project area would remain, and may be enhanced after the reintroduction of whooping cranes. Management plans for the Necedah and Horicon NWRs and Wisconsin WAs may be modified to benefit whooping cranes and allow reasonable public access to the cranes in non-sensitive locations and time intervals.

Currently, in Wisconsin, there is little to no hunting of species which appear similar to whooping cranes and might be shot mistakenly by hunters. Further, most sport hunting activity in central Wisconsin is for upland species (deer and turkey). Interest has been expressed by Wisconsin hunters to have a hunting season for sandhill cranes in Wisconsin. In the event the sandhill crane becomes a game species, it is not likely there would be any additional restrictions imposed as a result of the presence of whooping cranes. Per provisions of the special rule to establish the migratory whooping crane NEP, the Service would not mandate any closure of areas including National Wildlife Refuges, during hunting or conservation order seasons or closure or modification of hunting or conservation order seasons for the purpose of avoiding take of the proposed NEP.

The Service established a conservation order in a final rule published in the December 20, 1999, *Federal Register* (Volume 64, Number 243). The conservation order is aimed at reducing the populations of lesser snow geese (*Anser caerulescens caerulescens)* and Ross' geese (*Anser rossii)* that breed, migrate, and winter in the mid-continent portion of North America, primarily in the Central and Mississippi Flyways. These geese are referred to as mid-continent light geese (MCLG). The Service established the conservation order allowing take of the geese to prevent further habitat degradation by the MCLG population which had reached such a high level that the geese were seriously injuring their arctic and subarctic breeding grounds through their feeding actions. A management goal was set to reduce the MCLG by 50 percent by the year 2005. The conservation order can be implemented in the States, or portions of States, contained within the boundaries of the Central and Mississippi Flyways, including Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa,

Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, Wisconsin, and Wyoming.

As identified previously, special regulations pertaining to the NEP would allow incidental take of an NEP individual in situations where the take is accidental and occurs as a result of an otherwise lawful activity such as hunting, when the activity is in full compliance with all applicable laws and regulations. Other State or Federal laws, however, may still apply.

Access to some limited areas associated with release or wintering sites and at ultralight migration stopover points could be temporarily restricted at times when whooping cranes might be particularly vulnerable to human disturbance (i.e., around rearing and training facilities in the spring/summer and conditioning and holding pens in the fall/winter). Any temporary restricted access to areas for these purposes would be of the minimum size and duration necessary for protection of the NEP cranes, and would be closely coordinated with the respective States. Any such access restrictions would not require federal closure of hunting areas or seasons.

States within the NEP maintain their management prerogatives regarding the whooping crane. They are not directed by the proposed rule to take any specific actions to provide special protective measures, nor are they prevented from imposing restrictions under state law, such as protective designations, area closures, etc. None of the States within the NEP area have indicated that they would propose hunting restrictions or closures related to game species because of the proposed whooping crane reintroduction. Overall, the presence of whooping cranes is not expected to place constraints on hunting of wildlife nor on economic gain landowners might receive from hunting leases.

The presence of whooping cranes in some wetland areas is not likely to place constraints on fishing activity. Most whooping crane nesting is expected to occur in emergent marshes. Therefore, no appreciable limitation on fishing activity and no reduction in economic activity associated with sport fishing is expected..

The number of people visiting the release area for birding and wildlife viewing is expected to change after whooping cranes are introduced and increase in numbers. Birders from the eastern U.S. would be attracted to Wisconsin to view the whooping cranes and other unique local bird life. Nature viewers from throughout Wisconsin would be attracted to those areas utilized by whooping cranes to view them. These visitations may eventually provide an increase in recreation income to local service industries. Such changes would benefit the local economy. Controlled opportunities for the public to view whooping cranes from a distance may be developed. Tour routes and accessible viewing blinds/towers are options the Wisconsin DNR or the Service may consider for providing controlled viewing opportunities.

Proposed Florida Wintering Area

Existing recreational values within the project area would remain, and may be enhanced after the reintroduction. Incorporating whooping cranes into management plans of the Chassahowitzka NWR and Florida State lands would give whooping cranes priority and allow reasonable public access to the cranes in non-sensitive locations and times. Most of the Chassahowitzka NWR is open to various public uses with the exception of a portion of Citrus County that is closed to waterfowl hunting.

Currently, there are no hunted species in Florida that resemble the whooping crane that might be mistakenly shot by hunters. Snow geese are occasionally hunted in the northern part of the state. The southward expansion of snow geese could potentially result in the State of Florida allowing hunting of this species in the proposed wintering area. Waterfowl hunting on public lands is not expected to be impacted by the presence of wintering cranes.

The presence of wintering whooping cranes in Crystal River is expected to increase tourism to the area. Birders from throughout the eastern U.S. would be attracted to the area to view cranes. These visits may provide a financial benefit to the local economy.

Alternative 3

Concerns have been expressed about the impact the presence of whooping cranes might have on sport hunting. If whooping cranes are introduced as endangered, States would be likely to assess current hunting programs and perhaps impose restrictions so that introduced whooping cranes would not be impacted significantly. For example, in Texas, hunting seasons for sandhill cranes are adjusted so that almost all whooping cranes have migrated through an area before it is opened to sandhill crane hunting. States within the proposed eastern U.S. reintroduction area would be likely to make similar adjustments. Temporary closures of small areas in the vicinity of whooping crane activity probably would be considered when whooping cranes were sighted in a potentially hazardous situation due to hunting of look-alike species. Restrictions could result in negative attitudes about the whooping cranes which, in turn, could lead to purposeful shooting of individual cranes.

On National Wildlife Refuges and National Parks, protections of the ESA probably would require closures of areas utilized by whooping cranes to human activities, including hunting. Similar actions may be mandated on State lands. In the event that Horicon NWR would become a release site, significant changes to local waterfowl hunting seasons could be needed to minimize the potential for disturbance or accidental shootings, which could have severe repercussions to the local economy. For this reason, the Service believes that an environmental impact statement would be appropriate if this alternative were selected and would not consider signing a FONSI for Alternative 3.

For all of the potential release sites, an increase in recreational birdwatching also could be expected, due to the anticipated greater desire to view whooping cranes.

The Atlantic and Mississippi Flyway Councils, and representatives of natural resource agencies of a number of states including Florida and Wisconsin, have indicated they would not support the introduction of whooping cranes without an NEP designation, due to possible adverse impacts to hunting, agriculture, development, and other activities. The Service maintains the position that we would not proceed with the whooping crane reintroduction project without the full support of all affected states.

Alternative 4

Existing recreational values within the project area would remain, and may be enhanced, after the reintroduction of whooping cranes. Tourism could be expected to increase slightly because of interest in the whooping cranes. Management plans for Seney NWR may be modified to benefit whooping cranes and allow reasonable public access to the cranes in non-sensitive locations. Opportunities to view the cranes would have to be controlled around the release pens. Construction of an observation tower with a mounted spotting scope at a suitable distance from the release pens could provide public accessibility to the project. Public access might have to be restricted near nest sites. With such a large area at Seney NWR and light public visitation, only minor management problems are anticipated, such as use of the self-guided auto tour route, fishing route, and access by bicyclists. Whooping cranes have adapted to a developed environment in central Florida without impacting human activities. Therefore, whooping cranes would be anticipated to be a positive presence at Seney NWR.

Seney NWR is currently closed to waterfowl and sandhill crane hunting. There is a small amount of waterfowl hunting in farmlands southeast of the refuge. No legally hunted look-alike species are normally present in the area. With whooping cranes designated as an NEP, and the commitment that there would be no Federally-mandated hunting closures of areas or seasons, no impacts to hunting or trapping are expected if whooping cranes are introduced at Seney NWR. As identified with previous EA alternatives, special regulations pertaining to the NEP would allow incidental take of an NEP individual in situations where the take is accidental and occurs as a result of an otherwise lawful activity such as hunting, when the activity is in full compliance with all applicable laws and regulations.

4.3.4 Water Usage

Alternative 2 (Preferred Alternative)

No major effects on water usage by either private or government entities are expected as a result of this action. There may be some minor modifications to water level management regimes on NWRs and State WAs as a result of this action, but the actual amounts of water used are not expected to change, and no adverse effects on water availability to private entities is anticipated. As a result of provisions of the rule to designate the eastern U.S. whooping crane NEP, no non-federal entities would be obligated to manage for the species, so there would be no mandated changes to water management on other properties.

Alternative 3

There could possibly be significant effects on water usage by both private and government entities as a result of this action. On National Wildlife Refuges and National Parks, the protections of the ESA would mandate management actions to benefit the species, and similar management actions could be mandated as a result of section 7 consultation on federal actions occurring off of federal lands, such as Corps of Engineers wetland permit reviews (e.g., permits under seciton 404 of the Clean Water Act), highway or utility projects, etc.

Alternative 4

No major effects on water usage by either private or government entities are expected as a result of this action. At Seney NWR there is limited management of surface water, and no competition for water resources with other users off-refuge lands. There may be some minor modifications to water level management regimes, but the actual amounts of water used are not expected to change. As a result of provisions of the rule to designate the eastern U.S. whooping crane NEP, no non-federal entities would be obligated to manage for the species, so there would be no mandated changes to water management on other properties.

4.4 Cultural/Paleontological Resources

Alternatives 2, 3 and 4

No adverse effects on existing archaeological resources are expected to result from any of the reintroduction project alternatives. A screening of local archaeological resources was done for pre-migration training areas and rearing facilities at Necedah NWR prior to their construction for a sandhill crane experimental migration project conducted in 2000. If Necedah NWR is used as a release site, those same facilities can be used for the whooping crane reintroduction, which would minimize potential disturbance and adverse effects. In the event that releases are conducted at any of the other potential release areas, any soil disturbance activities would be screened for possible effects to archaeological resources prior to any actual construction, and site location would be adjusted to avoid impacts.

4.5 Local Socio-economic Conditions

Alternative 2 (Preferred Alternative)

The region would receive greater, but undetermined, revenues from the influx of State and Federal personnel periodically involved in the reintroduction program and from contracts with individuals involved in the whooping crane recovery effort. The region also would receive greater, but undetermined, revenues from additional tourism activities associated with whooping cranes. Birders throughout the Midwest would have a great desire to view the species, and would likely contribute substantially to the local service economy, spending money in motels, restaurants and stores. Substantial income is generated from the influx of visitors who go to see whooping cranes in New Mexico where the population cross-fostered with sandhill cranes winters, also near Monte Vista, Colorado, where those cranes stop in spring and fall migration. Similar conditions occur near Rockport, Texas, where the self-sustaining wild population winters. The annual spring viewing of cranes along the Platte River in Nebraska also generates economic benefits from enthusiastic birders (Lingle 1992). A similar, localized economic benefit would, no doubt, develop around the Wisconsin population. The public could possibly be provided the opportunity to view the whooping cranes from a distance (from accessible blinds, towers, or tour routes) without jeopardizing the birds' normal activities.

Reintroduction of whooping cranes into Wisconsin would be implemented in a manner that allows continuing multiple-use management on public land and should not negatively affect private landowners' lifestyles or income potential. The eastern U.S. whooping crane NEP designation would accommodate the concerns of landowners and land managers. Only the U.S. Fish and Wildlife Service, on refuge lands, and the National Park Service, on lands it manages, would be required to undergo section 7 consultation if their actions might affect whooping cranes. Other Federal agencies would not be required to conduct formal consultation on proposed actions that might adversely affect whooping cranes.

No significant effect is expected on small private entities. Privately-owned tracts surrounding each of the potential release areas are largely in rural settings. Forestry, agriculture, and recreational hunting are the main land uses. The proposed releases would not interfere with land management options of private landowners nor with their ability to realize economic gain from their properties, including development for residential use. The NEP designation for the eastern U.S. whooping crane population would permit greater management flexibility. No adverse effects on small private entities are expected at any of the potential release areas.

Greater sandhill cranes have been a part of the natural scene in Wisconsin throughout recent centuries, utilizing wetlands and upland pastures. Their feeding, roosting, nesting, and general behavior patterns are similar to the activities likely to be observed in whooping cranes, although the whooping cranes are likely to utilize slightly deeper wetland areas. Whooping cranes may utilize improved pastures to probe for invertebrates. This action aerates the soil and removes insects potentially damaging to plant root health. There is evidence that sandhill cranes sometimes cause damage to emerging corn; whooping

cranes may engage in similar activities. If such depredations occur they can be eliminated through use of bird scaring devices and other techniques. Ongoing research on seed treatments as a deterrent to corn depredation is promising (Blackwell, Helon and Dolbeer, in press). Relatively few small grains are grown in the area near Necedah NWR and Crex Meadows WA. Whooping cranes will not enter standing grain fields because of their vulnerability to predators and difficulty gaining flight. Whooping cranes will feed along the borders of such fields and, if large flocks occurred they could cause some crop damage. However, whooping cranes are socially less gregarious than sandhill cranes and, therefore, are less likely to cause any appreciable crop depredation. The establishment of a population of whooping cranes is not expected to negatively impact the current socioeconomic situation at any of the potential release sites in Wisconsin.

Proposed Florida Wintering Site

It is anticipated that the economic impacts in the area of the proposed wintering site would be in the form of economic benefits due to the presence of wintering whooping cranes, similar to those described previously in the EA for the Wisconsin release areas. These benefits are likely to be even greater in Florida, due to the greater amount of tourism present. There is likely to be a significant demand from the public for the opportunity to view the whooping cranes. The Service will make an effort to provide opportunities for viewing the cranes from a distance (from accessible blinds, towers, or tour routes) without jeopardizing the birds' normal activities. No negative impacts are expected to the local socio-economic condition of the area.

Alternative 3

Similar to Alternative 2, the area around the reintroduction site would receive greater, but undetermined, revenues from the influx of State and Federal personnel periodically involved in the reintroduction program and from contracts with individuals involved in the whooping crane recovery effort. The region also would receive greater, but undetermined, revenues from additional tourism activities associated with whooping cranes. Birders throughout the Midwest would have a great desire to view the species, and would likely contribute substantially to the local service economy, spending money in motels, restaurants and stores.

The presence of a population of fully-protected, endangered whooping cranes in Wisconsin, Florida, and states within the migration corridor is likely to affect private landowners, businesses, and state and federal agencies through the necessity of section 7 consultation on federal actions such as Corps of Engineers section 404 (Clean Water Act) permits, utility corridors and highway construction. All of these activities have the potential for adverse effects to the species, and any federal agency providing funding, approvals or permits related to any such project would then be required to consult with the Service. Initially, the incidence of consultation would be low, but as the population expanded and began to occupy private lands, there would be a greater likelihood of the need for consultation on development of properties for agriculture, residential and commercial uses. Although primarily affecting properties in

Wisconsin and Florida, the regular use of certain sites within the migration corridor also could lead to the need for consultation on actions proposed in those areas.

In order for States, individuals or other entities to be exempt from the take prohibitions of section 9 of the ESA, permits from the Service would be required, either as a result of section 7 consultation on federal actions, or through completion of a section 10 Habitat Conservation Plan (HCP) for those projects with no federal involvement. The additional time and effort associated with completion of a section 7 consultation, or implementation of measures mandated through consultation, would increase project costs, or in certain circumstances, may preclude completion of a proposed project. Costs associated with completion of an HCP also could represent a significant economic impact to the affected party. Intra-Service section 7 consultation would be
required for proposed actions on Service lands that might adversely affect whooping cranes, which could increase the cost of management actions. All of these additional costs could inhibit local economic growth to some degree.

The Service and other federal land managers in Wisconsin, Florida, and other states within the migration corridor would be obligated when carrying out management activities, to include actions to benefit whooping cranes where possible, to fulfill section 7(a)(1) obligations for conservation of listed species. In addition, Federal area closures on NWRs probably would be required during hunting seasons and crane rearing periods. States, as well, probably would be required to modify hunting seasons or areas open to hunting to minimize incidental take of whooping cranes. This could have a substantial economic impact in those areas that receive a significant influx of hunting dollars into the local economy, such as occurs near Horicon NWR and the Upper Mississippi River National Wildlife and Fish Refuge. It is possible the presence of endangered whooping cranes would inhibit or preclude the establishment of any future sandhill crane hunting seasons in Wisconsin, or elsewhere within the eastern U.S., which would also preclude any associated economic benefits.

As the population expands and begins to occupy private properties within the reintroduction area, there could eventually be an effect on routine human activity. The establishment of a whooping crane breeding territory in an area which receives periodic human use may ultimately lead to disturbance of birds at a nest, which may result in take due to adverse effects on reproductive success. This disturbance could occur in the course of routine recreational activities such as hunting, fishing, or hiking, or agricultural activities such as plowing, planting or harvesting of crops, application of pesticides, or water level management. Any take that occurred would be subject to prosecution under section 9 of the ESA, unless the involved parties had completed an HCP and were issued an incidental take permit by the Service. The expenditure of resources necessary for completion of an HCP would represent a significant socio-economic impact to the affected party. The only other alternative available to individuals in such a situation would be to avoid those areas during sensitive periods. This could result in adverse economic impacts to landowners by precluding management actions that could lead to crop failure, or by affecting individuals who depend on the influx of dollars from specific recreation activities.

As discussed previously for Alternative 2, reintroduction of whooping cranes under full protection of the ESA would not likely result in appreciable crop depredations, so potential impact on agriculture would be the same as described for other alternatives.

Alternative 4

Economic benefits similar to those described above for the Wisconsin release site in Alternative 2 could be expected as a result of the establishment of an Upper Peninsula Michigan population of whooping cranes. Similar consequences could be expected at the Florida wintering site.

4.6 Logistical Feasibility of Each Alternative

This section describes other issues associated with each alternative that have no associated environmental consequences per se, but which may influence the success of the project. This information was used in formulation of the Preferred Alternative, and is presented here as a further aid to understanding the advantages and disadvantages of each described alternative.

4.6.1 Availability of Veterinary Care

Implementation of the reintroduction would require veterinary support to maintain the health and safety of the cranes. The location of each potential reintroduction site relative to veterinary care facilities and population centers influences the suitability of each as a reintroduction site. In Wisconsin, the best veterinary care available for cranes is from personnel at the International Crane Foundation in Baraboo. The proximity of Necedah NWR to Baraboo makes it the best choice from the perspective of this parameter, since it would minimize the amount of time that veterinary personnel would need to invest in travel, decreasing costs and enhancing response times in the event of an emergency.

Horicon NWR is in the next best location relative to veterinary care from the ICF, and also is located proximal to population centers in the Appleton/Oshkosh and Milwaukee areas, where numerous alternate veterinary staff are available. Crex Meadows WA is located the farthest away from the ICF of any potential Wisconsin reintroduction sites, although it is located near the Minneapolis/St.Paul, Minnesota population center, where numerous alternate veterinary facilities and staff are available.

Seney NWR is located in an area that is least desirable from the standpoint of veterinary support to the project. Of any of the potential reintroduction sites, it is located the farthest away from the ICF and is far from any population center which could offer alternate veterinary facilities and staff.

4.6.2 Suitability for Use by Ultralight Aircraft

As described in Section 2.3 Preferred Alternative, the proposed **initial** reintroduction technique includes leading young cranes to the proposed wintering site behind an ultralight aircraft. The suitability of each of

the potential reintroduction sites for use by ultralight aircraft can be quantified through evaluation of availability of existing migration training areas associated with that type of aircraft, suitability of the reintroduction site for constructing new or alternate migration training areas on site, and composition of or land use in the landscape surrounding the site, for use in takeoffs and landings during training flights, including emergency landings, and stopover sites while on migration.

Of each of the alternatives presented, Necedah NWR is the only site with existing facilities suitable for landings and takeoffs by ultralight aircraft. At Horicon NWR, Crex Meadows WA, and Seney NWR, no such facilities currently exist, although suitable locations are present at each site for construction of migration training areas. At Necedah and Horicon NWRs and Crex Meadows WA, numerous open areas which can be utilized for takeoffs and landings by ultralight aircraft also are available in the vicinity of the potential reintroduction site.

Seney NWR is located in a landscape of nearly unbroken forest, making it difficult to find suitable alternate landing areas off-site. This could become problematic during the course of pre-migration training, when it may be desirable to land the aircraft away from the rearing location, to accustom the young cranes to a procedure which would be used throughout the migration period. The scarcity of additional off-site landing locations also is a safety issue, as it restricts the alternatives for emergency landings in the event of mechanical or other emergencies during the flight training period. Additionally, the intervening landscape between Seney NWR and planned migration stopovers in Wisconsin is largely an unbroken forest canopy. This makes locating suitable migration stopover sites difficult.

4.6.3 Distance to Wintering Area

For the reintroduction project to be successful, a migratory flock of whooping cranes would be established with a breeding site in Wisconsin or Michigan, and the wintering area in Florida. The distance cranes would need to migrate between breeding and wintering areas would influence the amount of hazards they would face during migration, such as accidental or intentional shootings, predators, fences and utility lines, etc. The bulk of the annual mortality in the natural Aransas-Wood Buffalo Population occurs during migration periods (T.Stehn, pers.comm.), and it is expected this would be the case for an eastern U.S. migratory flock as well. With increased distance, there is an associated increased potential for accidents, or loss of individual cranes. Therefore, the relative location of each of the potential reintroduction sites may ultimately influence the success of the project. Distance between the reintroduction site and the wintering site also would influence the time and funding needed to successfully complete the project, which could also influence the chances for success.

The distance between the various potential reintroduction sites and the Florida wintering location is in excess of 1,600 km (1,000 miles). The approximate distance each site is located from the Florida wintering site, when measured along the expected migration route, is as follows: Horicon NWR 1,730 km (1,075 miles); Necedah NWR 1,818 km (1,130 miles); Crex Meadows WA 2,111 km (1,312 miles), and Seney NWR 2,097 km (1,303miles). From these figures, it is evident that Horicon and

Necedah NWRs are in a much more desirable location from the perspective of this parameter than either of the other two potential reintroduction sites.

4.6.4 Expected Mortality Rates

As discussed above, the mortality experienced by the population may determine the ultimate success of the reintroduction, and the bulk of this mortality is expected to occur during migration. The major known cause of mortality in the Aransas/Wood Buffalo Population is collision with utility lines. Some other known causes of mortality in that flock, and in the Kissimmee Prairie flock in Florida, include collision with fences, predation, accidental or intentional shootings, and disease. When comparing the expected mortality rates among alternatives presented in this assessment, the major issues which appear likely to affect mortality include: distance to wintering area and associated level of risk; exposure to hunting pressure that could lead to accidental shooting; and exposure to utility lines, both on the breeding area and in migration. When the alternatives are compared, lower levels of mortality are associated with Horicon and Necedah NWRs as release sites.

Accidental/Intentional Shootings

While some whooping crane deaths within the Aransas/Wood Buffalo Population have been associated with hunting, there are only two or three mortalities which have been documented incidental to hunting activities within the past 20 years (T. Stehn. pers. comm). During this same period, there have been other deaths due to shooting, but they have been intentional, and not an accident in the course of legal hunting activities. Other sources of mortality during that same period have been much greater, although the cause of many of the losses can not be established, since they occurred between the period cranes departed from the wintering grounds, and when they arrived the next fall (USFWS, 1994). Given the relative numbers of hunters present in different areas during the fall migration period, the greatest level of risk for accidental shooting undoubtedly occurs in the U.S., within the Central Flyway and on the Texas wintering grounds. Within this area, snow geese (a bird with very similar colors to the whooping crane) are abundant, and inexperienced hunters could potentially mistake a whooping crane for a snow goose. Hunting of sandhill cranes also is permitted throughout the Central Flyway, again presenting the potential for misidentification and accidental shooting. However, even given the occurrence of similar species within that migration corridor that may lead to accidental shooting, it is thought that loss of whooping cranes to hunters is a small fraction of total mortality (T. Stehn. pers.comm.).

Any migratory flock of whooping cranes reintroduced in the eastern U.S. would be subject to potential accidental, or even intentional shooting by hunters. The greater protections afforded for a fully-protected entity, as in Alternative 3, could be expected to reduce the potential for accidental mortality due to hunting. However, a low level of mortality is experienced by the Aranasas/Wood Buffalo Population in areas where two other species similar in appearance to whooping cranes are hunted. Since neither of those species is widely hunted in the east, the likelihood of mortality associated with species misidentification while hunting is expected to be low for all of the alternatives. Any differences in

expected mortality levels among the alternatives is expected to be so minor as to be impossible to estimate.

Collision with Utility Lines

Density of utility lines at the release sites and rearing areas, and within the migration corridor, varies from site to site, but is not appreciably different. The lowest density of utility lines occurs in the vicinity of Seney NWR, which makes it the site of lowest risk for this factor of all alternatives. That portion of the migration corridor between Seney NWR and the Wisconsin/Michigan border also has a lower density of utility lines than any of the other migration corridors associated with the other potential release sites. However, from the Wisconsin/Illinois border southward, whooping cranes from any of the potential release sites would be expected to utilize approximately the same migration corridor. Therefore, any differences would be those inherent to the route each alternative flock would take through the State of Wisconsin. Without knowing the specific migration route that whooping cranes would follow for each of the reintroduction alternatives, it is not possible to accurately assess specific differences between alternatives. It appears that for this parameter, both Seney NWR and Crex Meadows WA are at a slight disadvantage in comparison to the other two sites, by virtue of their longer route and greater number of utility lines likely to be encountered.

4.7 Cumulative Impacts

The cumulative impacts associated with Alternative 1 would be continued risk to the existing natural wild population of whooping cranes. Cumulative impacts of Alternatives 2 and 4 could include eventual natural migration of the reintroduced whooping cranes to other areas, or additional reintroductions by the Service in response to the behavior and distribution of released birds. The same cumulative impacts could be expected with expansion of the designated NEP area described for Alternatives 2 and 4 to include additional northeastern States. This would result in the impacts associated with these alternatives occurring in the new areas occupied as well. The same minor impacts associated with Alternatives 2 and 4 also would occur on a larger area of the landscape as a result of any future increase in the reintroduced population. If successful, all three of the action alternatives would reduce the risk of extinction of the species and could enable the Service to downlist the species to threatened status.

The cumulative impacts associated with Alternative 3 are likely to be more noticeable and widespread. While the action would be expected to have the same likelihood to recover the species as the other action alternatives, it also could result in a large number of negative impacts on the economy of areas the birds may occupy. In the event the population is successful and expands its range, or if the Service chooses to do additional introductions under the method described in Alternative 3, the adverse affects associated with the presence of these birds could potentially impact a larger area. Waterfowl hunting seasons could be impacted because of the presence of whooping cranes under Alternative 3, with potential closures of areas and modifications of seasons likely. A number of State DNRs as well as the

Mississippi and Altlantic Flyway Councils have expressed opposition to reintroduction under full ESA protection, and more States would probably join the opposition as cumulative impacts are considered. Agricultural expansion could be impacted wherever the cranes are found and even current activities could be negatively impacted. If incidental take associated with activities on the working landscape was likely, the entity involved would have to modify the activity to avoid the take or seek to obtain an incidental take permit from the Service and prepare a habitat conservation plan. All of which could mean delays or restriction of activities. As previously stated, the Service would prepare an Environmental Impact Statement if Alternative 3 were selected.

4.8 Environmental Justice

The Executive Order 12898 on Environmental Justice issued by President Clinton on February 11, 1994, requires all federal agencies to assess the impacts of federal actions with respect to environmental justice. The Executive Order states that, to the extent practicable and permitted by law, neither minority nor low-income populations may receive disproportionately high and adverse impacts as a result of a proposed project.

Due to the rural nature of most of the proposed reintroduction sites, especially Necedah and Seney NWRs, the surrounding population tends to be in lower income categories, but no identifiable group of individuals can be considered to have lower income in relation to local averages. None of the potential reintroduction areas have any known concentrations of minority populations in the vicinity of the proposed release site. The impacts of Alternatives 2 and 4 on human activities in the areas surrounding reintroduction sites are expected to be minimal, and so do not represent any disproportionate high and adverse impacts to low-income and minority groups. The greater level of impacts associated with Alternative 3 would likely result in a disproportionate level of impacts to residents surrounding the potential release sites; however, the local residents are not members of a low income group in relation to local conditions.

4.9 Matrix of Environmental Impacts

ENVIRONMENTAL CONSEQUENCE	ALTERNATIVES			
	Alternative 1 No Action	**Alternative 2 Proposed Action NEP - Wisconsin**	**Alternative 3 Full ESA Protection**	**Alternative 4 Introduce to Seney NWR**
Physical Characteristics	NA	None - Premigration training areas and holding pens already exist	None - same as Alternative 2	Premigration training areas and holding pens, support building would need to be established; about 5 acres altered temporarily
Biological Environment				
Vegetation	NA	Minor, short-term - premigration training areas would continue to be mowed if ultralights continued to be used	Minor, short-term - same as Alternative 2	Minor, short-term - same as Alternative 2 after premigration areas are established
Threatened, Endangered, and Candidate Species	Threat to survival of the whooping crane species	Could produce an important step in recovering the species, minuscule impact to neighboring listed species	Could produce an important step in recovering the species, but less likely to be implemented than Alternatives 2 or 4. Minuscule impact to neighboring listed species	Same as Alternative 2
Other Wildlife Species	NA	Minor because of low numbers of whooping cranes and little direct competition	Minor - same as Alternative 2	Minor - same as Alternative 2
Disease	NA	No adverse impacts expected	No adverse impacts expected	No adverse impacts expected

ENVIRONMENTAL CONSEQUENCE	ALTERNATIVES			
	Alternative 1 No Action	**Alternative 2 Proposed Action NEP - Wisconsin**	**Alternative 3 Full ESA Protection**	**Alternative 4 Introduce to Seney NWR**
Land Use				
Agriculture and industrial use	NA	Minor - in both intensity and in area impacted	Has a reasonable chance of having noticeable to major impact to specific development projects	Minor - in intensity and in area impacted, even less impacts to private neighbors than Alternative 2
Residential Use	NA	Minor - may even increase development slightly	May impact some residential development	Minor - with fewer summer neighbors, impacts would be extremely minor
Recreational use	NA	Minor - in a worst case scenario, there could be local and temporary adjustments	Area closures, hunting season changes which could produce major impacts	Minor - impacts even less likely than Alternative 2
Water Usage	NA	No change	Potential for some changes on NWRs	No change
Cultural/Paleontological Resources	NA	None expected - premigration training sites already established	None expected - same as Alternative 2	None expected - any disturbance from developing training/holding facilities would be located to avoid impact
Local Socio-economic Conditions	NA	Minor - mostly positive, with localized increase in service industries such as food, fuel, and lodging	Definite negative impacts on development which probably would be greater than any increased spending by tourists	Minor - mostly positive, as with Alternative 2

ENVIRONMENTAL CONSEQUENCE	ALTERNATIVES			
	Alternative 1 No Action	**Alternative 2 Proposed Action NEP - Wisconsin**	**Alternative 3 Full ESA Protection**	**Alternative 4 Introduce to Seney NWR**
Logistical Feasibility of Alternatives				
Availability of Veterinary Care	NA	Good with International Crane Foundation facilities near two of three sites and other major facilities also nearby	Good - same as Alternative 2	Poor
Suitability for Ultralight Aircraft	NA	Good	Good	Poor - Refuge and surrounding area too forested to provide many landing options
Distance to Wintering Area	NA	Medium to Long	Medium to Long	Long
Expected Mortality Rates	NA	Low	Although they would probably be better than Alternatives 2 or 4, the difference is expected to be so slight as to be undetectable	Low

5.0 LIST OF PREPARERS

The EA was prepared by the Service's Green Bay, Wisconsin, Ecological Services Field Office in coordination with other Service personnel involved in the reintroduction project from Regions 2, 3, 4, 5, and 6. The principal individuals involved in preparing and providing input to the document are listed below.

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6.0 CONSULTATION AND COORDINATION WITH THE PUBLIC AND OTHERS

The following is a partial list of individuals, organizations, and public agencies contacted during project planning for reintroduction of a migratory whooping crane population to the eastern U.S.

Federal Agencies:

Department of Agriculture
- Animal and Plant Inspection Service
- Natural Resources Conservation Service

Department of Defense
- U.S. Army Corps of Engineers
- Air National Guard

Department of the Interior
- Bureau of Indian Affairs
- Bureau of Land Management
- Fish and Wildlife Service
- National Park Service

Federal Elected Officials and staff:
- All (240) Congressional Washington and District offices representing the 20 states within the proposed eastern U.S. NEP area

State Agencies and Commissions:
- Alabama Department of Conservation and Natural Resources
- Arkansas Game And Fish Commission
- Florida Fish and Wildlife Conservation Commission
- Florida Department of Environmental Protection
- Florida Department of Agriculture and Consumer Services
- Georgia Department of Natural Resources
- Illinois Department of Natural Resources
- Indiana Department of Natural Resources
- Indiana Division of Fish and Wildlife
- Iowa Department of Natural Resources
- Kentucky Department of Fish and Wildlife Resources
- Louisiana Department of Wildlife and Fisheries
- Michigan Department of Natural Resources
- Minnesota Department of Natural Resources
- Mississippi Department of Wildlife, Fisheries and Parks
- Missouri Department of Conservation
- North Carolina Wildlife Resources Commission
- Ohio Division of Wildlife
- South Carolina Department of Natural Resources
- Tennessee Wildlife Resources Agency
- Virginia Department of Game and Inland Fisheries
- West Virginia Division of Natural Resources
- Wisconsin Department of Agriculture, Trade and Consumer Protection
- Wisconsin Department of Natural Resources
- Wisconsin Department of Transportation

State Elected Officials
Wisconsin:

Assembly District 50 (Juneau County) Sheryl K. Albers
Assembly District 70 (Wood County) Donald W. Hasenohrl
Assembly District 92 (Monroe & Jackson Counties) Terry M. Musser

Florida:

Senator Richard Mitchell
Senator Anna Cowin
Representative Nancy Argenziano

Atlantic Flyway Council

Central Flyway Council

Mississippi Flyway Council

Native American Indian Tribes:

All Native American Indian Tribes located within the states included in the proposed eastern U.S. NEP area were contacted to provide them information regarding the proposed project and seek their input.

A complete list of people and agencies contacted is available from the Service's Green Bay, Wisconsin, and Jacksonville, Florida, Ecological Services Field Offices.

7.0 PUBLIC COMMENTS AND RESPONSES TO DRAFT ENVIRONMENTAL ASSESSMENT

This chapter of the Environmental Assessment presents comments that were received on the draft EA and provides the Service's response to the comments. Some comments were specifically addressed to the EA, as opposed to the proposed rule. Other comments did not indicate to which document they were addressed. If a comment could be appropriate to either document, EA or proposed rule, they were addressed in both.

Respondent	Comment	Response
Multiple	We received a total of 94 comments on the EA and/or proposed rule that indicated general support for the Preferred Alternative.	The Service appreciates the support of everyone that took the time to read the Environmental Assessment and to respond. We are glad that the Preferred Alternative is well received among resource agencies, wildlife organizations, government representatives, and the general public.
Twenty State Wildlife Agencies representing the 20 states in the Eastern U.S. NEP area, Mississippi and Atlantic Flyway Councils, two Provincial Wildlife Agencies, and the Canadian Wildlife Service, Prairie and Northern Region	Provided letters of concurrence for implementing the Preferred Alternative and Proposed Rule (attached, Appendix 2).	The Service greatly appreciates the unanimous show of support from the NEP States, two Flyway Councils, and three Canadian Wildlife Agencies. In the implementation phase, the project will demonstrate an outstanding cooperative effort among all the partners that may serve as a model for similar resource actions.
Florida Fish and Wildlife Conservation Commission	Questioned our statement that bobcats are not present on Marsh Island, Louisiana	Added the missing reference.
" "	Pointed out possible adverse impacts of whooping cranes on crawfish farms	Added a brief discussion of potential impacts to crawfish farms.

Respondent	Comment	Response
“ ”	The problem with reintroduction of an additional nonmigratory population of whooping cranes in Florida is not lack of funding, but that the flocks would not be separate, since the current population is expected to eventually cover all suitable habitat in Florida	We agree. Given the ongoing expansion of the whooping cranes in the Kissimmee Prairie flock, it is unlikely that any future reintroduced flock would remain separate. Changes were made in EA to reflect this fact.
“ ”	Objected to whooping cranes being led by sandhills because we cannot control where they would end up.	We agree that it may prove difficult to retrieve whooping cranes that migrate to central Florida and relocate them to Chassahowitzka NWR. However, we want to have a wide array of techniques available for potential use in migration in future years. For at least the first year of the project, we will use ultralight aircraft to lead whooping cranes in migration to Florida. In the future, if we consider using wild sandhill cranes to guide released whooping cranes in migration, we will consult with the State of Florida and obtain the State’s concurrence before proceeding with that approach.
“ ”	Objected to whooping cranes overwintering north of central Florida because of disease potential (peanut mycotoxicosis).	We agree that this potential disease problem should be avoided. Plans call for leading the cranes to Chassahowitzka NWR, and we believe the excellent habitat at the site will keep birds from wandering into northern Florida.
“ ”	Stated that eagles have not been a problem for the nonmigratory whooping cranes in Florida	Comment noted, and referenced within the EA.
“ ”	Stated that there are no authenticated records of alligators over 14 feet	Comment noted. This change has been made in the EA.

Respondent	Comment	Response
“ ”	Stated that nonmigratory whooping cranes go through a 60-day quarantine period to insure that released birds don’t carry disease	For this project, there are no plans for a strict quarantine period. However, a complete health screening will be conducted prior to shipment from the rearing facility at Patuxent Wildlife Research Center. In addition, scheduled health checks of the whooping crane chicks will be conducted upon arrival in Wisconsin, several weeks prior to departure from Wisconsin, and upon arrival in Florida. Further, whooping cranes will be reared within a top-netted enclosure, with little opportunity for contact with wild birds, greatly reducing the potential for disease transmission. Additional discussion was added to EA.
“ ”	Commented on discrepancy between numbers of whooping cranes shipped to Florida, and number released.	Comment noted. This change has been made in the EA.

Respondent	Comment	Response
Central Flyway Council, North Dakota and South Dakota	In favor of the proposal, but concerned over the fact that eastern U.S. NEP cranes or their offspring could stray into the Central Flyway States which may result in adverse effects to the AWP, or to ongoing human activities. Suggested that all released cranes, and all their future progeny, be permanently marked so they could be monitored and removed from any undesirable areas in which they may occur (i.e., Central Flyway States). Further, the respondents suggested that any whooping cranes originating from eastern U.S. reintroduction efforts maintain the NEP status, even when they occur outside the designated NEP area.	The Service will mark all released cranes with color bands, radio or satellite transmitters, and with coded electronic microchip implants placed under the skin. For at least the 10-year life of the reintroduction project, we will attempt to color band all offspring, including any unmarked juvenile cranes that migrate with and are clearly part of NEP family groups. If one or more whooping cranes from the eastern U.S. NEP move out of the designated eastern U.S. NEP area, the status of those birds would then be considered endangered. Provisions of the ESA do not allow us to consider such cranes as experimental when outside of the designated NEP area, even if the birds are identifiable as experimental animals. In the event that one of the eastern U.S. NEP whooping cranes wanders into the Central Flyway, we will immediately initiate discussions with the involved State or States to determine the appropriate action to take, which may include attempts to remove the bird. As provided for in the rule, the course of action will not include closure of hunting areas or seasons, including those pertaining to conservation orders, for the purpose of protecting individual cranes known to have originated from the eastern U.S. whooping crane NEP.
Sierra Club - Florida Chapter	Concerned that any new action not jeopardize the current nonmigratory population of whooping cranes.	We concur. That is one of the reasons, along with lack of need and probably location for a second nonmigratory population, that such an Alternative was not analyzed in detail.
“ ”	Similar comment to Florida FWCC, concern about whooping cranes that might migrate with sandhill cranes getting to the appropriate wintering location.	See response to similar comment of Florida FWCC, above.

Respondent	Comment	Response
Sierra Club	Asked for more discussion on whether migratory population would tend to lead off significant numbers of the nonmigratory population.	Based upon the results of multiple research projects, and the best judgement of crane experts including the International Whooping Crane Recovery Team, we believe that any such incidents will be extremely rare. We have added additional discussion of this topic to the EA.
Private citizen	Concerned about impacts of additional work on overall refuge staff and how it affects their other jobs.	We have anticipated the increased funding needs, and have already requested additional funding for staff and equipment at both Necedah and Chassahowitzka NWRs. In addition, both NWRs have active "Friends-of-the-Refuge" groups that contribute significant amounts of their time to assist in meeting staffing needs. We anticipate this project will generate considerable additional interest in those groups, resulting in even greater numbers of volunteers. If these efforts fail, some staff and resources may need to be redirected from current activities.
Louisiana Wildlife Federation	Expressed hope that the decision to choose Florida does not preclude consideration of Louisiana as a future reintroduction site.	In our analysis, we sought the most feasible combination of sites for our initial experiment. After we determine how successful that effort is, we will be in a position to evaluate the need for additional migratory populations and to look at other potential sites. The Louisiana site considered in this analysis had many features to recommend it for future consideration.
Florida Forestry Association	Would object if the Service considers alternative action regarding the whooping crane that would have adverse impacts on management of private forests.	We understand the concerns expressed; as noted in the comment letter, the preferred alternative will not negatively affect management of private forestlands. With any significant change in project direction, the public, including the Florida Forestry Association would be notified.

Respondent	Comment	Response
Wisconsin Wildlife Federation (WWF)	Wants Wisconsin DNR to state in writing that there will be no hunting closures for protection of the introduced whooping cranes.	The Service has stated that it will not mandate the closure of any area, including National Wildlife Refuges, or seasons to hunting in regard to the proposed action. Although the Service will not dictate to the Wisconsin DNR regarding its State management actions and prerogatives, we forwarded a copy of the WWF's letter to the Wisconsin DNR for its consideration. The Wisconsin DNR responded in an April 26, 2001 letter to a similar request submitted by the WWF directly to the Wisconsin DNR that: "we have no intention of developing state mandated hunting or season closures or season modifications for the protection of whooping cranes. Additionally, we intend that there be no regulations of this type, specific to Wisconsin, that are more restrictive than Federal regulations."
private citizen	Wants "rules" to state that there will be no hunting or seasonal closures.	We have stated repeatedly, including within the proposed special rule, that the Service will not mandate any closure of areas, including National Wildlife Refuges, during hunting seasons or closure or modification of hunting seasons for the purpose of avoiding take of the nonessential experimental population. We also included this commitment within the final rule for this NEP. While this will preclude Federally-mandated closures within the NEP area, States still retain the power to impose closures at their discretion. No States have indicated any desire to institute such closures.
private citizen	Questioned cost of program and projected length Wants to know the percentage contributed by private groups	Although it requires substantial funding, the project is enthusiastically supported by many agencies, individuals, and non-governmental organizations. Best estimates indicate that greater than 50 percent of project costs will be derived from private contributions. Projected Service costs are about $5 to 7 million over the 10-year project life.

Respondent	Comment	Response
“ ”	Wants to know “who” wants this project. Is it mandated by Congress or the Service’s idea?	Through their elected representatives, the people of the United States have made the collective decision that it is desirable to preserve viable populations of the plant and animal species of the United States. The U.S. Congress has directed the conservation and recovery of all endangered species, through passage of the Endangered Species Act of 1973, as amended. This project was initiated in response to recommendations of the International Whooping Crane Recovery Team, and will be carried out by a partnership of governmental and non-governmental groups such as Operation Migration, the International Crane Foundation, the Natural Resources Foundation of Wisconsin, and others.
“ ”	Wants to know if the advantages to mankind equal the economic costs. What else could be done with the funds?	The U.S. Congress has determined that expenditure of funds for the conservation and recovery of threatened and endangered species is worthwhile and benefits the citizens of this country and other nations. Funding provided to the Service for endangered species-related activities must be spent for that purpose. If the whooping crane reintroduction project was not undertaken, the Service funds would be applied to other listed species.

Respondent	Comment	Response
“ ”	Implies that it would be acceptable to allow whooping cranes to go extinct as part of natural events.	While species extinction is indeed a part of the natural biological process, the activities of human culture and industrialization have greatly accelerated this process. In the Endangered Species Act, the U.S. Congress recognized the aesthetic, ecological, educational, historical, recreational, and scientific values of fish, wildlife and plants to the Nation and its citizens; as part of the international community, the U.S. pledged to conserve the various species facing extinction to the extent practicable. Congress has directed all Federal departments and agencies to use their authorities to conserve endangered and threatened species. The Service and other natural resource agencies are making an attempt to slow extinction of species back toward the natural rate.
private citizen	Concerned that future citizen lawsuits could force the Fish and Wildlife Service to implement protective measures for whooping cranes, which may adversely affect private property rights within the reintroduction area.	We cannot know how future actions or court orders may ultimately affect our implementation of the ESA; however, the Service has made every effort to ensure that the whooping crane reintroduction in the eastern U.S. does not interfere with private property rights. To ensure this, we have included provisions within the nonessential experimental population rule to allow ongoing lawful activities to continue. The Fish and Wildlife Service is the Federal agency given responsibility for administration of the Endangered Species Act, but we do not have the independent authority to change the ESA to provide protection from citizen lawsuits; that would require an act of Congress.
“ ”	Prefers “No Action” Alternative to avoid further lawsuits	Based upon the comments received on the draft EA, we don’t expect that lawsuits will be filed against this action. If they are, the most likely result would be a delay in implementation, which is equivalent to the “No Action” Alternative.

Respondent	Comment	Response
private citizen	Adamant for "No Action" Alternative because of citizen lawsuits. Also believes that there are adequate number of "these birds" in Ohio, sees no need for additional ones.	Because of the Service's responsibility to recover listed species, the EA purpose and need dictate that we choose an "action" alternative for the project. The Service has made every effort to ensure that the reintroduction does not interfere with private property rights, including activities such as agricultural practices, pesticide application, water management, construction, recreation, trapping, or hunting. To ensure that private property rights are unaffected, we have included provisions within the rule to allow ongoing lawful activities to continue. The Fish and Wildlife Service is the Federal agency given responsibility for administration of the Endangered Species Act, but the Service does not have the independent authority to change the ESA to provide protection from citizen lawsuits; that would require an act of Congress. The commentor may have been referring to sandhill cranes when mentioning "these birds". There have been no verified records of whooping cranes in Ohio since 1902.

Respondent	Comment	Response
private citizen	Asked that hunting not be affected by project; Concerned that reintroducing whooping cranes may affect establishment of sandhill crane hunting season; Questioned the soundness of proposed techniques, given the failures experienced in Idaho; Questioned the overall professional support for this project, given that the Pacific Flyway and some western states were opposed to further reintroduction in the Rocky Mountains..	We have stated repeatedly, including within the final rule to designate the eastern U.S. whooping crane NEP, that the Service will not mandate any closure of areas, including National Wildlife Refuges, during hunting seasons or closure or modification of hunting seasons for the purpose of avoiding take of the nonessential experimental population. We have gone on record that this action will not prevent the establishment of future hunting or conservation order seasons approved for other migratory bird species by the Mississippi or Atlantic Flyway Councils. This project has undergone extensive review by leading crane experts throughout the planning process, and represents the state of the art for crane reintroduction. The professional wildlife community throughout the country is extremely supportive of this project. The lack of support by the Pacific Flyway Council for reintroduction in the western U.S. for the most part reflects the views of hunting interests, and their concern about restrictions on hunting activities in that part of the country. All states within the NEP area have formally expressed support for the eastern U.S. reintroduction.

Respondent	Comment	Response
private citizen	One respondent believed that it was inappropriate to allow for penalties less than those of the Endangered Species Act, in the event of an accidental shooting. This respondent pointed out that current restrictions against the illegal take of protected migratory birds, as well as those restrictions in place for the Mexican wolf, a federally-listed endangered species, dictate that the hunter is responsible for identification of their quarry before shooting.	A provision was included in the proposed eastern U.S. whooping crane NEP rule such that Endangered Species Act penalties would not apply if take of an NEP whooping crane occurred accidentally, and incidental to an otherwise legal activity. Accidental shooting, occurring in the course of otherwise lawful activity (i.e., hunting in accordance with all laws and regulations), would be covered under that provision. Although Endangered Species Act penalties would not apply in that situation, applicable Federal penalties under the Migratory Bird Treaty Act and/or State penalties, may still apply. The incidental take provision was included in an effort to allay concerns of hunters and other sectors of the public. There was concern that Federal penalties or restrictions of property rights, business or recreational activities might be imposed if a whooping crane was injured or killed unintentionally on their property and/or as a result of some activity they were carrying out legally. We do not believe this provision of the rule is likely to lead to an increased incidence of illegal shooting of whooping cranes. In recent years, shootings of wild whooping cranes of the AWP flock, intentional or otherwise, have been rare. The same has been true for the reintroduced Florida nonmigratory whooping crane flock. Similarly, we believe that mortality to the eastern U.S. whooping crane NEP from shooting is likely to be low. In the event that a whooping crane was shot intentionally, (for example, if shot during a closed hunting season), then the penalties of the Endangered Species Act would still apply.

Respondent	Comment	Response
private citizen	Advocating for selecting Rocky Mountain Alternative.	The current proposal for reintroduction in the eastern U.S. reflects the most recent recommendation of the International Whooping Crane Recovery Team. This recommendation was arrived at only after complete and careful consideration of all factors likely to influence the re-establishment of another self-sustaining flock of whooping cranes, to contribute towards recovery of the species. All States within the proposed NEP area have gone on record as supporting the project. While some segments of the western public continue to be very supportive of reintroduction efforts in the western U.S., not all the States within the Rocky Mountain flyway are supportive of reintroduction of the whooping crane in that area. There are some aspects of reintroduction in the Rocky Mountain states which hold promise, such that the area will remain under consideration for a future reintroduction when conditions are more favorable for the effort.
“ ”	There is no evidence for historic use of Wisconsin as a nesting site.	While there are no documented records of nesting whooping cranes known from Wisconsin, whooping crane occurrence in Wisconsin is documented. Nesting also could have occurred, but was not discovered. The heart of the species' main nesting range included the adjacent states of Iowa, Illinois and Minnesota. There are documented nest records from Dubuque County, Iowa (Allen 1952), which is adjacent to Grant County, Wisconsin.
Citrus County, Florida	Feels that successful implementation would provide positive economic values to Florida that have not been mentioned in Chapter 4. Also advocate some provision for viewing by public when can be safely done without danger to cranes.	Comment noted. We have added additional discussion of these topics to the EA.

Respondent	Comment	Response
“ ”	Two changes to subsection 3.2.1: Add Chassahowitzka to list of adjacent communities; change spelling: Homosassa	These changes have been made in the EA.
“ ”	Change subsection 3.2.3 Residential use: Most of the lands adjacent to the wintering area are publicly owned conservation lands. Development on any privately held land is restricted to 1 dwelling unit per 20 acres and subject to the County’s Coastal and Lakes management plan.	This information has been added to the EA.
private citizen	Provides narrative information on dangers of power lines along migration paths of sandhill cranes. Suggests that proposed migration routes be surveyed and power lines in locations that are likely to pose problems be appropriately marked to avoid collisions.	The Service and its partners will explore the feasibility of conducting such surveys (in terms of staff and cost) and providing appropriate markings. We will also have discussions with utility companies regarding their willingness to mark lines identified as high risk to migrating whooping cranes.

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9.0 APPENDICES

APPENDIX 1: Status, History and Ecology of the Whooping Crane

The whooping crane is an endangered species found only in North America. A total of about 413 survive as of fall 2000, including 267 individuals in the wild in 3 populations and 146 individuals in captivity at 6 locations (T.Stehn, pers.comm.). The whooping crane was first listed as an endangered species under the law that preceded the Endangered Species Act (32 FR 4001, March 11, 1967). The species is listed as endangered primarily because of hunting and specimen collection, human disturbance, and conversion of the primary nesting habitat to hay, pastureland, and grain production (Allen 1952, Erickson and Derrickson 1981).

The whooping crane is classified in the family Gruidae, Order Gruiformes. It is the tallest bird in North America; males approach 1.5 m (5 feet). In captivity, adult males average 7.3 kg (16 pounds) and females 6.4 kg (14 pounds). Plumage of the adult is snowy white except for black primaries, black or grayish alulae, sparse black bristly feathers on the carmine crown and malar region, and a dark gray-black wedge-shaped patch on the nape. The bill is dark olive-gray which becomes lighter during the breeding season. The iris of the eye is yellow, the legs and feet are gray-black.

Adults are potentially long-lived. Current estimates suggest a maximum longevity in the wild of 22 to 24 years (Binkley and Miller 1980). Captive individuals are known to have survived 27 to 40 years (McNulty 1966, Moody 1931). Mating is characterized by monogamous life-long pair bonds. Individuals remate following death of their mate. Fertile eggs are occasionally produced at age 3 years but more typically at age 4 (pers. comm., Ernie Kuyt 1991). Some experienced pairs do not breed every year and some experienced pairs fail to breed when habitat conditions are poor. Whooping cranes ordinarily lay two eggs. They will renest if their first clutch is destroyed or lost before mid-incubation (Erickson and Derrickson 1981, Kuyt 1981). Although two eggs are laid, whooping cranes infrequently fledge two chicks. Only about one of every four hatched chicks survives to reach the wintering grounds (U.S. Fish and Wildlife Service 1986).

The whooping crane first appeared in fossil records from the early Pleistocene (Allen 1952) and probably was most abundant during that-two-million-year epoch. They once occurred from the Arctic Sea to the high plateau of central Mexico, and from Utah east to New Jersey, South Carolina, and Florida (Allen 1952, Nesbitt 1982). In the 19th century, the principal breeding range extended from central Illinois northwest through northern Iowa, western Minnesota, northeastern North Dakota, southern Manitoba, and Saskatchewan to the vicinity of Edmonton, Alberta. A nonmigratory breeding population still existed in southwestern Louisiana in the early 1900s (Allen 1952, Craft 1992).

Through use of two independent techniques of population estimation, Banks (1978) derived estimates of 500 to 700 whooping cranes in 1870. By 1941, the migratory population contained only 15 individuals. The whooping crane population decline in the 19th and early 20th century was a consequence of hunting

and specimen collection, human disturbance, and conversion of the primary nesting habitat to hay, pastureland, and grain production.

Allen (1952) described several historical migration routes. One of the most important led from the principal nesting grounds in Iowa, Illinois, Minnesota, North Dakota, and Manitoba to coastal Louisiana. Another went from Texas and the Rio Grande Delta region of Mexico northward to nesting grounds in North Dakota and the Canadian Provinces. A route through west Texas into Mexico probably followed the route still used by sandhill cranes (*Grus canadensis*). The whooping cranes following these routes wintered in the interior tablelands of western Texas and the high plateau of central Mexico.

Another migration route crossed the Appalachian Mountains to the Atlantic Coast. These birds apparently nested in the Hudson Bay area of Canada. Coastal areas of New Jersey, South Carolina, and river deltas farther south were the wintering grounds. The latest specimen records or sighting reports for some eastern locations are Alabama, 1899; Arkansas, 1889; Florida, 1927 or 1928; Georgia, 1885; Illinois, 1891; Indiana, 1881; Iowa, 1911; Kentucky, 1886; Manitoba, 1948; Michigan, 1882; Mississippi, 1902; Missouri, 1884; New Jersey, 1857; Ohio, 1902; Ontario, 1895; South Carolina, 1850; and Wisconsin, 1878; (Allen 1952, Burleigh 1944, Hallman 1965, Sprunt and Chamberlain 1949).

The whooping crane is still vulnerable to extinction in the wild. The crane adheres to ancestral breeding areas, migration routes, and wintering grounds, leaving little possibility of pioneering into new regions. The existing wild populations can be expected to continue utilizing their present habitats with little likelihood of expansion, except locally.

Whooping cranes currently exist in three wild populations and at three primary captive locations. The only self-sustaining natural wild population nests in the Northwest Territories and adjacent areas of Alberta, Canada, primarily within the boundaries of Wood Buffalo National Park. These birds winter along the central Texas coast of the Gulf of Mexico at Aransas National Wildlife Refuge and adjacent areas. They are distributed for 48 to 56 km (30 to 35 miles) along the coast from San Jose Island, and Lamar Peninsula on the south to Welder Point and the central portion of Matagorda Island on the north. This population is referred to as the Aransas/Wood Buffalo National Park Population (AWP).

The primary habitats of these birds in winter are coastal marshes and adjacent shallow waters of bays where they feed on blue crabs (*Callinectes sapidus*), clams (*Tagelus plebius, Ensis minor, Rangia cuneata, Cyrtopleura costada, Phecoides pectinata, and Macoma constricta*), and the plant wolfberry (*Lycium carolinianum*) (U.S. Fish and Wildlife Service 1994). Fifty pairs from this population nested in 2000, and 187 adult whooping cranes were reported in spring 2000 (T. Stehn, pers.comm.). This population is hereafter referred to as the Aransas/Wood Buffalo National Park population (AWP).

In their restricted winter distribution, whooping cranes are vulnerable to annihilation by catastrophic events like a hurricane, red tide, or a contaminant spill which could destroy their habitat, eradicate their food resources or kill the birds directly as a result of ingestion of toxins. A hurricane in 1940 contributed to the

loss of half the population of nonmigratory whooping cranes residing in Louisiana at that time (Gomez1992). The population never recovered from that loss and the last bird was captured and moved to Aransas NWR in Texas in 1949(Allen, 1952).

The principal threat continues to be a contaminant spill along the Gulf Intracoastal Waterway that bisects the winter range. It is one of the busiest waterways in the world and much of the commercial barge tonnage is petrochemical products. For example, the total tonnage transported in 1987 was almost 10 million tons, including 616,872 tons of crude petroleum; 2,399,018 tons of gasoline; 2,361,249 tons of benzene; and 1,049,509 tons of basic industrial chemicals. Each of these cargoes is chronically to acutely toxic and has the potential, if spilled or carried by the action of wind and weather into the critical habitat, to destroy and/or degrade that habitat and to affect the whooping crane adversely, perhaps even fatally. The vulnerability of these birds in the wild illustrates the need for additional self-sustaining wild populations which are separate from the existing wild birds.

The second largest wild population is found in the Kissimmee Prairie area of central Florida. This population was designated as experimental nonessential in January 1993 (58 FR 5647-5658). Since 1993, 228 isolation-reared whooping cranes have been released in this area (FLFWCC, 2001), in an ongoing re-introduction effort to establish a non-migratory flock. As of October 2000, there are 75 surviving individuals in the project area. Birds in this population have reached breeding age within the past several years. During the 2000 nesting season, a total of fifteen pairs defended territories, three pairs laid eggs, and two of these pairs failed prior to hatching. The remaining pair hatched both eggs, but no chicks survived to fledging.

The third wild flock consists of two individuals which remain from an effort to establish a migratory population in the Rocky Mountains through cross-fostering with greater sandhill cranes (*G. c. tabida*) (Drewien and Bizeau 1977, Bizeau et al. 1987), and an experiment in 1997 when four whooping cranes were led behind an ultralight aircraft between Idaho and New Mexico (Clegg, et. al.1997). The cross-fostering project began in 1975 and has failed to produce any chicks or mated pairs (Ellis et al. 1992a). These individuals have never bred with other whooping cranes. The females in that group may be improperly sexually imprinted on male sandhill cranes. As a consequence of the lack of breeding and the inordinately high mortality experienced by this population, the project was phased out.

Initiated in 1967, the whooping crane captive breeding program has been very successful. The U.S. Fish and Wildlife Service (Service) and the Canadian Wildlife Service began taking eggs from the nests of the wild population in 1967 and raising the resulting young in captivity. Between 1967 and 1993, 181 eggs were taken from the wild to captive sites. Birds raised from those eggs form the nucleus of the captive flock (USFWS, 1994). The captive population is now located at three primary locations: Patuxent Wildlife Research Center in Laurel, Maryland; the International Crane Foundation in Baraboo, Wisconsin; and the Calgary Zoo, Alberta, Canada. An additional captive population was started in 1998 at the Audubon Species Survival Center in New Orleans, Louisiana.

The total captive population as of September 2000 stood at 146 birds, with 135 birds present in the three primary captive breeding centers, and an additional 11 birds present at three other locations; six whooping cranes are found at the San Antonio Zoological Gardens, Texas; four at the Audubon Institute, New Orleans, Louisiana; and one at the Lowery Park Zoo in Tampa, Florida.

In 1985, the Director-General of the Canadian Wildlife Service and the Director of the U.S. Fish and Wildlife Service signed a memorandum of understanding (MOU) entitled "Conservation of the Whooping Crane Related to Coordinated Management Activities." The MOU was revised and signed in 1990. The U.S. Geological Survey-Biological Resources Division (Patuxent) and Parks Canada (Wood Buffalo National Park) were added signatories in 1995. The MOU discusses disposition of birds and eggs, postmortem analysis, population restoration and objectives, new population sites, international management, recovery plans, and consultation and coordination. All captive whooping cranes and their future progeny are jointly owned by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service. Consequently, both nations are involved in recovery decisions.

The Whooping Crane Recovery Plan (U.S. Fish and Wildlife Service 1994) lists the criteria for downlisting from endangered to threatened status as attaining a population level of at least 40 wild nesting pairs at Wood Buffalo National Park, and self-sustaining, discrete populations of at least 25 wild nesting pairs at each of two other sites. These new populations may be migratory or non-migratory, but should be sustained by natural reproduction for 10 years before downlisting occurs.

In early 1984, pursuant to the recovery plan goals and the recommendation of the Whooping Crane Recovery Team (Team), potential whooping crane release areas were selected in the eastern United States. At that time, the prognosis was favorable for successfully establishing a western population by use of the cross-fostering technique. Consequently, key considerations in selecting areas to evaluate for the eastern release were: 1) large areas of potentially suitable wetland habitat; 2) a healthy sandhill crane population sufficient to support recovery using the cross-fostering technique; 3) public and state agency support for such a recovery effort in the release locale; 4) low-to-moderate levels of avian disease pathogens, environmental contaminants, and power lines; 5) the potential of the habitats to simultaneously support whooping cranes and sandhill cranes; and (6) reasonable certainty the new population would not have contact with the AWP.

The areas selected were the Upper Peninsula of Michigan and adjacent areas of Ontario, the Okefenokee Swamp in southern Georgia, and three sites in Florida. The Michigan site would potentially support a migratory population. The Georgia and three Florida sites would each support a nonmigratory population. The Michigan/Ontario wetlands are occupied by greater sandhill cranes which winter in Florida and the Okefenokee Swamp of Georgia. The wetlands in Georgia and Florida are occupied by the nonmigratory Florida sandhill crane (G. c. pratensis) and in winter by the greater sandhill cranes which nest primarily in southern Ontario, Michigan, eastern Minnesota, and Wisconsin. Three-year studies were initiated at each site in October 1984 to evaluate their respective suitabilities.

Results of the studies were presented in written final reports to the Team in fall 1987 (Bennett and Bennett 1987, Bishop 1988, McMillan.1987, Nesbitt 1988a) and in verbal reports in February 1988. By 1988, the Team recognized that cross-fostering was not working to establish a migratory population in the West. The possibility of inappropriate sexual imprinting associated with cross-fostering, and the lack of a proven technique for establishing a migratory flock, influenced the Team to favor establishing a nonmigratory flock. A nonmigratory population has several features which make it easier to achieve success: 1) released birds do not face the hazards of migration (over one half of the losses of fledged, cross-fostered birds occurs during migration (Drewien et al. 1989)); and 2) released birds inhabit a more geographically limited area year-round than do migratory cranes, which increases the opportunity for birds to find a compatible mate.

In summer 1988, the Team selected Kissimmee Prairie in central Florida as the area most suitable for the next experiment to establish a nonmigratory population. The Service designated this flock as an experimental, nonessential population under the Endangered Species Act and began releasing captive-reared birds in 1993. This project is a joint collaboration with the Service, the Florida Fish and Wildlife Conservation Commission and numerous private landowners in the release area. The project has been well-received by the general public and the media and no adverse impacts to agricultural or environmental resources have occurred. If successful, this non-migratory flock will be considered as one of the three self-sustaining populations necessary for the recovery of the species.

In 1996, the Team decided to investigate the potential for another reintroduction site in the eastern U.S., with the intent of establishing an additional migratory population. Following a study of potential wintering sites by Dr. John Cannon (Cannon 1998), the Team selected the Chassahowitzka NWR /St. Martin's Marsh Aquatic Preserve as the top wintering site for a new migratory flock of whooping cranes. Based on concerns that a reintroduced population in Saskatchewan or Manitoba might mix with the wild AWP, the Team requested that Dr. Cannon see if suitable summering sites were present in Wisconsin, an area well east of the AWP migration corridor. After preliminary data was gathered, a decision was made in March, 1998 to focus on three potential release sites: Crex Meadows State WA, central Wisconsin including Necedah NWR and several State WAs, and Horicon NWR. Detailed analysis of the potential release sites was presented at the Team meeting in September 1999 (Cannon 1999), and the Team then recommended that releases be started in central Wisconsin.

APPENDIX 2: Letters of Concurrence for Implementing the Preferred Alternative and Proposed Rule from Twenty State Wildlife Agencies representing the 20 States in the Eastern U.S. NEP area.