United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

August 29, 2002

James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Re: Everglades Agricultural Area Storage Reservoirs Project, Phase 1

Dear Mr. Duck:

The Fish and Wildlife Service (Service) has prepared this Planning Aid Letter (PAL) for the Everglades Agricultural Area Storage Reservoirs Project, Phase 1 (EAA Project) both in compliance with a Scope of Work agreed upon between the U.S. Army Corps of Engineers (Corps) and the Service in January 2000 and in reply to the National Environmental Policy Act scoping letter from the Corps dated July 16, 2002. The EAA Project is a component of the Comprehensive Everglades Restoration Plan (CERP). This PAL is provided in accordance with the Fish and Wildlife Coordination Act of 1958 (FWCA), as amended (16 U.S.C. 661 *et seq.*), and the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This PAL does not constitute the report of the Secretary of Interior as required by section 2(b) of the FWCA, nor does it constitute a biological opinion under section 7 of the ESA. This PAL provides guidance and recommendations regarding resource conservation issues in the planning stage for the EAA Project, authorized under the Water Resources Development Act (WRDA) of 2000.

I. Introduction

The Service is the principal Federal agency responsible for conserving, protecting and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The agency enforces Federal wildlife laws, administers the ESA, manages migratory bird populations, restores nationally significant fisheries, and conserves and restores wildlife habitat such as wetlands. The Service evaluates projects for threatened and endangered species concerns and impacts to fish and wildlife resources. We are committed to contributing scientific and technical guidance to the Project Delivery Team (PDT) for the EAA Project in the areas of ecological/biological assessment and environmental risk assessment.

II. Project Description and Existing Conditions

The EAA Project is a component of the Central and South Florida Project Comprehensive Review Study, Final Integrated Feasibility Report and Programmatic Environmental Impact Statement, otherwise known as the "Restudy" (Corps 1999).

The EAA Project originally envisioned in the Restudy consisted of constructing two 20,000 acre reservoirs with increased conveyance in associated canals. The first reservoir would meet Everglades Agricultural Area (EAA) irrigation demands only. The second reservoir would meet environmental demands as a priority.

An increase in land availability of the EAA Project has led to a revision in the Restudy conceptual plan. The EAA Project potential footprint now encompasses approximately 49,616 acres in the EAA, referred to as Components A, B, and C (Figure 1). According to the real estate plan section of the EAA Storage Reservoirs, Phase 1 Project Management Plan (PMP), the three parcels were part of the Talisman and Woerner land acquisitions (Corps 2002). Components A and C are located west of US Highway 27 and the North New River Canal in southern Palm Beach County. Component B is located east of the highway and canal. The Talisman property acquired for the EAA Project consists of 44,000 acres, is primarily located in Components A and C, and is used for sugar cane production. The Woerner property consists of 5,241 acres and is used to grow sod and row crops. The Woerner South Farm 2 property is part of the northern portion of Component B and the Woerner South Farm 3 property is the northeastern corner of Compartment A. At the present time, the Talisman and Woerner properties are being leased and farmed for sugar cane and sod, respectively. Existing canals associated with the EAA Project include the Miami, Bolles, Cross, and North New River Canals.

Natural areas adjacent to the EAA Project are part of the Everglades Protection Area (EPA) and include Holey Land Wildlife Management Area (WMA), Rotenberger WMA, and Water Conservation Area (WCA) 2. These areas are managed for fish and wildlife resources by the Florida Fish and Wildlife Conservation Commission (FWC). All three natural areas discharge water into WCA 3A North. Management of water levels in the WCAs is the responsibility of the South Florida Water Management District (SFWMD) in accordance with regulation schedules set by the Corps.

Ecological disturbances in the EPA include unnatural fluctuations and extremes in water levels due to water management operations. Disturbances also result from agricultural and urban runoff directed into the EPA. According to the Everglades Stormwater Program Summary (SFWMD 1999):

> ***I****ncreased amounts of phosphorus coming from agricultural and urban runoff have caused several adverse ecological changes and an imbalance in natural populations of aquatic flora and fauna. Phosphorus enrichment causes a decline in the coverage of sawgrass in sloughs and wet prairies as these habitats are gradually invaded by cattail stands. Invertebrates and other aquatic fauna are also affected by phosphorus changes*

in the Everglades environment. Their variability and abundance tends to be low in much of the marsh areas enriched with phosphorus.

Significant increases in phosphorus concentrations have contributed to eutrophication, increased organic matter in water, changes in periphyton communities, and lower levels of dissolved oxygen (DO) (Stober *et. al.*1996). In addition, high levels of nutrients may lead to harmful algal blooms, some of which produce potent algal toxins that could harm fish and wildlife.

Currently, the majority of EAA runoff is untreated and discharged to natural as well as developed areas. In addition, the EAA relies on water from Lake Okeechobee for irrigation purposes and backpumps untreated water into the lake when flooding threatens the area. Residual pesticides and contaminants from the EAA have adversely impacted the Everglades ecosystem (Service 1999).

Various Stormwater Treatment Areas (STAs) are constructed or planned adjacent to the EAA Project. As part of the Everglades Construction Project, STAs are constructed wetlands designed to incorporate biological processes to reduce the nutrient load (primarily phosphorus) entering the EPA (SFWMD 2002). STA 3/4 is currently under construction and located at the southeastern corner of Compartment A, east of Holey Land WMA. Most environmental releases from the EAA Project destined for treatment are expected to pass through STA 3/4. STA 2, located on the eastern side of Compartment B, and STAs 5 and 6, located on the western side of Rotenberger WMA, may also be used to treat some releases from the EAA Project.

The current goals and objectives of the EAA Project are presented in the PMP (Section 3.2):

1) Reduction of the Lake Okeechobee regulatory releases to the estuaries and backpumping from the EAA into Lake Okeechobee by sending water to the south and into the reservoirs;

2) Improved environmental releases through the storage of water and release to the Everglades during the dry season demand;

3) Flow equalization and optimization of treatment performance of STA2, STA 3/4, STA 5, and STA 6 by capturing peak storm event discharges within the reservoirs for slow release to the STAs; and

4) Improved flood control and regional water supply for the agricultural community currently served by the EAA canals and other areas served by Lake Okeechobee.

During the Project Implementation Report (PIR) process, the PDT will reevaluate the optimum number, size, and depth of the reservoirs. Canal conveyance construction may be implemented prior to reservoir construction in order for the transmission system to be in place.

III. Fish and Wildlife Resource Issues to be Considered During Project Planning

The Service understands and concurs that the main hydrologic function of the EAA Project is to store and release water for the benefit of the natural environment, regional water supply, and flood control. However, we also recognize potential opportunities to reduce negative effects and enhance benefits to fish and wildlife and their habitats through optimizing the EAA Project.

Performance measures are currently under development by the PDT as evaluation criteria to assist in formulating, modeling, and analyzing EAA Project alternative plans. Finalized performance measures will consist of defined parameters (such as TP concentrations in water) and targets (such as ten parts-per-billion) designed to evaluate potential effects of the EAA Project.

Service issues and recommendations for the EAA Project PIR planning process are designed to ensure goals of the project are met, additional potential benefits are explored, and negative impacts to fish and wildlife resources are minimized. Our recommendations include requests for performance measures, monitoring plans, and other information that will be required by the Service and other members of the PDT early in the planning process to adequately formulate, model, analyze, and evaluate alternative plans. Optimal alternative plan analysis requires consideration of all project phases including the planning, design, construction, and operational phases.

Measurable water quality effects of the EAA Project on fish and wildlife and their habitats are addressed in the recommendations below. Regional effects that may not be measurable or directly attributable to the EAA Project may provide indirect benefits to wetlands, migratory birds, and other fish and wildlife within the EPA, Lake Okeechobee, and the Caloosahatchee and St. Lucie Estuaries.

Because the EAA Project envisions potentially inundating 49,616 acres of former agricultural property, Service concerns mainly focus on contaminant and water quality issues both within the reservoirs and in natural areas downstream. We first address soil quality issues of the EAA Project and offer recommendations which require action as soon as possible. The second section provides recommendations for water quality performance measures and monitoring plans. The third section provides recommendations, including performance measures, for project design and operations that may affect both water quality and fish and wildlife resources directly.

A. Soil/Sediment Quality Issues and Recommendations

The Service recommends further evaluation of contaminants on potential EAA Project lands. Depending on the type of crops grown, agricultural practices in southern Florida historically included the use of organochlorine pesticides (OCs) prior to their being banned due to detrimental effects on fish, wildlife, and the environment (Haag and McPherson 1997). Other contaminants of concern to fish and wildlife include, but are not limited to, mercury and other metals, ammonia, petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organophosphate pesticides (OPs), and persistent herbicides.

Phase I and Phase II Environmental Assessments of the Talisman and Woerner properties were completed in 1999 to evaluate the potential presence of contaminants. Contaminants found on the Talisman property included petroleum products in localized areas or "hot spots." Contaminant sampling performed on the Woerner South Farm 3 property in Compartment A revealed high levels of residual OCs (DDT, DDD, DDE, toxaphene, and chlordane) from past agricultural practices, primarily at "hot spot" locations. However, only limited sampling was performed on the Woerner South Farm 2 property in Compartment B. Sampling performed at maintenance area "hot spots" on the South Farm 2 property revealed high levels of petroleum contamination in soil and groundwater. The EAA Project PMP (Section 6.4) estimates an approximate cost of $4 M to remediate the environmental problems already detected at the maintenance site on South Farm 2. Based upon agricultural history, comprehensive contaminant sampling of the cultivated areas of South Farm 2 has been recommended by the Service's South Florida Ecological Services Environmental Contaminants Program (ECP) and is pending. Difficulties accessing the leased Woerner property continues to delay efforts to conduct additional sampling. If after evaluation, contamination on the South Farm 2 property is found to be widespread and exceeds the ecological screening criteria established by the Florida Department of Environmental Protection and/or the U. S. Environmental Protection Agency, an Ecological Risk Assessment Analysis will need to be performed to determine potential impacts to fish and wildlife communities.

The Service recommends the following be performed as early as possible in the PIR planning process, prior to alternative plan formulation:

1) Ensure "Environmental - Hazardous, Toxic, and Radioactive Waste" (E-HTRW) assessments on all properties are completed in accordance with the PMP (Section 6.2.4) and based upon criteria established to protect fish and wildlife.

2) Ensure contaminant testing along canal embankments is performed prior to identification of a recommended plan for the increase conveyance in the canals. Widening and subsequent flooding of canals may result in undesirable mobilization of contaminants.

3) Ensure additional contaminant evaluation of the proposed Woerner South Farm 2 property is completed. Contaminant characterization and assessment of remediation needs and costs are required before the South Farm 2 property can be considered as a candidate for inclusion in the EAA Project footprint.

4) Ensure interim uses of the leased properties do not exacerbate existing conditions or result in the spreading of contamination. Sampling for contaminants at the conclusion of the lease agreements is recommended. This concern was raised in a July 24, 2001 letter to the SFWMD from Environmental Consulting and Technology, Inc., the consulting firm conducting contaminant sampling on the Woerner property.

5) Provide the Service with the contaminant remediation plan for the Talisman and Woerner properties, as well as quarterly status reports of ongoing remediation efforts.

B. Water Quality Issues and Recommendations

Service concerns relating to the EAA Project include the potential for the uptake and/or bioaccumulation of harmful contaminants in fish and wildlife. Contaminants present in and around the EAA Project footprint may become mobilized, particularly during initial flooding of the reservoirs. Contaminants may also be directed into the reservoirs from source water, such as agricultural runoff. Of particular concern is the potential use of contaminated reservoir waters by fish and wildlife, including threatened and endangered species such as the federally endangered wood stork (*Mycteria americana*).

High nutrient levels are also of concern as a large portion of the source water for the EAA Project will be direct or transported runoff from EAA lands. High levels of Total Phosphorus (TP) negatively impact the Everglades ecosystem and have been listed as one of two primary water quality parameters to be evaluated in the EAA Project (SFWMD 2000, PMP Section 6.9.3). Deleterious effects of high phosphorus levels found in the Everglades was discussed in Section II.

In addition to phosphorus, sulfates in agricultural fertilizers may be present, or directed into, the EAA Project footprint. The introduction of sulfates to soil and water in the absence of oxygen has been implicated as a primary driving force in methylation of mercury by sulfate-reducing bacteria (Gilmore and Henry 1991, Jones and Slotton 1996, SFWMD 2002). Sulfate loading in a system may be even more important to methyl mercury production than mercury loading (U.S. Environmental Protection Agency 2001). Because methyl mercury readily bioaccumulates in fish and wildlife, the Service is concerned with levels of both mercury and sulfates that may be encountered in the EAA Project. A quick release of mercury may occur when a reservoir is first flooded. Sulfates that are already present, or a surge of sulfates from the source water such as the EAA, may result in enhanced mercury methylation within the EAA Project.

DO within reservoirs and discharge waters is also of concern and is the second of two primary water quality parameters to be evaluated in the EAA Project (PMP Section 6.9.3). Low levels of DO have been found to negatively impact fish and wildlife in the Everglades ecosystem (SFWMD 2000, Wetzel 1983). In southern Florida, lower DO levels are generally found at lower depths in the water column (Jon Fury, FW C, personal communication 2002). Extremely low levels of DO within a reservoir, or delivered through structures at the bottom of a water column, may result in fish kills. In addition, low DO levels may contribute to increased mercury methylation (SFWMD 2002).

1. General Water Quality Recommendations for Performance Measures and Monitoring Plans

The majority of potential negative effects to fish and wildlife in the EAA Project relate to water quality and the presence of deleterious levels of contaminants and nutrients. Water quality issues should be addressed by the PDT early in the planning process to assist in the formulation and evaluation of EAA Project alternative plans.

Performance measures should be developed for reservoirs, discharge waters, receiving STAs, and downstream natural areas of the EPA, such as Holey Land WMA, Rotenberger WMA, and WCA 2.

Water quality monitoring plans should be developed to produce a baseline of existing conditions and to monitor ecological performance after project implementation. Ecological performance includes evaluation of downstream effects. Monitoring plans should be implemented throughout all phases of the EAA Project including planning, design, construction, and operations.

The Service offers the following recommendations for inclusion as performance measures and in development of baseline and long term monitoring plans in the EAA Project to determine potential and actual effects of water quality on fish and wildlife and their habitats:

1) Minimize or eliminate contaminants in discharge waters. Monitor for the presence of contaminants in reservoir source water, holding water, and discharge water. Contaminants of concern include, but are not limited to, mercury and other metals, ammonia, petroleum hydrocarbons, PAHs, PCBs, OPs, OCs, and persistent herbicides.

2) Include baseline monitoring for contaminants currently within potential EAA Project footprint. Include internal canals, agricultural canals, and ponds.

3) Minimize or eliminate bioaccumulation of methyl mercury in fish and wildlife within the reservoirs. Include baseline and periodic monitoring of aquatic fauna within the reservoirs for bioaccumulation of contaminants. Monitoring for contaminants both in waters and in aquatic fauna will identify potential negative effects to fish and wildlife, including endangered species, that may use the reservoirs for feeding or resting.

4) Minimize or eliminate mobilization of contaminants and nutrients by minimizing dryout in the reservoirs. Include contaminant monitoring before, during, and after initial flooding of the project. Water monitoring and modeling should be performed to determine possible "first flush" mobilization of contaminants and nutrients, both upon first flooding and following periods of dryout with subsequent reflooding.

5) Minimize or eliminate the accretion of contaminant levels in reservoir sediments. Develop and implement a monitoring plan for analyzing sediments and investigate the feasibility of periodic removal and disposal of contaminated sediments as necessary.

6) Minimize or eliminate seepage from reservoirs. Monitor for possible seepage of contaminated water into adjacent reservoirs, canals, and downstream of the EAA Project.

Seepage is identified as a concern on the Talisman and Woerner properties (PMP Section 6.2.1).

7) Minimize deleterious levels of nutrients in reservoirs and discharge waters. Monitor for the presence of high levels of nutrients in reservoir source water, holding water, and discharge water. Nutrients of concern include, but are not limited to, phosphorus, sulfates, and nitrogen.

8) Ensure water quality models used for the EAA Project follow the objectives, protocols, and calibrations designed by the model developers. Input from model developers can be sought and closely considered when modeling the alternative plans.

9) Design reservoir features and operations to optimize water quality (Section III.C.).

2. Lake Okeechobee, St. Lucie Estuary, and Caloosahatchee Estuary Performance Measures

The following recommendations for performance measures relate directly to EAA Project goals outlined in the PMP (Section 3.2). These goals include reducing freshwater releases from Lake Okeechobee to the St. Lucie and Caloosahatchee Estuaries, reducing the amount of backpumping of untreated water from the EAA into Lake Okeechobee, and improving environmental releases during the dry season.

The following are proposed performance measures specific to Lake Okeechobee to assist in tracking potential benefits to lake and estuarine habitats:

1) Minimize or eliminate water releases from Lake Okeechobee for EAA irrigation purposes, particularly during the dry season.

2) Minimize or eliminate backpumping untreated water from the EAA into Lake Okeechobee. It may be possible to correlate a reduction of TP levels and a rise in DO levels achieved in the lake due to the decrease in backpumping.

3) Reduce freshwater releases to estuaries from Lake Okeechobee in order to benefit estuarine habitats.

Independent of the EAA Project, we recommend the SFWMD monitor the salinity envelope of the estuaries and adjust freshwater releases from Lake Okeechobee accordingly. However, we are not recommending including the monitoring of salinity in the estuaries as an EAA Project performance measure as there are multiple factors that contribute to the salinity envelope independent of the EAA Project.

C. Issues and Recommendations for Optimizing Reservoir Design and Operation

As stated earlier, the Service understands and agrees that the main function of the EAA Project is to store and release water. However, we also recognize the many opportunities to enhance fish and wildlife and their habitats through optimizing the design and operation of the reservoirs in the EAA Project. Consideration of design and operation issues should be addressed early in the planning process to assist in the formulation and evaluation of EAA Project alternative plans.

1. Water Quality Design and Operation Performance Measures and Recommendations

The EAA Project may provide a constant source of water to the STAs, thereby increasing their efficiency and preventing mobilization of nutrients and contaminants within the STAs. However, due to the expected high nutrient levels of the source water, optimizing water quality within the EAA Project prior to discharge to STAs or other portion of the EPA is desirable and consistent with overarching CERP goals. According to the Restudy, Section 9.1.5.1 (Corps 1999):

> *The storage compartments* (EAA Project reservoirs) *can also be designed to provide a water quality treatment function, augmenting the performance of the Everglades Construction Project and ensuring protection of water quality in the Everglades Protection Area*.

We interpret this goal as providing direction to investigate ways to optimize the design of the reservoirs to enhance water quality prior to release to the STAs.

As stated in the PMP (Sections 3.2 and 6.9.3, respectively):

> *The PIR will evaluate the storage reservoirs' effect on basin water quality. This evaluation will include...investigations of operational alternatives that will maximize the opportunity of the EAA Storage Reservoirs to capture and reduce nutrient loads without compromising the water supply component of the project.*
>
> *The Water Quality sub-team will evaluate operational and design feature alternatives for the purpose of improving water quality in the reservoirs, and optimization of STA performance*.

The Service offers the following performance measures and recommendations for developing design and operational features to enhance water quality of the EAA Project:

> 1) Minimize or eliminate the number of dryouts in the reservoirs to prevent mobilization of nutrients and contaminants upon reflooding and to reduce negative impacts to aquatic wildlife.
>
> 2) Evaluate technologies to optimize DO levels in reservoirs and discharge waters. Minimize the potential for fish kills caused by low water levels and/or low DO levels.

3) Minimize evapotranspiration leading to loss of water in reservoirs.

4) Minimize the presence of deleterious levels of nutrients in outflows through strategic operational planning.

5) Investigate potential benefits and negative impacts of maximizing retention time in reservoirs to increase settling of contaminants and nutrients prior to discharging downstream.

6) Investigate increasing the number and sequencing of reservoirs and/or including polishing cells within reservoirs to optimize water quality. Compartmentalization may enhance water quality in the EAA Project by helping to redistribute flow.

7) Evaluate whether only one reservoir or parts of each reservoir should be designated to receive recirculated EAA water. Investigate potential problems in using recirculated source water from the EAA on both EAA Project lands and EAA lands. The long term use of recirculated irrigation water on EAA lands may be of concern depending upon future land uses that may include agriculture, urban development, and/or increased expansion of natural areas.

8) Minimize nutrient levels in the reservoirs prior to water deliveries to STAs to further enhance STA performance.

9) Minimize or eliminate the potential for STAs to dry out by optimizing deliveries from the EAA Project. Providing a constant source of water to the STAs may prevent further mobilization of nutrients and/or contaminants in STAs.

10) Minimize or eliminate the potential for discharging from a reservoir directly into an STA or environmental area at the same time untreated source water is being pumped into that reservoir.

11) Investigate opportunities for including some form of treatment wetland within the reservoirs.

12) Minimize or eliminate the potential for reservoir water to be discharged to environmental areas prior to being directed through an STA for treatment. Bypass of STAs should be avoided.

13) Track changes and future plans for STA operation and design in order to optimize both the EAA Project and associated STAs.

14) Identify which canal(s) transports or holds higher levels of contaminants and nutrients. Minimize directing this water to natural areas.

15) Optimize the timing of canal water releases to natural areas and to reservoirs discharging to environmental areas. A seasonal regime for directing canal water may be appropriate due to seasonal fluctuations of nutrient levels in canals as a result of agricultural practices upstream.

16) Evaluate the possibility of using wide vegetated swales instead of canals to control or capture seepage. A vegetated shallow swale may result in improved water quality in seepage water and may also provide some wildlife habitat benefits. Using swales may also reduce the need, difficulty, and high cost of excavating canals. Ensure contaminant testing is performed on potential swale footprints. Continue contaminant monitoring in swales throughout EAA Project operations.

17) Evaluate using substrates and/or features such as levees within all or part of a reservoir to enhance water quality. Research is being conducted to investigate the use of lime rock berms for increased nutrient removal in STAs (SFWMD 2002).

18) Investigate ways to prepare the soil surface of the EAA Project reservoirs to enhance water quality and/or minimize negative effects to water quality. Loose organic soils may leach nutrients into the water column. Disking or "turning over" fields prior to flooding may increase the mobilization of nutrients and contaminants, as well as increase turbidity and suspended solids. Vegetation allowed to remain on agricultural fields within the reservoirs prior to flooding may physically stabilize the sediments.

19) Investigate the efficacy of introducing submerged aquatic vegetation (SAV) to one or more reservoirs. SAV and associated periphyton are currently used in STAs for nutrient removal (SFWMD 2002). Introduction of SAV may not only aid in removing nutrients when reservoirs are flooded, but may also serve as a vegetative mat to prevent the physical mobilization of contaminants and nutrients during dryouts and subsequent reflooding.

2. Additional Design and Operation Performance Measures and Recommendations for Fish and Wildlife

The Service offers the following additional performance measures and recommendations for developing design and operational features of the EAA Project for the benefit of fish and wildlife:

1) Minimize or eliminate negative impacts to fish and wildlife within the EAA Project footprint during construction and first flooding. Major construction activities should be carefully scheduled to minimize impacts during wildlife breeding seasons. In addition,

first flooding should be accomplished slowly and gradually to increase the amount of time for terrestrial wildlife to vacate the area.

2) Minimize or eliminate the introduction and possible spread of aquatic and/or terrestrial exotic vegetation and reduce the potential for deleterious algae blooms. Allowing extended dryout in reservoirs may increase incidence and seed transport of invasive terrestrial exotic vegetation such as Melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebenthifolius*), and Old World climbing fern (*Lygodium microphyllum*).

3) Design EAA Project reservoirs to provide areas of deep open water to serve as refugia for aquatic wildlife during dry periods. Areas of deep open water may enhance nutrient removal by allowing uninterrupted SAV growth. Providing refugia may also prevent mortality of mosquito fish (*Gambusia affinis*) which help control mosquito (*Anopheles* spp.) populations. Existing agricultural canals within the EAA Project footprint could be included as part of a refugia design plan.

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4) Evaluate increasing the spatial extent of wetlands and/or fish and wildlife habitat by including littoral shelves in a reservoir or part of a reservoir. Consider sloping and/or terracing levees and planting native trees and other vegetation. Maintenance operations, such as mowing along levees, would require further consideration. A portion of a levee could be closed to traffic and designed as transitional habitat with terraces and littoral shelves allowing emergent vegetation, herbaceous shrub vegetation, and trees. Ensure only non-contaminated or remediated lands are used as potential habitat. If a wetland treatment system is designed as part of the EAA Project, investigate the possibility of incorporating wildlife habitat into the system.

5) Investigate the potential for inadvertently creating an attractive nuisance, such as attracting of wading and migratory birds out of season due to unnatural water levels within the reservoirs (*i.e.*, sending false cues).

6) Design and include wide buffer zones of vegetated habitat outside the levees of the EAA Project reservoirs to expand terrestrial wildlife habitat.

7) Design and operate pumping, discharge, and flow-through structures to minimize or eliminate negative effects to aquatic wildlife, including the impingement of fish and wildlife at operational structures.

8) Design and operate structures to avoid sending low DO water from one area into another which could result in fish kills (See Section III). Discharging water through structures at the upper reaches of the water column may reduce negative impacts to aquatic wildlife (Jon Fury, FWC, personal communication 2002).

3. Recreational Opportunities

Opportunities for recreation should be considered when formulating design and operational plans. Recreational activities in the reservoirs, canals, and associated levees could include wildlife viewing, fishing, boating, hiking, and biking. Depending on recreational activities recommended by the public and the PDT, access, parking, and boat ramps may be designed. In addition, recreational areas along levees and canals could include shade trees, shrub vegetation, informational signs, and pavilions to increase public use and positive public perception. Shade trees and vegetation may also serve as wildlife habitat. We recommend the Corps also discuss recreational opportunities with the FWC.

IV. "Cost" as a Performance Measure

The Service supports the PDT decision to remove "cost" as a potential performance measure. The use of "cost" or "cost-effectiveness" as a target early in the planning process could have precluded otherwise viable and ecologically sound alternative plans from full consideration. We understand "cost" will be addressed in the PIR planning process for the EAA Project through a cost effective analysis and incremental cost analysis.

V. Closing Comments

The Service appreciates this opportunity to provide planning guidance to the Corps in support of the EAA Storage Reservoirs Project, Phase 1 planning effort and its potential impact to fish and wildlife and their habitat. As an active member of the PDT, we look forward to continuing to

provide technical support to the Corps during all phases of this important project. If you have questions or comments, please feel free to contact Cindy Brashear, Fish and Wildlife Biologist, at (772) 532-9776.

Sincerely yours,

James J. Slack
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South Florida Ecological Services Office

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