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CENTRAL AND SOUTHERN FLORIDA PROJECT

COMPREHENSIVE EVERGLADES RESTORATION PLAN

COMPREHENSIVE EVERGLADES
RESTORATION PLAN

SECTIONS 5.4.3 & 7.1
EVALUATION STRATEGY

DRAFT PROJECT IMPLEMENTATION REPORT

LAKE OKEECHOBEE WATERSHED PROJECT

U.S. Army Corps of Engineers
Jacksonville District

South Florida
Water Management District

Assisted By:

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This document was prepared by the Lake Okeechobee Watershed Project Delivery Team, with assistance from HDR Engineering, Inc. The purposes of this Evaluation Strategy document are to explain the significance of the LOW Project evaluation criteria and to describe how the U.S. Army Corps of Engineers (USACE) Principles and Guidelines (P&G) evaluation criteria will be used to determine the Tentatively Selected Plan. The final document will be one component of the Project Implementation Report for the Lake Okeechobee Watershed Project, which is scheduled for completion in early 2005. Sections of this document are numbered according to the proposed outline for the Project Implementation Report.

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5.4.3 Significance of Evaluation Criteria

LOW Project evaluation criteria have been developed as a comprehensive list of factors and predictive assessments that will be used during the planning process for the LOW Project. These evaluation criteria were developed to help characterize the effectiveness of an alternative plans ability to meet the project goals and objectives and to assess other impacts. The criteria typically address ecological factors, economic factors, social factors, project performance, and efficiency. Analytical tools or models are utilized to quantify and assess these various factors. In other cases, qualitative analyses, based on best professional judgment, are utilized to subjectively assess the performance of alternatives relative to the criteria.

Certain of the evaluation criteria have been identified as performance measures. These performance measures are directly related to the project purposes of nutrient load reduction, watershed storage capacity, and wetland habitat enhancement. The performance measures are utilized during plan formulation, and the full suite of evaluation criteria are utilized for the comparison of alternative plans and selection of the recommended plan. The evaluation criteria and performance measures were developed early in the planning process to guide alternative formulation, build support by team members and stakeholders, and to minimize bias in the criteria, the alternative development, and the alternative evaluations.

The evaluation criteria are organized and grouped using a hierarchal structure (see Figure 1). The evaluation criteria hierarchy has been organized so that branches are indicative of the project goals and objectives and will serve as the decision matrix to compare alternative plans.

The goals at the upper levels are evaluated by the criteria in the respective branches of the hierarchy. The top level of the evaluation criteria hierarchy was developed to allow for a clear distinction between evaluation criteria that are to be evaluated at Level 1 (the watershed scale or the system scale). The hierarchy transitions through a number of levels to the lowest level in the hierarchy – the evaluation criteria. Detailed information regarding the evaluation criteria has been developed in the evaluation criteria fact sheets. A brief explanation of each level of the evaluation criteria hierarchy is provided below.

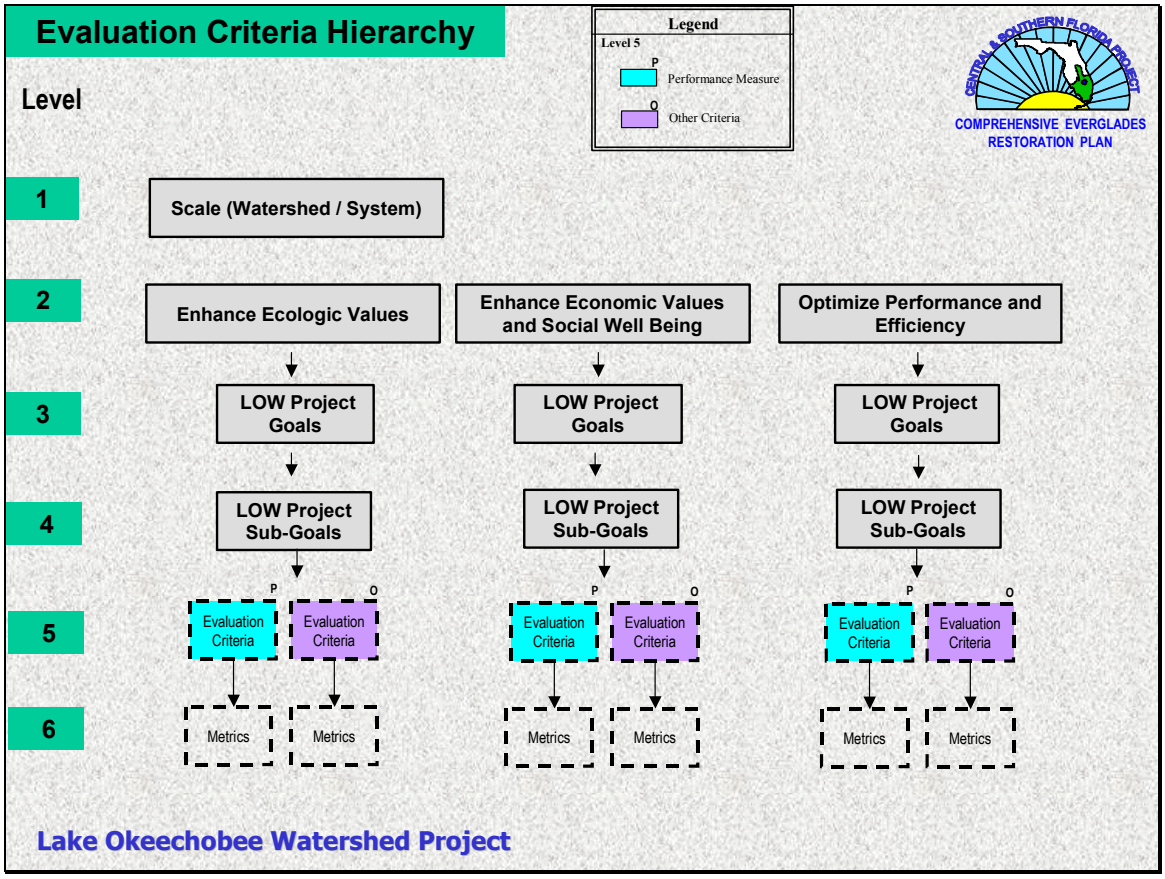


Figure 1 – Evaluation Criteria Hierarchy

Evaluation of alternative plans and selection of the recommended plan will address issues on the System and Watershed scales. The System benefits/impacts will occur in Lake Okeechobee, the St Lucie and Caloosahatchee estuaries, and other areas to the south. The Watershed scale benefits/impacts will occur within the LOW Project study area. Alternatives that are being considered will be implemented in the Watershed, but will have benefits/impacts outside of the study area on the System scale.

Level 1 of the evaluation criteria hierarchy consists of two branches: System and Watershed Scale evaluation criteria.

5.4.3.1 Evaluation Criteria Hierarchy – Watershed Branch

<u>Level 1 – Watershed Scale</u>

The Watershed scale is part of the Level 1 Branch of the evaluation criteria hierarchy, which relates to the all benefits and impacts within the Lake Okeechobee watershed, excluding the Lake. Levels 2 through 5 of this branch will address the various goals and evaluation criteria used in formulating and evaluating alternatives within the watershed.

Level 2 - CERP Goals & CERP Requirements

The CERP goals were identified in the Restudy and represent the first two branches of Level 2 within the evaluation criteria hierarchy. A third branch, "Optimize Project Performance and Efficiency", was included at the CERP Goals and Requirements level to capture other evaluation requirements of CERP projects including project implementation, performance, and costs. The list below represents the three branches of Level 2 within the evaluation criteria hierarchy.

- Enhance Ecologic Values
  - Increase the total spatial extent of natural areas
  - Improve habitat and functional quality
  - Improve native plant and animal species abundance and diversity
- Enhance economic values and social well being
  - Increase availability of fresh water (agriculture/municipal & industrial)
  - Reduce flood damages (agricultural/urban)
  - Provide recreational and navigation opportunities
  - Protect cultural and archaeological resources and values
- Optimize Project Performance and Efficiency
  - Project implementation, performance, and costs.

Level 3 – Watershed Goals

Ten watershed goals were identified and appropriately organized by ecological values (Goals 1 and 2), economic values and social well being (Goals 3 through 7), and project performance and efficiency (Goals 8, 9 and 10). Watershed goals for the LOW Project are as follows:

Goal 1	Improve habitat in the watershed
Goal 2	Improve water quality in the watershed
Goal 3	Maintain or enhance municipal, industrial, and agricultural water supply in the Lake Okeechobee watershed
Goal 4	Maintain agricultural and urban flood protection
Goal 5	Enhance recreational opportunities
Goal 6	Protect and manage significant cultural, historical, and archeological resources
Goal 7	Minimize adverse socioeconomic impacts on the local and regional economies

Goal 8 Maximize immediate, interim, and long-term project performance
Goal 9 Ensure that the recommended plan is cost efficient
Goal 10 Minimize risk and uncertainty of project performance

Improving habitat and water quality in Lake Okeechobee and its watershed (Goals 1 and 2) are critical goals of the project and support the CERP goal of enhancing ecological values.

Several project goals support the CERP goal of enhancing economic values and social well being. Maintaining or enhancing municipal, industrial, and agricultural water supply in the Lake Okeechobee watershed (Goal 3) will maintain or increase the availability of fresh water for human utilization. Maintaining agricultural and urban flood protection (Goal 4) sustains economic values and social well being by not increasing the negative economic impact of flood conditions for property owners in the study area. Enhancing recreational opportunities (Goal 5) provides potential for additional local tourism income and outdoor opportunities. Protecting and managing significant cultural, historical, and archeological resources (Goal 6) maintains important sites of local and regional significance. Minimizing adverse socioeconomic impacts on the local and regional economies is Goal 7.

Several project goals fit within the CERP requirements branch. Maximizing immediate, interim, and long-term project performance (Goal 8) is important to accelerate the recovery of Lake Okeechobee and ensure its long-term ecological value in the South Florida ecosystem. Ensuring that the recommended plan is cost efficient (Goal 9), while minimizing risk and uncertainty of project performance (Goal 10), is required by USACE Principles and Guidelines (P&G).

Level 4 – Watershed Sub-goals

Each watershed goal includes a comprehensive set of supporting sub-goals. The detailed evaluation criteria were developed to support each of the watershed sub-goals.

Wetland, upland, and deep/open-water habitat improvement (Sub-goals 1.1, 1.2, and 1.3) supports the Watershed Project goal of improving habitat in watershed. Maximizing tributary phosphorus reduction benefits (Sub-goal 2.1), meeting Class III water quality standards for discharges into the tributaries (Sub-goal 2.2), and ensuring consistency with the Lake Okeechobee Protection Plan (LOPP) (Sub-goal 2.3) support the project goal of improving water quality in the watershed.

Maintaining or enhancing water supply to the Brighton Reservation and other watershed users (Sub-goals 3.1 and 3.2) will help to attain the project goal related to water supply. Maintaining existing flood protection (Sub-goal 4.1) is a requirement of the WRDA Savings Clause and supports Goal 4. Increasing recreational opportunities and maintaining navigability to Lake Okeechobee and within the watershed (Sub-goals 5.1 and 5.2) support the project goal to enhance recreational opportunities. Avoiding or minimizing adverse effects on significant cultural, historical, or archeological resources (Sub-goal 6.1) is required by state and federal law and supports Goal 6.

A number of sub-goals have been identified to minimize adverse impacts on the local and regional economies (Goal 7). Minimizing adverse impacts to the local economy (Sub-goal 7.1), minimizing adverse social impacts within the local community (Sub-goal 7.2), meeting Environmental and Economic Equity (EEE) goals (Sub-goal 7.3), minimizing adverse impacts to local government tax revenues (Sub-goal 7.4), and maximizing social acceptability of the project (Sub-goal 7.5) support Goal 7.

Two sub-goals support the project goal of maximizing immediate, interim, and long-term project performance (Goal 8): to achieve project benefits as soon as possible (Sub-goal 8.1) and to provide interim and long-term operational flexibility to adapt to information obtained during operation of this and other CERP projects (Sub-goal 8.2).

The sub-goals that have been identified to ensure that the recommended plan is cost efficient (Goal 9), cost effective (Sub-goal 9.1), achieve reasonable incremental benefits (Sub-goal 9.2), and avoid implementation problems related to project cost (Sub-goal 9.3).

Maximizing the use of proven and reliable technologies (Sub-goal 10.1) and minimizing the risk associated with project susceptibility to hurricanes, droughts, energy costs, operator error, etc. (Sub-goal 10.2) will help to minimize risk and uncertainty of project performance (Goal 10).

Level 5 – Watershed Evaluation Criteria

For each of the watershed sub-goals, evaluation criteria were identified. The LOW Project evaluation criteria are intended to be a comprehensive list of factors associated with the goals and objectives of the project. Attachment 1 includes the detailed fact sheets for each of the evaluation criteria.

The evaluation criteria developed for Sub-goal 1.1 (EC 1.1.1, 1.1.2, 1.1.3, and 1.1.4) measure the change in spatial extent and functional value of wetlands in the watershed. These criteria are significant because wetland gains and

improvements are linked to 1) increased wildlife diversity and abundance; 2) improved water quality; 3) increased water storage capacity; 4) enhanced downstream structure and functions of the natural environment; and 5) improved human interests.

The evaluation criteria developed for Sub-goal 1.2 (EC 1.2.1, 1.2.2, 1.2.3, and 1.2.4) measure the change in spatial extent and functional value of uplands in the watershed. These criteria are significant because native and natural upland habitat gains and improvements are linked to: 1) increased wildlife diversity and abundance; 2) improved water quality; 3) increased groundwater recharge; and 4) improved human interests.

The evaluation criteria developed for Sub-goal 1.3 (EC 1.3.1, 1.3.2, 1.3.3, and 1.3.4) measure the change in spatial extent and functional value of open/deep-water habitat in the watershed. These criteria are significant because natural open/deep-water provides: 1) habitat for certain fish and wildlife (*e.g.,* waterfowl, larger fish, alligators, manatees, etc); 2) water storage; and 3) natural depositional areas. Constructed open/deep-water habitat (*i.e.,* canals and agricultural reservoirs) may also provide these functions for fish and wildlife, but to a lesser degree because of low dissolved oxygen concentrations, habitat uniformity, and low diversity and abundance of benthic macroinvertebrate populations.

The evaluation criteria developed for Sub-goal 2.1 maximizes the phosphorus load reduction to the tributaries from CERP project features (EC 2.1.1), maximizes the volume of tributary phosphorus laden sediment removed or sequestered (EC 2.1.2), and ensures consistency with the LOPP. EC 2.1.1 is significant because water quality improvements in the watershed will help to support the overall environmental restoration of Lake Okeechobee, the Everglades, and other downstream receiving waters. EC 2.1.2 is significant because phosphorus-laden sediment can become re-suspended and transported downstream by waves or currents, which contribute to the overall degradation and eutrophication of Lake Okeechobee. EC 2.2.1 supports Sub-goal 2.2 by achieving compliance with FAC 62-302. Water quality standards established by the state are based upon extensive research and are established and defensible parameters by which impacts on water quality can be evaluated and measured. These criteria can help achieve the Lake Okeechobee TMDL. EC 2.3.1 is significant because if the alternative captures less phosphorus than called for by the LOPP, the TMDL will not be met and other (less cost effective) actions will be required to make up the difference.

The evaluation criteria developed for Sub-goal 3.1 measures the number of occurrences in which the respective water supply levels of Lake Okeechobee and Lake Istokpoga fall below that which would sustain optimal water levels

in the C-41 and C-40 canals with (EC 3.1.2) and without (EC 3.1.1) declared water shortages. This is significant due to water rights agreements between the SFWMD and the Seminole Tribe that must be considered.

The evaluation criteria developed for Sub-goal 4.1 measures flood damage potential to existing development (EC 4.1.1). This is significant because the Savings Clause of WRDA requires that the existing level of flood protection be maintained after project implementation.

The evaluation criteria developed for Sub-goal 5.1 measures the net change in outdoor recreational potential within the Lake Okeechobee watershed (EC 5.1.1). Economic values and social well being are enhanced with recreational utilization of public water resource management facilities when compatible with the primary purpose of those facilities.

The evaluation criteria developed for Sub-goal 5.2 measures the number of days of constrained navigation access to Lake Okeechobee (EC 5.2.1). The opportunity to pursue recreational navigation access to Lake Okeechobee is very important to the local community and tourists.

The evaluation criteria developed for Sub-goal 6.1 measures the number of significant resources disturbed, encroached, or impacted (EC 6.1.1) and the spatial extent of adverse impact to areas of high cultural resource sensitivity (EC 6.1.2). The National Historic Preservation Act of 1966 (36 CFR Part 800) requires all federal agencies to take account of the effect of any federal undertaking on archeological sites, historic properties, and traditional cultural properties eligible or potentially eligible for listing on the National Register of Historic Places.

The evaluation criteria developed for Sub-goal 7.1 measures agricultural production (EC 7.1.1), present value change in regional income (EC 7.1.2), and jobs displaced or created (EC 7.1.3). The impact on agricultural production will be measured because the Governor's Commission for a Sustainable South Florida identified agriculture and tourism as "critical industries". The impact the CERP projects have on agriculture should be minimized. The present value change in regional income is significant because the net effect of the LOW Project on regional income can be a summary measure of the effects on economic well being of the region. Jobs displaced or created is an economic indicator for local impacts of the LOW Project.

The evaluation criteria developed for Sub-goal 7.2 measures the number of primary residences impacted (EC 7.2.1) and community well being (EC 7.2.2). The number of residences impacted by the LOW Project should be

minimized to avoid adverse social impacts in the local community. Community well being will be measured to avoid bisection of communities and neighborhoods. These criteria are supported by Executive Order 12898 and WRDA 2000.

The evaluation criteria developed for Sub-goal 7.3 measures the number of jobs displaced (EC 7.3.1) and relocations of primary residences (EC 7.3.2) within low income and minority populations. These evaluation criteria will be used to help fulfill Executive Order 12898 and WRDA 2000. Project alternatives will be adjusted to avoid or reduce these impacts whenever practicable and appropriate.

The evaluation criteria developed for Sub-goal 7.4 measures impacts to property tax. Minimizing the reduction in local property tax revenues generated is supported by Executive Order 12898 and WRDA 2000.

The evaluation criteria developed for Sub-goal 7.5 measures the acceptability of the project. Acceptability is one of the four USACE Principles and Guidelines evaluation criteria. Acceptability of the project by state and local entities and the public will be assessed and maximized, as practicable.

The evaluation criteria developed for Sub-goal 8.1 are related to time to substantial construction completion (EC 8.1.1) and time to achieve 100% of overall performance (EC 8.1.2). Time to substantial construction completion is measured to determine the ability of an alternative to achieve the objectives in accordance with or ahead of the implementation schedule in the Restudy. Time to achieve 100% of overall performance is significant because of the January 1, 2015, deadline to meet the Lake Okeechobee TMDL.

The evaluation criteria developed for Sub-goal 8.2 is potential operational flexibility (EC 8.2.1). High flexibility is desired so that the facilities may be adapted as information is obtained throughout interim project conditions and the long-term RECOVER Adaptive Assessment Process.

The evaluation criteria developed for Sub-goal 9.3 compares the total project cost with the cost estimate provided in the Restudy (EC 9.3.1). Because the Taylor Creek/Nubbin Slough Reservoir and Stormwater Treatment Area Project received initial authorization, a Section 902 (WRDA 1986) cost limit applies. The Lake Okeechobee Tributary Sediment Dredging Project falls within the programmatic authority for projects that cost less than $25 million. For other CERP projects, comparison with the Restudy cost estimates is important since it bears on budgeting requirements and could impact the implementation of other CERP projects.

The evaluation criteria developed for Sub-goal 10.1 determines the level of confidence to achieve water quality treatment goals (EC 10.1.1). This is significant because risk and uncertainty associated with the proposed water quality treatment technologies should be minimized in order to best achieve the objectives of the project.

The evaluation criteria developed for Sub-goal 10.2 assesses the sensitivity of the treatment capability to extreme weather conditions, specifically fire, extended flood, extended drought, and hurricane winds (EC 10.2.1). Any of these conditions could impact the ability of a treatment alternative to perform effectively, which could negatively impact water quality in Lake Okeechobee and the watershed.

5.4.3.2 Evaluation Criteria Hierarchy – System-wide Branch

System-wide scale is part of the Level 1 branch of the evaluation criteria hierarchy, which relates to all the benefits and impacts to Lake Okeechobee, and the St. Lucie and Caloosahatchee estuaries.

Lake Okeechobee Performance Measures

Nine system-wide Performance Measures were identified and organized by the RECOVER Regional Evaluation Team. The Performance Measures are:

LO-E1 Lake Okeechobee Extreme Low Lake Stage – This Performance Measure was developed to prevent any low lake stage events from falling below 11 feet.

LO-E2 Lake Okeechobee Prolonged Moderate Low Lake Stage – This Performance Measure was developed to prevent lake stage events from falling below 12 feet for a period greater than 12 months.

LO-E3 Lake Okeechobee Extreme High Lake Stage – This Performance Measure was developed to prevent any lake stage events from rising above 17 feet.

LO-E4 Lake Okeechobee Prolonged Moderate High Lake Stage – This Performance Measure was developed to prevent lake stage events from rising above 15 feet for a period greater than 12 months.

LO-E5 Spring Recession for Lake Okeechobee – Studies have shown that spring recessions benefit wading bird nesting and foraging, fisheries and other attributes of the lakes ecosystem. This performance measure was developed to prevent a lake stage decline from 15.5 feet to 12.5 feet, January to June with no reversal greater than 0.5 feet per month.

LO-E6 Lake Okeechobee Total Phosphorous Concentration – The numeric goal of 40 ppb total phosphorous (TP) is specified in the Lake Okeechobee TMDL rule. This performance measure requires the use of the Lake Okeechobee Water Quality Model (LOWQM) to model alternatives. Model results for alternatives that produce annual averages closer to or below the 40 ppb will be preferred.

LO-E7 Lake Okeechobee Total Nitrogen: Total Phosphorous Ratio– Studies have shown that bloom forming cyanobacteria are favored over more desirable algae when the total nitrogen (TN):TP mass ratio of the lake water is below 22:1. The present mass ratio is near 12:1 and cyanobacteria are dominant and include species known to produce toxins. This performance measure requires the use of the Lake LOWQM to model alternatives. Model results for alternatives that produce annual averages closer to or above the 22:1 will be preferred.

LO-E8 Lake Okeechobee Diatom: Cyanobacteria Ratio – Studies in the 1970's showed that the phytoplankton taxonomic structure has dominated by diatoms. Today the lake is dominated by pollution-tolerant bloom-forming cyanobacteria. If phosphorous loads were reduced in the lake, it is expected that this trend will be reversed. This performance measure requires the reduction of cyanobacteria dominance over diatoms. LOWQM Model results for alternatives that produce annual averages closer to or above the 1.5:1 (diatoms:cyanobacteria) will be preferred.

LO-E9 Lake Okeechobee Algal Bloom Frequency – Water Quality Data collected on the lake since the early 1980s indicate that the frequency of algal blooms (chlorophyll a concentrations in excess of 40ppb) has significantly increased. Algal blooms threaten both natural and societal values of the ecosystem. This performance measure requires the use of the Lake LOWQM to model alternatives. Model results for alternatives that produce fewer days with chlorophyll a greater than 40 ppb will be preferred.

NE-E1 St. Lucie Estuary Salinity Envelope Performance Measures

The estuarine environment found at St. Lucie is sensitive to freshwater inputs. Modifications of the volume, distribution, circulation, or temporal patterns of freshwater discharges can place sever stress upon the entire ecosystem. The goal of the restoration is to reduce the high volume and minimum discharge events to the estuary to improve estuarine water quality and protect and enhance estuarine habitat and biota. Maintaining the

salinity envelope at St. Lucie will provide more natural quality, quantity, timing, and distribution of freshwater flow to estuary and coral reef ecosystems. The following CERP Evaluation Targets have been identified:

- The low flow target is 207 months;
- The number of allowable Lake Okeechobee regulatory discharge target is 0 releases;
- No more than 21 months of mean monthly flows between 2,000 and 3,000 cubic feet per second (cfs); and
- No more than 12 months of mean monthly flows greater than 3,000 cfs.

NE-E3 Caloosahatchee Salinity Envelope Performance Measures

The target is for freshwater discharges from C-43 to be maintained between 300 and 2,800 cfs to ensure that freshwater releases or lack thereof do not cause the impairment of designated uses for propagation and maintenance of a healthy, well balanced population of fish and wildlife. The target also includes the restoration of the shellfish designated as class II area in the estuary. These flow targets were developed to reduce high volume and minimum discharge events to estuary to improve estuarine water quality and protect and enhance estuarine habitat and biota. The following CERP Evaluation Targets have been identified:

- Less than 70 months with mean monthly flows less than 300 cfs (basin runoff or S-79). Months with low flow should occur in the dry season (November – May);
- Less than 7 months with mean monthly flows greater than 4,500 cfs;
- Less than 26 months with mean monthly flows greater than 2,800 cfs (local basin runoff); and
- No months with mean monthly flows greater than 2,800 cfs from Lake Okeechobee regulatory releases.

7.1 Principles & Guidelines Evaluation

According to *Planning Guidance*, "All Corps water resources development projects shall be evaluated in terms of acceptability; completeness; effectiveness; efficiency. Ecosystem restoration alternatives are also evaluated on the basis of cost effectiveness and incremental cost analyses of the possible restoration alternatives and significance of ecosystem outputs" (E-153).

The cost effectiveness and incremental cost analyses are described in Section 7.2.4. Acceptability, effectiveness, efficiency and completeness are discussed in the following section.

7.1.1 P&G Evaluation Criteria

Acceptability, completeness, effectiveness, and efficiency are the four evaluation criteria specified in the P&G (Paragraph 1.6.2(c)) in the screening of alternative plans. According to *Planning Guidance*, "Alternatives considered in any planning study, not just ecosystem restoration studies, should meet minimum subjective standards of these criteria in order to qualify for further consideration and comparison with other plans" (p. E-162).

The four P&G evaluation criteria are defined below, and LOW Project evaluation criteria that are related are categorized into one of the four groups.

7.1.1.1 Acceptability

Planning Guidance states, "An ecosystem restoration plan should be acceptable to State and Federal resources agencies, and local government. There should be evidence of broad based public consensus and support for the plan. A recommended plan must be acceptable to the non-Federal cost-sharing partner. However, this does not mean that the recommended plan must be the locally preferred plan" (E-162).

LOW Project evaluation criteria EC 7.5.1 will be used to measure "Acceptability".

7.1.1.2 Effectiveness

Planning Guidance states, "An ecosystem restoration plan must make a significant contribution to addressing the specified restoration problems or opportunities (i.e., restore important ecosystem structure or function to some meaningful degree)" (E-163).

The following LOW Project evaluation criteria related to wetlands, uplands, and open/deep water habitat fall into the "Effectiveness" category: EC 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.3.1, 1.3.2, 1.3.3, and 1.3.4. Additionally, EC 2.1.1 and 2.1.2 (relating to phosphorus load reduction) and will be used to measure "Effectiveness". Finally, the system-wide performance measures suggested by RECOVER (LO E1 - LO E9, NE-E1 and NE-E3) are all in the "Effectiveness" category.

7.1.1.3 Efficiency

Planning Guidance states, "An ecosystem restoration plan must represent a cost effective means of addressing the restoration problem or opportunity. It must be determined that the plan's restoration outputs cannot be produced more cost effectively by another agency or institution" (E-163).

The following LOW Project evaluation criteria related to cost effectiveness/incremental cost analysis fall into the "Efficiency" category: EC 9.1.1, 9.1.2, 9.1.3, 9.2.1, 9.2.2, and 9.2.3. Evaluation criteria EC 9.3.1 (total cost) also will be used to measure "Efficiency".

7.1.1.4 Completeness

Planning Guidance states, "A plan must provide and account for all necessary investments or other actions needed to ensure the realization of the planned restoration outputs. This may require relating the plan to other types of public or private plans if these plans are crucial to the outcome of the restoration objective. Real estate, Operation & Maintenance, monitoring and sponsorship factors must be considered. Where there is uncertainty concerning the functioning of certain restoration features and an adaptive management plan has been proposed it must be accounted for in the plan" (E-162).

LOW Project evaluation criteria EC 2.3.1 will be used to measure "Completeness".

Attachment 1
Evaluation Criteria Fact Sheets

Lake Okeechobee Watershed Project
Evaluation Criteria Fact Sheet

Comprehensive Everglades Restoration Plan		**EC 1.1.1**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.1	Improve wetland habitat in the watershed
Evaluation Criteria:	1.1.1	Total acres of wetlands gained
Performance Measure		
Description: (What is being measured and why) The increase in spatial extent of jurisdictional wetlands, as defined by state and/or federal criteria, relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.		
Rationale: (Technical basis for why the evaluation criteria is being utilized) The importance of wetlands in the Lake Okeechobee watershed has been documented and it is known that substantial losses have occurred over the last century. Wetland gains are linked to: 1) increased wildlife diversity and abundance; 2) improved water quality; 3) increased water storage capacity; 4) enhanced downstream structure and functions of the natural environment; and 5) improved human interests. Thus, reversing the trend of wetland losses (by additional gains) is a significant achievement. The PDT should track and map wetland gains and losses to determine overall project performance for restoration of wetland habitat to non-impacted conditions that existed before 1882 (i.e., pre-drainage).		
Target: (Specific description of how success or failure will be measured) A pre-project baseline spatial extent of wetlands will be defined. The target is restoration that would result in a minimum net gain of 3,500 acres* (Restudy 1999) of pre-drainage, non-STA wetlands. However, within the context of the stormwater treatment areas deemed necessary to attain project goals, this project seeks to maximize the area within these facilities that provides high quality fish and wildlife habitat. The degree to which the target is achieved would be measured based on an increase in spatial extent below the targeted increase.		
Evaluation Method: (Description of what model or analytical method will be utilized) The spatial extent of wetlands will be defined using combined state and federal criteria (*i.e.,* the greater extent of the two delineation methodologies). The increase in spatial extent will be calculated using GIS applications that incorporate pre-drainage (i.e., 1882; based on historic hydric soils), baseline (based on National Wetlands Inventory data, SFWMD updated 1995 land use data, and the most recent aerial infrared digital ortho-quarter quads), and predicted wetland coverages (based on LIDAR or another form of elevation data and the isolated wetland model** recently developed by the SFWMD for the Allapattah Natural Area component of the Indian River Lagoon – South Project) to compare different plan alternatives. An option to using the isolated wetland model for assessment of predicted wetland coverages would be to assume that the plan will restore wetlands over the entire extent of historic hydric soils.		

Comprehensive Everglades Restoration Plan	**EC 1.1.1**

Comments:

*****This performance measure only addresses spatial extent of wetland impacts for the evaluation of alternatives. It does not address wetland quality and function (see 1.1.2). This performance measure is linked to evaluation criteria 1.1.3. A net gain in habitat is to be calculated including losses that relate to evaluation criteria 1.1.3. Stormwater treatment areas may be considered part of this performance measure if the design, operation, and maintenance of the facilities create conditions that are appropriate for healthy fish and wildlife populations.

******Contact Ken Konyha (SFWMD) for the specifics of the isolated wetland model, accuracy requirements for LIDAR data, wetland indices, and model modifications that would be needed for non-isolated wetlands.

Comprehensive Everglades Restoration Plan			**E.C. 1.1.2**
Scale:	Watershed		
CERP Goal:	Enhance Ecologic Values		
LOW Project Goal:	1	Improve habitat in the watershed	
LOW Project Sub-Goal:	1.1	Improve wetland habitat in the watershed	
Evaluation Criteria:	1.1.2	Increase in wetland functional value	

Description: (What is being measured and why)

Wetlands vary greatly with respect to their values or contributions to wetland functions, such as wildlife habitat, water quality, flood attenuation, etc. The increase in wetland functional value of jurisdictional wetlands, as defined by state and/or federal criteria, relative to baseline conditions in the project area will be measured. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The altered landscape in the Lake Okeechobee watershed has resulted in reduced effectiveness of wetland functions. Gains in wetland functional value include: 1) increased wildlife diversity and abundance; 2) improved water quality; 3) improved natural water storage capacity; 4) enhanced downstream structure and functions of the natural environment; and 5) improved human interests. Thus, restoring wetland functional values to pre-drainage conditions is a significant achievement.

Target: (Specific description of how success or failure will be measured)

The target is to maximize lift (*i.e.,* the increase from baseline condition to post-project condition) to a theoretical value that corresponds pre-drainage conditions (Wetland Rapid Assessment Protocol "WRAP" score of 1) in wetland functional values as a result of the project. The degree to which the target is achieved would be measured based on an increase in functional value of wetland habitat below the targeted increase.

Evaluation Method: (Description of what model or analytical method will be utilized)

Wetland evaluation methodologies (*e.g.*, WRAP or its replacement - UWMAM*) should be used to compare baseline conditions in functional value to predicted conditions for the project plan alternatives. For wetland restoration components, we assume that the post-project WRAP score would be 1 unless circumstances such as off-site flooding would not allow for complete restoration of any given wetland. This will require substantial field evaluations and assessments of aerial photography through an interagency effort (ecological subteam/contractor). Comparisons of future with-project conditions to pre-drainage conditions will be used to determine overall project restoration. An alternative to using the original WRAP [as written by Miller and Gunsalus (1999)], will be to use a modified WRAP (as outlined in Appendix A). This modified method would require some field work or overflights but would also incorporate GIS analysis for some of the indices. Utilization of this modified method could significantly cut down on the amount of time needed for field work or overflights.

Comprehensive Everglades Restoration Plan	**E.C. 1.1.2**

Comments:

Other evaluation methods for wetland function may be available or should be developed to consider measures of vegetation, wildlife, water quality, hydrology, soils, and habitat suitability for threatened and endangered species. STAs may be considered part of this evaluation criteria if the design, operation, and maintenance of the facilities create conditions that are appropriate for healthy fish and wildlife populations. Their predicted WRAP score would be dependent on the predicted value of their wetland habitat based on hydrologic/ecologic factors (*i.e.,* depth, frequency of drying, shoreline habitat, and water quality).

Comprehensive Everglades Restoration Plan			**E.C. 1.1.3**
Scale:	Watershed		
CERP Goal:	Enhance Ecologic Values		
LOW Project Goal:	1	Improve habitat in the watershed	
LOW Project Sub-Goal:	1.1	Improve wetland habitat in the watershed	
Evaluation Criteria:	1.1.3	Total acres of wetlands lost	

Description: (What is being measured and why)

The decrease in spatial extent of jurisdictional wetlands, as defined by state and/or federal criteria, relative to baseline conditions in the project area will be measured. Baseline conditions are by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of wetlands in the Lake Okeechobee watershed has been documented and it is known that substantial losses have occurred over the last century. Wetland losses are linked to: 1) decreases in wildlife diversity and abundance; 2) impaired water quality; 3) reduced water storage capacity; 4) degraded downstream structure and functions of the natural environment; and 5) impaired human interests. Additional losses in wetland habitat will exacerbate the current situation; thus, reversing the trend of wetland losses is a significant achievement. The PDT should track and map wetland gains and losses to determine the degree of overall project performance for restoration of wetland habitat to non-impacted conditions (that existed before 1882, i.e., pre-drainage conditions).

Target: (Specific description of how success or failure will be measured)

A pre-project baseline spatial extent of wetlands will be defined. The target is no loss in the spatial extent of existing wetlands.* The degree to which the target is achieved would be measured based on the amount of reduction in the spatial extent of wetlands.

Evaluation Method: (Description of what model or analytical method will be utilized)

The spatial extent of wetlands will be defined using combined state and federal criteria (*i.e.,* the greater extent of the two delineation methodologies). The decrease in spatial extent will be calculated using GIS applications that incorporate pre-drainage (i.e., 1882; based on historic hydric soils), baseline (based on National Wetlands Inventory data, SFWMD updated 1995 land use data, and the most recent aerial infrared digital ortho-quarter quads), and predicted wetland coverages (based future land uses for project components) to compare different plan alternatives.

Comments:

*****This evaluation criteria only addresses quantity of wetland impacts for the evaluation of alternatives. It does not address wetland quality and function. This evaluation criteria is linked to performance measure 1.1.1. A net gain in habitat should be calculated including any losses that relate to this evaluation criteria.

Comprehensive Everglades Restoration Plan		**E.C. 1.1.4**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.1	Improve wetland habitat in the watershed
Evaluation Criteria:	1.1.4	Decrease in wetland functional value

Description: (What is being measured and why)

Wetlands vary greatly with respect to their values or contributions to wetland functions, such as wildlife habitat, water quality, flood attenuation, etc. The decrease in wetland functional value of jurisdictional wetlands, as defined by state and/or federal criteria, relative to baseline conditions in the project area will be measured. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The altered landscape in the Lake Okeechobee watershed has resulted in reduced effectiveness of wetland functions. Losses in wetland functional value impact: 1) wildlife diversity and abundance; 2) water quality; 3) natural water storage capacity; 4) downstream functions of the natural environment; and 5) human interests. Thus, reduced wetland functional value is undesirable.

Target: (Specific description of how success or failure will be measured)

The target is no reduction in wetland functional values (*i.e.,* the decrease from baseline condition to post-project condition) as a result of the project.

Evaluation Method: (Description of what model or analytical method will be utilized)

Wetland evaluation methodologies (*e.g.*, WRAP or its replacement –UWMAM*) should be used to compare baseline conditions in functional value with predicted project plan alternatives. This will require substantial field evaluation and assessment of aerial photography through an interagency effort (ecological subteam). An alternative to using the original WRAP [as written by Miller and Gunsalus (1999)], will be to use a modified WRAP (as outlined in Appendix A). This modified method would require some field work or overflights but would also incorporate GIS analysis for some of the indices. Utilization of this modified method could significantly cut down on the amount of time needed for field work or overflights.

Comments:

*****Other evaluation methods for wetland function may be available or should be developed to consider measures of vegetation, wildlife, water quality, hydrology, soils, and habitat suitability for threatened and endangered species.

Comprehensive Everglades Restoration Plan		**E.C. 1.2.1**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.2	Improve upland habitat in the watershed
Evaluation Criteria:	1.2.1	Total acres of upland gained.

Description: (What is being measured and why)

The increase in spatial extent of uplands (*i.e.,* native and natural* non-wetland habitat), relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of native and natural upland habitats in the Lake Okeechobee watershed has been documented and it is known that substantial losses have occurred over the last century. Native and natural upland habitat gains are linked to: 1) increased wildlife diversity and abundance; 2) improved water quality; 3) increased groundwater recharge; and 4) improved human interests. Thus, reversing the trend of native and natural upland habitat loss (by additional gains) is a significant achievement.

Target: (Specific description of how success or failure will be measured)

The target is to maximize the spatial extent of native and natural uplands for wildlife habitat to pre-drainage conditions in areas that were historically uplands. The degree to which the target is achieved would be measured based on an increase in spatial extent below the targeted increase.

Evaluation Method: (Description of what model or analytical method will be utilized)

The increase in spatial extent of upland habitat will be calculated using GIS applications that incorporate pre-drainage (*i.e.,* 1882; based on historic non-hydric soils), baseline (based on SFWMD updated 1995 land use data, and the most recent aerial infrared digital ortho-quarter quads), and predicted native and natural upland coverages (based on project components and future expected land management practices) to compare different plan alternatives.

Comments:

*Native habitats are defined as relatively undisturbed ecosystems. Natural habitats exhibit some degree of human alteration but still provide significant fish and wildlife benefits. Rangeland and low- and moderate-intensity (*i.e.,* unimproved and improved) pasture are included in this evaluation criteria. Urban and high-intensity agricultural areas (*e.g.,* citrus, row crops, sugar cane, etc.) are not included. For the purpose of this analysis, areas underlain by hydric soils that are no longer functioning as wetlands will be considered to be baseline condition uplands.

Lake Okeechobee Watershed Project
Evaluation Criteria Fact Sheet

Comprehensive Everglades Restoration Plan		**E.C. 1.2.2**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.2	Improve upland habitat in the watershed
Evaluation Criteria:	1.2.2	Increase in upland functional value
Description: (What is being measured and why) The increase in functional value of uplands (*i.e.,* native and natural* non-wetland habitat), relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.		
Rationale: (Technical basis for why the evaluation criteria is being utilized) The importance of native and natural upland habitats in the Lake Okeechobee watershed has been documented and it is known that substantial losses have occurred over the last century. Native and natural upland habitat functional gains include: 1) increased wildlife diversity and abundance; 2) improved water quality; 3) increased groundwater recharge; 4) improved human interests. Thus, reversing the trend of native and natural upland habitat functional value loss (by additional gains) is a significant achievement.		
Target: (Specific description of how success or failure will be measured) The target is to maximize functional value including connectivity of native and natural uplands for wildlife habitat. The degree to which the target is achieved would be measured based on an increase in functional value of upland habitat below the targeted increase.		
Evaluation Method: (Description of what model or analytical method will be utilized) The extent of upland habitat functional value gained from baseline to future conditions will be defined using a method similar in concept to WRAP but that replaces the buffer, hydrology, and water quality indices with connectivity/isolation and rarity/uniqueness indices (see Appendix B for the upland rapid assessment protocol). This method may require some field work, overflights, and assessment of aerial photography through an interagency effort (ecological subteam/contractor). It would also incorporate GIS analysis for some of the indices. An Appendix in the Lake Okeechobee Watershed Assessment Report will provide a more detailed evaluation methodology.		
Comments: *****Native habitats are relatively undisturbed ecosystems. Natural habitats exhibit some degree of human alteration but still provide significant fish and wildlife benefits. Low- and moderate-intensity (*i.e.,* unimproved and improved) pasture and rangeland are included in this evaluation criteria. High-intensity urban and agricultural areas (*e.g.,* citrus, row crops, sugar cane, etc.) are not included. . For the purpose of this analysis, areas underlain by hydric soils that are no longer functioning as wetlands will be considered to be baseline condition uplands.		

Comprehensive Everglades Restoration Plan		**E.C. 1.2.3**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.2	Improve upland habitat in the watershed
Evaluation Criteria:	1.2.3	Total acres of upland lost

Description: (What is being measured and why)

The decrease in spatial extent of uplands (*i.e.,* native and natural non-wetland habitat*), relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of native and natural upland habitat in the Lake Okeechobee watershed has been documented and it is known that substantial losses have occurred over the last century. Native and natural upland habitat losses: 1) decrease wildlife diversity and abundance; 2) impair water quality; 3) decrease groundwater recharge; and 4) impact human interests. Thus, continuing the trend of native and natural upland habitat loss is undesirable.

Target: (Specific description of how success or failure will be measured)

The target is no loss in the spatial extent of native and natural uplands suitable for wildlife habitat. The degree to which the target is achieved would be measured based on a reduction in spatial extent.

Evaluation Method: (Description of what model or analytical method will be utilized)

The extent of upland habitat lost will be defined using GIS applications that incorporate pre-drainage, (i.e., 1882; based on historic non-hydric soils), baseline, (based on SFWMD updated 1995 land use data, and the most recent aerial infrared digital ortho-quarter quads), and predicted native and natural upland coverages (based on project components and future expected land management practices).

Comments: *Native habitats are relatively undisturbed ecosystems.

Natural habitats exhibit some degree of human alteration but still provide significant fish and wildlife benefits. Low- and moderate-intensity (*i.e.,* unimproved and improved) pasture and rangeland are included in this evaluation criteria. Urban and high-intensity agricultural areas (*e.g.,* citrus, row crops, sugar cane, etc.) are not included. . For the purpose of this analysis, areas underlain by hydric soils that are no longer functioning as wetlands will be considered to be baseline condition uplands.

Comprehensive Everglades Restoration Plan		**E.C. 1.2.4**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.2	Improve wetland habitat in the watershed
Evaluation Criteria:	1.2.4	Decrease in upland functional value

Description: (What is being measured and why)

The decrease in functional value of uplands (*i.e.,* natural and native non-wetland habitat*), relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of native and natural upland habitats in the Lake Okeechobee watershed has been documented and it is known that substantial losses have occurred over the last century. Native and natural upland habitat functional losses cause: 1) decreased wildlife diversity and abundance; 2) impaired water quality; 3) decreased groundwater recharge; and 4) impacts to human interests. Thus, continuing the trend of native and natural upland habitat functional value loss is undesirable.

Target: (Specific description of how success or failure will be measured)

The target is no loss in functional values, including connectivity, of native and natural uplands for wildlife habitat. The degree to which the target is achieved would be measured based a decrease in functional value of upland habitat below the baseline condition.

Evaluation Method: (Description of what model or analytical method will be utilized)

The loss in functional value of upland habitat from baseline to future conditions will be calculated using a method similar in concept to WRAP but that replaces the buffer, hydrology, and water quality indices with connectivity/isolation and rarity/uniqueness indices (see Appendix B for the upland rapid assessment protocol). This method may require some field work, overflights, and assessment of aerial photography through an interagency effort (ecological subteam/contractor). It would also incorporate GIS analysis for some of the indices. An Appendix in the Lake Okeechobee Watershed Assessment Report will provide a more detailed evaluation methodology.

Comments:

*****Native habitats are relatively undisturbed ecosystems. Natural habitats exhibit some degree of human alteration but still provide significant fish and wildlife benefits. Low- and moderate-intensity (*i.e.,* unimproved and improved) pasture and rangeland are included in this evaluation criteria. High-intensity urban and agricultural areas (*e.g.,* citrus, row crops, sugar cane, etc.) are not included. . For the purpose of this analysis, areas underlain by hydric soils that are no longer functioning as wetlands will be considered to be baseline condition uplands.

Lake Okeechobee Watershed Project
Evaluation Criteria Fact Sheet

Comprehensive Everglades Restoration Plan		**E.C. 1.3.1**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.3	Improve deep/open-water habitat in the watershed
Evaluation Criteria:	1.3.1	Total acres of open/deep-water (ODW) habitat Gained

Description: (What is being measured and why)

For the purposes of this evaluation criteria, the ODW habitats are the natural and constructed tributaries to the lake that lie within the project boundary. The increase in spatial extent of ODW relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of ODW in the Lake Okeechobee watershed has been documented and it is known that deleterious alterations have occurred over the last century. Natural ODW provides: 1) habitat for certain fish and wildlife (*e.g.,* waterfowl, larger fish, alligators, manatees, etc); 2) water storage; and 3) natural depositional areas. Constructed ODW habitat (*i.e.,* canals and agricultural reservoirs) may also provide these functions for fish and wildlife, but to a lesser degree because of low dissolved oxygen concentrations, habitat uniformity, and low diversity and abundance of benthic macroinvertebrate populations.

Target: (Specific description of how success or failure will be measured)

The target is restoration that would result in no net gain in the spatial extent of ODW. However, within the context of the storage reservoirs deemed necessary to attain project goals, this project seeks to maximize the area within these facilities that provides high quality fish and wildlife habitat. The degree to which the target is achieved would be measured based on an increase in spatial extent above the baseline condition.

Evaluation Method: (Description of what model or analytical method will be utilized)

The spatial extent of ODW will be calculated using GIS applications that incorporate pre-drainage, baseline (using SFWMD updated 1995 land use data, and the most recent aerial infrared digital ortho-quarter quads) , and predicted ODW coverages (based on project alternatives and future expected land management practices) to compare different plan alternatives.

Comments:

Storage reservoirs may be considered part of this evaluation criteria if the design, operation, and maintenance of the facilities create conditions that are appropriate for healthy fish and wildlife populations.

Comprehensive Everglades Restoration Plan		**E.C. 1.3.2**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.3	Improve open/deep-water habitat in the watershed
Evaluation Criteria:	1.3.2	Increase in open/deep-water functional value

Description: (What is being measured and why)

For the purposes of this evaluation criteria, the ODW habitats are the natural and constructed tributaries to the lake that lie within the project boundary. The increase in functional value of ODW relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of ODW in the Lake Okeechobee watershed has been documented and it is known that deleterious alterations have occurred over the last century. Natural ODW provides: 1) habitat for certain fish and wildlife (*e.g.,* waterfowl, larger fish, alligators, manatees, etc); 2) water storage; and 3) natural depositional areas. Constructed ODW habitat (*i.e.,* canals and agricultural reservoirs) may also provide these functions for fish and wildlife, but to a lesser degree because of low dissolved oxygen concentrations, habitat uniformity, and low diversity and abundance of benthic macroinvertebrate populations.

Target: (Specific description of how success or failure will be measured)

The target is restoration that would maximize ODW functional value to pre-drainage conditions (similar to a WRAP score of 1). The degree to which the target is achieved would be measured based on an increase in functional value below the targeted increase.

Evaluation Method: (Description of what model or analytical method will be utilized)

The gain in functional value of ODW from baseline to future with project conditions will be calculated using a method similar in concept to WRAP but that replaces the canopy and ground cover indices with riparian vegetation and littoral zone/water depth mosaic indices. This may require field evaluations and assessments of aerial photography through an interagency effort (ecological subteam/contractor). See Appendix C for a more detailed discussion of the protocol. Existing non-digital datasets and survey reports from the SFWMD, FWC, and FDEP may also be utilized. An Appendix in the Lake Okeechobee Watershed Assessment Report will provide a more detailed evaluation methodology..

Comments:

Storage reservoirs may be considered part of this evaluation criteria if the design, operation, and maintenance of the facilities create conditions that are appropriate for healthy fish and wildlife populations.

Comprehensive Everglades Restoration Plan		**E.C. 1.3.3**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.3	Improve open/deep-water habitat in the watershed
Evaluation Criteria:	1.3.3	Total acres of open/deep-water (ODW) habitat lost

Description: (What is being measured and why)

For the purposes of this evaluation criteria, the ODW habitats are the natural and constructed tributaries to the lake that lie within the project boundary. The decrease in spatial extent of ODW relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of ODW in the Lake Okeechobee watershed has been documented and it is known that deleterious alterations have occurred over the last century. Natural ODW provides: 1) habitat for certain fish and wildlife (*e.g.,* waterfowl, larger fish, alligators, manatees, etc); 2) water storage; and 3) natural depositional areas. Constructed ODW habitat (*i.e.,* canals and agricultural reservoirs) may also provide these functions for fish and wildlife, but to a lesser degree because of low dissolved oxygen concentrations, habitat uniformity, and low diversity and abundance of benthic macroinvertebrate populations. Although constructed ODW is less desirable than natural ODW, a decrease in spatial extent was deemed an inappropriate target because that condition may not maintain the current level of flood protection and water supply.

Target: (Specific description of how success or failure will be measured)

The target is restoration that would result in no loss in the spatial extent of ODW. The degree to which the target is achieved would be measured based on a decrease in spatial extent from the baseline condition.

Evaluation Method: (Description of what model or analytical method will be utilized)

The spatial extent of ODW will be calculated using GIS applications that incorporate pre-drainage, baseline(using SFWMD updated 1995 land use data, and the most recent aerial infrared digital ortho-quarter quads), and predicted ODW coverages (based on project alternatives and future expected land management practices) to compare different plan alternatives.

Comments:

Storage reservoirs may be considered part of this evaluation criteria if the design, operation, and maintenance of the facilities create conditions that are appropriate for healthy fish and wildlife populations.

Comprehensive Everglades Restoration Plan		**E.C. 1.3.4**
Scale:	Watershed	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	1	Improve habitat in the watershed
LOW Project Sub-Goal:	1.3	Improve open/deep-water habitat in the watershed
Evaluation Criteria:	1.3.4	Decrease in open/deep-water functional value

Description: (What is being measured and why)

For the purposes of this evaluation criteria, the ODW habitats are the natural and constructed tributaries to the lake that lie within the project boundary. The decrease in functional value of ODW relative to baseline conditions in the project area will be measured. Baseline conditions are defined by Corps planning guidelines and CERP requirements. Comparisons of baseline conditions to future without project conditions will also be conducted.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The importance of ODW in the Lake Okeechobee watershed has been documented and it is known that deleterious alterations have occurred over the last century. Natural ODW provides: 1) habitat for certain fish and wildlife (*e.g.,* waterfowl, larger fish, alligators, manatees, etc); 2) water storage; and 3) natural depositional areas. Constructed ODW habitat (*i.e.,* canals and agricultural reservoirs) may also provide these functions for fish and wildlife, but to a lesser degree because of low dissolved oxygen concentrations, habitat uniformity, and low diversity and abundance of benthic macroinvertebrate populations.

Target: (Specific description of how success or failure will be measured)

The target is no loss of ODW functional value. The degree to which the target is achieved would be measured based on a decrease in functional value below the baseline condition.

Evaluation Method: (Description of what model or analytical method will be utilized)

The loss in functional value of ODW from baseline to future with project conditions will be calculated using a method similar in concept to WRAP but that replaces the canopy and ground cover indices with riparian vegetation and littoral zone/water depth mosaic indices. This may require field evaluations and assessments of aerial photography through an interagency effort (ecological subteam/contractor). See Appendix C for a more detailed discussion of the protocol. Existing non-digital datasets and survey reports from the SFWMD, FWC, and FDEP may also be utilized. An Appendix in the Lake Okeechobee Watershed Assessment Report will provide a more detailed evaluation methodology.

Comments:

Storage reservoirs may be considered part of this evaluation criteria if the design, operation, and maintenance of the facilities create conditions that are appropriate for healthy fish and wildlife populations.

Comprehensive Everglades Restoration Plan		**EC 2.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Ecologic Values	
LOW Project Goal:	2	Improve water quality in the watershed
LOW Project Sub-Goal:	2.1	Maximize tributary phosphorus reduction benefits
Evaluation Criteria:	2.1.1	Phosphorus load reduction to tributaries from CERP project features

***Performance Measure* (Recommendation)**

Description: (What is being measured and why)

The average annual phosphorus load reduction being discharged from each of the proposed CERP facilities will be estimated in metric tons. The length of tributaries or canals with reduced phosphorus loadings due to CERP project features will be determined. The standard deviation will be determined for the period of record simulation to indicate the variability of the phosphorus loads reduction. The corresponding reduction in phosphorus loads to Lake Okeechobee tributaries, attributed to LOW Project features, will significantly aid in the overall reduction of total phosphorus loading to Lake Okeechobee.

The location of these features could provide additional water quality benefit to some of the tributaries, not just the lake. This is beneficial for ecosystem restoration.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Water quality improvements within the watershed will help to support overall environmental restoration of Lake Okeechobee, the Everglades, and other downstream receiving waters.

Water quality in the Lake Okeechobee watershed has experienced substantial degradation over the last century. Anthropogenic inputs have resulted in the nutrient enrichment of Lake Okeechobee and its tributaries. Thus, reversing the historic trend of water quality degradation and nutrient enrichment will: 1) improve ecological health by increasing native wildlife diversity and abundance; 2) decrease occurrences of algal blooms; 3) decrease nutrient dependent benthic organisms; 4) reverse impairments in designated uses; 5) reduce costs of water treatment for drinking purposes and 6) improve the quality of water flowing to downstream ecosystems including the Everglades. Reduction in phosphorus load will provide water quality improvements to support the ecological restoration of Lake Okeechobee.

Target: (Specific description of how success or failure will be measured)

Maximize the reduction in phosphorus loadings multiplied by length of tributaries benefited (ton miles).

Evaluation Method: (Description of what model or analytical method will be utilized)

The WAMView model will be utilized in combination with the DMSTA to determine the expected water quality performance of each project feature. The WAMView model will provide input values to the DMSTA model including inflows, rainfall, and phosphorous concentrations at the specific location of the proposed feature. The DMSTA model, reservoir

Comprehensive Everglades Restoration Plan	**EC 2.1.1**
water quality model, and WAMView (depending on feature type) will use this information to compute the resulting average annual phosphorus load reduction. The average annual load reduction will be computed for the period of record simulation. Additionally, the standard deviation of the annual values will be determined to indicate the variability of the projected performance. Additionally, the WAMView model will be used to determine the distance from each LOW project feature to Lake Okeechobee on the tributary that receives benefits (reduced phosphorous loading). The forecasted loads will then be multiplied by the distance from the facility to Lake Okeechobee. The target will be reported in ton-miles. Ton-miles for all tributaries will be summed for each alternative.	
Comments: Recommendation to consider this a performance measure consistent with CERP Guidance Memorandum (CGM) 023.	

Comprehensive Everglades Restoration Plan		**EC 2.1.2**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Ecologic Values	
LOW Project Goal:	2	Improve water quality in the watershed
LOW Project Sub-Goal:	2.1	Maximize tributary phosphorus reduction benefits
Evaluation Criteria:	2.1.2	Maximize the volume of tributary phosphorus laden sediment removed or sequestered

***Performance Measure* (Recommendation)**

Description: (What is being measured and why)

The volume of the tributary phosphorus laden sediment removed or sequestered will be based on estimates associated with LOW project features, and their capability to sequester or remove phosphorus loads. The removal of sediment may increase the assimilation capacity of the tributary or remove a source, thus reducing total phosphorus loading to Lake Okeechobee.

Lake Okeechobee is considered eutrophic as a result of anthropogenic loading of excess phosphorus. A water column goal of 40 ug/L was set for Lake Okeechobee to support a healthy lake system, restore the designated uses of Lake Okeechobee and allow the lake to meet applicable water quality standards. To achieve this concentration in the pelagic zones of the Lake a Total Maximum Daily Load (TMDL) of phosphorus to Lake Okeechobee as been established to be 140 metric tons, of which 35 metric tons is attributed to atmospheric deposition. To achieve this TMDL and the associated target P concentration, phosphorus loads to the Lake must be reduced in each of the contributing basins.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Phosphorus laden sediment can become re-suspended and transported downstream by waves or currents thus contributing the overall loading and eutrophication of the Lake Okeechobee. Nutrient-rich sediments export dissolved P to the water column when water column P levels become low, thus keeping P levels high.

Target: (Specific description of how success or failure will be measured)

Maximize the volume of phosphorus laden sediment removed or sequestered from the tributaries to Lake Okeechobee.

Evaluation Method: (Description of what model or analytical method will be utilized)

Model predictions will be used to estimate the volume of phosphorus laden sediment removed or sequestered within the primary canals. The WAMView model will be used to estimate the load of phosphorus to the LOW feature. A function related to the technology capabilities to sequester or remove phosphorus laden sediment will be added to WAMView.

Comments:

Recommendation to consider this a performance measure consistent with CERP Guidance Memorandum (CGM) 023.

Comprehensive Everglades Restoration Plan		**EC 2.2.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Ecologic Values	
LOW Project Goal:	2	Improve water quality in the watershed
LOW Project Sub-Goal:	2.2	Meet Class III water quality standards for discharges from CERP project features into tributaries.
Evaluation Criteria:	2.2.1	Compliance with FAC 62-302

Description: (What is being measured and why)

The CERP project features will be evaluated for compliance with Florida Administrative Code (FAC) 62-302. Project features cannot be a source of pollutants, in other words cannot cause or contribute to water quality problems.

Most of the tributaries of Lake Okeechobee are classified as Class III Surface Water Bodies under FAC 62-302 based on their designated use for recreation and propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Water quality standards established by the State are based on extensive research and are established and defensible parameters by which impacts on water quality can be evaluated and measured.

Target: (Specific description of how success or failure will be measured)

Compliance with FAC 62-302.

Evaluation Method: (Description of what model or analytical method will be utilized)

A quantitative and/or qualitative evaluation will be completed to determine the likelihood of compliance with FAC 62-302. This evaluation will consider the potential for changes to certain constituents in a project facility (i.e., mercury transformations in STAs/reservoirs) and other potential sources of constituents as a direct result of the proposed project features. This evaluation will be based on site-specific data including, but not limited to, land use and soil information. The alternative will be given a high, moderate or low designation with respect to the likelihood of compliance with FAC 62-302.

Comments:

By the end of 2003, the RECOVER Water Quality Subteam is expected to provide the PDT with specific guidance on mercury evaluations and considerations.

This evaluation criteria is consistent with the CERP Guidance Memorandum (CGM) 023.

Comprehensive Everglades Restoration Plan			**EC 2.3.1**
Scale:	Watershed		
CERP Goal:	Enhance Ecologic Values.		
LOW Project Goal:	2.0	Improve water quality in the watershed.	
LOW Project Sub-Goal:	2.3	Consistency with LOPP	
Evaluation Criteria:	2.3.1	Consistency with LOPP	

Description: (What is being measured and why)

A comparison will be made of the total load reduction for the Lake Okeechobee Watershed Project required in the Lake Okeechobee Protection Plan (LOPP) vs the load reduction for the alternative being evaluated.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The LOPP establishes the comprehensive set of public and private actions that will be required to meet the Lake Okeechobee TMDL. It consists of BMPs applied by land owners with assistance from state and federal agencies, regional projects implemented by federal and non-federal interests, regulatory programs, and the Lake Okeechobee Watershed Project. The plan was developed for the purpose of identifying the most cost effective set of actions that would meet the TMDL by 2015. The LOPP target load reduction for the LOW Project will include a safety margin to account for uncertainties.

If the alternative captures less phosphorus than called for by the LOPP, the TMDL will not be met. As a result, other (less cost effective) actions will be required to make up the difference. If the alternative captures more phosphorus than called for by the LOPP, then the TMDL will be overshot and the alternative design will be less efficient.

Target: (Specific description of how success or failure will be measured)

The target will be for the alternative plans to capture the phosphorus loads required for the LOW Project in the LOPP so that the TMDL is met in the most efficient and cost effective manner.

Evaluation Method: (Description of what model or analytical method will be utilized)

The average annual load reduction computed for each alternative plan (based on WAM View results) will be compared to the LOW Project target defined in the LOPP.

Comprehensive Everglades Restoration Plan		**EC 3.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	3	Maintain and enhance municipal, industrial, and agricultural water supply in the Lake Okeechobee watershed
LOW Project Sub-Goal:	3.1	Maintain and enhance water supply to the Brighton Reservation of the Seminole Tribe of Florida pursuant to federal and state law, and the Water Rights Compact
Evaluation Criteria:	3.1.1	Agricultural Water Supply – No Declared Water Shortage
Description: (What is being measured and why) The volume of increased surface water supply available to maintain the water in the C-41 and C-40 canals south of the S-70 and S-75 structures, respectively, at optimum levels.		
Rationale: (Technical basis for why the evaluation criteria is being utilized) The Seminole Tribe is entitled to 15% of the total amount of water that can be withdrawn from SFWMD canals and borrow canals within the Indian Prairie Basin. The Seminole Tribe is also entitled to a fractional share of surface waters from Lake Okeechobee for use on the lands of the Brighton Reservation located within the Lakeshore Perimeter Basin pursuant to its existing uses as of the effective date of the Water Rights Compact (Compact). The SFWMD is obligated to maintain the water in the C-41 and C-40 canals south of the S-70 and S-71 (G-207), and 20.2 feet msl in the segment of the C-40 canal between S-75 and S-72 (G-208).		
Target: (Specific description of how success or failure will be measured) Reduce the number of occurrences in which the respective water supply levels of Lake Okeechobee and Lake Istokpoga fall below that which would sustain optimal water levels in the C-41 and C-40 canals.		
Evaluation Method: (Description of what model or analytical method will be utilized) Modeling efforts to be determined by the LOWP-PDT will be used to estimate the number of occurrences in which optimal water levels in the C-41 and C-40 canals would not be achieved.		
Comments:		

Comprehensive Everglades Restoration Plan		**EC 3.1.2**
Scale:	Watershed	
CERP Goal:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	3	Maintain and enhance municipal, industrial, and agricultural water supply in the Lake Okeechobee watershed.
LOW Project Sub-Goal:	3.1	Maintain and enhance water supply to the Brighton Reservation of the Seminole Tribe of Florida pursuant to federal and state law, and the Water Rights Compact.
Evaluation Criteria:	3.1.2	Agricultural Water Supply – Declared Water Shortages

Description: (What is being measured and why)

The volume of reduced surface water supply available to maintain the water in the C-41 and C-40 canals south of the S-70 and S-75 structures, respectively, at optimum levels.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The SFWMD is obligated to maintain the water in the C-41 and C-41 canals south of the S-70 and S-75 at optimum levels provided that neither Lake Istokpoga nor Lake Okeechobee are in declared water shortages. Optimum levels shall be 19.2 feet mean sea level (msl) in the segment of the C-41 canal between S-70 and S071 (G-207), and 20.2 msl in the segment of the C-40 canal between S-75 and S-72 (G-208).

If Lake Istokpoga is in a declared water shortage, the SFWMD is obligated to maintain the water in the C-41 and C-40 canals south of the S-70 and S-75 at optimum levels through the operation of pumps at S-71 (G-207) and S-72 (G-408), respectively, unless and until a shortage for Lake Okeechobee is declared.

If Lake Okeechobee is in a declared water shortage, the SFWMD is obligated to maintain the water in the C-41 and C-40 canals south of S-70 and S075 at optimum levels through releases from Lake Istokpoga, or until Lake Istokpoga reaches the water supply level of the regulation schedule. If water levels of Lake Istokpoga are insufficient to maintain water levels in the canals south of S-70 and S-75 at optimum levels, the SFWMD agrees to operate the pumps at S-71 (G-207) and S-72 (G-208) on the C-41 and C-40 canals when Lake Okeechobee is at or above elevation 10ft NGVD, or use available storage in SFWMD canals to supply the minimum water amount to which the Tribe is entitled under the Compact.

See Agreement Between the SFWMD and Seminole Tribe of Florida and Water Supply Plan for the Brighton Reservation Implementing Section VI.B. of the Water Rights Compact and subparagraph 3.3.3.2.A.3 of the Criteria Manual (Agreement No. C-4121).

Target: (Specific description of how success or failure will be measured)

Reduce the number of occurrences in which the respective water supply levels of Lake Okeechobee and Lake Istokpoga fall below that which would sustain optimal water levels in the C-41 and C-40 canals under declared water shortage conditions.

Comprehensive Everglades Restoration Plan	**EC 3.1.2**
Evaluation Method: (Description of what model or analytical method will be utilized) Modeling efforts to be determined by the LOWP-PDT will be used to estimate the number of occurrences in which optimal water levels in the C-41 and C-40 canals would not be achieved under declared water shortage conditions.	
Comments:	

Comprehensive Everglades Restoration Plan		**EC 4.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	4	Maintain agricultural and urban flood protection
LOW Project Sub-Goal:	4.1	Maintain existing level of agricultural and urban flood protection
Evaluation Criteria:	4.1.1	Flood damage potential to existing development.

Description: (What is being measured and why)

The LOW Project is not designed to enhance flood protection. Any impacts on existing flood protection will be reflected by changes in canal stages. Increases or decreases in the duration of high wet season canal stages will be evaluated. An increase in wet season canal stages will reflect an increase in flows and a corresponding reduction in the capacity to remove flood runoff. Conversely, a reduction in wet season canal stages will reflect additional flood runoff conveyance capacity and an enhancement of flood protection.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The Savings Clause requires that the existing level of flood protection be maintained after project implementation.

Target: (Specific description of how success or failure will be measured)

The levels and duration of high wet season canal stages will remain at the existing levels to maintain flood protection. Lower canal stages or a reduced duration of high stages during the wet season will be an indication of enhanced flood protection.

Evaluation Method: (Description of what model or analytical method will be utilized)

The results of the WAMView model will be used to compare canal stages in the without project conditions with those for the alternative being evaluated. An increase (or a reduction) in the water levels in the highest 10% of stage-duration curve will be considered as a flood protection reduction or enhancement, respectively.

Comments:

This criterion is intended to evaluate the overall flood damage potential within the basins; it is not intended to evaluate localized effects at the specific facility location.

The WAMView model results will indicate relative changes in canal stages and durations for each alternative plan as compared to base conditions. If high stages do occur, it is imperative that these results are assessed to see if design or operational changes may alleviate the initial flooding concern. This initial hydrologic/hydraulic evaluation by WAMView may trigger more detailed flood control analyses using other tools and applications.

Comprehensive Everglades Restoration Plan		**EC 5.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal	5	Enhance recreational opportunities
LOW Project Sub-Goal:	5.1	Increase recreational opportunities
Evaluation Criteria	5.1.1	Net change in outdoor recreational potential within the Lake Okeechobee watershed

Description: (What is being measured and why)

The design of the alternatives for evaluation in the LOW project will include basic specifications of the features, which are likely to include reservoirs, water quality treatment facilities and wetland enhancement areas. The planning will not include specification of recreation facilities, which might be constructed, such as boat ramps, non-boat fishing access facilities and bike paths. Therefore, the evaluation will focus on the outdoor recreational potential of the features in each LOW alternative rather than on the quantification or utilization of specific facilities. The final design (to be completed after the PIR) will include specification of recreation facilities, which would be constructed, such as boat ramps, non-boat fishing access facilities and trails.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Inclusion of recreational utilization of public water resource management facilities when they are compatible with the primary purpose of those facilities is an integral part of state and federal planning and management of these facilities.

Target: (Specific description of how success or failure will be measured)

The target is that the LOW alternatives have large recreational potential while not decreasing existing recreational opportunities.

Evaluation Method: (Description of what model or analytical method will be utilized)

Project related recreational opportunities may include boating/fishing, non-boat fishing, picnicking, hiking, biking and bird watching. The potential for the facilities to provide such opportunities is related to the size of the facilities. Since the lineal feet of access is correlated to the area of the facility, estimates of potential lineal feet of access will be used to estimate recreational development potential. If any significant recreational areas are lost as a result of the construction of the LOW facilities, this will have to be taken into consideration. Alternatives will be assigned high, moderate or low value based on the above evaluation.

Comments:

The 2000 SCORP indicates a need for additional non-boat fishing and bicycling opportunities in the Central Region, which includes Okeechobee County.

Comprehensive Everglades Restoration Plan		**EC 5.2.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	5	Enhance recreational opportunities
LOW Project Sub-Goal:	5.2	Maintain navigability to Lake Okeechobee and within the watershed
Evaluation Criteria:	5.2.1	Number of days of constrained navigation access to Lake Okeechobee

Description: (What is being measured and why)

Minimize the number of days of constrained navigation access to Lake Okeechobee as a result of this project. This may result from decreases in the stages within the navigable waterways in the project area that provide navigable access to Lake Okeechobee via locks in the Herbert Hoover Dike or from low Lake Okeechobee water levels that limit navigation within the lake.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The opportunity to pursue recreational navigation access to Lake Okeechobee is very important to the local community and tourists. One of the CERP goals is to "Provide recreational and navigation opportunities."

Target: (Specific description of how success or failure will be measured)

Minimize occurrences of low stages and durations to navigable waters providing access to Lake Okeechobee, measured in number of days.

Evaluation Method: (Description of what model or analytical method will be utilized)

Levels of waters in the study area providing access to Lake Okeechobee are controlled by lake levels. The lake levels will be estimated by the SFWMM runs.

Comments:

Note: (Non-recreational related) From CERP (p. 8-13, Vol. 1), very small positive effects on commercial navigation in Lake Okeechobee are expected to result from any of the alternative plans. These effects are due to decreased occurrence of low stages (i.e., percent of time Lake Okeechobee falls below 12 feet).

Comprehensive Everglades Restoration Plan		**EC 6.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	6	Protect and manage significant cultural, historical, and archeological resources
LOW Project Sub-Goal:	6.1	Avoid or minimize adverse effects on significant cultural, historical, and archeological resources.
Evaluation Criteria:	6.1.1	Number of significant resources disturbed, encroached or impacted.

Description: (What is being measured and why)

"Significant cultural resources" includes archeological sites and districts; historical structures, properties, and districts; and traditional cultural properties that are eligible or potentially eligible for listing on the National Register of Historic Places (NRHP) or are otherwise of local or regional importance. In addition, all cemeteries, family gravesites, and Native American burial mounds on state-owned or privately owned lands are protected under state law (Ch. 872, F.S.) regardless of their NRHP eligibility. Native American cemeteries and burial mounds on federal and tribal lands are protected by the Native American Graves Protection and Repatriation Act (NAGPRA) of 1991.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing rule, 36 CFR Part 800, requires all federal agencies to take account of the effect of any federal undertaking on archeological sites, historic properties, and traditional cultural properties eligible or potentially eligible for listing on the National Register of Historic Places. A federal undertaking is defined as any project conducted, funded, or permitted by a federal agency. Similar requirements are mandated by state law (Ch. 267.061[2], F.S.) for any undertaking performed, funded, or permitted by state agencies of the executive branch.

Sensitivity analysis is being used to augment existing Florida Master Site File (FMSF) data because 100% survey of the project area for cultural resources has not been accomplished. The use of environmental variables, such as distance to potable water or wetland resources, soil drainage, relative elevation, vegetation, etc., has been demonstrated to be successful in predicting the locations of archeological sites and historic properties with approximately 80% accuracy. To accommodate the remaining 20%, the predictive model should be augmented with historic documentary research, including historic maps and aerials, informant interviews, and Native American consultation.

Section 101(d)(6) of the NHPA requires federal agencies, in carrying out their Section 106 responsibilities; to consult with any Indian tribe or Native American organization that attaches religious and cultural significance to resources within the project's area of potential effect (APE). Such consultation can be carried out by the federal agency's designated representative if agreed to by the Native American tribes.

Comprehensive Everglades Restoration Plan	**EC 6.1.1**

Target: (Specific description of how success or failure will be measured)

Avoid or minimize adverse effects to all cultural resources to the extent feasible, and particularly those resources eligible or potentially eligible for listing on the NRHP.

For known or documented resources, the ratio of known cultural resources versus those that will be adversely affected should approach 0. Ratio values between 0 and 1 indicate complete success (0, or no sites affected) and complete failure (1, or all sites affected). Target goal will be to minimize the ratio, i.e., to keep the ratio as close to zero as is prudent and feasible.

Adverse effects to significant cultural resources may be minimized through various mitigation measures such as the archeological data recovery or photo documentation of structures. Proposing such mitigation measures will further the target goal of minimizing adverse effects.

Evaluation Method: (Description of what model or analytical method will be utilized)

Previously recorded sites within the project are listed on the Florida Master Site File and can be used as an initial indicator of resource potential. These data are incomplete however since 100% survey of the project area has not been performed. Consequently, sensitivity analysis, which uses a combination of site location predictive modeling, historic documentary research, interviews with locally affected populations, and Native American consultation, will be employed to identify areas of high cultural resource sensitivity. The FMSF data and the sensitivity analysis will contribute to the site alternative selection process.

Site location predictive modeling employs GIS technology to evaluate environmental variables that have been demonstrated through previous research to be accurate predictors of prehistoric and early historic site locations. Historic documentary research will focus on an examination of early aerial photographs of the project area for the presence of trails, homesteads, fields, prehistoric earthworks, and vegetative signatures of mounds, middens, or other cultural resources. Consultation with Native American tribal representatives will identify areas of religious and cultural significance (i.e., traditional cultural properties), such as medicinal plant collecting areas, sacred areas, etc. Interviews with local residents will identify local historic properties and cultural features that may be important to locally affected populations.

Once site alternatives have been selected, field investigations will be necessary to determine the effect of the project on cultural resources. Evaluation of NRHP eligibility will use the National Register Criteria as specified in 36 CFR 60.4.

Comments:

Comprehensive Everglades Restoration Plan		**EC 6.1.2**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	6	Protect and manage significant cultural, historical and archeological resources
LOW Project Sub-Goal:	6.1	Avoid or minimize adverse effects on significant cultural, historical, and archeological resources.
Evaluation Criteria:	6.1.2	Spatial extent of adverse impact to areas of high cultural resource sensitivity

Description: (What is being measured and why)

"Areas of cultural resource sensitivity" include those areas identified through site location predictive modeling as having a high potential for containing significant cultural resources and/or have been identified through consultation with Native American tribes, local residents, or other locally affected populations as having cultural, historical, religious, or archeological importance.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing rule, 36 CFR Part 800, requires all federal agencies to take account of the effect of any federal undertaking on archeological sites, historic properties, and traditional cultural properties eligible or potentially eligible for listing on the National Register of Historic Places. A federal undertaking is defined as any project conducted, funded, or permitted by a federal agency. Similar requirements are mandated by state law (Ch. 267.061[2], F.S.) for any undertaking performed, funded, or permitted by state agencies of the executive branch.

Sensitivity analysis is being used to augment existing Florida Master Site File (FMSF) data because 100% survey of the project area for cultural resources has not been accomplished. The use of environmental variables, such as distance to potable water or wetland resources, soil drainage, relative elevation, vegetation, etc., has been demonstrated to be successful in predicting the locations of archeological sites and historic properties with approximately 80% accuracy. To accommodate the remaining 20%, the predictive model should be augmented with historic documentary research, including historic maps and aerials, informant interviews, and Native American consultation.

Section 101(d)(6) of the NHPA requires federal agencies, in carrying out their Section 106 responsibilities; to consult with any Indian tribe or Native American organization that attaches religious and cultural significance to resources within the project's area of potential effect (APE). Such consultation can be carried out by the federal agency's designated representative if agreed to by the Native American tribes.

Comprehensive Everglades Restoration Plan	**EC 6.1.2**

Target: (Specific description of how success or failure will be measured)

Avoid or minimize adverse effects to all cultural resources to the extent feasible, and particularly those resources eligible or potentially eligible for listing on the NRHP.

The measure of success will be the ratio of acreage impacted within areas identified through predictive modeling to have a high potential for significant cultural resources versus the total amount of acreage within areas of high cultural resource sensitivity. The target goal will be to achieve a ratio as close to zero as is prudent and feasible.

Adverse effects to significant cultural resources may be minimized through various mitigation measures such as the archeological data recovery or photo documentation of structures. Proposing such mitigation measures will further the target goal of minimizing adverse effects.

Evaluation Method: (Description of what model or analytical method will be utilized)

Previously recorded sites within the project are listed on the Florida Master Site File and can be used as an initial indicator of resource potential. These data are incomplete however since 100% survey of the project area has not been performed. Consequently, sensitivity analysis, which uses a combination of site location predictive modeling, historic documentary research, interviews with locally affected populations, and Native American consultation, will be employed to identify areas of high cultural resource sensitivity. The FMSF data and the sensitivity analysis will contribute to the site alternative selection process.

Site location predictive modeling employs GIS technology to evaluate environmental variables that have been demonstrated through previous research to be accurate predictors of prehistoric and early historic site locations. Historic documentary research will focus on an examination of early aerial photographs of the project area for the presence of trails, homesteads, fields, prehistoric earthworks, and vegetative signatures of mounds, middens, or other cultural resources. Consultation with Native American tribal representatives will identify areas of religious and cultural significance (i.e., traditional cultural properties), such as medicinal plant collecting areas, sacred areas, etc. Interviews with local residents will identify local historic properties and cultural features that may be important to locally affected populations.

Once site alternatives have been selected, field investigations will be necessary to determine the effect of the project on cultural resources. Evaluation of NRHP eligibility will use the National Register Criteria as specified in 36 CFR 60.4.

Comments:

Lake Okeechobee Watershed Project
Evaluation Criteria Fact Sheet

Comprehensive Everglades Restoration Plan		**EC 7.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.1	Minimize adverse impacts to the local economy
Evaluation Criteria:	7.1.1	Agricultural production

Description: (What is being measured and why)

Based on land use data, agricultural production as a result of land use changes due to construction of project facilities will be quantified.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The Governor's Commission for a Sustainable South Florida identified agriculture and tourism as "critical industries". This analysis will evaluate economic changes in the agricultural economy as a result of changes in land use types. The impact the CERP projects have on the agriculture industry should be minimized.

Target: (Specific description of how success or failure will be measured)

Minimize losses in agricultural production.

Evaluation Method: (Description of what model or analytical method will be utilized)

Agriculture production will be quantified by computing acres of land directly taken out of production for each type of land use and multiplying those sums by per acre production to compute a total for each of the alternatives.

Comments:

Agricultural land use categories include dairy, pasture, sugarcane, sod, vegetables and citrus. This EC is a subset of EC 7.1.2.

Comprehensive Everglades Restoration Plan		**EC 7.1.2**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.1	Minimize adverse impacts to the local economy
Evaluation Criteria:	7.1.2	Present value change in regional income

Description: (What is being measured and why)

The present value of change in regional income in the watershed as a result of the LOW project facilities will be estimated.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

The net effect of the LOW projects on regional income is a summary measure of the effects on economic well being of the region.

Target: (Specific description of how success or failure will be measured)

Minimize losses and if possible enhance regional income.

Evaluation Method: (Description of what model or analytical method will be utilized)

Effects will be estimated by considering the effects of CERP expenditures and the changes in sales from businesses directly affected by the project. Regional income multipliers will be used to determine the total impacts on income (direct, indirect and induced). A net present value of the changes to the stream of income over an economic adjustment period will be estimated. This analysis will be performed using the REMI (Regional Economic Models, Inc.) forecasting and policy analysis model. The intent of this model is to answer "what if" questions about future conditions and the effect of CERP implementation related to the agricultural land purchases.

Comments:

Model the performance measure after Criterion 7 (Present Value Change in Regional Income) from "Natural Resource Analysis of Lake Okeechobee – Phosphorus Management Strategies," by Hazen and Sawyer.

Comprehensive Everglades Restoration Plan		**EC 7.1.3**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.1	Minimize adverse impacts to the local economy
Evaluation Criteria:	7.1.3	Jobs displaced /created

Description: (What is being measured and why)

Total change in the number of jobs for major economic sectors as a result of this project will be quantified.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

While much of the local economy depends upon the system for vital water supply and benefits provided by the C&SF Project, the impact the CERP projects have on jobs should be evaluated.

Target: (Specific description of how success or failure will be measured)

Minimize losses in regional employment and if possible enhance regional employment.

Evaluation Method: (Description of what model or analytical method will be utilized)

Landowner input can be solicited. An initial estimate of the number of direct, indirect and induced jobs created or displaced can be estimated by using actual employment information, converting this to FTE's (full time equivalence) and prorating the FTE's on a per acre basis. Positive impacts can be estimated for the actual construction given the time of construction, amounts of skilled, semi-skilled and unskilled labor and the durations of effort necessary to complete the construction. The net present value of the time series of jobs displaced/created will be computed for an economic adjustment period.

Comments: This EC is a subset of EC 7.1.2. EC 7.1.2 will answer questions about total jobs lost or created.

Comprehensive Everglades Restoration Plan		**EC 7.2.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.2	Minimize adverse social impacts within the local community
Evaluation Criteria:	7.2.1	Total number of primary residences impacted

Description: (What is being measured and why)

The number of primary residences (permanent, year round homes) impacted by the project will be quantified.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Executive Order 12898 and WRDA 2000 require the evaluation of the Restudy (p 8-13, Vol. 1) which states, "The most potentially significant "other social effects" consideration for the alternative plans concerns the development of new storage reservoirs in the rural areas surrounding Lake Okeechobee, and the consequences for urban and community impacts and displacement of people. …the resilience of local economies and the cohesion of local communities to agricultural land conversion depend on a variety of factors, including the age, ethnic, and racial composition of the community and income, unemployment, and poverty levels."

Target: (Specific description of how success or failure will be measured)

Minimize total number of primary residences impacted.

Evaluation Method: (Description of what model or analytical method will be utilized)

Alternative project sites can be overlaid on a GIS database that has the most current information to determine the number of residences impacted. This information is currently available in Okeechobee by primary sub-basins. Maps of the other counties are available but are not digitized. Small area Census information also will be utilized where available to supplement this information.

Comments:

This EC is intended to capture the socio impacts associated with each alternative. The relocation cost is captured in the total project costs (EC 9.3.1).

Comprehensive Everglades Restoration Plan		**EC 7.2.2**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.2	Minimize adverse social impacts within the local community
Evaluation Criteria:	7.2.2	Community well being

Description: (What is being measured and why)

The extent to which whole neighborhoods or communities are significantly impacted by land acquisitions will be used to assess impacts on community well being.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Executive Order 12898 and WRDA 2000 require the evaluation of the Restudy (p 8-13, Vol. 1) which states, "The most potentially significant "other social effects" consideration for the alternative plans concerns the development of new storage reservoirs in the rural areas surrounding Lake Okeechobee, and the consequences for urban and community impacts and displacement of people. …the resilience of local economies and the cohesion of local communities to agricultural land conversion depend on a variety of factors, including the age, ethnic, and racial composition of the community and income, unemployment, and poverty levels."

Target: (Specific description of how success or failure will be measured)

Minimize impact on community well being in the project area. This impact may be low, moderate, or high.

Evaluation Method: (Description of what model or analytical method will be utilized)

This will be a function of the extent to which whole neighborhoods or communities are significantly impacted by land acquisitions. This is evaluated by comparing alternatives and considers bisecting communities or neighborhoods. The impact on community well being will be characterized as low, moderate, or high.

Comments:

Comprehensive Everglades Restoration Plan		**EC 7.3.1**
Evaluation:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.3	Meet Environmental and Economic Equity Goals
Evaluation Criteria:	7.3.1	Jobs displaced within low income and minority populations

Description: (What is being measured and why)

The number of workers from low income and minority populations displaced from their jobs as a direct result of this project will be quantified.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

This evaluation criteria will be used to help fulfill Executive Order 12898 and WRDA 2000 obligations by measuring a specific alternative's effects on low income and minority populations. The project delivery team will adjust the alternative to avoid or reduce the impacts whenever practicable and appropriate.

Target: (Specific description of how success or failure will be measured)

Minimize number of job holders from low income and minority populations displaced from their jobs.

Evaluation Method: (Description of what model or analytical method will be utilized)

The evaluation will include direct impacts only. Following completion of field surveys or public outreach to determine locations of places of employment of minorities and determination of minorities working at those locations, this information can be combined and applied as a percentage to the information collected in evaluation criteria 7.1.3.

Comments:

Comprehensive Everglades Restoration Plan		**EC 7.3.2**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.3	Meet Environmental and Economic Equity Goals
Evaluation Criteria:	7.3.2	Number of relocations of primary residences within low income and minority populations

Description: (What is being measured and why)
The number of households from low income and minority populations forced to relocate as a direct result of this project will be quantified.

Rationale: (Technical basis for why the evaluation criteria is being utilized)
This evaluation criteria will be used to help fulfill Executive Order 12898 and WRDA 2000 obligations by measuring a specific alternative's effects on low income and minority populations. The project delivery team will adjust the alternative to avoid or reduce the impacts whenever practicable and appropriate.

Target: (Specific description of how success or failure will be measured)
Minimize the number of relocations within low income and minority populations to avoid disproportionate impacts on this population group.

Evaluation Method: (Description of what model or analytical method will be utilized)
Alternative project sites can be overlaid on a GIS database that has the most current information to determine the number of residences impacted. This information is currently available in Okeechobee by primary sub-basins. Maps of the other counties are available but are not digitized. Data on minorities, by group, at the sub-basin level is available in the watershed. Method of evaluation could include talking to the Okeechobee Planning Department and identifying (through local knowledge), the location of homogeneous poor neighborhoods, coming up with average densities, and then proportioning number of structures with area affected. If the neighborhoods or areas are not homogeneous, perhaps use a (less severe, equal, more severe) rating system. Residential relocation information along with specific information collected through direct inquiries will be used to determine the number of residences occupied by minorities.

Comments:

Lake Okeechobee Watershed Project
Evaluation Criteria Fact Sheet

Comprehensive Everglades Restoration Plan		**EC 7.4.1**
Evaluation:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.4	Minimize adverse impacts to local government tax revenues
Evaluation Criteria:	7.4.1	Impacts to property tax

Description: (What is being measured and why)

The direct effect of purchase of lands for project facilities on property tax revenues will be quantified. It is anticipated that a significant amount of agricultural land will be taken out of production as a result of this project.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Executive Order 12898 and WRDA 2000 require the evaluation of the Restudy (p 8-13, Vol. 1) which states, "The most potentially significant "other social effects" consideration for the alternative plans concerns the development of new storage reservoirs in the rural areas surrounding Lake Okeechobee, and the consequences for urban and community impacts and displacement of people. …the resilience of local economies and the cohesion of local communities to agricultural land conversion depend on a variety of factors, including the age, ethnic, and racial composition of the community and income, unemployment, and poverty levels."

Target: (Specific description of how success or failure will be measured)

Minimize reduction in local property tax revenues generated, measured in dollars.

Evaluation Method: (Description of what model or analytical method will be utilized)

During the plan formulation phase of the project, the number of acres of land taken off the property tax rolls will be quantified. This can be converted to dollars using property tax rates for the appropriate county.

Comments:

Comprehensive Everglades Restoration Plan		**EC 7.5.1**
Scale:	Watershed	
CERP Goal/Requirement:	Enhance Economic Values and Social Well Being	
LOW Project Goal:	7	Minimize adverse socioeconomic impacts on the local and regional economies
LOW Project Sub-Goal:	7.5	Maximize social acceptability of the project
Evaluation Criteria:	7.5.1	Acceptability of the project

Description: (What is being measured and why)

Project acceptability is a subjective measure that will identify the extent to which the alternative plan are acceptable to state and local entities and the public in terms of applicable laws, regulations and public policies.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Acceptability is one of the four primary evaluation criteria as described in the Corps' Principles & Guidelines. The other criteria include completeness, efficiency and effectiveness.

Target: (Specific description of how success or failure will be measured)

Maximize acceptability of the project. Each alternative will be designated as low, moderate, or high acceptability.

Evaluation Method: (Description of what model or analytical method will be utilized)

Workability and viability of an alternative with respect to acceptance by state and local entities and the public will be assessed. Applicable laws, regulations and public policies will be evaluated to determine the acceptability of each alternative plan.

Comments:

Comprehensive Everglades Restoration Plan		**EC 8.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	8	Maximize immediate, interim, and long-term project performance
LOW Project Sub-Goal:	8.1	Achieve project benefits as soon as possible
Evaluation Criteria:	8.1.1	Time to substantial construction completion

Description: (What is being measured and why)

Estimated time to substantially complete construction of the project to achieve project benefits as soon as possible.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

To score the alternative based on how well it achieves the objectives in accordance with or ahead of the implementation schedule identified in the 1999 Restudy.

Target: (Specific description of how success or failure will be measured)

Complete construction within or ahead of the 1999 Restudy implementation schedule for each of the four Lake Okeechobee Watershed Project components that are included in the given alternative plan:

North Lake Okeechobee Storage Reservoir: September 2009
Taylor Creek/Nubbin Slough Storage and Treatment Area: January 2009
Lake Okeechobee Watershed Water Quality Treatment Facilities: September 2010
Lake Okeechobee Tributary Sediment Dredging: September 2005

Evaluation Method: (Description of what model or analytical method will be utilized)

Calculate total time to substantially complete construction of the project (i.e. project is available for start up). The schedule will include time for real estate acquisition, detailed design, preparation of plans and specifications, and construction.

Comments:

The use of Primavera or Microsoft Projects scheduling software could be used to determine critical path components for each alternative. This criteria will represent the initiation of benefits derived by the project and will be required for the benefits analysis.

Comprehensive Everglades Restoration Plan		**EC 8.1.2**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal	8	Maximize immediate, interim, and long-term project performance
LOW Project Sub-Goal:	8.1	Achieve project benefits as soon as possible
Evaluation Criteria:	8.1.2	Time to achieve 100% of overall performance

Description: (What is being measured and why)

Measure the ability of each plan to achieve significant load reduction earlier in the implementation schedule.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Phosphorus loading to Lake Okeechobee must meet the State's water quality standards by January 1, 2015. The TMDL is 140MT/yr (105 MT/yr from runoff). It will take approximately 30 years for Lake Okeechobee to naturally balance its internal loading once the TMDL is met. Achieving significant load reductions in the early stages of the implementation will allow the Lake to begin its recovery earlier.

Target: (Specific description of how success or failure will be measured)

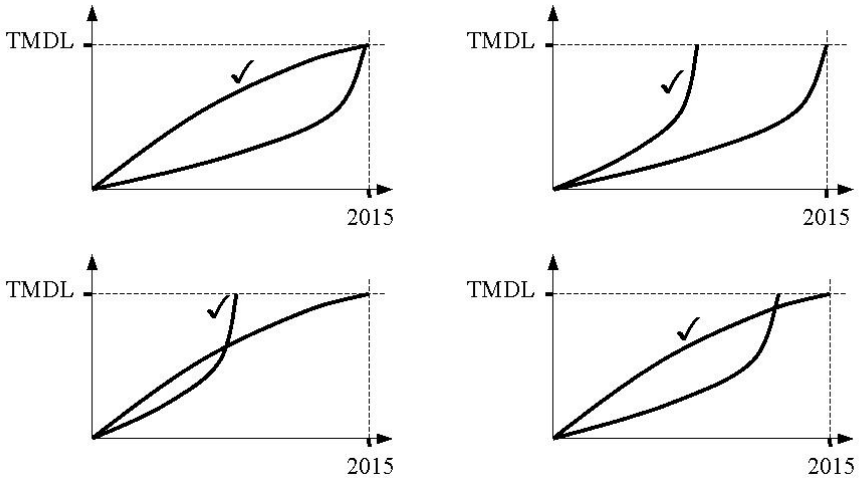
Achieve the larger portion of the design load reduction in the earlier part of the implementation.

Evaluation Method: (Description of what model or analytical method will be utilized)

Estimate year when 50% load reduction will occur. Use implementation schedules from similar projects and load reduction performance for similar projects or from literature. If possible, estimate the natural loading to the Lake after the implementation of each alternative

Comments:

Graphically, the Early Results criteria together with the Time To Completion criteria combine to favor the plans checked below:



Comprehensive Everglades Restoration Plan		**EC 8.2.1**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	8	Maximize immediate, interim, and long-term project performance
LOW Project Sub-Goal:	8.2	Provide interim and long-term operational flexibility to adapt to information obtained during operation of this project and other CERP projects
Evaluation Criteria:	8.2.1	Potential operational flexibility

Description: (What is being measured and why)

Assess interim and long-term operational flexibility to adapt to unforeseen project conditions. This assessment of operational flexibility will consider the reliability and number of water sources, flexibility of the internal operations, and the number and location of potential discharge points or downstream receiving waters.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

To score the alternatives based on their flexibility to adapt to information obtained throughout interim project conditions and the long-term RECOVER Adaptive Assessment Process.

Target: (Specific description of how success or failure will be measured)

Provide a project that will maximize interim and long-term flexibility to adapt to unforeseen project conditions. This would be equivalent to a high flexibility rating.

Evaluation Method: (Description of what model or analytical method will be utilized)

Qualitative evaluation of the interim and long-term operational flexibility of the alternative based on the water source, internal operational paths, and external discharge points.

For the water source, each alternative will be evaluated to determine the reliability of the water source. Additionally, the alternative will be assessed to determine the number of inflow sources or inflow points from a variety of subbasins. The more reliable the water source and the more inflow points from different subbasins, the higher the alternative will be scored during this assessment of the water source.

For the internal operational path, each alternative will be evaluated relative to the number of treatment or storage cells where flows can be diverted to, flows can be retained in, or be isolated from production. Alternatives with a variety of internal flow paths will be assessed with a high flexibility rating for internal operations.

For the external discharge points, each alternative will be evaluated relative to the location and number of discharge points. This would include an assessment of the potential receiving water bodies downstream of the alternative where flows could be diverted to after discharge. Alternatives with a variety of external flow paths following discharge will be assessed with a high flexibility rating for external discharge points.

Comprehensive Everglades Restoration Plan	**EC 8.2.1**

Alternatives will be assigned an overall high, moderate or low operational flexibility rating based on the qualitative evaluation of the water source, internal operational paths, and external discharge points as follows:

Overall Score	Individual Scores
High	High for all 3 assessments
Moderate	Moderate for one or more assessments
Low	Low for one or more assessments, with no high assessments

Comments:

Comprehensive Everglades Restoration Plan		**EC 9.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	9	Ensure that the recommended plan is cost efficient
LOW Project Sub-Goal:	9.1	Provide a cost effective project
Evaluation Criteria:	9.1.1	Cost per acre-feet of storage

Description: (What is being measured and why)

Calculate costs per acre-feet of storage provided by project features (reservoirs, natural areas, etc.). for all level of storage considered

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Corps Engineer Regulation 1105-2-100 requires cost effectiveness and incremental cost analyses to support recommendations for ecosystem restoration. This provides information about good financial investments given dollar costs and non-dollar outputs for the various alternatives. Efficiency (the extent to which an alternative plan is the most cost effective means of achieving the objectives) is one of the four primary evaluation criteria as described in the Water Resources Council's Principles & Guidelines. The other criteria include completeness, effectiveness, and acceptability.

Target: (Specific description of how success or failure will be measured)

Determine alternative plans that are the cost effective with respect to storage. No specific "target" in terms of dollar cost per acre-foot is established. However, for any given level of storage, cost effectiveness is determined through the following three criteria:

1. Whether, the same output level could be produced by another plan at less cost,
2. Whether, a larger output level could be produced at the same cost, or
3. Whether, a larger output level could be produced at less cost.

Evaluation Method: (Description of what model or analytical method will be utilized)

For all sites, designs, and scales of project features considered (e.g., reservoirs, natural areas, STA's etc.), the cost per acre-foot of storage will be calculated using appropriate cost estimate techniques. The total project cost will be established using MCACES (Micro Computer Aided Cost Engineering System) and will be presented at the annualized net present value for the 50-year planning horizon.

Comments:

Cost effectiveness is one of many factors used for evaluating, comparing and selecting a plan. Measuring acre-feet of storage is a surrogate for the ecological outputs/benefits that accrue from storage. Translating storage into ecological outputs/ benefits will be required for the final evaluation and comparison of alternatives. How those ecological outputs/benefits resulting from storage will be characterized is currently undetermined.

Comprehensive Everglades Restoration Plan		**EC 9.1.2**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	9	Ensure that the recommended plan is cost efficient
LOW Project Sub-Goal:	9.1	Provide a cost effective project
Evaluation Criteria:	9.1.2	Cost per ton of phosphorus removed

Description: (What is being measured and why)

Calculate costs per ton of phosphorus removed by project features (reservoirs, stormwater treatment areas, natural areas, etc.) for all levels of phosphorus removal considered.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Corps Engineer Regulation 1105-2-100 requires cost effectiveness and incremental cost analyses to support recommendations for ecosystem restoration. This provides information about good financial investments given dollar costs and non-dollar outputs for the various alternatives. Efficiency (the extent to which an alternative plan is the most cost effective means of achieving the objectives) is one of the four primary evaluation criteria as described in the Water Resources Council's Principles & Guidelines. The other criteria include completeness, effectiveness, and acceptability.

Target: (Specific description of how success or failure will be measured)

Determine alternative plans that are cost effective with respect to phosphorus removal. No specific "target" in terms of dollar cost per ton of phosphorus removed is established. However, for any given level of phosphorus removal, cost effectiveness is determined through the following three criteria:

1. Whether, the same output level could be produced by another plan at less cost,
2. Whether, a larger output level could be produced at the same cost, or
3. Whether, a larger output level could be produced at less cost.

Evaluation Method: (Description of what model or analytical method will be utilized)

For all sites, designs, and scales of project features considered (e.g., reservoirs, natural areas, STA's etc.), the cost per acre-foot of phosphorus removal will be calculated using appropriate cost estimating techniques. The total project cost will be establish using MCACES and will be presented at the annualized net present value for the 50-year planning horizon.

Comments:

Cost effectiveness is one of many factors used for evaluating, comparing and selecting a plan. Measuring phosphorus load reduction is a surrogate for the ecological outputs/benefits that accrue from load reduction. Translating load reduction into ecological outputs/ benefits will be required for the final evaluation and comparison of alternatives. How those ecological outputs/benefits resulting from phosphorus load reduction will be characterized is currently undetermined.

Comprehensive Everglades Restoration Plan		**EC 9.1.3**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	9	Ensure that the recommended plan is cost efficient
LOW Project Sub-Goal:	9.1	Provide a cost effective project
Evaluation Criteria:	9.1.3	Cost per functional value of habitat created

Description: (What is being measured and why)

Calculate costs per functional value of habitat created by project features (wetland restoration, natural areas, etc.) for all levels of functional values of habitat considered.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Corps Engineer Regulation 1105-2-100 requires cost effectiveness and incremental cost analyses to support recommendations for ecosystem restoration. This provides information about good financial investments given dollar costs and non-dollar outputs for the various alternatives. Efficiency (the extent to which an alternative plan is the most cost effective means of achieving the objectives) is one of the four primary evaluation criteria as described in the Water Resources Council's Principles & Guidelines. The other criteria include completeness, effectiveness, and acceptability.

Target: (Specific description of how success or failure will be measured)

Determine alternative plans that are cost effective with respect to habitat creation. No specific "target" in terms of dollar cost per functional value of habitat is established. However, for any given level of habitat creation, cost effectiveness is determined through the following three criteria:

1. Whether, the same output level could be produced by another plan at less cost,
2. Whether, a larger output level could be produced at the same cost, or
3. Whether, a larger output level could be produced at less cost.

Evaluation Method: (Description of what model or analytical method will be utilized)

For all sites, designs, and scales of project features considered (e.g., reservoirs, natural areas, STA's etc.), the cost per functional value of habitat created will be calculated using appropriate cost estimating techniques. The total project cost will be establish using MCACES and will be presented at the annualized net present value for the 50-year planning horizon.

Comments:

Cost effectiveness is one of many factors used for evaluating, comparing and selecting a plan

Comprehensive Everglades Restoration Plan		**EC 9.2.1**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	9	Ensure that the recommended plan is cost efficient
LOW Project Sub-Goal:	9.2	Achieve reasonable incremental benefits
Evaluation Criteria:	9.2.1	Incremental cost per additional acre-feet of storage

Description: (What is being measured and why)

Calculate incremental (additional) costs per incremental (additional) acre-feet of storage gained as successively larger (in terms of storage) cost effective alternative plans are considered.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Corps Engineer Regulation 1105-2-100 requires cost effectiveness and incremental cost analyses to support recommendations for ecosystem restoration. This provides information about good financial investments given dollar costs and non-dollar outputs for the various alternatives. Efficiency (the extent to which an alternative plan is the most cost effective means of achieving the objectives) is one of the four primary evaluation criteria as described in the Water Resources Council's Principle & Guidelines. The other criteria include completeness, effectiveness, and acceptability.

Target: (Specific description of how success or failure will be measured)

Determine which cost effective plans are "best buy" plans. "Best buys" are the cost effective plans that are most efficient in production, yielding the greatest increases in acre-feet of storage for the least increases in cost, and possessing the lowest incremental cost per acre-foot of storage as successively larger levels of storage are considered. No specific target in terms of incremental costs per acre-foot of storage is established. Rather, the incremental cost analysis provides a basis for addressing the decision question "is it worth it?" Such choices require that decision makers base subjective judgments on the value of the output being produced from additional information generated outside the framework of the cost effectiveness and incremental cost analyses.

Evaluation Method: (Description of what model or analytical method will be utilized)

Starting from the "No Action" alternative, the additional costs ("incremental costs") for the additional amounts of storage ("incremental output") produced by successively larger alternative plans are calculated. The incremental cost per acre-feet of storage is calculated by dividing the additional cost by the additional acre-feet of storage (as compared to the last alternative under consideration). As levels of storage increase, those plans with the lowest incremental costs per unit of output are identified as the "Best Buy" plans.

Comments:

Because it is likely that a series of "Best Buy" plans may be identified, the project delivery team will need to consider such factors as how well each "Best Buy" plan achieves or addresses planning objectives, resource significance, completeness, effectiveness, acceptability, and risk and uncertainty in answering the "Is it worth it?" question.

Comprehensive Everglades Restoration Plan	**EC 9.2.1**
Measuring acre-feet of storage is a surrogate for the ecological output/benefits that accrue from storage. Translating storage into ecological outputs/benefits will be required for the final evaluation and comparison of alternatives. How those ecological outputs/benefits resulting from storage will be characterized is currently undetermined	

Comprehensive Everglades Restoration Plan		**EC 9.2.2**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	9	Ensure that the recommended plan is cost efficient
LOW Project Sub-Goal:	9.2	Achieve reasonable incremental benefits
Evaluation Criteria:	9.2.2	Incremental cost per additional ton of phosphorus removed

Description: (What is being measured and why)

Calculate incremental (additional) costs per incremental (additional) ton of phosphorus removed as successively larger (in terms of phosphorus load reduction) cost effective alternative plans are considered.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Corps Engineer Regulation 1105-2-100 requires cost effectiveness and incremental cost analyses to support recommendations for ecosystem restoration. This provides information about good financial investments given dollar costs and non-dollar outputs for the various alternatives. Efficiency (the extent to which an alternative plan is the most cost effective means of achieving the objectives) is one of the four primary evaluation criteria as described in the Water Resources Council's Principle & Guidelines. The other criteria include completeness, effectiveness, and acceptability.

Target: (Specific description of how success or failure will be measured)

Determine which cost effective plans are "best buy" plans. "Best buys" are the cost effective plans that are most efficient in production, yielding the greatest increases in phosphorus load reduction for the least increases in cost, and possessing the lowest incremental cost per ton of phosphorus reduced as successively larger levels of phosphorus load reduction are considered. No specific target in terms of incremental costs per ton of phosphorus reduced is established. Rather, the incremental cost analysis provides a basis for addressing the decision question "is it worth it?" Such choices require that decision makers base subjective judgments on the value of the output being produced from additional information generated outside the framework of the cost effectiveness and incremental cost analyses.

Evaluation Method: (Description of what model or analytical method will be utilized)

Starting from the "No Action" alternative, the additional costs ("incremental costs") for the additional amounts of phosphorus load reduction (incremental output) produced by successively larger alternative plans are calculated.

The incremental cost per ton of phosphorus removed is calculated by dividing the additional tons of phosphorus removed (as compared to the last alternative under consideration). As levels of phosphorus removed increase, those plans with the lowest incremental costs per unit of output are identified as the "best buy" plans.

Comprehensive Everglades Restoration Plan	**EC 9.2.2**

Comments:

Because it is likely that a series of "best buy" plans may be identified, the project delivery team will need to consider such factors as how well each "best buy" plan achieves or addresses planning objectives, resource significance, completeness, effectiveness, acceptability, and risk and uncertainty in answering the "Is it worth it?" question.

Measuring load reduction is a surrogate for the ecological output/benefits that accrue from load reduction. Translating load reduction into ecological outputs/benefits will be required for the final evaluation and comparison of alternatives. How those ecological outputs/benefits resulting from load reduction will be characterized is currently undetermined

Comprehensive Everglades Restoration Plan		**EC 9.2.3**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	9	Ensure that the recommended plan is cost efficient
LOW Project Sub-Goal:	9.2	Achieve reasonable incremental benefits
Evaluation Criteria:	9.2.3	Incremental cost per additional functional value of habitat created

Description: (What is being measured and why)

Calculated incremental (additional) costs per incremental (additional) functional value of habitat created as successively larger (in terms of habitat) cost effective alternative plans are considered.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Corps Engineer Regulation 1105-2-100 requires cost effectiveness and incremental cost analyses to support recommendations for ecosystem restoration. This provides information about good financial investments given dollar costs and non-dollar outputs for the various alternatives. Efficiency (the extent to which an alternative plan is the most cost effective means of achieving the objectives) is one of the four primary evaluation criteria as described in the Water Resources Council's Principle & Guidelines. The other criteria include completeness, effectiveness, and acceptability.

Target: (Specific description of how success or failure will be measured)

Determine which cost effective plans are "best buy" plans. "Best buys" are the cost effective plans that are most efficient in production, yielding the greatest increases in habitat for the least increases in cost, and possessing the lowest incremental cost per functional value of habitat as successively larger levels of habitat are considered. No specific target in terms of incremental costs per functional value of habitat is established. Rather, the incremental cost analysis provides a basis for addressing the decision question "is it worth it?" Such choices require that decision makers base subjective judgments on the value of the output being produced from additional information generated outside the framework of the cost effectiveness and incremental cost analyses.

Evaluation Method: (Description of what model or analytical method will be utilized)

Starting from the "No Action" alternative, the additional costs ("incremental costs") for the additional amounts of habitat ("incremental output") produced by successively larger alternative plans are calculated.

The incremental cost per functional value of habitat is calculated by dividing the additional cost by the additional habitat created (as compared to the last alternative under consideration). As levels of habitat created increase, those plans with the lowest incremental costs per unit of output are identified as the "best buy" plans.

Comprehensive Everglades Restoration Plan	**EC 9.2.3**

Comments:
Because it is likely that a series of "best buy" plans may be identified, the project delivery team will need to consider such factors as how well each "best buy" plan achieves or addresses planning objectives, resource significance, completeness, effectiveness, acceptability, and risk and uncertainty in answering the "Is it worth it?" question.

Comprehensive Everglades Restoration Plan		**EC 9.3.1**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	9	Ensure that the recommended plan is cost efficient
LOW Project Sub-Goal:	9.3	Avoid implementation problems related to project cost
Evaluation Criteria:	9.3.1	Total project costs consistent with CERP

Description: (What is being measured and why)

The Total Project Cost will be compared to the Authorized Project Cost, the estimated project cost contained in the 1999 Restudy, or the programmatic costs defined in WRDA 2000 as appropriate for each of the LOW Project components.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Section 902 of WRDA 1986, as amended, requires that the Corps of Engineers obtain Congressional approval prior to exceeding the authorized project cost by more than 20%. Since the Taylor Creek/Nubbin Slough Reservoir and Stormwater Treatment Area Project is one of the initially authorized projects, the Section 902 cost limit applies. If this limit is exceeded, the required Congressional approval would result in a significant delay in project implementation. The Lake Okeechobee Tributary Sediment Dredging Project falls within the programmatic authority for projects that cost less than $25 million and therefore, can be implemented without additional Congressional authorization. If this limit is exceeded, the time required for authorization would delay project implementation. For other CERP projects, comparison with the Restudy cost estimates is important since it bears on budgeting requirements and could impact the implementation of other CERP projects.

Target: (Specific description of how success or failure will be measured)

For Taylor Creek/Nubbin Slough Reservoir and Stormwater Treatment Area Project, the total project cost should be maintained at no more than 120% of the authorized project cost. For the Lake Okeechobee Tributary Sediment Dredging Project, the total project cost should remain less than $25 million. For the other LOW Projects, the total project cost should minimize exceedance of the Restudy cost estimates.

Evaluation Method: (Description of what model or analytical method will be utilized)

The total project cost for each LOW Project alternative will be estimated using MCACES. It will include all planning, engineering and design, LERRD (Lands, Easements, Rights-of-way, Relocations, and Disposal areas), construction, and OMRR&R (Operations, Maintenance, Repair, Rehabilitation, and Replacement) costs. The total project cost will be presented as the net present value for the 50-year planning horizon.

Comments:

Lake Okeechobee Watershed Project
Evaluation Criteria Fact Sheet

Comprehensive Everglades Restoration Plan		**EC 10.1.1**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	10	Minimize risk and uncertainty of project performance
LOW Project Sub-Goal:	10.1	Maximize the use of proven and reliable technologies
Evaluation Criteria:	10.1.1	Level of confidence to achieve water quality treatment goals (qualitative – high, moderate, low)

Description: (What is being measured and why)

Assess level of confidence to achieve water quality treatment goals given the technology utilized within each alternative. This assessment will take information from the Water Quality Treatment Technology Ranking, and apply it on a site-specific and alternative-specific basis.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Evaluate alternatives with respect to risk and uncertainty associated with the proposed water quality treatment technologies in order to best achieve the project's water quality objectives.

Target: (Specific description of how success or failure will be measured)

Minimize risk and/or uncertainty related to the ability of the alternative to perform as designed. This would be equivalent to a high level of confidence rating.

Evaluation Method: (Description of what model or analytical method will be utilized)

The Water Quality Treatment Technology Ranking, will provide tools to estimate the level of confidence to achieve the water quality treatment goals for each water quality feature within an alternative. Alternatives that rely on technologies that have been proven and found to be reliable under conditions comparable to those of the Lake Okeechobee watershed will be assigned a high level of confidence for achieving water quality treatment goals. Alternatives that rely on technologies that have been proven and found to be reliable under conditions different from those of the Lake Okeechobee watershed will be assigned a moderate level of confidence. Alternatives that rely on technologies that are untested or had limited prior success will be assigned a low level of confidence.

Comments:

Comprehensive Everglades Restoration Plan		**EC 10.2.1**
Scale:	Watershed	
CERP Goal/Requirement:	Optimize Project Performance and Efficiency	
LOW Project Goal:	10	Minimize risk and uncertainty of project performance
LOW Project Sub-Goal:	10.2	Minimize the risk associated with project susceptibility to hurricanes, droughts, energy costs, operator error, etc.
Evaluation Criteria:	10.2.1	Sensitivity of treatment capability to extreme weather conditions (i.e., hurricanes and droughts)

Description: (What is being measured and why)

Assess sensitivity of treatment capability to extreme weather conditions, specifically fire, extended flood, extended drought, and hurricane winds.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Score alternatives according to how each achieves the project treatment goals with the least amount of risk of impacts from fire, flood, drought, and hurricane winds. Although a drought is a natural event, severe droughts may cause prolonged drawdowns followed by reflooding that may negatively impact the phosphorous retention and wetland performance of an STA. Extended floods could reduce the hydraulic residence time and create faster currents increasing the likelihood of moving phosphorous out of the treatment area. Treatment cells in parallel together with trains of cells in series may enable better management of extreme weather events and may reduce the sensitivity. Extended floods may increase short-circuiting. Hurricanes winds may uproot vegetation. Fire would destroy vegetation reducing uptake capacity.

Target: (Specific description of how success or failure will be measured)

Provide a project that will function as designed with minimal impacts from extreme weather conditions. This would be equivalent to a low sensitivity rating.

Evaluation Method: (Description of what model or analytical method will be utilized)

An operational model will be used to estimate the percent of time and the proportion of the treatment area that would dry out. Alternatives with longer periods of dryout and larger dryout areas would be assigned a high density (maximum negative impact) to extreme weather conditions. Conversely, alternatives with shorter dryout periods and smaller dryout areas would be assigned a low sensitivity (minimum negative impact). The model will also be used to estimate the amount of time and extent of area suffering extended periods of flooding. Alternatives with longer periods of flooding and larger flooded areas would be assigned a high sensitivity. Conversely, alternatives with shorter floods and smaller flooded areas would be assigned a low sensitivity. A method to assess the sensitivity to hurricane winds (uprooting vegetation) and to fire (destruction of vegetation) is not available at this time.

Comments:

Comprehensive Everglades Restoration Plan		**EC 11.1.1**
Scale:	System	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	11 Improve water quality in Lake Okeechobee	
LOW Project Sub-Goal:	11.1 Reduce phosphorus loads to Lake Okeechobee	
Evaluation Criteria:	11.1.1 Phosphorus load reduction to Lake Okeechobee	
Performance Measure		

Description: (What is being measured and why)

The average annual phosphorus load reduction to Lake Okeechobee from a CERP LOW Project alternative plan will be estimated in metric tons. The standard deviation will be determined for the period of record simulation to indicate the variability of the phosphorus load reduction. The reduction in phosphorus loads to Lake Okeechobee, attributed to LOW Project features, will significantly aid in the overall reduction of total phosphorus loading to Lake Okeechobee.

Lake Okeechobee is considered eutrophic as a result of anthropogenic loading of excess phosphorus. A water column goal of 40 ug/L was set for Lake Okeechobee to support a healthy lake system, restore the designated uses of Lake Okeechobee and allow the lake to meet applicable water quality standards. To achieve this concentration in the pelagic zones of the Lake a Total Maximum Daily Load (TMDL) of phosphorus to Lake Okeechobee as been established to be 140 metric tons, of which 35 metric tons is attributed to atmospheric deposition. To achieve this TMDL and the associated target P concentration, phosphorus loads to the Lake must be reduced in each of the contributing basins.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Water quality in the Lake Okeechobee watershed has experienced substantial degradation over the last century. Anthropogenic inputs have resulted in the nutrient enrichment of Lake Okeechobee and its tributaries. Thus, reversing the historic trend of water quality degradation and nutrient enrichment will: 1) improve ecological health by increasing native wildlife diversity and abundance; 2) decrease occurrences of algal blooms; 3) decrease nutrient dependent benthic organisms; 4) reverse impairments in designated uses; 5) reduce costs of water treatment for drinking purposes and 6) improve the quality of water flowing to downstream ecosystems including the Everglades. Reduction in phosphorus load will provide water quality improvements to support the ecological restoration of Lake Okeechobee.

Target: (Specific description of how success or failure will be measured)

Maximize the average annual load reduction and minimize the standard deviation or variability in the performance. A minimum annual target value of 167 metric tons of phosphorus load reduction has been established. This value is based on the "DRAFT Water Quality Targets for LOWP-CERP components" as prepared by FDEP dated July 22, 2002. As more information becomes available the minimum target value may change.

Comprehensive Everglades Restoration Plan	**EC 11.1.1**

Evaluation Method: (Description of what model or analytical method will be utilized)

Model predictions will be used to forecast total phosphorus loads discharged to Lake Okeechobee from all LOW Project facilities for each of the alternative plans. The forecasted loads will then be compared to the target value.

The WAMView model will be utilized in combination with the DMSTA or reservoir water quality model to determine the expected performance of each alternative. The WAMView model will provide input values to the DMSTA or reservoir water quality model including inflows, rainfall, and phosphorus concentrations at the specific location of each of the proposed features within an alternative plan. The DMSTA or reservoir water quality model will use this information to compute the resulting average annual phosphorus load reduction per project feature. This information will be returned to the WAMView model for routing and conveyance through the remaining tributary system to Lake Okeechobee. The average annual load reduction to Lake Okeechobee will be computed for the period of record simulation. Additionally, the standard deviation of the annual values will be determined to indicate the variability of the projected performance.

Comments:

The total load reduction is based on an assumption of 25% load reduction from BMPs and other efforts in the watershed (This number is currently being evaluated and the final number will be available 1/2004). The 167 metric tons load reduction figure is based on best available information and may be subject to reevaluation if new information is provided.

Through another effort, WASP is currently being integrated with WAMView to provide better modeling of in-stream water quality constituents. It may be possible to utilize the WAMView/WASP integrated model instead of the DMSTA model to estimate phosphorus load reductions.

Comprehensive Everglades Restoration Plan		**EC 11.1.2**
Scale:	System	
CERP Goal:	Enhance Ecologic Values	
LOW Project Goal:	11	Improve water quality in Lake Okeechobee
LOW Project Sub-Goal:	11.1	Reduce phosphorus loads to Lake Okeechobee
Evaluation Criteria:	11.1.2	Exceedances of phosphorus load reduction target to Lake Okeechobee
Performance Measure		

Description: (What is being measured and why)

The number of exceedances of the target value as compared to the annual phosphorus load reduction to Lake Okeechobee from a CERP LOW Project alternative plan. The reduction in phosphorus loads to Lake Okeechobee, attributed to LOW Project features, will significantly aid in the overall reduction of total phosphorus loading to Lake Okeechobee.

Lake Okeechobee is considered eutrophic as a result of anthropogenic loading of excess phosphorus. A water column goal of 40 ug/L was set for Lake Okeechobee to support a healthy lake system, restore the designated uses of Lake Okeechobee and allow the lake to meet applicable water quality standards. To achieve this concentration in the pelagic zones of the Lake a Total Maximum Daily Load (TMDL) of phosphorus to Lake Okeechobee as been established to be 140 metric tons, of which 35 metric tons is attributed to atmospheric deposition. To achieve this TMDL and the associated target P concentration, phosphorus loads to the Lake must be reduced in each of the contributing basins.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Water quality in the Lake Okeechobee watershed has experienced substantial degradation over the last century. Anthropogenic inputs have resulted in the nutrient enrichment of Lake Okeechobee and its tributaries. Thus, reversing the historic trend of water quality degradation and nutrient enrichment will: 1) improve ecological health by increasing native wildlife diversity and abundance; 2) decrease occurrences of algal blooms; 3) decrease nutrient dependent benthic organisms; 4) reverse impairments in designated uses; 5) reduce costs of water treatment for drinking purposes; and 6) improve the quality of water flowing to downstream ecosystems including the Everglades. Reduction in phosphorus load will provide water quality improvements to support the ecological restoration of Lake Okeechobee.

Target: (Specific description of how success or failure will be measured)

Minimize the number of exceedances of the target value of 167 metric tons of phosphorus load reduction. This value is based on the "DRAFT Water Quality Targets for LOWP-CERP components" as prepared by FDEP dated July 22, 2002. As more information becomes available the minimum target value may change.

Comprehensive Everglades Restoration Plan	**EC 11.1.2**

Evaluation Method: (Description of what model or analytical method will be utilized)

Model predictions will be used to forecast total phosphorus loads discharged to Lake Okeechobee from all LOW Project facilities for each of the alternative plans. The forecasted loads will then be compared to the target value.

The WAMView model will be utilized in combination with the DMSTA or reservoir water quality model to determine the expected performance of each alternative. The WAMView model will provide input values to the DMSTA or reservoir water quality model including inflows, rainfall, and phosphorus concentrations at the specific location of each of the proposed features within an alternative plan. The DMSTA or reservoir water quality model will use this information to compute the resulting average annual phosphorus load reduction per project feature. This information will be returned to the WAMView Model for routing and conveyance through the remaining tributary system to Lake Okeechobee. The annual phosphorus load reduction to Lake Okeechobee based on a 5-year rolling average will be compared to the target value. Whenever this 5-year average value exceeds the target value, it will be counted as an exceedance.

Comments:

The total load reduction is based on an assumption of 25% load reduction from BMPs and other efforts in the watershed (This number is currently being evaluated and the final number will be available 1/2004). The 167 metric tons load reduction figure is based on best available information and may be subject to reevaluation if new information is provided.

Through another effort, WASP is currently being integrated with WAMView to provide better modeling of in-stream water quality constituents. It may be possible to utilize the WAMView/WASP integrated model instead of the DMSTA model to estimate phosphorus load reductions.

Comprehensive Everglades Restoration Plan		**EC 11.1.3**
Scale:	System	
CERP Goal/Requirement:	Enhance Ecologic Values	
LOW Project Goal:	11	Improve water quality in Lake Okeechobee
LOW Project Sub-Goal:	11.1	Reduce phosphorus loads to Lake Okeechobee
Evaluation Criteria:	11.1.3	Phosphorus load reduction to tributaries from CERP project features

Description: (What is being measured and why)

The average annual phosphorus load reduction being discharged from each of the proposed CERP facilities will be estimated in metric tons. The standard deviation will be determined for the period of record simulation to indicate the variability of the phosphorus load reduction. The corresponding reduction in phosphorus loads to Lake Okeechobee tributaries, attributed to LOW Project features, will significantly aid in the overall reduction of total phosphorus loading to Lake Okeechobee.

Lake Okeechobee is considered eutrophic as a result of anthropogenic loading of excess phosphorus. A water column goal of 40 ug/L was set for Lake Okeechobee to support a healthy lake system, restore the designated uses of Lake Okeechobee and allow the lake to meet applicable water quality standards. To achieve this concentration in the pelagic zones of the Lake a Total Maximum Daily Load (TMDL) of phosphorus to Lake Okeechobee as been established to be 140 metric tons, of which 35 metric tons is attributed to atmospheric deposition. To achieve this TMDL and the associated target P concentration, phosphorus loads to the Lake must be reduced in each of the contributing basins.

Rationale: (Technical basis for why the evaluation criteria is being utilized)

Water quality in the Lake Okeechobee watershed has experienced substantial degradation over the last century. Anthropogenic inputs have resulted in the nutrient enrichment of Lake Okeechobee and its tributaries. Thus, reversing the historic trend of water quality degradation and nutrient enrichment will: 1) improve ecological health by increasing native wildlife diversity and abundance; 2) decrease occurrences of algal blooms; 3) decrease nutrient dependent benthic organisms; 4) reverse impairments in designated uses; 5) reduce costs of water treatment for drinking purposes and 6) improve the quality of water flowing to downstream ecosystems including the Everglades. . Reduction in phosphorus load will provide water quality improvements to support the ecological restoration of Lake Okeechobee.

Target: (Specific description of how success or failure will be measured)

Primarily, maximize the average annual load reduction from each project feature. Secondarily, minimize the standard deviation or variability in the performance. A specific target for each LOW Project feature will be developed following preliminary model evaluations.

Comprehensive Everglades Restoration Plan	**EC 11.1.3**

Evaluation Method: (Description of what model or analytical method will be utilized)

Model predictions will be used to forecast phosphorus loads discharged from project facilities for each of the alternative plans. The forecasted loads will then be compared to the target value.

The WAMView model will be utilized in combination with the DMSTA model to determine the expected performance of each project feature such as STAs, reservoirs and RASTAs. The WAMView model will provide input values to the DMSTA model including inflows, rainfall, and phosphorus concentrations at the specific location of the proposed feature. The DMSTA model, reservoir water quality model, and WAM View (depending on feature type) will use this information to compute the resulting average annual phosphorus load reduction. The average annual load reduction will be computed for the period of record simulation. Additionally, the standard deviation of the annual values will be determined to indicate the variability of the projected performance. This load reduction is observed at the CERP facility, not at Lake Okeechobee (i.e., this does not account for any assimilation in the tributaries to Lake Okeechobee).

Comments:

Comprehensive Everglades Restoration Plan			**EC 12.1.1**
Scale:	System		
CERP Goal/Requirement:	Enhance Ecologic Values		
LOW Project Goal:	12	Provide adequate storage capacity	
LOW Project Sub-Goal:	12.1	Provide adequate storage capacity during wet season	
Evaluation Criteria:	12.1.1	Percent of runoff stored when Lake Okeechobee water levels are high	
Performance Measure			
Description: (What is being measured) Volume of water stored in the watershed compared with the total volume of water that would need to be stored to prevent Lake Okeechobee water levels from exceeding desirable stages. This evaluation criteria will be utilized by the PDT during the plan formulation process. The results of the system-wide evaluation by RECOVER will replace this criteria in the final comparison of alternative plans.			
Rationale: (Technical basis for why the evaluation criteria is being utilized) Excessively high water levels in Lake Okeechobee result in damage to the environmental health of the lake. High lake stages are also associated with large flood control discharges that damage the St Lucie and Caloosahatchee estuaries. By storing water in the watershed during high water conditions in Lake Okeechobee, these damages can be reduced or eliminated.			
Target: (Specific description of how success or failure will be measured) Maximize the percent of the total watershed runoff captured and stored in reservoirs during periods when high water levels in Lake Okeechobee are damaging the environmental health of the lake or the estuaries.			
Evaluation Method: (Description of what model or analytical method will be utilized) Periods during the SFWMM period of record will be identified during which high water levels in Lake Okeechobee are harmful to the environmental health of the lake and/or are resulting in damaging discharges to the estuaries. The results of the SFWMM for the future without project condition will be evaluated to determine the volume of the total inflows to Lake Okeechobee during these periods that would have to be stored in order to prevent damaging high lake stages. The WAMView Model will be run for each alternative and the total volume of water that is stored in the proposed facilities (reservoirs, STAs, wetlands, etc) during the problematic periods will be computed. The percent of total runoff stored compared to the total volume of storage required to avoid damages will be computed.			
Comments: This evaluation criteria will be used by the PDT for the purpose of screening alternatives, optimizing storage requirements for alternative plan components, and/or developing operating strategies. The results of the RECOVER system-wide evaluation of the alternative plans will replace this for the final comparison of alternative plans and selection of the recommended plan.			

Comprehensive Everglades Restoration Plan			**EC 12.2.1**
Scale:	System		
CERP Goal/Requirement:	Enhance Ecologic Values		
LOW Project Goal:	12	Provide adequate storage capacity	
LOW Project Sub-Goal:	12.2	Provide adequate water availability during dry conditions	
Evaluation Criteria:	12.2.1	Increased Lake Okeechobee inflows during extreme dry conditions	
Performance Measure			
Description: (What is being measured) Increased volume of water discharged from the watershed to Lake Okeechobee compared with the total volume of water that would be needed to prevent Lake Okeechobee water levels from falling below desirable stages. This evaluation criteria will be utilized by the PDT during the plan formulation process. The results of the system-wide evaluation by RECOVER will replace this criteria in the final comparison of alternative plans.			
Rationale: (Technical basis for why the evaluation criteria is being utilized) Extremely low water levels in Lake Okeechobee result in damage to the environmental health of the lake. Low lake stages are also associated with water supply demands not met in the Lake Okeechobee Service Area. By storing water in the watershed during low water conditions in Lake Okeechobee, these damages can be reduced or eliminated.			
Target: (Specific description of how success or failure will be measured) Maximize the percent of the increased watershed discharges to Lake Okeechobee during periods when extremely low water levels in Lake Okeechobee are resulting in environmental harm to the lake and/or are causing demands not met in the Lake Okeechobee Service Area.			
Evaluation Method: (Description of what model or analytical method will be utilized) Periods during the SFWMM period of record will be identified during which extremely low water levels in Lake Okeechobee are harmful to the environmental health of the lake and/or are resulting in demands not met in the Lake Okeechobee Service Area. The results of the SFWMM for the future without project condition will be evaluated for these periods to determine the additional volume of inflows to Lake Okeechobee that would be needed in order to avoid harmful low water levels in the lake. Using the WAMView Model the increased Lake Okeechobee inflow for each alternative (relative to the without project conditions) will be computed. The percent of increased runoff for the alternative plan compared to the total volume of inflows required to avoid damaging low water levels will be computed.			
Comments: This evaluation criteria will be used by the PDT for the purpose of screening alternatives, optimizing storage requirements for alternative plan components, and/or developing operating strategies. The results of the RECOVER system-wide evaluation of the alternative plans will replace this for the final comparison of alternative plans and selection of the recommended plan.			

Appendix A
Modified Wetland Rapid Assessment Method

[Based on Miller and Gunsalus (1999) modified by Barry Wharton (HDR) and Steve Schubert (USFWS) June 15, 2003]

The Modified Wetland Rapid Assessment Method was developed in order to more quickly assess wetland functional value on large acreages of wetlands. Recent experiences with other WRAP studies have indicated that to conduct wetland assessment using the Miller and Gunsalus (1999) method on 20,000 acres (the estimated total reservoir size for the LOWP) would require approximately 22 field days, if conducted by one WRAP team comprised of 3 to 4 PDT members or contractors. If the PDT had to assess 3 to 5 project alternatives the amount of field days could increase to between 66 and 110 days just for reservoir assessment. Additional field days would be needed for STA footprints and wetland restoration sites. Therefore, the method outlined below uses existing digital data and ArcView GIS analyses to perform the wetland assessment in a more timely manner. Some of the indices may need to be field-verified with overflights or site visits (probably 10 to 20 days assuming there are 5 final alternatives). Digital infrared ortho-quarter quadrangles will be needed, and are available for most of the project area. Images may not be available for some sections of the Fisheating Creek Basin. In this case, some other form of aerial imagery will be needed for this and the upland and open/deep water assessments.

Index 1. Wildlife Value Index, Using Habitat Complexity.

"Wetlands provide many species of wildlife with basic life sustaining needs such as water, food (*i.e.,* macroinvertebrates and other wetland dependent species including plants) and nesting and roosting areas. While some animal species prefer uplands for nesting and rearing of young, their primary food sources are found within wetland systems. Water dependent species such as fish, some amphibians and birds have specific requirements with regard to duration and magnitude of hydrologic inundation in order to complete their life cycles" (Miller and Gunsalus 1999). This index will estimate wildlife utilization by estimating habitat complexity rather than require site visits to determine general wildlife usage. High habitat complexity is defined as that which supports fish, aquatic herptofauna, and macroinvertebrates (open water), wading and water birds (shallow littoral zones and roosting/nesting trees), and mammals and semi-aquatic herptofauna (diversely vegetated herbaceous zone and forested areas). Lesser complexity would be exhibited by wetlands that were missing one or more of these components. This index does not evaluate presence of exotic or invasive plant species except where the vegetative diversity is affected (*i.e.,* a Melaleuca canopy fringe could be scored less than a temperate hardwood fringe based on a lower tree species diversity, but not because Melaleuca is an exotic species). Using aerial photographs (oblique color and/or digital infrared images) in combination with overflights we will score wetlands as follows:

Score

0 No habitat complexity. Vegetation may be mowed or heavily impacted by cattle, standing water absent, very little value for wetland-dependent wildlife.

1 Some habitat complexity, the extent of two of the following is diminished (or absent): open water, herbaceous zone, or canopy; some value for a diversity of wetland-dependent wildlife.

2 Good habitat complexity although the extent of open water, herbaceous zone, or canopy is diminished (or absent); good value for a diversity of wetland-dependent wildlife.

3 Maximum habitat complexity present as open water, vegetated herbaceous zone, and canopy vegetation; high value for a diversity of wetland-dependent wildlife.

There is a potential for this index to score freshwater marshes and wet prairies low due to the general absence of tree canopies for those ecosystems, and therefore, those wetland types should not be compared to forested wetlands.

This method will require a contractor or team member well versed in ArcView GIS programming.

Index 2. Wetland Vegetative Cover Condition Index

This index is a measure of the presence, abundance, appropriateness, and condition of the vegetative cover within the wetland. It specifically considers the presence of exotic and invasive plant species. This index also specifically identifies impacts by cattle to facilitate the scoring process. Cattle impacts may be present as grazing on wetland vegetation, trampling of vegetation, manure, or usage of deeper water as wallows. We will score wetlands as follows:

Score

0 Native vegetation highly degraded; >50% exotic/nuisance species; large cattle impacts evident in wetland.

1 Minimal native vegetation; 50% exotic/nuisance species; moderate cattle impacts evident in wetland.

2 Moderate amount of native vegetation; 25% exotic/nuisance species; slight cattle impacts evident in wetland.

3 Maximal amount of native vegetation; <10% exotic/nuisance species; no cattle impacts evident in wetland.

Site visits, overflights, and/or photo-interpretation will likely be necessary to accurately score this index. This index incorporates all vegetative covers that would be expected for that wetland type. It does not split out canopy species versus herbaceous species (as done in Miller and Gunsalus 1999).

Index 3. Buffer Value Index, Using Landuse

This index combines two of the Miller and Gunsalus (1999) indices (*i.e.,* buffer rating index and water quality input and treatment index) into an ArcView GIS calculation that will score a 100m buffer around each jurisdictional wetland based on land use (SFWMD 1995 updated FLUCCS3 codes). Percentages of each land use score within the buffer will be summed to determine the final score (0 to 3). This will indicate the degree of impact to the ecological attributes (*i.e.,* cover, food, roosting and nesting areas) that the buffer provides to that wetland. The percentage of each land use within the buffer will be

calculated using the FLUCCS3 scores in Table 1 [Note: some land uses were not scored (*e.g.,* residential, commercial, utilities) because they were pre-determined to be areas that would be avoided for placement of project features]. Scores were based on those used by the US FWS for the Ecological Value Model (as such are an indication of the degree of human disturbance and relative rarity of natural land covers). This method will require a contractor or team member well versed in ArcView GIS programming.

Fluccs 3 code	Land Use	Score
214	Row Crops	0.3
215	Field Crops	0.3
242	Sod Farms	0.3
243	Ornamentals	0.3
245	Floriculture	0.3
743	Spoil Areas	0.3
211	Improved Pastures	0.6
221	Citrus Groves	0.6
222	Fruit Orchards	0.6
223	Other Groves	0.6
241	Tree Nurseries	0.6
251	Horse Farms	0.6
252	Dairies	0.6
254	Aquaculture	0.6
261	Fallow Crop Land	0.6
422	Brazilian Pepper	0.6
424	Melaleuca	0.6
741	Rural land in transition	0.6
212	Unimproved Pastures	0.9
329	Other Shrubs and Brush	0.9
330	Mixed Range	0.9
213	Woodland Pastures	1.2
441	Coniferous Plantations	1.2
442	Hardwood Plantations	1.2
194	Other Open Land	1.5
310	Herbaceous	1.5
435	Dead Trees	1.5
443	Forest Regeneration Areas	1.5
531	Reservoirs larger than 500 acres	1.5
532	Reservoirs larger than 100 acres - less then 500 acres	1.5
533	Reservoirs larger than 10 acres - less than 100 acres	1.5
534	Reservoirs less than 10 acres	1.5
742	Borrow Areas	1.5
4119	Pine Flatwoods - Melaleuca Infested	1.5
6412	Freshwater Marshes - Cattail	1.5
616	Inland Ponds and Sloughs	1.8
641	Freshwater Marshes	2.1
643	Wet Prairies	2.1
644	Emergent Aquatic Vegetation	2.1
653	Intermittent Ponds	2.1
6411	Freshwater Marshes - Sawgrass	2.1
560	Slough Waters	2.4
321	Palmetto Prairies	2.4
411	Pine Flatwoods	2.4
414	Pine - Mesic Oak	2.4
423	Oak - Pine - Hickory	2.4
427	Live Oak	2.4
428	Cabbage Palm	2.4
434	Hardwood Conifer Mixed	2.4
6171	Mixed Wetland Hardwoods - Willows	2.4
6172	Mixed Wetland Hardwoods - Mixed Shrubs	2.4
6218	Cypress - Melaleuca Infested	2.4
6439	Wet Prairies - with Pine	2.4
412	Longleaf Pine - Xeric Oak	3.0
413	Sand Pine	3.0
421	Xeric Oak	3.0
425	Temperate Hardwood	3.0
432	Sand Live Oak	3.0
438	Mixed Hardwoods	3.0
510	Streams and Waterways	3.0
524	Lakes less than 10 acres	3.0
611	Bay Swamps	3.0
614	Titi Swamps	3.0
615	Stream and Lake Swamps (Bottomland)	3.0
617	Mixed Wetland Hardwoods	3.0
621	Cypress	3.0
622	Pond Pine	3.0
624	Cypress - Pine - Cabbage Palm	3.0
630	Wetland Forested Mixed	3.0
6219	Cypress - with Wet Prairies	3.0

Table 1. Ecological value scores for various land uses in the LOW Project Area

Index 4. Wetland Hydrology Index

This index scores the presence of soil disturbance features like ditches and canals that modify the natural hydroperiod of the wetland. Recent, accurate aerial photos (*e.g.,* digital infrared ortho-quarter quads or oblique photos), or site visits/overflights will be necessary to score this index. Index is the same as that of Miller and Gunsalus (1999), with additional ditching criteria added to facilitate the scoring process. Wetlands will be scored as follows:

Score

0 Hydrology severely altered; inadequate to support wetland plant species; strong evidence of upland plants encroaching into historic wetland footprint. Numerous small ditches or larger canals intersect or are adjacent to the wetland.

1 Hydroperiod inadequate to maintain the system that is being created, enhanced, or preserved; vegetation stressed or dying from too much or too little water. Some ditches intersect or are adjacent to the wetland.

2 Hydroperiod adequate although conditions possibly interfering with or influencing the hydroperiod of wetland are present. Plant community is healthy. One or two small ditches are adjacent to, but do not intersect the wetland.

3 No alteration to natural hydroperiod. Plants are healthy. No drainage features present.

As an optional analysis for Index 4, existing wetland coverage could be laid over the historic hydric soils coverage in a GIS application to indicate the degree of hydrologic alteration. Scores could then be calculated based on percentage of spatial extent of hydrologic alteration.

SCORING OF WETLAND FUNCTIONAL VALUE

The individual scores for all indices will be summed and then divided by the total maximum possible score to result in a final score between 1.0 and 0.0. An example is given below.

	SCORE
Index 1. Wildlife Value Index, Using Habitat Complexity.	2.0
Index 2. Wetland Vegetative Cover Condition Index	2.5
Index 3. Buffer Value Index, Using Landuse	2.0
Index 4. Wetland Hydrology Index	1.5
Total	8.0

A total score of 8.0 divided by a possible maximum score of 12.0 equals a final score of 0.67. There are limitations to the quantitative value of this score. It is a valid subjective estimate of overall quality, and should be used only for comparison ranking of one wetland against another wetland(s) of similar type, or temporal comparison of pre- and post-conditions within a wetland.

Literature Cited

Miller Jr., R.E. and B.E. Gunsalus. 1999. Wetland Rapid Assessment Procedure (WRAP). Technical Publication REG-001. South Florida Water Management District. Natural Resource Management Division. West Palm Beach, Florida.

Appendix B
Modified Upland Rapid Assessment Method

The following summarizes the process for implementing the Modified Upland Rapid Assessment Method.

Index 1. Wildlife Utilization Index, Using Focal Species

This index will estimate wildlife utilization by calculating focal species occurrence rather than require site visits to determine general wildlife usage. We will use the Florida Fish and Wildlife Conservation Commission's digital data for focal species (*i.e.*, 44 vertebrate indicator species of biological diversity in Florida; Cox *et al.* 1994). Of these 44 species, only 22 have the potential to be present in the study area. Some of these are wetland dependant species, but will still be evaluated to determine if upland habitats are utilized during any stage of their life cycle. They are:

Bog frog
Florida scrub lizard
Gopher tortoise
American swallow-tailed kite
Audubon's crested caracara
Florida burrowing owl
Florida grasshopper sparrow
Florida sandhill crane
Florida scrub jay
Limpkin
Mottled duck
Red-cockaded woodpecker
Short-tailed hawk
Snail kite
Southeastern American kestrel
Southern bald eagle
Wild turkey
Bobcat
Sherman's fox squirrel
Southeastern fox squirrel
Florida panther
Florida black bear

Project polygons, or component footprints, will be laid over species occurrence maps to determine how many focal species are present in the upland habitats. The number of each focal species per land use (based on FLUCCS3 Codes) will be multiplied by the relative percent of the land use area, and then summed and scored. (An optional, but less rigorous analysis would be to take the maximum number of upland-dependent focal species present for any land use within the polygon and score 100% of the upland habitat based on that number.) Many upland FLUCCS3 codes that represent land cover such as agriculture will be scored as zero. A maximum number of upland-dependent focal species will need to be determined for the project area. We will then score uplands for project alternatives as follows:

Score

0 No focal species present.
1 33% of the maximum number of focal species in the project area.
2 66% of the maximum number of focal species in the project area.
3 100% of the maximum number of focal species in the project area.

This method will require a contractor or team member well versed in ArcView GIS programming. Examples of upland types in the project area would include agricultural areas (FLUCCS code 200 series), rangeland (310, 321, 329, and 330) upland forests (400 series), sand other than beaches (720), rural land (741), borrow areas (742), spoil areas (743), and other open land (194).

Index 2A Option. Upland Vegetative Cover Condition Index

This index is a measure of the presence, abundance, appropriateness, and condition of the vegetative cover within the upland. It specifically considers the presence of exotic and invasive plant species. This index also indicates the degree of anthropogenic impacts from mining, agriculture, cattle, off-road vehicles, trash, or other forms of soil disturbance. We will score potential uplands for project alternatives as follows:

Score

0 Native vegetation highly degraded; >50% exotic/nuisance species; large anthropogenic impacts evident in upland.
1 Minimal native vegetation; 50% exotic/nuisance species; some anthropogenic impacts evident in upland.
2 Moderate amount of native vegetation; 25% exotic/nuisance species; little anthropogenic impacts evident in upland.
3 Maximal amount of native vegetation; <10% exotic/nuisance species; no anthropogenic impacts evident in upland.

Site visits or overflights with recent, aerial images will likely be necessary to accurately score this index. This index incorporates all vegetative covers and does not split out canopy species versus ground cover species.

Index 2B Option. Upland Vegetative Cover Index

As an optional analysis for this index, the USFWS scoring of the FLUCCS3 codes for general wildlife habitat (see Table 1, based on the Ecological Surface Model) could be converted to a 0-3 scale and then used to estimate vegetative cover. This option however, would not give an indication of real-time conditions, or occurrence of exotic/invasive plants.

Index 3. Rarity and Uniqueness Index

This index is a measure of the relative ecological rarity or uniqueness of the natural upland habitats within any given footprint for the entire project area. It will be estimated using an ArcView GIS calculation that will delineate the land uses of the entire upland area within an alternative's footprint based on the FLUCCS3 codes (as updated by the LOWP PDT consultants) and then score each land use using the FNAI Global and State ranks (see http://www.fnai.org) for natural communities as tabulated and cross-walked below. Percentages of each score within the footprint will be summed to determine the final score (0 to 3). [Note: some land uses were not scored (*e.g.,* residential, commercial, utilities) because they were pre-determined to be areas that would be avoided for placement of project features]. Non-natural communities would receive scores of zero. This method will require a contractor or team member well versed in ArcView GIS programming.

Definition of Global (G) element ranks:
G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very little remaining area, e.g., <2,000 acres) or because of some factor(s) making it especially vulnerable to extinction;
G2 = Imperiled globally because of rarity (6-20 occurrences or very little remaining area, e.g., <10,000 acres) or because of some factor(s) making it very vulnerable to extinction throughout its range;
G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range, 21 to 100 occurrences;
G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery;
G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery;
G? = uncertain Global rank.

Definition of State (S) element ranks:
S1 = Critically imperiled in state because of extreme rarity (5 or fewer occurrences or very little remaining
area) or because of some factor(s) making it especially vulnerable to extinction;
S2 = Imperiled in state because of rarity (6-20 occurrences or little remaining area) or because of some factor(s) making it very vulnerable to extinction throughout it range;
S3 = Rare or uncommon in state (on the order of 21 to 100 occurrences);
S4 = Apparently secure in state, although it may be rare in some parts of its state range;
S5 = Demonstrably secure in state and essentially ineradicable under present conditions;
S? = uncertain State rank.
Rarity scores were developed based on the following point system for each global and state rank.

G1 = 5 points S1 = 5 points
G2 = 4 points S2 = 4 points
G3 = 3 points S3 = 3 points
G4 = 2 points S4 = 2 points
G5 = 1 point S5 = 1 point

Therefore, a natural community that was listed as G3 and S2 would receive a total score of 7 out of a maximum score of 10 and therefore, be given an index score of 2.1 (based on the 0 to 3 scale; for final index scores see Table 3 below). For FNAI upland communities types that are represented by more than one FLUCCS3 code, the most conservative score (*i.e.,* the highest rarity score) was selected (for corresponding FLUCCS3 Codes see Table 2 below).

Table 2. Crosswalk for upland FLUCCS3 Codes and FNAI Natural Community Types to a rarity score

Corresponding FLUCCS3 Codes					FNAI Description	GLOBAL RANK	STATE RANK	Score based or (0 to 10 scale)
					Xeric Uplands			
			412	421	Sandhill	G3	S2	7
				413	Scrub	G2	S2	8
421	423	425	427	432	Xeric Hammock	G3	S3	6
					Mesic Uplands			
			434	438	Upland Hardwood Forest	G5	S3	4
414	423	425	434	438	Upland Mixed Forest	G4	S4	4
			414	423	Upland Pine Forest	G3	S3	6
					Mesic Flatlands			
			310	321	Dry Prairie	G2	S2	8
		411	414	428	Mesic Flatwoods	G?	S4	?
		425	427	428	Prairie Hammock	G4	S3	5
				411	Scrubby Flatwoods	G3	S3	6

Table 3. Rarity index score for upland FLUCCS3 codes			
FLUCCS3 Codes	Score based on ranks		
	(0 to 3)		
194	0		
211	0		
212	0		
213	0		
214	0		
215	0		
221	0		
222	0		
223	0		
241	0		
242	0		
245	0		
246	0		
251	0		
252	0		
261	0		
310	2.4		
321	2.4		
329	0		
330	0		
411	1.8		
412	2.1		
413	2.4		
421	2.1		
422	0		
423	1.8		
424	0		
425	1.8		
427	1.8		
428	1.5		
432	1.8		
434	1.2		
435	0		
438	1.2		
441	0		
442	0		
443	0		
720	0		
741	0		
742	0		

Index 4. Upland Connectivity Index

This index is a measure of the degree of connectivity or isolation of upland habitat to other native habitats. Native/natural upland habitats with high connectivity and low fragmentation should exhibit higher ecological quality, and should be conserved or protected. This index will be scored based on the percentage of the perimeter of the native/natural upland areas within an alternative's footprint that is coincident with other native habitats (FLUCCS3 codes for native habitats; *i.e.,* 300, 400, and 600 series) outside of the footprint.

Score

0 No connectivity of native upland habitats with other native habitats outside of the project footprint.

1 Minimal amount (33%) of connectivity of native upland habitats with other native habitats outside of the project footprint.

2 Moderate amount (66%) of connectivity of native upland habitats with other native habitats outside of the project footprint.

3 Maximal amount of connectivity of native upland habitats with other native habitats outside of the project footprint.

SCORING OF UPLAND FUNCTIONAL VALUE

The individual scores for all indices will be summed and then divided by the total maximum possible score to result in a final score between 1.0 and 0.0. An example is given below.

	SCORE
Index 1. Wildlife Utilization Index, Using Focal Species.	2.0
Index 2. Upland Vegetative Cover Condition Index	2.5
Index 3. Rarity and Uniqueness Index	2.0
Index 4. Upland Connectivity Index	1.5
Total	8.0

A total score of 8.0 divided by a possible maximum score of 12.0 equals a final score of 0.67. There are limitations to the quantitative value of this score. It is a valid subjective estimate of overall quality, and should be used only for comparison ranking of one upland area against another upland area of similar type, or temporal comparison of pre- and post-conditions within an upland area.

Literature Cited

Cox , J.A., R.S. Kautz, M. MacLaughlin, and T. Gilbert. 1994. Closing the gaps in Florida's wildlife habitat conservation system. Florida Game and Fresh Water Fish Commission; Tallahassee, Florida.

Appendix C
Modified Open/Deep Water Rapid Assessment Method

The following provides an overview of the indices and scoring guidelines for the Modified Opened and Deep Water Rapid Assessment Method.

Index 1. Wildlife Utilization Index

This index will use existing datasets, where available, from the SFWMD, Florida Fish and Wildlife Conservation Commission, and/or Florida Department of Environmental Protection. If data are not available local knowledge or professional judgement will serve to estimate general fish and wildlife usage (focal species data are not available for open/deep water habitat). Site investigations or overflights may be needed to accurately assess this index. Open/deep water (ODW) habitat will be scored as follows:

Score

0 No wildlife usage recorded or observed.

1 Minimal evidence of wildlife utilization for fish, wading or water birds, amphibians, macroinvertebrates, and aquatic reptiles and mammals.

2 Moderate evidence of wildlife utilization for fish, wading or water birds, amphibians, and aquatic reptiles and mammals.

3 Strong evidence of wildlife utilization; abundant fish, wading or water birds, amphibians, and aquatic reptiles and mammals.

Examples of open/deep water habitat types in the project area would include lakes (FLUCCS3 code 521 and 524), reservoirs (531, 532, 533, and 534), streams (510) and canals (816).

Index 2. Riparian Vegetation Condition Index

This index will estimate the quality and quantity of vegetative riparian habitat around the ODW. This index is similar in theory to the overstory/shrub canopy, vegetative ground cover, and buffer rating indices of the WRAP method (Miller and Gunsalus 1999) in that it indicates habitat support for the aquatic community and gives and indication of the ecological quality of the area being evaluated. Site investigations or overflights may be needed to accurately assess this index. Open/deep water (ODW) habitat will be scored as follows:

Score

0 No desirable trees or shrub species are present.
Negligible or little habitat support (i.e., roosting, nesting and foraging) from trees or shrubs.
Vegetative ground cover is intensively maintained, managed or impacted.

1 Overstory/shrub canopy immature but some potential for habitat support.
Large amounts (approx. 50%) of undesirable tree or shrub species.
Some desirable plant species which provide cover, food source, and roosting areas for wildlife.

2 Overstory/shrub canopy is providing habitat support.
Few (less than 25%) undesirable tree or shrub species.
Contains desirable plant species which provide cover, food, and roosting areas for wildlife.

3 Overstory/shrub canopy is providing good habitat support.
No exotics and less than 10% invasive canopy/shrub species present.
Minimal or no disturbances to ground cover.
Contains predominantly desirable plant species for cover, food, and roosting areas for wildlife.

Index 3. Littoral zone structure and depth mosaic

This index scores the degree of physical alteration to the littoral, sub-littoral, and open-water zones as they function to support fish and wildlife within and around the perimeter of the ODW habitat. Generally, deep water surrounded by a wide, shallow littoral zone will provide high-quality habitat support for amphibians, aquatic macroinvertebrates, fish, wading and water birds, and aquatic reptiles. Site investigations or overflights may be needed to accurately assess this index. Open/deep water (ODW) habitat will be scored as follows:

Score

0 No shallow (*i.e.,* 0.1 to 1.5 feet deep); littoral zone; shoreline steep; only deep (>2 feet) or very deep (>5 feet) areas.

1 Shallow littoral zone minimal (<5 feet wide); shoreline steep; mostly deep or very deep areas.

2 Shallow littoral zone good (approx 20 feet wide); shoreline not steep; adequate depth mosaic.

3 Shallow littoral zone wide (>30 feet); shoreline not steep; good mosaic of deep, very deep, and shallow areas.

Index 4. ODW Hydrology Index

This index scores the degree of hydrologic alterations that modify the natural flow patterns and water quality of the ODW. Recent, accurate aerial photos (*e.g.,* digital infrared ortho-quarter quads), site visits/overflights, and/or survey data reports will be necessary to score this index. ODW will be scored as follows:

Score

0 Hydrology severely altered; extreme and flashy water elevation changes; severe water quality impacts (*i.e.,* turbidity, sedimentation, algal blooms) evident; inadequate to support aquatic life or emergent plant species;

1 Hydroperiod inadequate to maintain the system that is being created, enhanced, or preserved; water quality impacts evident; inadequate to maintain aquatic life or emergent plant species;

2 Hydroperiod adequate although conditions possibly interfering with or influencing the hydroperiod are present. Water quality impacts not apparent. Emergent plant community is healthy.

3 No alteration to natural hydroperiod or water quality. Aquatic life and emergent plants are healthy.

SCORING OF ODW FUNCTIONAL VALUE

The individual scores for all indices will be summed and then divided by the total maximum possible score to result in a final score between 1.0 and 0.0. An example is given below.

	SCORE
Index 1. Wildlife Utilization Index	2.0
Index 2. Riparian Vegetation Condition Index	2.5
Index 3. Littoral zone structure and depth mosaic	2.0
Index 4. ODW Hydrology Index	1.5
Total	8.0

A total score of 8.0 divided by a possible maximum score of 12.0 equals a final score of 0.67. There are limitations to the quantitative value of this score. It is a valid subjective estimate of overall quality, and should be used only for comparison ranking of one ODW area against another ODW area of similar type, or temporal comparison of pre- and post-conditions within an ODW area.