

C-111 Spreader Canal (C-11 SC) Project
RECOVER EVALUATION OF PROJECT-LEVEL PERFORMANCE
MEASURES (Final 062104)

Prepared by the Regional Evaluation Team (RET) and Water Quality Team (WQT)

Contributors: Steve Traxler (FWS), Eric Hughes (EPA), Tom Schmidt (NPS), Gwen Burzycki (Miami-Dade DERM), Patrick Pitts (FWS), Sandra Sneckenberger (FWS), Cheryl Buckingham (Corps), Orlando Ramos-Gines (Corps)

1.0 Introduction

The role of the Restoration Coordination and Verification (RECOVER) team is to organize and apply scientific and technical information in ways that are most effective in supporting the objectives of the Comprehensive Everglades Restoration Plan (CERP). RECOVER links science and the tools of science to a set of system-wide planning, evaluation and assessment tasks. These links provide RECOVER with the scientific basis for meeting its overall objectives of evaluating and assessing Comprehensive Plan performance and refining and improving the plan during the implementation period. RECOVER fulfills this role by working with the project delivery teams (PDTs) to help them meet CERP's system-wide goals and objectives. Specifically, RECOVER reviews the performance measures for project-level evaluation of alternatives for consistency with the system-wide evaluation performance measures developed by RECOVER.

The purpose of this performance measures consistency review is: 1) to identify general compatibility of project-level performance measures with applicable system-wide performance measures, and 2) to provide information to project managers and others, as appropriate, regarding compatibility of project-level and system-wide performance measures of the C-111 SC as submitted to RECOVER in April 2004. RECOVER recognizes and appreciates the time and effort that went into developing these performance measures. The review comments below are intended to enhance the existing set of performance measures. Comments on the specific project-level performance measure are presented in the attached table (Attachment A).

2.0 General Document Comments

The C-111 SC PMs are generally well developed. RECOVER does however have suggestions regarding the potential redundancy of PMs, the differentiation between evaluation criteria and performance measures, and areas to provide additional information for document reviewers and developers.

Redundancy and Conflict among PMs – Several C-111 SC PMs address the hydroperiod and inundation patterns of the Greater Everglades (GE) wetlands. EC 1.1 (Annual Inundation Patterns), EC 2.1 (Improve Marl Prairie Vegetation Mosaic), and EC 3.7 (Maintain or Increase Habitat Suitable for Periphyton) all address hydroperiod with different inundation patterns as the targets. RECOVER suggests the PDT examine these PMs for redundancy or conflict with each other. For example, what if WASH shows pre-

drainage conditions (the target for EC 1.1) have hydroperiods of less than 130 days (target for EC 2.1) in places where freshwater graminoid marsh is desired.

Additionally, EC 3.2 (Improve Marsh Recession Rates to Support Successful Nesting and Foraging for Wading Birds) and EC 3.5 (Wetland Aquatic Fauna) have identical targets and both identify the aquatic fauna as prey for wading birds. RECOVER suggests the PDT examine these PMs for redundancy.

Utility of PMs and ECs in Evaluating Project Alternatives – RECOVER recognizes that the C-111 SC PDT has done an excellent job of differentiating between performance measures, which will be used to evaluate alternative plans, and evaluation criteria, which will be used as constraints during the screening process. Those designated as performance measures have numeric targets conducive to making decisions in distinguishing between alternatives. Those indicators that use such terms as “minimize”, “maximize”, “increase”, and “no significant decrease” have been designated as evaluation criteria for use in screening alternatives. RECOVER commends the PDT on recognizing and differentiating the use of performance measures and evaluation criteria.

Additional Documentation Performance Measure Documentation Sheets (Fact Sheets) – C-111 SC PM fact sheets are generally well developed; RECOVER does however have some suggestions to improve the clarity of some fact sheets. Documentation could be added to several of the PM fact sheets to define terminology, indicate why particular target ranges were chosen, and reference why certain targets were selected (i.e. scientific studies, best professional judgment, etc.). Specific comments on documentation and references are included in Attachment A.

3.0 Consistency with RECOVER System-Wide Evaluation Performance Measures

There seems to be general compatibility in intent between the project-level performance measures developed by the PDT for the C-111 SC Project and the system-wide evaluation performance measures developed for the Comprehensive Plan by RECOVER. RECOVER does however have suggestions regarding the content, target and classification for several of the performance measures/evaluation criteria. General comments of significance are noted below, while comments on each specific project-level performance measure are presented in the attached table (Attachment A).

WASH targets vs. NSM targets – For several hydroperiod PMs, there are slight differences between the targets for C-111 SC PMs and those for RECOVER PMs. Although generally consistent, these differences are noted below:

In EC 1.2 (Reestablish Amplitude and Interannual Water Levels that Reflect Natural Conditions-PM) the C-111SC PM utilizes percent difference from pre-drainage conditions and uses indicator regions, whereas the GE-E4 targets depend on habitat type of interest (e.g., for ridge and slough/sawgrass plains and marl marsh areas, an envelope is developed using NSM4.6 for amplitude; for Big Cypress the target is to match NSM 4.6 output indicator region by indicator region).

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In EC 1.3 (Extreme High and Low Water Depths-PM) the C-111 SC PM defines extreme high and low water events based on the WASH123 model rather than the NSM 4.6.

In EC 4.1 (Reestablish Seasonal and Annual Inflow Volumes That Reflect Natural Conditions-PM), the C-111 SC PM target specifies minimum differences in flow between NSM (pre-drainage) and the alternative, regardless of compatibility with other hydrologic PMs. By comparison, the RECOVER PM GE-E5 target specifies qualified similarity. (RECOVER would also like to note that GE-E5 has been tabled due to the large amount of uncertainty associated with sheetflow calculated by the SFWMM.)

Ecologic and Biologic PMs – In general, the intent of C-111 SC ecologic and biologic PMs were consistent with RECOVER PMs; however, RECOVER noted several ecologic and biologic PMs with slightly different targets. These differences are noted below:

RECOVER recognizes that RECOVER targets for WCA-3 are based on hammock tree islands rather than bayhead tree islands; however, it is important to note the target for this PM is slightly different than RECOVER's GE-E15. GE-E15's target is to minimize deviation from NSM, whereas the C-111SC PM utilizes hard numbers of hydroperiod and water depth for targets.

Documentation in C-111 SC EC 3.1 (Improve Habitat for American Crocodile-PM) is slightly inconsistent with work proposed by Dr. Frank Mazzotti, University of Florida. Dr. Mazzotti's work indicates a target of less than or equal to 20 ppt for the wet season and the first part of the dry season for crocodiles.

EC 3.2 (Improve Marsh Recession Rates to Support Successful Nesting and Foraging for Wading Birds-PM) is generally consistent with RECOVER PM GE-E20 (Long Legged Wading Bird Foraging Conditions). RECOVER does not have PM's that specifically address recession rates. RECOVER PM GE-E20 will utilize the ATLSS wading bird model; the C-111SC PM will utilize watershed model for water levels, recession rates

EC 3.3 (Cape Sable Seaside Sparrow Nesting Condition Availability) PM is not inconsistent with RECOVER PMs. RECOVER does not have a CSSS PM but has identified Special Issue Indicator Regions for the Sparrow sub-populations. RECOVER chose not to pursue the draft performance measure but it's graphics for Sub-population D indicates the 40 to 80 days are to be between February 15 and July 15 instead of March 1 to July 15.

Salinity – RECOVER has identified two potential areas of inconsistency between C-111 SC PMs and RECOVER PMs with regard to salinity targets. Both are noted below:

Although there is no corresponding RECOVER PM for comparison with EC 2.4 (Restore Historic Spatial Extent and Distribution of Oligohaline, Mesohaline, and Estuarine Marsh Flats-PM), this PM is consistent with RECOVER SE PMs in concept. RECOVER suggests coordinating with RECOVER RET SE sub-team when model output describing

the pre-drainage salinities are obtained to make targets are consistent with RECOVER targets.

The targets set for EC 5.1 (Minimize Impacts to Eastern Barnes Sound Hard Bottom Communities-PM) are inconsistent with those of RECOVER PM SE-E4 (Salinity Patterns in, and Timing of Freshwater Inputs to, Manatee Bay and Coastal Embayments of Barnes Sound). To review RECOVER PM targets for SE-E4 please visit http://www.evergladesplan.org/pm/recover/ret_perf_measures.cfm for the most recent documentation sheet.

Flood Protection and Water Supply – Targets for C-111 SC evaluation criteria EC 8.1 through 8.4 and EC 9.1 appear to be inconsistent with RECOVER PMs for flood protection and water supply. The targets for RECOVER flood protection PMs are based on 1983-1993 conditions, years when performance was considered adequate. Additionally, RECOVER PMs WS-E2 (Frequency of Water Restrictions for the Lower East Coast) and WS-E8 (Duration and Severity of Water Restrictions for the Lower East Coast) should be consulted for consistency.

Terminology – RECOVER recognizes that EC 2.4 (Restore Historic Spatial Extent and Distribution of Oligohaline, Mesohaline, and Estuarine Marsh Flats-PM) includes salinity classifications of oligohaline, mesohaline, etc. This terminology is normally associated with the Venice classification system. However, the Venice system defines mesohaline as a range of 5 to 18 ppt and polyhaline as 18 to 30 ppt; the C-111SC PM defines mesohaline as 6 to 15 ppt and estuarine (polyhaline) as 16 to 30 ppt. RECOVER suggests using consistent terminology and salinity ranges with the Venice system.

Additionally, RECOVER suggests the C-111 SC PDT clarify in EC 6.1, EC 6.3, EC 6.4, and EC 6.5 that discharges entering natural areas are from STAs/reservoirs rather than untreated water.

Models – For EC 3.8 (Maintain or Increase American Alligator Production), RECOVER recognizes the PDT is using RECOVER PM GE-E23; however, RECOVER suggests the PDT consider whether the ATLSS model may be unable to use WASH123 output as its input. The PDT should ensure these models are consistent.

Uncertainty and CERP Influences – Some C-111 SC PMs and ECs may be inappropriate for the project, as a number of influences other than those imposed by the project may have significant impacts on the parameters. For example, there are non-CERP influences that significantly impact water quality in the project area. For example, in EC 6.3 (Reduce N levels in Discharges Entering Natural Areas [from STAs/Reservoirs]-PM) it may be worthwhile for the PDT to determine where numeric TN load reduction is expected and if it is applicable to STA's within the project area. If the project is not expected to affect N concentrations, it may be more appropriate to use this as a screening criterion with the target of "no increase". Additionally, EC 6.2 (Maintain desirable phosphorus target concentration in natural system areas-PM) and EC 6.5 (Meet Class III WQ Standards from CERP Facilities to natural areas [from

STAs/Reservoirs]) appear to be governed by non-CERP influences capable of affecting parameters that the project will be treating/affecting. It may be more appropriate to make these EC a project constraint with the expectation “not to make worse”.

Consistency Among Projects and RECOVER – There are several metrics within the BBCW suite of PMs that are also present in neighboring projects like the Florida Bay / Florida Keys Feasibility Study (FBFKFS) and Biscayne Bay Coastal Wetlands (BBCW) Project. RECOVER suggests the PDT review these project PMs, as well as RECOVER PMs to ensure that PM targets, metrics, and evaluation methodologies are consistent. This will enable the comparison of evaluation data among projects and RECOVER.

4.0 Conclusions

There is general compatibility of intent between the project-level performance measures and evaluation criteria developed for the C-111 SC and the system-wide performance measures of the Comprehensive Plan. Some revisions are suggested to increase the degree of consistency between project and system-wide performance measures. RECOVER suggests reviewing several PMs for redundancy and the additional documentation. Additionally, RECOVER suggests that some of the C-111 SC PMs be reviewed for applicability, uncertainty, and consistency with neighboring projects and RECOVER.

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve flow patterns, hydroperiods and ecological connectivity between the Southern Glades, Model Lands, and adjacent natural areas
EC 1.1 Annual Inundation Patterns (Performance Measure)
Target: The target is the range of weeks of inundation and the number of inundation events or an envelope for the duration and number of inundation events that approximate the Wash123D pre-drainage model output for cells in the model categorized by landscape type (vegetation zone) requirements of depth of water table and surface water flow.
Evaluation Method: Wash123D
Is this PM consistent with RECOVER PMs? (GE- E2 Inundation Pattern in the Greater Everglades Wetlands) This PM is consistent with RECOVER GE-E2, including the target and definition of “inundation event”; however, it is unclear if the PM applies to the entire project area or only to the freshwater wetlands in the project area (i.e. marl prairies, forested wetlands, etc.). It may be appropriate to develop and use indicator regions the same as or similar to those developed for the Greater Everglades for use in evaluation of this PM. RECOVER suggests language be added to this PM to show both freshwater and tidal wetland landscape types will be evaluated.

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve flow patterns, hydroperiods and ecological connectivity between the Southern Glades, Model Lands, and adjacent natural areas
EC 1.2 Reestablish amplitude and interannual water levels that reflect natural conditions (Performance Measure)
Target: The target is zero percent difference from pre-drainage seasonal variation of stage for each indicator region. Seasonal variations that are closest to the pre-drainage values are considered more likely to support native vegetation, aquatic fauna and to support the freshwater flows for Florida Bay.
Evaluation Method: Wash123
Is this PM consistent with RECOVER PMs? (GE-E4 Seasonal Amplitude and Interannual Variability of Water Levels in the Greater Everglades Wetlands) This PM is generally consistent with RECOVER PM GE-E4; however, the target is slightly different. GE-E4 targets depend on habitat type of interest (e.g., for ridge and slough/sawgrass plains and marl marsh areas, an envelope is developed using NSM4.6 for amplitude; for Big Cypress the target is to match NSM 4.6 output indicator region by indicator region). The C-111SC PM utilizes percent difference from pre-drainage conditions and uses indicator regions. Additionally, RECOVER suggests defining to which areas within the C-111SC project area this PM applies.

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RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve flow patterns, hydroperiods and ecological connectivity between the Southern Glades, Model Lands, and adjacent natural areas
EC 1.3 Extreme High and Low water depths (Performance Measure)
Target: The target is a range for the total duration of extreme high and low water events in weeks and the number of extreme high and low water events or an envelope of occurrences that meet the Wash123D pre-drainage model output for selected cells (groups of cells for different vegetation zones).
Evaluation Method: Wash123D
Is this PM consistent with RECOVER PMs? (GE-E3 Extreme High and Low Water Levels in the Greater Everglades Wetlands) This PM is generally consistent with RECOVER PM GE-E3; however, RECOVER has a definition for extreme high and low water events based on a Natural System Model envelope rather than the WASH 123. RECOVER also suggests defining criteria for extreme high and low water events (see GE-E3). Additionally, RECOVER suggests defining to which areas within the C-111SC project area this PM applies.

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve flow patterns, hydroperiods and ecological connectivity between the Southern Glades, Model Lands, and adjacent natural areas
EC 1.4 Improve hydrologic connectivity between the Southern Glades, model Lands, and adjacent natural areas (Performance Measure)
Target: The target condition is water surface elevation differences across a selected set of barriers similar to that predicted by the pre-drainage model developed from Wash123D. Differences of more than one depth category from pre-drainage model predictions are considered poor.
Evaluation Method: Wash123D
Is this PM consistent with RECOVER PMs? (TS-E1 Continuity-Water Surface Elevations Across Barriers) This PM is generally consistent with RECOVER PM GE-E4. RECOVER suggests the phrase “groups of WASH mesh” be expanded to indicate whether it refers to groups of WASH model cells. Additionally, RECOVER suggests documenting if comparisons will be made based on average annual/seasonal differences, and on what time scales comparisons are made (days, weeks, seasons).

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve habitat and functional quality of wetlands and natural areas & increase spatial extent where practicable
EC 2.1 Improve marl prairie vegetation mosaic (Performance Measure)
<p>Target: The restoration target is for the distribution and aerial extent of hydroperiods that would support Zone 3 graminoid-dominated freshwater wetlands to match pre-drainage conditions. The specific hydroperiod distribution for evaluation purposes will be determined by the pre-drainage modeling scenario, but it is expected that this scenario will yield results similar to the description in Egler (1952) and the depiction of the Desired Future Condition in Figure 1. Alternatives that maximize the spatial distribution of freshwater marshes and more closely approximate the distribution depicted in Figure 1 (Desired Future Conditions) would be preferred in the absence of a reliable pre-drainage scenario to provide comparisons.</p> <p>Evaluation Method: Model not specified and post-processing</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>The underlying concept behind this PM and the RECOVER PM's are consistent. RECOVER Indicator Regions 145 East Perrine Marl Marsh and 146 Model Lands Marl Marsh fall within the study area. GE-E2 Inundation Pattern has an inundation target of 140-168 days for IR-145 and 196-224 days for IR 146. They are similar but not identical to the targets in this PM. The purpose of this project PM is to increase spatial extent of marl prairie. The only time there could be a conflict would be if the increase in marl prairie were in a different location that did not include IR's-145 and 146.</p> <p>Although the targets for this PM are generally consistent with RECOVER PM GE-E2, this PM does not appear to differ significantly from EC1.1. Inundation (EC1.1) and hydroperiod (EC2.1) may be redundant. Additionally, this PM could possibly conflict with EC1.1. What if WASH shows pre-drainage conditions in places where freshwater graminoid marsh is desired that have a hydroperiod less than 130 days (minimum hydroperiod for freshwater graminoids)?</p>

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve habitat and functional quality of wetlands and natural areas & increase spatial extent where practicable
EC 2.2 Minimize loss of functional wetlands
<p>Target: The target is 0 acres (determined by calculating the acreage of canal and STA) of well-functioning wetland habitat lost.</p> <p>Evaluation Method: A wetland evaluation methodology (e.g., W.A.T.E.R, HGM) will be used to compare baseline conditions in the surrounding wetlands with project plan alternatives. Other evaluation methods (soils, habitat suitability for particular species) for wetland function may be available to complement the chosen methodology.</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>This PM appears to be consistent with CERP goals, but there is not necessarily a corresponding RECOVER PM for comparison.</p>

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CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve habitat and functional quality of wetlands and natural areas & increase spatial extent where practicable
EC 2.3 Maintain bayhead tree island habitat (Performance Measure)
<p>Target: In Zone 3 (sawgrass with tree islands) of the Desired Future Condition for South Dade Wetlands MAP (Burzycki, In progress), hydroperiods within the bayheads should not exceed 4 months. Marsh water depths in Zone 3 should not exceed 1.5 ft except in the wettest years. The water table recession in Zone 3 should not exceed 1.5 ft below the ground surface. A duration of -1.5 ft for more than 30 days in any given year would be considered particularly detrimental. (The results of the tree island topographic surveys when available may be used to determine the relative island height at which the 4-month exceedence would be measured.)</p> <p>Evaluation Method: Model not specified</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>The targets for RECOVER PM GE-E3 Extreme High and Low Water Levels for IR's 145 and 146 are: IR-145. East Perrine Marl Marsh. No more than 7 high events >1.5 feet and >2 weeks duration. Minimize low events <1.0 foot IR-146. Model Lands Marl Marsh. No more than 7 high events >2.0 feet and >2 weeks duration. Minimize low events <1.0 foot</p> <p>RECOVER recognizes that RECOVER targets for WCA-3 are based on hammock tree islands rather than bayhead tree islands; however, it is important to note the target for this PM is slightly different than RECOVER's GE-E15. GE-E15's target is to minimize deviation from NSM, whereas the C-111SC PM utilizes hard numbers of hydroperiod and water depth for targets.</p>

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve habitat and functional quality of wetlands and natural areas & increase spatial extent where practicable
EC 2.4 Restore historic spatial extent and distribution of oligohaline, mesohaline, and estuarine marsh flats (Performance Measure)
<p>Target: The restoration target is for the coastal salinity pattern to match pre-drainage conditions. In the absence of both pre-drainage salinity data and supporting research that can correlate vegetation succession patterns with surface water salinity patterns, the following surrogate measure will be used: the distribution and aerial extent of wetlands limited by seasonal surface water salinity > 5 ppt (Figure 1, Zones 2-5) should match pre-drainage projections, and salinity contours in coastal wetlands should also follow pre-drainage projections.</p> <p>Evaluation Method: Model not specified</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>Although there is no corresponding RECOVER PM for comparison, this PM is consistent with RECOVER SE PMs in concept. RECOVER suggests coordinating with RECOVER RET SE sub-team when model output describing the pre-drainage salinities are obtained to develop targets that are consistent with RECOVER targets.</p> <p>Additionally, the evaluation method section for this PM includes salinity classifications of oligohaline, mesohaline, etc. This terminology is normally associated with the Venice classification system. However, the Venice system defines mesohaline as a range of 5 to 18 ppt and polyhaline as 18 to 30 ppt; the C-111SC PM defines mesohaline as 6 to 15 ppt and estuarine (polyhaline?) as 16 to 30 ppt. RECOVER suggests using consistent terminology and salinity ranges as Venice system.</p>

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve habitat and functional quality of wetlands and natural areas & increase spatial extent where practicable
EC 2.5 Migration of the saltwater intrusion line toward the coast (Performance Measure)
Target: Saltwater intrusion (500 ppm groundwater chloride line) within the project boundary should be shifted toward the bay.
Evaluation Method: Model not specified
Is this PM consistent with RECOVER PMs? This PM is generally consistent with RECOVER PM WS-E5, which is targeted towards preventing saltwater intrusion from moving further from the Bay.

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.1 Improve habitat for American Crocodile (Performance Measure)
Target: The target for this criterion is the establishment of seasonally brackish salinity in areas contiguous with the coastal mangrove fringe (Zone 8, Figure 2). Salinity should not exceed 15 ppt in this zone from June through October, or 20 ppt from November through January, based on requirements for estuarine fishes and juvenile crocodiles. Salinity should not exceed 36 ppt during the remainder of the year. Salinity should not change in this zone more than +/- 7 ppt per day during all parts of the year to minimize the potential for osmotic shock to plants and animals.
Evaluation Method: Wash123D
Is this PM consistent with RECOVER PMs? This PM is generally consistent with salinity targets in RECOVER PMs for SE-E4 Barnes Sound/Manatee Bay and SE-E2, which includes Joe Bay. Documentation in this PM is unclear for 15 ppt June-Oct and 20 ppt Nov-Jan target. Frank Mazzotti's work indicates a target of less than or equal to 20 ppt for the wet season and the first part of the dry season for crocodiles. RECOVER suggests the PDT document the +/- 7 ppt per day target and its difference from previous scientific work.

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RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.2 Improve marsh recession rates to support successful nesting and foraging for wading birds (e.g. roseate spoonbill) (Performance Measure)
<p>Target: Provision of acceptable feeding habitat for a sufficient period of time are defined as:</p> <ol style="list-style-type: none"> 1.) Dry Season (Nov – Apr) surface water recession rates range between 1 to 4 cm/week. This recession rate assumes successful nesting (an average of at least 1 chick per nest) in at least 7 out of 10 years or 70% of the historical recession rate range, which will result in population growth (Lorenz, 2002). 2.) Major non-tidal water control related reversal periods in the dry season will be limited to a rise in surface water levels of 1.5 cm/day (daily average) and a period of 5 days (Frederick and Spalding,1995). 3.) Wet Season water levels (June-October) should range from 0.12 to 0.6 meters in Zones 3-6 to accommodate good development of prey organisms. <p>The target is restoration that would result in a range of rates, depths, and durations as described for freshwater/brackish non-STA wetlands. The degree to which the target is achieved would be measured based on achieving target hydropatterns within the described range for rates, depths, and duration.</p> <p>Evaluation Method: Specific watershed model not specified</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>This PM is generally consistent with RECOVER PM GE-E20 Long Legged Wading Bird Foraging Conditions. RECOVER does not have PM's that specifically addresses recession rates. RECOVER PM GE-E20 will utilize the ATLSS wading bird model; the C-111SC PM will utilize watershed model for water levels, recession rates. Additionally, RECOVER suggests that the justification section of the PM documentation sheet provide documentation for wet season water level targets of 0.12-0.6 meter in Zones 3-6.</p>
CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.3 Cape Sable Seaside Sparrow nesting condition availability (Evaluation Criteria)
<p>Target: The evaluation target is 40-80 days between March 1 and July 15 that water levels are below ground in selected areas.</p> <p>Evaluation Method: Wash123D</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>This PM is consistent with RECOVER PMs. RECOVER does not have a CSSS PM but has identified Special Issue Indicator Regions for the Sparrow sub-populations. RECOVER has chosen not to pursue the draft performance measure but it's graphics for Sub-population D indicates the 40 to 80 days are to be between February 15 and July 15 instead of March 1 to July 15. Additionally, RECOVER suggests the PDT consider whether the target has a constraint of the number of years when the target is met.</p>

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CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.4 Assure the project contributes to the overall recovery goal for the Florida Panther of a viable population level in South Florida (Evaluation Criteria)
<p>The first measure will be the total combined acreage in the primary zone of all high and medium value Florida panther habitat greater than 2 hectares (ha) within the project study area and non-urban cover types less than 200 meters (m) from high habitat value cover. The second measure will be the total continuous acreage of the first measure that is also interconnected (no more than a 1 kilometer gap) with and included in the Primary Zone previously discussed and illustrated in Figure 4. The third measure will be the total combined acreage of tree islands greater than 0.5 ha in the primary zone.</p> <p>Target: The target for all three measures will be no loss of total acreage classified as either high or medium value.</p> <p>Evaluation Method: Model not specified</p>
<p>Is this PM consistent with RECOVER PMs? Although there is no corresponding RECOVER PM, this PM is consistent with RECOVER PMs. RECOVER notes, however, that targets and evaluation method may change significantly in response to recent panther habitat requirements controversy.</p>

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.5 Wetland aquatic fauna (Evaluation Criteria)
<p>Target: Wet Season water levels (June-October) should range from 0.12 to 0.6 meters in Zones 3-6 to accommodate good development of prey organisms. Dry Season (Nov – Apr) surface water recession rates range between 1 to 4 cm/week.</p> <p>Evaluation Method: watershed model not specified</p>
<p>Is this PM consistent with RECOVER PMs? RECOVER notes that this PM seems redundant to EC3.2. Both PMs have identical targets and both identify the aquatic fauna as prey for wading birds.</p>

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.6 Exotic Animal Species (Evaluation Criteria)
<p>Target: Zero acres in zones 2 through 6 (Figure 1), where water management feature depth is greater than the adjacent wetlands by more than 1 meter.</p> <p>Evaluation Method: Calculated using GIS applications that incorporate historic, baseline, and predicted wetland coverages to compare different plan alternatives.</p>
<p>Is this PM consistent with RECOVER PMs? There in no corresponding RECOVER PM for comparison. RECOVER suggests the PDT add documentation to describe the impact of the elimination of “deep” water habitat on native fishes. Additionally, RECOVER suggests adding documentation to describe the source of the “1 meter below adjacent wetland elevation” target.</p>

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RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.7 Maintain or increase percentage of habitat suitable for periphyton (Evaluation Criteria)
Target: Maintain or increase aerial coverage of habitat suitable for benthic mat periphyton communities as defined by output from the Wash123D 2000 base condition.
Evaluation Method: The Periphyton Habitat Suitability Index (PHSI) is a time-averaged, spatially-variable index that is a function of the average hydroperiod for the simulation period and is partitioned into three models: Benthic Periphyton Suitability Index (BPSI), Floating Periphyton Suitability Index (FPSI), and Epiphytic Periphyton Suitability Index (EPSI).
Is this PM consistent with RECOVER PMs? This PM is consistent with RECOVER PM GE-E11. RECOVER suggests the PDT consider whether this PM is redundant to or in conflict with EC1.1 and/or EC2.1. These PMs all address hydroperiod.

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Improve native plant and animal species abundance and diversity
EC 3.8 Maintain or increase American Alligator production (Evaluation Criteria)
Target: For the total CERP project, the evaluation target is to improve total alligator production scores relative to the 2050 base. For implementation runs, the evaluation target is to exceed 2000 base production scores.
Evaluation Method: ATLSS Alligator Production Index Model
Is this PM consistent with RECOVER PMs? This PM is consistent with RECOVER PM GE-E23; however, RECOVER suggests the PDT investigate the ability for the ATLSS model to use WASH123 output as its input. The PDT should check to make sure models are consistent.

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Reserve sufficient water for the restoration of the natural system
EC 4.1 Reestablish seasonal and annual inflow volumes that reflect natural conditions (Performance Measure and Evaluation Criteria)
Target: Minimize differences in annual and seasonal flow between the modified and natural system, as determined by the WASH123D, or other appropriate, fine scale, hydrologic model, across specified transects.
Evaluation Method: WASH123D, or other appropriate, fine scale, hydrologic model
Is this PM consistent with RECOVER PMs? (GE-E5 Seasonal and Annual Flow Volume in the Greater Everglades Wetlands) This PM is generally consistent with RECOVER PM GE-E5; however, the GE-E5 target is slightly different from the proposed PM. The GE-E5 target specifies qualified similarity; C-111SC target specifies minimum differences in flow between NSM (pre-drainage) and the alternative, regardless of compatibility with other hydrologic PMs. RECOVER also notes that GE-E5 has been put on hold because of the great amount of uncertainty inherent in this measure (flow) when calculated by the SFWMM. The goal of restoring flows is still consistent.

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Eliminate ecologically damaging flows to Barnes Sound and Fl Bay
EC 5.1 Minimize impacts to Eastern Barnes Sound hard bottom communities (Performance Measure)
<p>Target: From 100 meters of mainland, maintain an east-west salinity gradient between US1 to the east and west to the C-107/FP&L outfall canals in Card Sound, of less than or equal to 30 ppt during the wet season (Jun-Nov) and greater than or equal to 30 ppt and less then or equal to 40 ppt during dry season months (Dec-May).</p> <p>Evaluation Method: Existing linear regression model developed by Alleman/Aguirre(RET Performance Measure, SE-E4) to link water levels in the watershed east of US 1 (near model node SWEVER 1) to monthly mean salinities in C-111 Geographical Zone 9b.</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>The justification and targets for this PM may be inconsistent with RECOVER PM SE-E4. RECOVER recommends that the PDT consider the targets set in SE-E4. SE-E4 for Manatee Bay/Barnes Sound has wet season (June to October) salinities within 5-15 ppt in coastal embayments and Manatee Bay, within 15-30 ppt at the mouths of coastal embayments and Barnes Sound, and within 15-30 ppt within Barnes Sound 90% of the wet season. Dry season (November-May) average salinity should be within 10-19 ppt in coastal embayments and Manatee Bay, within 20-32 ppt at the mouths of coastal embayments and Barnes Sound, and within 20-35 ppt within Barnes sound 90% of the time. Daily average salinity < 35 ppt at all location 95% of the dry season. Additionally, RECOVER suggests clarification should be added to describe where this PM applies with respect to the estuarine zone.</p>

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Provide ecologically compatible WQ consistent with restoration goals and federal and state requirements applicable to the Southern Glades, Model Lands, and Everglades National Park.
EC 6.1 Reduce phosphorus levels in discharges entering natural areas (Performance Measure)
<p>Target: Average flow- weighted mean concentration of approximately 10 ppb (EFA) for the surface and groundwater discharging to natural areas (Zone III of Desired Future Condition of Vegetation map) and 6 ppb (settlement agreement) in current existing Marsh Areas (Taylor Slough, Southern Glades, Model Lands, and Coastal Basins).</p> <p>Evaluation Method: DMSTA will be used for surface TP concentration evaluation, surface and groundwater flow will be evaluated with WASH123D, and TP in groundwater will be evaluated with WASH123D.</p>
<p>Is this PM consistent with RECOVER PMs?</p> <p>This PM appears to be generally consistent with RECOVER PM GE-E7; however, RECOVER suggests the title of this PM should be modified to read "...discharges from STAs/Reservoirs..."</p>

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Provide ecologically compatible WQ consistent with restoration goals and federal and state requirements applicable to the Southern Glades, Model Lands, and Everglades National Park.
EC 6.2 Maintain desirable phosphorus target concentration in natural system areas (Performance Measure)
Target: Maintain a long-term TP concentration of 6 ppb for the annual (arithmetic or geometric) mean in current existing Marsh Areas at ponded water monitoring points (Taylor Slough, Southern Glades, Model Lands, and ENP Coastal Basins).
Evaluation Method: ELM. (WASH123 output will be used as input for ELM west of US1)
Is this PM consistent with RECOVER PMs? There may be no corresponding RECOVER PM for this PM; however, since this appears to be governed by non-CERP influences and is not a parameter related to project constructed features (like STAs or reservoirs) it may be more appropriate to make this parameters a project constraint with the expectation “not to make worse”.

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Provide ecologically compatible WQ consistent with restoration goals and federal and state requirements applicable to the Southern Glades, Model Lands, and Everglades National Park.
EC 6.3 Reduce N levels in discharges entering natural areas (Performance Measure)
Target: Reduce loads and concentrations of Total nitrogen (TN) concentrations to freshwater and estuarine wetlands to achieve the concentration targets (not exceed historical background) and a load reduction discharging to natural area (Zone III of Desired Future Condition of Vegetation map).
Evaluation Method: Use Storm Water Management Model (SWMM) to evaluate the TN concentration at the effluent of water discharging to natural system areas. The flow for load calculation will be evaluated with WASH123D.
Is this PM consistent with RECOVER PMs? This PM appears to be generally consistent with proposed RECOVER PMs for the assessment of nutrient concentration and loading in the GE; however, it is important to note that increased flows to the area may not allow for reduction of TN load (depending on the reduction in TN concentration). It may also be worthwhile for the PDT to determine where numeric TN load reduction is expected and if it is applicable to STAs/reservoirs in the area. Additionally, RECOVER suggests the title of this PM should be modified to read “...discharges from STAs/Reservoirs...”

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Provide ecologically compatible WQ consistent with restoration goals and federal and state requirements applicable to the Southern Glades, Model Lands, and Everglades National Park.
EC 6.4 Minimize TSS in water entering natural areas (Performance Measure)
Target: median concentration of 3.0 mg/L as TSS target.
Evaluation Method: SWMM
Is this PM consistent with RECOVER PMs? RECOVER suggests the title of this PM be modified to read "...natural areas from STAs/Reservoirs..."

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values

Project Objective/Constraint: Provide ecologically compatible WQ consistent with restoration goals and federal and state requirements applicable to the Southern Glades, Model Lands, and Everglades National Park.

EC 6.5 Meet Class III WQ standards for discharges from CERP facilities to natural areas (Evaluation Criteria)

Target:

The discharge of **toxics/pathogens** to Natural system area should not increase due to redistribution of flows resulting from this project. Concentration of **metals** and **synthetic organic chemicals** in canal sediments should not exceed biological effects thresholds established by State (McDonald. 1994, Chapter 6) or EPA Region IV. **Bacteriological levels** should not exceed established state or local water quality standards (e.g., F.A.C. 62-302.530; Miami-Dade County Code: 24-11(4)).

Trace Metals-Total Cd, Total Cu, and Total Zn.

Meet Class III water quality standards/Non-ECP/modification structures (S177, S178, S-18C, S332E) Water Quality compliance requirements, No deterioration compared with "without project condition" in water discharging to natural system areas.

Pesticides/Herbicides:

Meet Class III water quality standards/Non-ECP/modification structures (S177, S178, S-18C, S332E) Water Quality compliance requirements, No deterioration compared with "without project condition" in water discharging to natural system areas.

Hg and MeHg: Bioaccumulation in fish Levels should not exceed biological effect thresholds established by State. (Mosquito fish (*Gambusia* spp): TL3- 0.077µg/g; Sun fish (*Lepomis* spp): TL3- 0.077µg/g; Warmouth (*Lepomis gulosus*): TL4--0.346 µg/g; Largemouth Bass- (*Micropterus salmoides floridanus*)-Human Health: TL5-300 µg/g.

Ammonia: Reduce ammonia concentrations from near toxic levels (up to 112 ppb) to concentrations not regarded as toxic (20-50 ppb).

Evaluation Method:

The transport of pollutants (pathogen, trace metals and pesticide/herbicides) of concerns discharged to Natural system areas will be evaluated with SWMM storage treatment module. **Hg and MeHg** will be evaluated with Everglades Mercury Cycling Model (E-MCM, Reed Harris et al., 2003). Net sediment flux will be estimated for with- and without project conditions to determine areas where potential sediment deposition or erosion will take place. Removal of suspended sediments by STAs will be evaluated by SWMM model. Pre- and post-project **Ammonia** concentrations and loads from coastal canals will be estimated using methods/results developed by Meeder (2001), Lietz (1999), and others.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison. RECOVER suggests the title of this PM be modified to read "...natural areas from STAs/Reservoirs..." Additionally, the suite of WQ parameters involved with Class III WQ standards is extensive, and project features (such as STAs and reservoirs) may not influence all these WQ parameters. Based on this, the EC could be influenced by non-CERP influences. RECOVER suggests the PDT clearly describe this EC as a project constraint with the expectation "not to make worse". The project may also consider developing a risk analysis tool especially for endosulfates.

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Take advantage of recreational opportunities where available and consistent with environmental restoration goals.
NOT TO BE REVIEWED BY RECOVER

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Maintain existing (Dec 2000) levels of flood protection to agricultural and urban lands
EC 8.1 Maintain Existing Urban Flood Protection (Evaluation Criteria)
Target: Minimize the time and number of occurrences of water stages above ground and no worse than 1994 C-111 GRR Planning Condition
Evaluation Method: MODBRANCH
Is this PM consistent with RECOVER PMs? The targets for RECOVER flood protection PMs are based on 1983-1993 conditions, years when performance was considered adequate.

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Maintain existing (Dec 2000) levels of flood protection to agricultural and urban lands
EC 8.2 Maintain Existing Agricultural Flood Protection – Damages to Combined Row and Truck Crops (Evaluation Criteria)
Target: Condition not to be made worse than 1994 C-111 GRR planning condition
Evaluation Method: SFWMM and MODBRANCH
Is this PM consistent with RECOVER PMs? The targets for RECOVER flood protection PMs are based on 1983-1993 conditions, years when performance was considered adequate.

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Maintain existing (Dec 2000) levels of flood protection to agricultural and urban lands
EC 8.3 Maintain Existing Agricultural Flood Protection – Damages to Fruit Trees (Evaluation Criteria)
Target: Condition not to be made worse than 1994 C-111 GRR planning condition
Evaluation Method: SFWMM and MODBRANCH
Is this PM consistent with RECOVER PMs? The targets for RECOVER flood protection PMs are based on 1983-1993 conditions, years when performance was considered adequate.

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

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CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Maintain existing (Dec 2000) levels of flood protection to agricultural and urban lands
EC 8.4 Maintain Existing Agricultural Flood Protection – Damages to Nursery Trees (Evaluation Criteria)
Target: Condition not to be made worse than 1994 C-111 GRR planning condition
Evaluation Method: SFWMM and MODBRANCH
Is this PM consistent with RECOVER PMs? The targets for RECOVER flood protection PMs are based on 1983-1993 conditions, years when performance was considered adequate.

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Maintain level of service for existing (Dec 2000) and legal users
EC 9.1 Municipal and Industrial Water Supply (Evaluation Criteria)
Target: If MODBRANCH or comparable water budget model is utilized to measure changes in water deliveries with various demands not met in the basin, then the alternative should be no worse (adverse impact) than the without project condition.
Evaluation Method: M+I demands will be measured as wellfield withdrawals in the model. Data input for this model will be produced from permitted water usage information provided by DERM.
Is this PM consistent with RECOVER PMs? RECOVER recommends that the PDT investigate compatibility with and use of the targets of existing RECOVER PMs. RECOVER PM WS-E2 (Frequency of Water Restrictions for the Lower East Coast Service Area) targets are to provide at least a 1-in-10 level of service as indicated three or less water years simulated with regionally significant water shortages in the 36-year evaluation period. RECOVER PM WS-E8 (Duration and Severity of Water Restrictions for the Lower East Coast Service Area) targets are for duration to be no more than 18 months with water shortages during the simulation period. Severity target is all water shortages to be Phase 1 “Moderate” Water Shortage in which overall reduction of use is up to 15%.

**ATTACHMENT A: C-111 SPREADER CANAL PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Maintain level of service for existing (Dec 2000) and legal users
EC 9.2 Agricultural Water Supply (Evaluation Criteria)
Target: If MODBRANCH or comparable water budget model is utilized to measure changes in water deliveries with various demands not met in the basin, then the alternative should be no worse (adverse impact) than the without project condition.
Evaluation Method: The economic post-processor developed for SSFWMM will be used in this evaluation (MODBRANCH or similar)
Is this PM consistent with RECOVER PMs? RECOVER recommends that the PDT investigate compatibility with and use of the targets of existing RECOVER PMs. RECOVER PM WS-E2 (Frequency of Water Restrictions for the Lower East Coast Service Area) targets are to provide at least a 1-in-10 level of service as indicated three or less water years simulated with regionally significant water shortages in the 36-year evaluation period. RECOVER PM WS-E8 (Duration and Severity of Water Restrictions for the Lower East Coast Service Area) targets are for duration to be no more than 18 months with water shortages during the simulation period. Severity target is all water shortages to be Phase 1 “Moderate” Water Shortage in which overall reduction of use is up to 15%.

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Minimize impacts to cultural, historic, and archaeological resources.
NOT TO BE REVIEWED BY RECOVER

CERP Goal: Enhance Economic Values and Social Well Being
Project Objective/Constraint: Minimize adverse socioeconomic impacts on local and regional economics
NOT TO BE REVIEWED BY RECOVER