

Biscayne Bay Coastal Wetlands (BBCW) Project
RECOVER EVALUATION OF PROJECT-LEVEL PERFORMANCE
MEASURES (Final 062104)

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

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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 BBCW 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 BBCW PMs are generally well developed in terms of coverage of significant parameters. RECOVER does, however, have suggestions regarding the level of detail for some PM fact sheets, the organization and labeling of PM fact sheets, the use of PMs in distinguishing between project alternatives, and areas to provide additional information for document reviewers and developers.

Performance Measure Documentation Sheets (Fact Sheets) - There are varying levels of detail associated with the project PMs and their associated documentation. Several fact sheets do not list targets or evaluation methods. RECOVER suggests removing these PMs until targets and evaluation methods have been determined.

Utility of PMs in Evaluating Project Alternatives - Several BBCW PMs do not have clear numeric targets that lend themselves for use in an evaluation methodology, and are not conducive to making decisions in distinguishing between alternatives. Such terms as “minimize”, “maximize”, “increase”, and “no significant decrease” should be replaced by numeric targets where possible. Documenting the linkage between the PM target and the evaluation methodology would clearly show how the PMs could be used to make decisions. As currently written, these PMs may be more appropriate as performance indicators or constraints in screening alternatives.

Assessment PMs vs. Evaluation PMs – Some BBCW PMs do not appear to be predictive in nature, rather they appear to be assessment PMs. RECOVER suggests distinguishing between assessment PMs and evaluation PMs to help clarify which PMs will be used for alternative evaluation and improve the overall organization of the PMs.

Additional Documentation for PM Fact Sheets – BBCW 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 indicate why particular target ranges were chosen and references as to 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 is general compatibility between the project-level performance measures developed by the PDT for the BBCW 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).

White Zones – In PM 2.G: Reduce areal extent of mangrove hypersaline (“white”) zone in favor of other wetland types within the Model Lands basin; possibly increase areal extent of the white zone in coastal wetlands between Shoal Point and Turkey Point, RECOVER notes the potential for conflict between reducing white zones in the Model Lands and increasing white zone between Shoal Point and Turkey point. Additionally, once quantified, the PM targets to obtain these increases may be at odds with RECOVER Performance measure SE-E5 (which specifies specific salinity regimes). RECOVER recommends the PDT ensure consistency between PM 2.G and SE-E5 once numeric targets are developed.

Terminology – In PM 3.B: Reduce areal extent of and frequency of hypersaline conditions in the bay, the term hypersaline is used in the PM title while a target of salinity concentration not to exceed 36 ppt is listed on the PM fact sheet. The term hypersaline usually refers to salinity concentrations > 40 ppt. The wording for this PM is not consistent with the target value of 36 ppt.

Model Inconsistency – In PM 3.N: Reduced concentration of nutrients in water discharged from STAs, the DMSTA model is listed as the evaluation method for this PM. RECOVER notes that the DMSTA model is calibrated for TP and vegetation found in mostly freshwater areas of the Greater Everglades Ecosystem. The PDT may need to determine the applicability of this model to TN and local vegetation. RECOVER suggests considering the use of a simple desktop model with a lumped rate constant for evaluation of this PM.

PM 3.A has a target identical to RECOVER PM SE-E5. The PDT proposes using a hydrodynamic/salinity model like TABS-MDS for evaluation. RECOVER recommends that the PDT also evaluate project information in terms of the spreadsheet method used in the RECOVER PM SE-E5. This will ensure consistency between the two PMs.

Uncertainty and CERP Influences – Some BBCW PMs 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 the levels of ammonia, inorganic nitrogen, nitrates, and nitrites in the project area. The loading of the wetlands from external sources will affect the target as much as the treatment efficiency of STAs. Additionally, these do not appear to be parameters that the project will be treating/affecting in all areas of Biscayne Bay. RECOVER suggests it may be more appropriate to make the ammonia PM a project constraint with the expectation “not to make worse” or, to remove it from the list of PMs. Additionally, RECOVER suggests the nitrate/nitrite PM would benefit from listing the specific areas of South Biscayne Bay to define the spatial extent of the area of evaluation (e.g., a map or list of station/locations to be evaluated). Specifying the areas of South Biscayne Bay to be evaluated would limit the scope of the area where CERP is expected to have an effect and improve the PM sensitivity in detecting these CERP effects.

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 C-111 Spreader Canal. 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. Specific comments on consistency among PM targets and evaluation methodologies are included in Attachment A.

4.0 Conclusions

There is general compatibility between the project-level performance measures and evaluation criteria developed for the BBCW 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. The largest improvement in the suite of BBCW PMs could be accomplished by reexamining some PM targets to address their utility to differentiate between alternatives. If numeric targets are not applicable, it may be more appropriate to use these parameters as performance indicators, constraints, or evaluation criteria. Additionally, RECOVER suggests that

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some of the BBCW PMs be reviewed for applicability, uncertainty, and consistency with neighboring projects and RECOVER. RECOVER would like to continue work with the PDT on the comments provided in this review to ensure that all issues are adequately resolved.

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Reestablish productive nursery habitat along the shoreline
1.D. The seagrass community at existing canal mouths will be similar in abundance and composition to the community in other areas nearshore.
Target:
Evaluation Method:
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, this PM should have a target and a seagrass model. Additionally, this PM should also show a linkage to a water flow or salinity model.

1.E. Pink shrimp abundance or density increases in the nearshore zone between Black Point and Turkey Point. (Performance Measure)
Target: The target is increased average pink shrimp density in the nearshore western Bay south of Black Point, to (tentatively) equal the same average density of shrimp north of Black Point (from Black Point to Shoal Point).
Evaluation Method: A model developed by Browder <i>et al.</i> (in press) for Florida Bay and the Dry Tortugas will be applied to indicate potential changes in shrimp abundance. The model requires water temperature and salinity as inputs.
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of the average pink shrimp density rather than using the term increase. Based on the target of “increasing” the number of events, this PM may be more appropriate as a performance indicator or constraint as it is currently written. Also, the model listed to evaluate this PM provides a total estimate of adult pink shrimp, which may be difficult to separate for specific project components. Additionally, this PM should specify “Juvenile” shrimp and the target should be consistent with targets in the FBFKFS.

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Redistribute freshwater flow to minimize point source discharges to improve freshwater and estuarine habitat.
2.A. Percentage of total freshwater flow through coastal canals is reduced by redirection through coastal wetlands, thereby decreasing the typical amplitude and frequency of extreme salinity excursions at canal mouths. (Performance Measure)
Target: Given the same average annual water flow of current conditions, the percentage passing through S-123, S-21, S-21A, S-20G, S-20F, S-20 should be reduced substantially.
Evaluation Method: Watershed model output in acre-feet/yr. should be summed for each water control structure and compared between current condition and an alternative condition. Where possible, a ratio should be computed that shows flow at the downstream structure in relation to that at a structure upstream of the diversion. For each canal system, this ratio should be compared between current condition and an alternative condition. The TABS-MDS and/or WASH123 models should indicate reduced variance of salinity at the mouths of the major canals compared to current conditions.
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of water flow rather than the term reduce substantially. Based on the target of “reducing” the number of events, this PM may be more appropriate as a performance indicator or constraint as it is currently written.

2.B. The number of freshwater creeks or outlets to the Bay passing through wetlands are recreated. (Performance Measure)
Target: The number of former creek systems identified as major in each project component are recreated in both general location and estimated freshwater flows.
Evaluation Method: The approach is two parts. An alternative design should include features in each component to pass water from the canal system into wetlands at appropriate locations. The estimated water flow through each creek should be within an acceptable range.
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the target for this PM be developed to include a stage or flow volume for each of the creek areas.

2.C. Viable oyster (<i>Crassostrea</i>) communities become established along the shoreline.
Target:
Evaluation Method:
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, this PM should have a target and an oyster model or HSI for evaluation method. Additionally, a link to the watershed model should also be provided

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

2.G. Reduce areal extent of mangrove hypersaline (“white”) zone in favor of other wetland types within the Model Lands basin; possibly increase areal extent of the white zone in coastal wetlands between Shoal Point and Turkey Point. (Performance Measure)

Target: An important target for this performance measure is to reduce impediments to natural freshwater flow in, and upstream of, the project area, particularly the Model Lands area adjacent to Barnes Sound and Card Sound. Restoring a more natural freshwater flow pattern should re-establish brackish salinities in the coastal wetlands, which should help reduce or halt the landward migration of the white zone. A **maximum salinity target** should also be established for this performance measure; possibly including extreme dry season and/or drought conditions

Evaluation Method: An appropriate surface water model (*e.g.* WASH) should be utilized to determine the project alternative best suited to restoring a more natural freshwater flow pattern and salinity regime in the existing white zone area, particularly in the Model Lands area adjacent to Barnes and Card sounds. Model output should include salinity contours in the Model Lands basin. Consider extreme conditions such as dry season salinity contours and average to drought condition salinity curves over time.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of water flow volumes. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The term “reduce” should be replaced by a numeric target. As currently written, this PM may be more appropriate as a performance indicator or constraint. Additionally, RECOVER notes the potential for conflict between reducing white zones in Model Lands and increasing white zone between Shoal Point and Turkey point. Once quantified, the targets to obtain these increases may be inconsistent with RECOVER Performance measure SE-E5 (which specifies specific salinity regimes).

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Restore and improve quantity, quality, timing, and distribution of freshwater to the Bay, including Biscayne National Park.
3.A. Nearshore salinity patterns exhibit a broader area and extended duration of mesohaline conditions. (Performance Measure) Target: Within the area of Biscayne Bay between Shoal Point and Turkey Point, salinity concentration should average 20 ppt within 500 meters of shore from June through October and within 250 meters of shore from November through May, and exhibit a positive salinity gradient from freshwater wetlands toward the bay. Evaluation Method: A hydrodynamic/salinity model (e.g. TABS-MDS) should indicate both a broader area and for a longer period through the year a salinity concentration between 5 and 20 ppt between the shoreline out to about 500 meters in the wet season and 250 meters in the dry season into the bay compared to current condition averaging 20 ppt. The primary area affected should lie between Shoal Point and Turkey Point.
Is this PM consistent with RECOVER PMs? This PM is consistent with RET evaluation PM SE-E5 for South Bay. RECOVER suggests that the PDT consider the targets and evaluation protocols developed by RET in addition to using the proposed model.
3.B. Reduce areal extent of and frequency of hypersaline conditions in the bay. (Performance Measure) Target: Salinity concentration in Biscayne Bay nearshore the project area should not exceed 36 ppt. The nearshore area is at least within one kilometer of the shoreline. Evaluation Method: Model not Specified
Is this PM consistent with RECOVER PMs? This PM is generally consistent with RECOVER PMs for Biscayne Bay; however, RECOVER suggests a range be developed to indicate how close to 36 ppt the model output can be while remaining acceptable. Additionally, the term hypersaline usually refers to salinity concentrations > 40 ppt. The wording for this PM is not consistent with the target value of 36 ppt.
3.D. The runoff hydrograph measured at the shoreline becomes significantly flatter (i.e. peak flows are reduced), and exhibits increased duration of discharge from contributing basins. (Performance Measure) Target: The intensity of surface freshwater flow into Biscayne Bay should be lower following moderate to large storm events than the current condition. Intensity can be defined as the quantity of water discharged per unit of time, therefore reduced intensity would result in the same quantity of water discharged over a longer period of time. Evaluation Method: Simulated event hydrographs from the watershed will be flatter and longer (through time) than current conditions.
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of water flow volumes. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The PDT should develop the number of events and how much longer and flatter (duration and quantity) the hydrograph should appear.

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

3.F. Reduce total inorganic nitrogen loading to Biscayne Bay. (Performance Measure)

Target: Maintain or reduce surface water nutrient concentrations so not to exceed historical background, and not exceed a monthly average of 0.80 mg/L total nitrogen, in open waters of south Biscayne Bay. Maintain or reduce nutrient loads so not to exceed historical background; achieve a 47% reduction in total nitrogen loading.

Evaluation Method: Utilizing output from a watershed model, compare loads calculated based on current flows and water quality results collected by Miami-Dade DERM to loads calculated based on simulated water volume input to Biscayne Bay and expected nutrient concentration changes. For each alternative, net total nitrogen removal in each STA will likely be estimated using simple first order equations.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however to improve clarity of the PM documentation sheet, it would be helpful to state background TN concentrations and to define the 47% reduction in TN (i.e., a 47% reduction from what condition?). Additionally, since the project does not have control over allochthonous sources of nitrogen, and nitrogen treatment may be outweighed by other project goals, it may be more appropriate to treat this PM as a performance indicator.

3.G. Maximize the statistical correlation between natural basin response and local rainfall so that outflows from canals into the bay are more related to antecedent rainfall events. (Performance Measure)

Target: The coefficient of determination will be larger than current conditions when relating daily freshwater discharge into the bay and rainfall events.

Evaluation Method: Daily rainfall and outflow from the watershed at specific locations will be regressed and a coefficient of determination will be calculated and compared to the current condition.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The PDT should develop how much larger the coefficient of determination should be. As currently written, this PM may be more appropriate as a performance indicator or constraint.

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

3H. Maintain/reduce geographic extent and concentration of sediment toxicity and water column toxicants /pathogens in Biscayne Bay and coastal areas.

Target: The geographic extent and concentration of sediment toxicity and water column toxicants/pathogens in Biscayne Bay and the coastal wetlands 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))

Evaluation Method: Monthly monitoring of ammonia and sewage related bacteriological indicators in areas where modified water deliveries or wastewater reuse may effect the spatial distribution and concentration of these contaminants, as well as selected 'reference' locations. Conduct biannual long-term sediment chemistry and toxicity testing to document spatial and temporal patterns in contaminant levels throughout the watershed, with emphasis on canals and adjoining coastal waters. The sampling protocols established through these monitoring programs should be continued. Parameters should include trace metals (arsenic, cadmium, chromium, copper, lead, mercury, and silver); PAHs; PCBs; and pesticides. Bioassays should include standard whole sediment and pore water toxicity protocols. For any BBCW alternative including wetland stormwater treatment/redistribution or wastewater reuse, site-specific baseline sediment chemistry and toxicity monitoring should be conducted, with follow-up annual monitoring, including information on EPOCs, as available. (Modeling approach?) For each alternative, changes in sediment flux will be estimated based on redirection of canal flows to STAs and Coastal Wetlands for with project conditions to determine areas where potential toxic sediment deposition or erosion will take place. Removal of suspended sediments and pathogens by STAs and coastal wetland will be estimated using first order settling equations.

Is this PM consistent with RECOVER PMs?

This PM does not appear to be predictive in nature, rather it appears to be an assessment PM. RECOVER suggests distinguishing between assessment PMs and evaluation PMs would help clarify which PMs will be used for alternative evaluation and improve the overall organization of the PMs. Although currently written like an assessment PM, this parameter could be used as an evaluation constraint by looking at the different amounts for sources of water. The source of water could determine the potential for pollutants.

3J. Turbidity in canal discharges that occurs during storm events decreases.

Target: Provide ecologically compatible water quality consistent with restoration goals and federal and state requirements applicable to the Southern Glades, Model Lands, Biscayne National Park (?), and Everglades National Park.

Evaluation Method: Output from SWMM model should indicate reduced TSS concentration for water discharging to natural system areas (Zone III of Desired Future Condition of Vegetation map) as compared to current condition, and meet the TSS target of 3 mg/L.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. As currently written, this PM may be more appropriate as a performance indicator.

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RECOVER COMMENTS**

3.K. Increased groundwater flow and stage in the project area. (Performance Measure)

Target: Average volume of groundwater flow into the bay increases. Average groundwater stage throughout most of the project area increases. Saltwater intrusion within the project boundary should be shifted toward the bay.

Evaluation Method: Output from a groundwater/density model should indicate increased average groundwater elevation in the project area, increased groundwater conveyance, and a bay-ward shift of the saltwater intrusion line in the project area compared to current condition.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of water flow volumes. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The term “increase” should be replaced by a numeric target. As currently written, this PM may be more appropriate as a performance indicator or constraint. Additionally, RECOVER notes that increased groundwater flows may affect landfill leachate thereby making the target of 3H difficult or impossible to achieve.

3.N. Reduced concentration of nutrients in water discharged from STAs. (Performance Measure)

Target: The STA should be designed to optimize nutrient removal such that the ecological requirements of species targeted as indicators of restoration are considered and nutrient loads to the Bay are reduced. The STAs should be designed to minimize dry-out events and optimize residence time for nutrient removal. A dry-out event is usually defined as an event where water levels within an STA are at or below the ground surface.

Evaluation Method: Reduction of phosphorus and nitrogen concentration and/or load when inflows to the STA are compared to outflows from the STA using DMSTA (An STA WQ model).

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of TP and TN. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The term “optimize”, “reduce”, and “minimize” should be replaced by a numeric target. As currently written, this PM may be more appropriate as a performance indicator. Once a numeric target is developed, the nutrient concentration should be consistent among projects and RECOVER.

No conflict with PMs seems to exist, but several observations are offered:

- 1) The DMSTA model is calibrated for TP and mostly freshwater areas of the Greater Everglades Ecosystem. The PDT may need to determine the applicability of this model to TN and local vegetation. It might be better to use a simple desktop model with a lumped rate constant.
- 2) Clarify the statement: “The STA should be designed to optimize nutrient removal such that the ecological requirements of species targeted as indicators of restoration”. A STA optimized for water treatment is usually not optimized for fish and wild life features. The fish and wildlife features such as tree islands, deep zones, littoral shelves, etc. reduce treatment processing (plug flow reactor kinetics) of the STA.

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

3.O. Reduce total phosphorous loading to Biscayne Bay. (Performance Measure)

Target: Not to exceed monthly average of 5µg/L in open waters and with an average flow-weighted mean inflow concentration of about 6 ppb for Southern Glades, Model Lands, and Coastal Basins.

Evaluation Method: For each alternative, average flow-weighted inflow concentrations in water discharged to coastal wetlands will be estimated based on hydrologic modeling and estimated TP concentrations in canal water and STA effluent routed to coastal wetlands.

Is this PM consistent with RECOVER PMs?

RECOVER suggests the specific locations where this PM will be evaluated be added to the documentation sheet. Additionally, RECOVER notes that a target of 5 and 6 µg/L TP might be achievable in open waters but may not be achievable in peat wetlands or mangrove areas with low water levels.

3.Q. Reduce total ammonia nitrogen loading to Biscayne Bay. (Performance Measure)

Target: Reduce total ammonia nitrogen concentrations from near toxic levels in coastal canals (up to 2 mg/l at Black Point Canal) to concentrations not regarded as toxic (0.50 mg/l). The target range for anti-degradation in Biscayne Bay waters is 0.02-0.05 mg/l total ammonia N.

Evaluation Method: For each alternative, pre- and post-project ammonia concentrations and loads from coastal canals will be estimated using methods/results developed by Meeder and Boyer (2001), Lietz (1999), and others.

Is this PM consistent with RECOVER PMs?

This parameter appears to be governed by non-CERP influences and is not a parameter that the project will be treating/affecting. The loading of the wetlands from external sources will affect the target as much as the treatment efficiency. RECOVER suggests it may be more appropriate to make this parameter a project constraint with the expectation “not to make worse” or, to remove it from the list of PMs.

3.S. Reduce Nitrate/Nitrite loading to Biscayne Bay. (Performance Measure)

Target: Restoration targets surface waters of southern Biscayne Bay are to not exceed: a monthly average of 10 ug/L nitrate/nitrite nitrogen.

Evaluation Method: For each alternative, total nitrogen loadings for post-project conditions will be estimated using the methods developed by Leitz (1999) and others. This will be compared to the desired 47% reduction in total nitrogen loading.

Is this PM consistent with RECOVER PMs?

This PM would benefit from listing the specific areas of South Biscayne Bay to define the spatial extent of the area of evaluation (e.g., a map or list of station/locations to be evaluated). RECOVER suggests specifying the areas of South Biscayne Bay to limit the scope of the area where CERP is expected to have an effect and improve the PM sensitivity. Additionally, to improve clarity of the PM documentation sheet, it would be helpful to define the 47% reduction in TN (i.e., a 47% reduction from what condition?).

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values

Project Objective/Constraint: Preserve and restore spatial extent of natural coastal glades habitat.

**4.A. Areal extent of freshwater wetlands and transverse glades vegetation increases.
(Performance Measure)**

Target: Target should be restoration as close as possible of freshwater and oligohaline wetlands to pre-drainage acreages as determined by simulations of pre-drainage hydroperiod, water level, and salinity by the WASH123 model.

Evaluation Method: Compare the percentage of land inundated for sufficient duration to produce wetlands under current conditions to the percentage resulting from alternatives.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of restoration. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The term “restoration as close as possible” should be replaced by a numeric target. This PM also seems in conflict with PM 2.G. in terms of the potential for increasing the hypersaline zone within the project area.

4.B. Enhance freshwater and oligohaline marsh habitat by restoring appropriate salinity, hydroperiod, water level. (Performance Measure)

Target: Environmental targets for these wetlands should match as closely as possible pre-drainage conditions and include:

- 1) Salinity target for freshwater wetlands is 0 ppt, which is consistent with tolerances for freshwater marsh flora and fauna such as sawgrass, muhly grass, and bayhead tree islands. Target for oligohaline wetlands is 0-5 ppt.
- 2) Average annual hydroperiod over the period of record is a minimum of 130 and maximum of 340 days per year to support sawgrass dominated wetlands (Wetzel 2001). This hydrologic regime is consistent with that required for 1) sawgrass (340 days); 2) muhly grass (120-140 days); bayhead tree islands; restoration of more natural numbers and distribution patterns for alligators across South Florida’s major freshwater and estuarine wetland landscapes, and 5) serving as a deterrent to further invasion of Brazilian pepper as this species requires shorter hydroperiods for germination of seeds.
- 3) Water depth does not exceed +2.0 feet over ground elevation nor –1.5 feet below ground elevation (RET Performance Measure for maximum, minimum depths in marl prairies). [Note: This criterion should be added if max-min depths are needed in addition to hydroperiod to define graminoid marsh]

Evaluation Method: The WASH123 Model should be used to determine the project alternative that most closely matches the target salinity, hydroperiod, and depth for freshwater and oligohaline marshes.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of pre-drainage condition. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The term “pre-drainage condition” should be replaced by a numeric target. Additionally, RECOVER recognizes the potential for conflict with SE-E1 and SE-E5. There are specific delivery schedules in these PMs which may not be compatible with the hydroperiod of the wetlands. The hydroperiod will be created by the delivery schedule. RECOVER suggests the PDT ensure delivery schedules are compatible with hydroperiod envelopes of the species (i.e., muhly grass and sawgrass).

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

**4.D. Improve and increase available feeding habitat for wading birds, especially roseate spoonbills, in freshwater, oligohaline, and mesohaline marshflats without increasing the risk of collision with military aircraft.
(Performance Measure)**

Target: The target for this evaluation criterion is for substantial portions (# of acres, % of total?) of the primary spoonbill foraging grounds in the BBCW project area (primarily the Model Lands) to have water levels of less than 12 cm from mid-November through the end of January. Water levels should recede slowly without reversals throughout the project area, and reversals in water depth caused by canal discharge should be eliminated during this period. Water levels should meet the above criteria in 7 out of 10 years.

The target for this evaluation criterion is for the mainland coastal wetlands within the foraging range of spoonbill colonies in the project area (mangrove and freshwater wetlands inland 8 km (5 mi.) from the coast in the Model Lands) to experience freshwater conditions throughout the wet season and into the early dry season (through Dec. 31). Salinity should not exceed 5 ppt between US 1 and Card Sound Road and salinity should not exceed 10 ppt from Card Sound Road north to Turkey Point through March 1. These conditions should be met in at least 8 out of 10 years.

Water levels in the preceding wet season (June-October?) should range from 0.12 to 0.6 meters in Zones 2-6 to accommodate good development of prey organisms.

Evaluation Method: The most appropriate groundwater/surface water hydrologic model (SICS, SEAWAT, WASH123, etc.) for BBCW project wetlands, particularly the Model Lands area, should be used to predict water level, hydroperiod, and salinity to select the preferred project alternative. A detailed modeling evaluation protocol is, or will soon be, available (Lorenz, personal communication).

Is this PM consistent with RECOVER PMs?

RECOVER recognizes the importance of this PM; however, the PDT should make the target for this PM more specific. RECOVER suggests the target for this PM be more defined.

4.F. The areal extent of non-native vegetation decreases.

Target: Target is to reduce to the extent possible the areal coverage of non-native vegetation.

Evaluation Method: Existing condition vegetation maps should be compared to post-project maps to quantify the reduction in coverage (in acres) of non-native vegetation. The WASH123 model should be used to determine the project alternative most suited to establishing hydroperiod, water level, and salinity most favorable for desired native species.

Is this PM consistent with RECOVER PMs?

There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of areal coverage. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The term “reduce” should be replaced by a numeric target. . As currently written, this PM may be more appropriate as a performance indicator or constraint.

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Ecologic Values
Project Objective/Constraint: Reestablish connectivity between Biscayne Coastal Wetlands, C-111 Basin, Model Lands, and adjacent basins.
5.A. Increase hydrologic connection within and between freshwater wetlands and coastal wetlands by reducing impediments to historic water flow and reestablishing connectivity between major and minor basins within the project area. (Performance Measure) Target: Surface water flow impedance outside of designed impoundments or canals should be equal to the resistance estimated for wetland vegetation alone. At a minimum, hydrologic connections should be established between major basins (C-100, C-1, C-102, C-103, and the Model Lands) through appropriate modifications to existing canals and levees. Smaller basins such as Military Canal, North Canal, and Florida City Canal basins should be included in the process. Also addressed should be the reconnection within basins that are currently fragmented by roads, secondary canals, and particularly mosquito ditches. Evaluation Method: watershed model not specified
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific. As currently written, there is no clear target that leads to decision-making. As currently written, this PM may be more appropriate as a performance indicator or constraint.

5.B. Establish wildlife corridors within and among basins. (Performance Measure) Target: Areal extent of contiguous restored habitats and water flow connections throughout the project area should increase. At a minimum, roadways and levees should be breached by culverts of appropriate dimensions to allow passage of native fish and wildlife to the extent possible. Also considered should be the backfilling of secondary drainage canals and mosquito ditches using disposal material that currently exists as berms adjacent to canals and ditches that fragment the coastal wetlands on smaller spatial scales than do primary conveyance canals, associated levees, and roads. Evaluation Method: Alternatives should be evaluated to quantify to the extent possible the change in areal extent of develop areas, the number of physical water flow connections between basins or sub-basins, and the number of water impoundments. The preferred alternative based on this performance measure provide the smallest areal extent of developed area (i.e. degrade unneeded roadways, levees, berms, etc.), the greatest number of physical water flow connections (e.g. culverts or other breaches in roadways and levees), and the fewest number of water impoundments compared to current conditions.
Is this PM consistent with RECOVER PMs? There is no corresponding RECOVER PM for comparison; however, RECOVER suggests the PDT make the target for this PM more specific in terms of areal extent. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The term “increase” should be replaced by a numeric target. . As currently written, this PM may be more appropriate as a performance indicator or constraint.

**ATTACHMENT A – BBCW PROJECT PM CONSISTENCY REVIEW
RECOVER COMMENTS**

CERP Goal: Enhance Economic Values and Social Well Being

Constraint No. 1. Flood protection adjacent to the project area or within the watershed will not be impacted by works or operational changes.

Target: Flood protection outside of the project area will be constrained according to the following criteria:

1. No increase in direct economic damage resulting from increased flooding.
2. Minimization of increased nuisance flooding.
3. Attempt to maintain preconstruction levels of service.

Evaluation Method: not specified

Is this PM consistent with RECOVER PMs?

RECOVER suggests the PDT make the target for this PM more specific in terms of flood protection. As currently written, there is no clear target that leads to decision-making. RECOVER suggests the target for this PM be more defined. The terms “increase” and “minimize” should be replaced by a numeric target. . As currently written, this PM may be more appropriate as a performance indicator or constraint.

General Comments:

Some targets don't appear to lend themselves for use in an evaluation methodology with which the Corps is familiar, and are not conducive to making decisions in distinguishing between alternatives. Documenting the linkage between the PM target and the evaluation methodology would clearly show how the PMs could be used to make decisions. Some PMs, as noted above, may be more appropriate as constraints to evaluate alternatives.

Additionally, there may be insensitivity for the HSIs used to evaluate PMs. The PDT should ensure the HSIs are sensitive enough to show differences in project alternatives for decision-making purposes.