

**RECOVER EVALUATION OF PROJECT-LEVEL
PERFORMANCE MEASURES for
Combined Structural and Operational Plan (CSOP)
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Prepared by RECOVER's Regional Evaluation and Water Quality Teams

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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. Although Combined Structural and Operational Plan (CSOP) is not one of the components of CERP its performance measures are evaluated by RECOVER due to the anticipated effects of CSOP will have on the Greater Everglades Wetlands, flood protection and perhaps water supply for urban and agricultural areas.

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 3) to provide information to project managers and others, as appropriate, regarding compatibility of project-level and system-wide performance measures of the CSOP as submitted to RECOVER in February 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 CSOP PMs are generally well-developed. RECOVER does, however, have suggestions regarding the performance measure descriptions and areas of evaluation in order to provide enough detail for document reviewers and developers.

Location of Indicator Regions - Where Greater Everglades Wetlands performance measures will be applied for the CSOP regional evaluation, it would be helpful to clarify the location and/or indicator regions that will be evaluated. This may reduce what appears as redundancy in using the same RECOVER PM under multiple objectives (i.e. ENP, Taylor Slough, WCA-3A).

Project Boundary Effects - RECOVER suggests the CSOP project look at areas outside the project boundaries to evaluate all of the effects on significant resources. Other areas to be evaluated might include WCA-2, WCA-3B and Biscayne Bay. Relevant RECOVER performance measures for these areas can be found on the Everglades Plan website at: http://www.evergladesplan.org/pm/recover/ret_perf_measures.cfm.

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 CSOP 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).

Marl Prairie Habitat Targets - In general, some evaluation targets may be inappropriate for the PMs. RECOVER evaluations have shown inconsistencies between NSM and best professional judgment targets for marl habitat hydroperiod and inundation patterns. The RET has worked with marl prairie experts to set targets for marl areas that are independent of the NSM predictions. The marl prairie targets RET will be using to conduct regional evaluations are attached for consideration.

Flow Targets - RECOVER has recently tabled performance measures based on flow volume across transect due to high levels of uncertainty with the model and the targets. To address this uncertainty, RECOVER suggests a target reflecting the NSM temporal (seasonal or monthly) distribution of flows across transects may be more appropriate in lieu of a volumetric target.

Flood Protection PMs - It appears there are two categories of performance measures for CSOP flood protection: 1) maintain current levels of flood protection and 2) improve levels of protection. The performance measures and their related project objectives should reflect this distinction. Also, it is difficult to understand the flood protection targets since "CSOP Base" is not clearly defined. Due to the lack of clarity for the flood protection performance measures only a cursory review was completed. It may require a more detailed examination in the future.

4.0 Conclusions

There is general compatibility between the project-level performance measures developed for the CSOP and the system-wide performance measures of the

FINAL RECOVER PM Consistency Review

Comprehensive Plan. Some revisions are suggested to increase the degree of consistency between project and system-wide performance measures. RECOVER suggests that the PDT reexamine some PM targets to address uncertainty and best professional judgment. RECOVER also suggests evaluating project effects outside project boundaries. Additionally, RECOVER suggests that the fact sheets be updated to include additional detail including Indicator Regions to be evaluated for several of the performance measures.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
Objective 1: Ecosystem Restoration in Taylor Slough and Eastern Panhandle			
MARL HABITATS			
1.a.i Spatial Distribution of marl-forming wetlands: Delineation of habitat according to hydroperiod	<u>Metric:</u> Acres of marl forming wetland <u>Target:</u> Wet year: 120-364 day hydroperiod Average year: 30-364 day hydroperiod Dry year: 0-340 days <u>Model Comparison:</u> CSOP Base	Model: Modbranch	Is the PM generally consistent with RECOVER's PM? NO The targets for this PM reflect longer hydroperiods than those for RECOVER PMs. RECOVER suggests the PDT review CSOP PM 1.a.iv.2 for more appropriate targets. Additionally, RECOVER evaluations have shown inconsistencies between NSM and best professional judgment in setting targets for marl habitats. The RET has worked with marl prairie experts to set targets for marl areas. These will be provided to the CSOP team.
1.a.ii.1 Fish and invertebrates: Restoration of hydropatterns typical of predrainage <u>marl prairies</u> to increase the total biomass of fishes and increase the proportion of fish and invertebrate species	<u>Metric:</u> Acres of fish and invert habitat with minimum surface water depth during the wet season >4 inches <u>Target:</u> Maximize the number of cells within marl-forming wetlands meeting criteria <u>Model Comparison:</u> CSOP Base	Model: Modbranch	Is the PM generally consistent with RECOVER's PM? YES RECOVER recognizes this PM as consistent with PM GE-E16 although it may not be directly comparable since RECOVER does have a target specifically for minimum water depth for the wet season.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
1.a.ii.2 Fish and invertebrates: Restoration of hydropatterns typical of predrainage <u>marl prairies</u> to increase the total biomass of fishes and increase the proportion of fish and invertebrate species	<u>Metric:</u> Acres of fish and invert habitat with mean wet season depth of 6-10 inches (need to double check range with S.P.) <u>Target:</u> Maximize the number of cells within marl-forming wetlands meeting criteria <u>Model Comparison:</u> CSOP Base	Model: Modbranch	Is the PM generally consistent with RECOVER's PM? YES RECOVER recognizes this PM as consistent with PM GE-E16 although it may not be directly comparable since RECOVER does have a target specifically mean wet season depth.
1.a.ii.3 Fish and invertebrates: Restoration of hydropatterns typical of predrainage <u>marl prairies</u> to increase the total biomass of fishes and increase the proportion of fish and invertebrate species	<u>Metric:</u> Hydroperiod <u>Target:</u> Typical (1-in-5 dry and 1-in-5 wet) Hydroperiods 3-8 months	Model: NSM, SFWMM, Modbranch	Is the PM generally consistent with RECOVER's PM? YES RECOVER recognizes this PM as consistent with PM GE-E16 although it may not be directly comparable since RECOVER does have a target specifically for fish and invertebrates.
1.a.ii.4 Fish and invertebrates: Restoration of hydropatterns typical of predrainage <u>marl prairies</u> to increase the total biomass of fishes and increase the proportion of fish and invertebrate species	<u>Metric:</u> Normalized (Divide Monthly Flow by Total flow) monthly distribution (volume distribution pattern) <u>Target:</u> Toward NSM distribution not volume <u>Model Comparison:</u> CSOP Base, NSM	Model: SFWMM, Modbranch	Is the PM generally consistent with RECOVER's PM? YES Although RECOVER has a for fish habitat suitability, PM GE-E16, it is not directly comparable since RECOVER it focuses on duration of inundation.
1.a.iii.1 Fish and invertebrates: Water depths	<u>Metric:</u> Minimum depth <u>Target:</u> Minimize the number of continuous	Model: SFWMM &	Is the PM generally consistent with RECOVER's PM? YES

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
that exceed 1-1.5 feet below the ground surface cause the loss of water in a large proportion of the potentially available refugia, rendering them non-functional, and killing the occupants.	days that water depth is > 1.5 ft below ground surface <u>Model Comparison</u> : NSM	Modbranch	The target for this PM is currently inconsistent with RECOVER PM GE-E3: extreme low stages. RECOVER suggests the target water depth for this PM be >1.0 ft below ground surface. (GE-E3)
1.a.iii.2 Fish and invertebrates: Water depths that exceed 1-1.5 feet below the ground surface cause the loss of water in a large proportion of the potentially available refugia, rendering them non-functional, and killing the occupants.	<u>Metric</u> : Water recession rate <u>Target</u> : (will define target slope) <u>Model Comparison</u> : NSM	Model: SFWMM & Modbranch	Is the PM generally consistent with RECOVER's PM? YES RECOVER recognizes this PM is consistent with the system-wide objectives, although it may not be directly comparable to a specific RECOVER PM.
1.a.iv.1 Marl prairie vegetation: Marl prairie vegetation can persist across a wide range of hydroperiods. Drier conditions lead to increased risks of either drought and fire risk, reduced periphyton development and increased expansion into marshes of woody plants.	<u>Metric</u> : Flooding duration <u>Target</u> : Hydroperiods with surface water in excess of 4 to 6 months annually are considered preferred over the drier state of the areas that are currently overdrained. Assumption is that annual hydroperiods that exceed 8 months will only occur in the wet years and along the boundary between the slough and the marl prairie landscape and along the transition to the mangrove forest. <u>Model Comparison</u> : CSOP Base	Model: Modbranch	Is the PM generally consistent with RECOVER's PM? YES

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
1.a.iv.2 Marl prairie vegetation: Marl prairie vegetation can persist across a wide range of hydroperiods. Drier conditions lead to increased risks of either drought and fire risk, reduced periphyton development and increased expansion into marshes of woody plants.	<u>Metric:</u> Flooding duration <u>Target:</u> Hydroperiods of 1-6 months in a dry year are considered preferred over the drier state that characterizes current conditions. Assumption is that annual hydroperiods that re less than 1-6 months will only occur in the driest year. <u>Model Comparison:</u> CSOP Base	Model: Modbranch	Is the PM generally consistent with RECOVER's PM? YES Although this PM may not be directly comparable, this PM seems to be consistent with RECOVER PMs.
1.a.v. Alligator – Production index model: (Proposed addition/replacement if different)	Metric: See RET ATLSS-E5	Model: ATLSS Production Index Model	Is the PM generally consistent with RECOVER's PM? RECOVER ATLSS Performance Measures are not currently available for evaluation.
1.a.vi Long-legged wading birds - foraging conditions: (Propose replacing “wading birds”)	Metric: See RET ATLSS-E2	Model: ATLSS	Is the PM generally consistent with RECOVER's PM? RECOVER ATLSS Performance Measures are not currently available for evaluation.
1.a.vii Short-legged wading birds - foraging conditions: (Propose replacing “wading birds”)	Metric: See RET ATLSS E-3	Model: ATLSS	Is the PM generally consistent with RECOVER's PM? RECOVER ATLSS Performance Measures are not currently available for evaluation.
SLOUGH HABITAT			
1.b.i Fish and Invertebrates: Restoration	<u>Metric:</u> Depth <u>Target:</u>	Model: NSM, SFWMM,	Is the PM generally consistent with RECOVER's PM? YES

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
of NSM hydropatterns typical of predrainage Taylor Slough to increase the total biomass of fishes and increase the proportion of fish and invertebrate species	1. Minimum surface water depth during the dry season (Dec 1 - May 1) >1.5 ft (ENP check) 2. Mean surface water depth during the wet season (Jun 1 - Oct 15) = 2 ft (ENP check) <u>Model Comparison</u> : Compare alternatives with NSM	ModBranch	Although there is no RECOVER PM specifically for minimum surface water depths, this PM is consistent with RECOVER PMs.
1.b.ii.1 Fish and Invertebrates: Restoration of NSM hydropatterns typical of predrainage Taylor Slough to increase the total biomass of fishes and increase the proportion of fish and invertebrate species	<u>Metric</u> : Distribution <u>Target</u> : Toward NSM shape of curve <u>Model Comparison</u> : Normalized monthly distribution compared to NSM (volume and distribution pattern)	Model: SFWMM and NSM	Is the PM generally consistent with RECOVER's PM? YES Although this PM is consistent with RECOVER PMs, the SFWMM does not model Taylor Slough as accurately as other areas of the Greater Everglades.
1.b.ii.2 Fish and Invertebrates: Restoration of NSM hydropatterns typical of predrainage Taylor Slough to increase the total biomass of fishes and increase the proportion of fish and invertebrate species	<u>Metric</u> : Hydroperiod <u>Target</u> : Hydroperiods = 365 days per year <u>Model Comparison</u> : Normalized monthly distribution compared to NSM (volume and distribution pattern)	Model: Modbranch	Is the PM generally consistent with RECOVER's PM? YES Although the RECOVER inundation target for GE-E2 is shorter, this PM is consistent with RECOVER PMs.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>1.b.iii.1 Fish and Invertebrates: Decrease the frequency and number of reversals and increase the duration of inundation in Taylor Slough</p>	<p><u>Metric</u>: Number of events when water level is below ground surface. <u>Target</u>: Minimize # events <u>Model Comparison</u>: CSOP Base</p>	<p>Model: ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>This PM is consistent with RECOVER PM GE-E3: Extreme High and Low Events in the GE, however, RECOVER PM GE-E1, which measures the number of dryout events applies only to Shark River Slough.</p>
<p>1.b.iii.2 Fish and Invertebrates: Decrease the frequency and number of reversals and increase the duration of inundation in Taylor Slough</p>	<p><u>Metric</u>: No of consecutive days depth > 1. <u>Target</u>: Maximize # cells that maintain minimum depths in the sloughs that support larger fish species (at least 1.0 feet for 12 months/year in average to wet years). <u>Model Comparison</u>: CSOP Base</p>	<p>Model: ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>Although RECOVER does not have a target for minimum water depths, this PM is consistent with RECOVER PMs.</p>
SAWGRASS PLAINS HABITAT			
<p>1.c.i Spatial Distribution of Everglades peat-forming wetlands: Description of habitat according to hydroperiod, days of drydown and maximum water depth</p>	<p><u>Metric</u>: Acres Everglades peat-forming wetland <u>Target</u>: Hydroperiods = 365 days all years except dry years <u>Model Comparison</u>: NSM, Base83</p>	<p>Model: ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM? NO</p> <p>The PM for this target may be inconsistent with RECOVER PM GE-E2. RECOVER evaluates sawgrass plains in IR 190 located in the north end of WCA 3A. Peat forming wetlands occur in areas with hydroperiods of approximately 9-10 months, therefore a target of 365 days may be inconsistent. RET PMs use a 9-10 month inundation period as a target in dryer peat areas.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
Objective 2: ENP Natural Values			
<p>2.i CSSS – habitat suitability: Return frequencies for number of days per year that one can expect CSSS habitats to be flooded.</p>	<p><u>Metric:</u> Days water below ground surface between March 1 and July 15 <u>Target:</u> For the purposes of this evaluation: 0-2 month discontinuous hydroperiod - not expected to support vegetation favorable to CSSS nesting; 2-4 month discontinuous hydroperiod - considered favorable and supportive of Muhlenbergia dominated habitat; 4-6 month discontinuous hydroperiod - considered good for other vegetation favorable to CSSS nesting; > 6 month discontinuous hydroperiod - not expected to support vegetation favorable to CSSS nesting. <u>Model Comparison:</u> Return frequencies compared</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER’s PM?</p> <p>RECOVER does not have a performance measure for CSSS. However, RECOVER suggests the metric for this PM read “Annual Discontinuous Hydroperiod”</p>
<p>2.ii Wood Stork: Potential foraging</p>	<p><u>Metric:</u> Acres wood stork habitat from November 1 and May 15</p>	<p>Model: SFWMM, MBR,</p>	<p>Is the PM generally consistent with RECOVER’s PM? YES.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>habitat for wood stork. For this analysis wood stork habitat is defined as the number of acres with a depth of water between 0.1 and 0.25 meters.</p>	<p><u>Target:</u> Modeled water depths will be analyzed throughout the study area to determine where potential stork habitat would be found and how that habitat would be changed by each alternative relative to the base, current conditions and NSM. Alternatives will be qualitatively ranked by including predicted foraging habitat and a determination of sustained habitat availability with a minimum of disruptions (abrupt changes) to that availability. <u>Model Comparison:</u> Plotted curves of adequate wood stork foraging habitat.</p>	<p>and NSM</p>	<p>Although it may not be directly comparable, this PM is consistent with RECOVER PMs for wading birds.</p>
<p>2.iii Wood Stork: It has been shown that the timing of stork colony formation influences colony success rates, and that earlier colonies are more likely to be successful than are later forming colonies. This performance measure looks at surface water flooding during November and December in the marl prairie portion of the project study area.</p>	<p><u>Metric:</u> Number of acres flooded during November and December <u>Target</u> The preferred alternative will be the plan that shows the greatest increase in flooded cells for the marl prairies in November and December. <u>Model Comparison:</u> in maps and tables this evaluation will compare predicted changes in the number of cells located in the marl prairie portion of the study area that show surface water flooding during November and December. Comparisons will be made between alternatives, base, current conditions, and NSM.</p>	<p>Model: ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM? YES.</p> <p>Although it may not be directly comparable, this PM is consistent with RECOVER PMs for wading birds.</p>
<p>2.iv Snail Kite - Potential foraging</p>	<p><u>Metric:</u> Acres snail kite habitat <u>Target:</u> Maximize # acres</p>	<p>Model: Modbranch,</p>	<p>Is the PM generally consistent with RECOVER's PM? NO</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
habitat for snail kite. For this analysis this performance measure estimates the number of acres with water depth between 0.2 and 1.3 meters for greater than 360 days/year.	<u>Model Comparison:</u> Table of acres of suitable snail kite habitat by basin, for each alternative, base, current conditions and NSM.	SFWMM and NSM	RECOVER suggests this PM include occasional drydowns which have been shown by Bennetts to be necessary for habitat maintenance. The PDT may consider using RECOVER PM GE-E18: Snail Kite Habitat Foraging Structure, which includes these drydowns.
2.v Snail kite – Apple snail reproduction	<u>Metric:</u> See RET GE-E17	Model: SFWMM	Is the PM generally consistent with RECOVER’s PM? YES.
2.vi Long-legged wading birds - foraging conditions: (Propose replacing “wading birds”)	<u>Metric:</u> See RET ATLSS-E2	Model: ATLSS	Is the PM generally consistent with RECOVER’s PM? RECOVER ATLSS Performance Measures are not currently available for evaluation.
2.vii Short-legged wading birds - foraging conditions: (Propose replacing “wading birds”)	<u>Metric:</u> See RET ATLSS E-3	Model: ATLSS	Is the PM generally consistent with RECOVER’s PM? RECOVER ATLSS Performance Measures are not currently available for evaluation.
2.viii Manatees and Crocodiles: The	<u>Metric:</u> Frequency across transect. Crocs - salinity regimes for juvenile development	Model: SFWMM and	Is the PM generally consistent with RECOVER’s PM? NO

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
frequency of input of annual flow volumes towards Shark Slough estuaries.	<u>Target:</u> shape of the NSM curve <u>Model Comparison:</u> Relative frequency compared to NSM (volume and shape of the curve).	NSM	RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. RECOVER suggests reviewing C-111 Spreader PM EC3.1 for possible use or adapting RECOVER PMs based on salinity/stage relationships. (RET PM SE-E2). Targets from Restudy crocodile pm could be used with new stage/salinity methods.
2.ix Manatees and Crocodiles: The distribution of mean monthly freshwater flow volumes into Shark Slough.	<u>Metric:</u> Distribution across transects. Cross - juvenile dispersal in estuaries <u>Target:</u> shape of the NSM curve ; October – December <u>Model Comparison:</u> Monthly distribution compared to NSM (volume and distribution pattern)	Model: SFWMM and NSM	Is the PM generally consistent with RECOVER 's PM? NO RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. RECOVER suggests reviewing C-111 Spreader PM EC3.1 for possible use or adapting RET PMs based on salinity/stage relationships. (RET PM SE-E2). Targets from Restudy crocodile pm could be used with new stage/salinity methods

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<p>2.x Roseate Spoonbill: Studies of spoonbill nesting patterns in eastern Florida Bay have shown that colony success is greatest when adult birds can find adequate feeding conditions in the mainland wetlands in the lower portions of the C-111 and Taylor Slough basins, especially during the nestling period from January through March. Ideal foraging conditions are created by extensive flooding early in the nesting season (Nov. - Dec.) followed by moderate, regional drying patterns through March. When drying is too slow, prey are not adequately concentrated; when it is too rapid, the adults birds are forced to fly greater distances to find adequate foraging sites.</p>	<p><u>Metric</u>: Plot of number of acres with water depths between 0 and 1 ft from November through March <u>Target</u>: NSM is the target. A preferred plan will be the one with the greatest number of cells in the lower basins (C-111) flooded during November, and with 50-75% of these cells dry by the end of March. A lower percentage of dry cells in March would indicate an inadequate drying rate, while a high percentage would indicate a too-rapid drying rate, resulting in an unacceptably extensive drying of foraging habitats within range of the colonies. <u>Model Comparison</u>: In maps and tables this evaluation will compare predicted changes in the number of cells located in the lower C-111 basin portion of the study area that show surface water flooding during November, and the number of dry cells by the end of March. Comparisons will be made between alternatives, base, current conditions, and NSM</p>	<p>Model: ModBranch,</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>Although it may not be directly comparable, this PM is consistent with RECOVER PMs. RECOVER PM does not a PM specifically for Roseate Spoonbills.</p>

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<p>2.xi Deer (panther surrogate): Water depths above 18 inches limits the movement (and therefore access to fresh browse) of deer in the Everglades marshes.</p>	<p><u>Metric</u>: Water depth and duration <u>Target</u>: The continuous duration of water depths over 18 inches used as a conservative measure of the conditions that limit deer movement. Particular focus is placed on duration exceeding 40 days of water depths exceeding 18 inches as research has shown this to be the threshold for malnutrition impacts, and the duration exceeding 60 days which research has shown to be the duration sufficient to cause catastrophic impacts on deer health and survival. <u>Model Comparison</u>: Return frequencies compared for the different alternatives</p>	<p>Model: SFWMM, NSM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER suggests clarifying which habitat this PM will be applied to. Additionally, if the purpose of this PM is to act as a panther surrogate, then marl areas should be included for evaluation. Sonny Bass, ENP, may provide data supporting panther use of marl areas. During marsh high water events deer in ENP move to Pinelands. High deer populations are not an ENP restoration target (Bass and Armentano).</p>
<p>2.xii White-tailed deer – breeding potential (Proposed addition/replacement if different)</p>	<p><u>Metric</u>: See RET ATLSS-E4</p>	<p>Model: ATLSS</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER ATLSS Performance Measures are not currently available for evaluation. Additionally, RECOVER recognizes that ATLSS-E4 may not be an appropriate ENP restoration target.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>2.xiii Exotic Fish: Operate water flow into canals and detention ponds bordering ENP, so that there is less probability of moving nonnative fish species into the proximity of ENP. Minimize the unnatural routing of water through canals, especially from areas that have large populations of exotic fish. Design structures to minimize the probability of introduction of exotic fish species into Everglades National Park</p>	<p><u>Metric:</u> Volume of surface water discharges into ENP <u>Target:</u> No introduction of exotic fish species <u>Model Comparison:</u> Comparing surface water flows into ENP proposed for the various alternatives</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>There is a high degree of uncertainty of the relationship between introduction of exotic fish and flows. The ability to accurately predict achievement of this target is questionable. It may be more appropriate to identify which structures are of concern than to assume minimizing flows into ENP will achieve the target. RECOVER does not have a similar target.</p>
<p>2.xiv Marl prairie vegetation (all areas of marl prairie vegetation in the Park outside of the eastern Panhandle): Marl prairie vegetation in any of several can persist across a wide range of hydroperiods ranging from about 3 to 8 months of annual flooding. At the dry end of this range there are increased risks of either drought and fire risk, reduced periphyton development and increased expansion into marshes of woody plants.</p>	<p><u>Metric:</u> Flooding duration <u>Target:</u> Hydroperiods with surface water in excess of 4 to 6 months annually are considered preferred over the drier state that characterizes current conditions. Assumption is that no alternative will cause annual hydroperiods to exceed 8 months because longer flooding brings the likelihood that vegetation will begin to develop slough-like characteristics within the marl prairie. <u>Model Comparison:</u></p>	<p>Model: MBR, SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>Although the targets may not be directly comparable to Modbranch, this PM is consistent with RECOVER PMs.</p>
<p>2.xv Shark River Slough – Number and duration of dry events</p>	<p><u>Metric:</u> See RET GE-E1</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p>

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2.xvi Greater Everglades wetlands – Inundation pattern	<u>Metric:</u> See RET GE-E2	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES
2.xvii Greater Everglades wetlands – Extreme high/low water levels	<u>Metric:</u> See RET GE-E3	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES
2.xviii Greater Everglades wetlands – Seasonal amplitude and interannual variability of water levels	<u>Metric:</u> See RET GE-E4	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES
2.xix Greater Everglades wetlands – Seasonal and annual flow volumes	<u>Metric:</u> See RET GE-E5	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? NO RECOVER has recently tabled PM GE-E5 due to high levels of uncertainty.

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2.xx Tree islands (RET) – Species richness suitability (Proposed addition or replacement)	<u>Metric:</u> See RET GE-E6	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? NO RECOVER PMs were developed for use with the SFWMM and may be inconsistent with ModBranch. Additionally, RECOVER PMs were developed for all of the GE and may not be appropriate for ENP. Tree islands within ENP require different conditions than those in WCA-3 for example. This PM is not applied to ENP for system-wide evaluations.
2.xxi Tree islands (SFWMD) – Species richness suitability + drought/flood index	<u>Metric:</u> See Habitat Suitability Indices – December 18, 2003 Draft, Chapter 4: Tree Island Habitat Suitability Index	Model:	Is the PM generally consistent with RECOVER's PM? RECOVER HSI Performance Measures are not currently available for evaluation.
2.xxii Alligator – Production index model: (Proposed addition/replacement if different)	<u>Metric:</u> See RET ATLSS-E5	Model: ATLSS Production Index Model	Is the PM generally consistent with RECOVER's PM? RECOVER ATLSS Performance Measures are not currently available for evaluation.
2.xxiii Snail kite – Foraging habitat vegetation structure (Proposed replacement if different)	<u>Metric:</u> See RET GE-E18	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES RECOVER PMs were developed for use with the SFWMM and may be inconsistent with ModBranch.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>RECOVER notes that RET PMs for the Greater Everglades were developed for all of GE area, WCAs, WMAs, ENP, BICY and Model Lands. They may not be suitable to evaluate Objective 2: ENP Natural Values, which applies only to ENP.</p> <p>The effects hydrological changes have on important biota including long and short-legged wading birds, fishes, alligators, tree islands, white-tailed deer, alligator, etc. are of great significance to Everglades restoration. If ATLSS and HSI evaluation tools are not available for use by the time the project is ready for evaluation, RECOVER suggests using RECOVER PMs (GE-E1: Number and duration of Dry Events for SRS, GE-E2: Inundation pattern in the GE, GE-E3: Extreme High and Low Events in the GE, GE-E4: Seasonal Amplitude and Interannual Variability of Water levels in the GE, and GE-E6: Species Richness Suitability for Tree Islands in the GE) to evaluate area throughout the WCAs and ENP. Because of the importance of the WCA's as foraging and nesting habitat for wading birds in the Everglades, tree island habitat, and home to large alligator populations, RECOVER suggests evaluating GE-E1 through GE-E6 (as applicable) for WCA-3A, WCA-3B, ENP, and Taylor Slough. All applicable Everglades habitat should be evaluated.</p>			
<p>Objective 3: Damaging Freshwater Flows</p>			
<p>3.i Impacts of freshwater flow on Manatee Bay/Barnes Sound: Reduce frequency of high volume discharges to Manatee Bay/Barnes Sound</p>	<p><u>Metric</u>: Number of years in which S-197 was opened to provide emergency discharges of freshwater to Manatee Bay <u>Target</u>: Reduce total discharge at S-18C <u>Model Comparison</u>: Compare to CSOP base, NSM target, and current conditions</p>	<p>Model: SFWMM & Modbranch</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>While this PM is consistent with RECOVER PMs, It may be more appropriate to evaluate flows from S-197 and set a target for this structure and not use S-18C , however they may be reasons for this discrepancy unclear to RET . Also, RECOVER suggests the PDT look at RET PM SE-E4: Manatee Bay and coastal embayments of Barnes Sound.</p>
<p>3.ii NE Florida Bay estuaries: Salinity</p>	<p><u>Metric</u>: Salinity as predicted by Marshall model</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
predictions	<p><u>Target:</u> Number of months over the 31-year simulation period in which mean salinity estimates fell within three classes: <20 ppt, 20-40 ppt, >40 ppt. The alternative which minimized the number of months in which salinities exceeded 40 ppt is considered superior.</p> <p><u>Model Comparison:</u> Marshall model</p>		<p>This PM is generally consistent with RECOVER PM SE-E2: Florida Bay - Salinity in Coastal Basins Estimated from Upstream Water Stages, however, the salinity ranges differ.</p>
<p>3.iii Florida Bay estuaries: Frequency of low/high salinities in coastal embayments (interim goals may have updated Bay PMs) Proposed addition</p>	<p><u>Metric:</u> See RET SE-E2</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>See Above Note. Check for Duplication</p>
Objective 4: Flood Protection for C-111 Basin			
<p>4.i Flood Risks east of L-31N (Revise using Cal N.'s refinement): Peak Stage Difference map</p>	<p><u>Metric:</u> Percent of years max. stage targets > 0.25 and 0.5 ft. higher than current conditions</p> <p><u>Target:</u> Target is current conditions</p> <p><u>Model Comparison:</u> Compare to CSOP base case and current conditions</p>	<p>Model: SFWMM & Modbranch</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>This PM is no longer used by RECOVER for system-wide evaluations</p>
<p>4.ii Agriculture Flood Risks (Revise using Cal N.'s refinement): Weekly Stage Difference Map</p>	<p><u>Metric:</u> Percent of time that weekly wet season stage differences (selected Alternative - Current conditions are > 0.25 ft & 0.50 ft)</p> <p><u>Target:</u> Target is current conditions</p> <p><u>Model Comparison:</u> Compare to CSOP base case and current condition</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>This PM is consistent with RECOVER PM WS-E6, however the RECOVER PM target is ISOP 2001.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>4.iii Agriculture Flood Risks (Revise using Cal N.'s refinement): Measure the percent of time selected Ag. Cells are flooded within root zone</p>	<p><u>Metric</u>: Based on stage duration curves, percent of time groundwater levels are maintained within root zone (-2 ft. below ground) for more than 24 hours in selected Ag. indicator cells is considered a flood event <u>Target</u>: Do not exceed values obtained from 1983-1993 model calibration & validation runs for 6 indicator cells (R10C25, R13C25, R15C26, R17C27, R19C27, R20C27) <u>Model Comparison</u>: Compare to CSOP base case and current condition</p>	<p>Model: SFWMM & Modbranch</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>This PM is consistent with RECOVER PM WS-E6, however, the durations considered to be significant for WS-E3 are measured for the entire POR and not daily.</p>
<p>4.iv Damages due to increased hydroperiod: Increased hydroperiod potentially cause agricultural/residential crop/property damage</p>	<p><u>Metric</u>: Acreage of increased hydroperiod at reference level reference levels: 0.1 ft above g.s.e. for urban/residential areas, -1.75 ft for orchards, 0.1 ft for row crops <u>Target</u>: < or = CSOP base <u>Model Comparison</u>: CSOP base vs Alternatives</p>	<p>Model: ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>More information is required for RECOVER to determine if this PM is consistent with RECOVER water Supply PMs.</p>
<p>4.v Damages due to increased water depths: Increased water depth potentially cause agricultural/residential crop/property damage</p>	<p><u>Metric</u>: Acreage with increased water depth at references: 0.1 ft above g.s.e. for urban/residential areas, -1.75 ft for orchards, 0.1 ft for row crops <u>Target</u>: < or = CSOP 83 <u>Model Comparison</u>: CSOP base vs Alternatives</p>	<p>Model: ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>More information is required for RECOVER to determine if this PM is consistent with RECOVER water Supply PMs.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
4.vi Agricultural Flood damages - delineate by watershed: Spatial extent of project-induced flood damages to agricultural areas delineated by watershed.	<u>Metric:</u> Area: Total number of agricultural acres where the water is within the root zone for a period sufficient to cause damages during the 40 percent SPF and over the POR <u>Target:</u> Minimize <u>Model Comparison:</u> Compare to CSOP base and current conditions	Model: SFWMM and Modbranch	Is the PM generally consistent with RECOVER's PM? More information is required for RECOVER to determine if this PM is consistent with RECOVER water Supply PMs.
4.vii Flood damage reduction - delineate by watershed: Spatial extent of project-induced flood damages	<u>Metric:</u> Area: total number of acres where the stage is greater than the existing ground surface elevation during the 40 percent SPF and over the POR <u>Target:</u> Minimize <u>Model Comparison:</u> Compare to CSOP base and current conditions	Model: SFWMM and Modbranch	Is the PM generally consistent with RECOVER's PM? More information is required for RECOVER to determine if this PM is consistent with RECOVER water Supply PMs.
4.viii Agriculture flood risks: Water table position difference	<u>Metric:</u> Stage hydrograph of water table position and maximum monthly water table graph for a wet year(s) using 6 indicator cells (R10C25, R13C25, R15C26, R17C27, R19C27, R20C27) <u>Target:</u> 1983-1993 condition <u>Model Comparison:</u> 1983-1993 condition to Planning Condition bases and Alternatives <u>Model Comparison:</u>	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? This PM appears to be consistent with RECOVER PM WS-E3 although their targets are not directly comparable.
Objective 5: Maintain the mitigation for project induced flood damages in the East Everglades, including the 8.5 SMA, the Osceola Camp, and the Tiger Tail Indian Camp.			
5.i Flood mitigation 8.5 SMA - address requirements of Everglades Expansion Act of 1989: Maintain flood mitigation within 8.5 SMA	<u>Metric:</u> <u>Target:</u> <u>Model Comparison:</u>	Model:	Is the PM generally consistent with RECOVER's PM? RECOVER does not have a flood mitigation PM for this area.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
5.ii Flooding mitigation 8.5 SMA - agricultural impact: Maintain flood mitigation within 8.5 SMA	<u>Metric:</u> <u>Target:</u> <u>Model Comparison:</u>	Model:	Is the PM generally consistent with RECOVER's PM? RECOVER does not have a flood mitigation PM for this area.
5.iii Flooding impacts on the Tiger Tail Camp: Maintain flood protection for the residents of the Tiger Tail Camp.	<u>Metric:</u> Compare stage hydrographs and stage duration curves at Tiger Tail Camp. <u>Target:</u> Maintain stages below 11 feet NGVD at all times. <u>Model Comparison:</u> No need to compare models. The target is an absolute.	Model: SFWMM & Modbranch	Is the PM generally consistent with RECOVER's PM? RECOVER does not have a flood mitigation PM for this area.
5.iv Flooding impacts on the Osceola Camp:	<u>Metric:</u> 1. Compare stage hydrographs, stage duration curves at Osceola Camp 2. Determine peak stages and duration for 5-day 100 year storm events at the Osceola Camp. <u>Target:</u> Maintain current conditions <u>Model Comparison:</u> Compare to CSOP base and current conditions	Model: SFWMM & Modbranch	Is the PM generally consistent with RECOVER's PM? RECOVER does not have a flood mitigation PM for this area.
5.v Flooding impacts on the Miccosukee Indians' Special Use Permit Area (SUPA):	<u>Metric:</u> 1. Compare stage hydrographs, stage duration curves at various locations within the SUPA. 2. Determine peak stages and duration for 5-day 100 year storm events within the SUPA. <u>Target:</u> Maintain current conditions <u>Model Comparison:</u> Compare to CSOP base and current conditions	Model: SFWMM & Modbranch	Is the PM generally consistent with RECOVER's PM? RECOVER does not have a flood mitigation PM for this area.
Objective 6: Ensure that C-111 project waters diverted to ENP meet all applicable water quality criteria; (1994 C-111 GRR)			

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>As written, the evaluation methods for the WQ PMs are not able to fulfill the objective of meeting all applicable WQ criteria. RECOVER suggests removing the objective's reference to applicable WQ criteria and state that the WQ PMs will be used to compare alternatives to ensure current nutrient levels are not degraded by the project.</p>			
<p>6.i Water Quality: Increases in phosphorus loads to the central portion of WCA-3A via S140 and S9 (Walker, 2003) may contribute to increases in concentration at the S12's and S333. Transport of loads from S9 may be facilitated by the L67A canal along the southeast border of WCA-3A, particularly when WCA-3A is at low stage and a higher fraction of the flow is likely to bypass the WCA-3A marsh. Direct canal discharge from S9 and S140 to S12's and S333 must be eliminated to reduce the likelihood of violating the long-term phosphorus limits of 8 ug/L and 6 ug/L for the Shark River Slough and Taylor Slough, respectively, as specified in Consent Decree (Hoeveler, 1992).</p>	<p><u>Metric:</u> Direct canal inflows from S9 and S140 to ENP <u>Target:</u> zero direct canal discharge from S9 and S140 to S12's and S333 <u>Model Comparison:</u> CSOP Base</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>RECOVER suggest clearly indicating in the PM title that this is a hydrologic surrogate for WQ. Additionally, RECOVER notes this PM may not be directly comparable to RECOVER PMs.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>6.ii Water Quality: Monitoring sites in WCA-3A and ENP Shark River Slough show an inverse correlation between stage and phosphorus concentration (Walker, 2003). Phosphorus concentrations at S-12's and marsh stations in ENP Shark River Slough increase when flow releases from WCA-3A are made during stages below 9.5 ft. To reduce the likelihood of violating the long-term phosphorus limits of 8ug/L for the Shark River Slough, as specified in Consent Decree (Hoeveler, 1992), the fraction of flow released to ENP through S12's and S333 at WCA-3A stages below 9.5 ft should be reduced.</p>	<p><u>Metric</u>: Flow discharged from WCA-3A during stages below 9.5 ft as percent of total inflow to ENP. <u>Target</u>: minimize percentage of flow released from WCA-3A during stages below 9.5 ft. <u>Model Comparison</u>: CSOP BASE</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>RECOVER suggest clearly indicating in the PM title that this is a hydrologic surrogate for WQ. Additionally, RECOVER notes this PM may not be directly comparable to RECOVER PMs.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>6.iii Maintenance of C-111 Project hydrologic ridge. A major purpose of the C-111 Project is to develop a hydrologic barrier ridge along the eastern boundary of the ENP to prevent seepage of marsh water from the Park into adjacent agricultural areas. This hydrologic ridge consists of a series of reservoirs that will receive agricultural and urban stormwater runoff of poor quality (Harper, 1994). If the stage of these reservoirs is higher than at the adjacent ENP marsh, water of poor quality from the reservoirs will seep into ENP and cause negative impacts. If the stage at the adjacent ENP marsh is higher than at the reservoirs, water of good quality from the ENP will seep into the reservoirs, and drain the ENP. The stage in the reservoir should not be higher than a stage at monitoring stations in the adjacent marsh.</p>	<p><u>Metric</u>: sum of absolute values of stage difference between reservoirs and adjacent marsh stations should be equal to zero. <u>Target</u>: zero difference <u>Model Comparison</u>: compare sum totals for various alternatives</p>	<p>Model: Modbranch</p>	<p>Is the PM generally consistent with RECOVER's PM? RECOVER does not have a PM of this type.</p>
<p>Objective 7: Construct modifications to improve water deliveries into ENP and take steps to restore natural hydrologic conditions in ENP by:</p>			

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
TIMING			
<p>7.a.i Monthly and annual flow variation: The 31-yr POR NSM data would be used to produce and accept range for flow volume for each month (one SD above and below the mean). For each Alt., monthly flows (avg. For all cells in transect) outside this range would be summed and plotted as a bar above and below the range, and the number of indicied of flows outside the range would be noted</p>	<p><u>Metric:</u> Flow volume <u>Target:</u> Toward NSM <u>Model Comparison:</u> Compare to CSOP base, NSM target, and current conditions</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. A target of moving toward NSM shape of the curve may be more appropriate.</p>
<p>7.a.ii Normalized monthly hydrographs: For each alternative, monthly flows (average for all cells in transect) would be plotted as a % of the annual to focus analysis on timing, independent of quantity (using same transects as the transect description described above)</p>	<p><u>Metric:</u> Flow volume and timing <u>Target:</u> Toward NSM <u>Model Comparison:</u> Compare to CSOP base, NSM target, and current conditions</p>	<p>Model: Modbranch, SFWMM average year, '89 and '95</p>	<p>Is the PM generally consistent with RECOVER's PM? RECOVER does not have a PM of this type.</p>
<p>7.a.iii Shark River Slough – Number and duration of dry events</p>	<p><u>Metric:</u> See RET GE-E1</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p>
<p>7.a.iv Greater Everglades wetlands – Inundation pattern</p>	<p><u>Metric:</u> See RET GE-E2</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
7.a.v Greater Everglades wetlands – Seasonal amplitude and interannual variability of water levels	<u>Metric:</u> See RET GE-E3	Model: SFWMM	Is the PM generally consistent with RECOVER’s PM? YES
LOCATION			
7.b.i Flow Distribution: Transects established Perpendicular to flow path. Line plot used to show the distribution and volume of flow through a given cell on the transect. Comparisons between Alts. can be made by observing the differences in the cell standard error	<u>Metric:</u> Flow volume and distribution <u>Target:</u> Toward NSM shape of the curve <u>Model Comparison:</u> CSOP base case, NSM and current conditions	Model: SFWMM	Is the PM generally consistent with RECOVER’s PM? RECOVER does not currently use this type of performance measure to evaluate alternatives; however, based of other RECOVER flow PMs, suggest using “NSM shape of the curve” as a PM target.
7.b.ii Sheet Flow Maintenance: Uniform flow along transects is an indication of sheet flow	<u>Metric:</u> Surface flow vector variance (direction and magnitude) <u>Target:</u> 1. Minimize regional variance (multiple transects) 2. Minimize transect variance (single transect) <u>Model Comparison:</u> CSOP Base	Model: Modbranch and SFWMM	Is the PM generally consistent with RECOVER’s PM? RECOVER does not currently apply a PM to evaluate flow direction.
7.b.iii Surface Flow Vector Deviation: Continuity of water level across man-made barriers.	<u>Metric:</u> Deviation <u>Target:</u> Minimize deviation <u>Model Comparison:</u> CSOP Base	Model: SFWMM, ModBranch	Is the PM generally consistent with RECOVER’s PM? RECOVER does not currently apply a PM to evaluate flow direction

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>7.b.iv Deer (panther surrogate): Water depths above 18 inches limits the movement (and therefore access to fresh browse) of deer in the Everglades marshes.</p>	<p><u>Metric</u>: Water depth and duration <u>Target</u>: The continuous duration of water depths over 18 inches used as a conservative measure of the conditions that limit deer movement. Particular focus is placed on duration exceeding 40 days of water depths exceeding 18 inches as research has shown this to be the threshold for malnutrition impacts, and the duration exceeding 60 days which research has shown to be the duration sufficient to cause catastrophic impacts on deer health and survival. <u>Model Comparison</u>: Return frequencies compared for the different alternatives</p>	<p>Model: SFWMM, NSM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER suggests clarifying which habitat this PM will be applied to. Additionally, if the purpose of this PM is to act as a panther surrogate, then marl areas should be included for evaluation. Sonny Bass, ENP, may provide data supporting panther use of marl areas. During marsh high water events deer in ENP move to Pinelands rather than congregating on tree islands as in WCA-3. (Bass and Armentano).</p>
<p>7.b.v White-tailed deer – breeding potential (Proposed addition/replacement if different)</p>	<p><u>Metric</u>: See RET ATLSS-E4</p>	<p>Model: ATLSS</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER ATLSS Performance Measures are not currently available for evaluation.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>7.b.v.i Phosphorus Transport by Soil Oxidation: During prolonged droughts, soil in the WCAs oxidizes by normal drying and/or fire which releases phosphorus bound in the sediments. At the onset of the next wet season, this phosphorus is transported to downstream areas. Water level depths below ground during 30-day droughts beyond what is expected of NSM are reviewed.</p>	<p><u>Metric</u>: Frequency <u>Target</u>: Minimize # days below round surface <u>Model Comparison</u>: CSOP Base Toward NSM</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER does not currently apply a PM to evaluate soil oxidation</p>
<p>7.b.vii Tree islands (RET) – Species richness suitability (Proposed addition or replacement)</p>	<p><u>Metric</u>: See RET GE-E6</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>This RECOVER PM was developed for the WCA and may not be appropriate for ENP. Tree islands within ENP require different conditions than those in WCA-3 for example. Currently, this RECOVER PM is not applied to ENP.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
7.b.viii Tree islands (SFWMD) – Species richness suitability + drought/flood index	<u>Metric:</u> See Habitat Suitability Indices – December 18, 2003 Draft, Chapter 4: Tree Island Habitat Suitability Index	Model:	Is the PM generally consistent with RECOVER’s PM? RECOVER recognizes some issues with HSI PMs in their current state. RECOVER suggests this PM not be used for evaluation until it is revised. In the meantime, RECOVER GE-E6 has been developed based on the same research supporting the Tree Island HSI. It may be more appropriate in this case.
7.b.ix Long-legged wading birds - foraging conditions: (Propose replacing “wading birds”)	<u>Metric:</u> See RET ATLSS-E2	Model: ATLSS	Is the PM generally consistent with RECOVER’s PM? YES RECOVER ATLSS Performance Measures are not currently available for evaluation.
7.b.x Short-legged wading birds - foraging conditions: (Propose replacing “wading birds”)	<u>Metric:</u> See RET ATLSS E-3	Model: ATLSS	Is the PM generally consistent with RECOVER’s PM? YES RECOVER ATLSS Performance Measures are not currently available for evaluation.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
VOLUME			
<p>7.c.i Dry, average, wet year drought/flood hydroperiod Maps: These maps should be produced relative to +1.0ft, ground surface, and -.5ft. They can also be plotted as hydroperiod differences to highlight differences between alternatives (using same transects as the transect description described above)</p>	<p><u>Metric:</u> Hydroperiod <u>Target:</u> Toward NSM shape of the curve <u>Model Comparison:</u> Compare to CSOP base, NSM target, and current conditions</p>	<p>Model: Modbranch, SFWMM average year, '89 and '95</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. A target of moving toward NSM shape of the curve may be more appropriate.</p>
<p>7.c.ii Increase in above and below ground storage in NESS: Change in average annual cubic-ft storage</p>	<p><u>Metric:</u> Acre-ft of water in storage per year <u>Target:</u> Maximize towards NSM shape of the curve <u>Model Comparison:</u> CSOP Base</p>	<p>Model: ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. A target of moving toward NSM shape of the curve may be more appropriate. Additionally, evaluating storage may not be appropriate as a measure of project performance.</p>
<p>7.c.iii Distribution of Flow into and within ENP</p>	<p><u>Metric:</u> Frequency distribution of flow along transect (wet season, dry season, total) <u>Target:</u> Toward NSM shape of the curve <u>Model Comparison:</u> CSOP Base, NSM</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. A target of moving toward NSM shape of the curve may be more appropriate.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
7.c.iv Distribution of Flow into and within ENP	<u>Metric</u> : Frequency distribution of ratio of surface water flows east and west of L-67 <u>Target</u> : NSM shape of the curve <u>Model Comparison</u> : CSOP Base, NSM	Model: SFWMM, NSM	Is the PM generally consistent with RECOVER's PM? RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. A target of moving toward NSM shape of the curve may be more appropriate.
7.c.v Shark River Slough – Number and duration of dry events	<u>Metric</u> : See RET GE-E1	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES
7.c.vi Greater Everglades wetlands – Extreme high/low water levels	<u>Metric</u> : See RET GE-E3	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES
7.c.vii Greater Everglades wetlands – Seasonal and annual flow volumes	<u>Metric</u> : See RET GE-E4	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES
Additional Objective: Future Restoration Actions. Maximize compatibility with future authorized restoration			
<p>RECOVER suggests the PDT look at RET PMs for Biscayne Bay to ensure there are no environmental impacts due to project implementation.</p> <p>RECOVER suggests hydrological PMs be applied across the project area landscape including WCA-2A and WCA-2B which is apparently not now being considered. The change in tailwater conditions in WCA-3A due to CSOP could potentially affect the outflow from the S-10s discharging from WCA-2A. The GE-E1 thru GE-E4 PMs from RECOVER would be logical choices of hydrological PMs to use, and would capture much of the same information that is being sought by the use of a multitude of other PMs.</p>			

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
Additional Objective: Natural Values of WCA-3A. Protect the natural values of WCA-3A			
<p>A7.i Deer (panther surrogate): Water depths above 18 inches limits the movement (and therefore access to fresh browse) of deer in the Everglades marshes.</p>	<p><u>Metric:</u> Water depth and duration <u>Target:</u> The continuous duration of water depths over 18 inches used as a conservative measure of the conditions that limit deer movement. Particular focus is placed on duration exceeding 40 days of water depths exceeding 18 inches as research has shown this to be the threshold for malnutrition impacts, and the duration exceeding 60 days which research has shown to be the duration sufficient to cause catastrophic impacts on deer health and survival. <u>Model Comparison:</u> Return frequencies compared for the different alternatives</p>	<p>Model: SFWMM, NSM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER suggests clarifying which habitat and location this PM will be applied to. Additionally, success of this PM may result in larger deer herds in WCA.</p>
<p>A7.ii White-tailed deer – breeding potential (Proposed addition/replacement if different)</p>	<p><u>Metric:</u> See RET ATLSS-E4</p>	<p>Model: ATLSS</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER ATLSS Performance Measures are not currently available for evaluation. Success of this PM may result in larger deer herds in WCA.</p>
<p>A7.iii.1 Fish and Invertebrates: Decrease the frequency and number of reversals and increase the duration of inundation in Taylor Slough WCA-3A</p>	<p><u>Metric:</u> Minimum depth <u>Target:</u> Maintain below-ground water levels no lower than ground surface elevation <u>Model Comparison:</u> Compare with NSM</p>	<p>Model: NSM, SFWMM, ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>Due to topography, water depth may not be the best target for this area. RECOVER suggests the PDT look at RET PMs GE-2, GE-E3, and GE-E4 for potential targets.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>A7.iii.2 Fish and Invertebrates: Decrease the frequency and number of reversals and increase the duration of inundation in Taylor Slough WCA-3A</p>	<p><u>Metric</u>: No of consecutive days Depth < ground surface elevation <u>Target</u>: Maintain minimum depths in the sloughs that support larger fish species (at least 1.0 feet for 12 months/year in average to wet years). <u>Model Comparison</u>: Compare with NSM</p>	<p>Model: NSM, SFWMM, ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM? RECOVER does not have a PM for minimum water depth and a duration of 365 days per year may be too long. Application to wet years only may be more appropriate as suggested. RECOVER suggests the PDT look at RET PMs GE-2 and GE-E3 for potential targets.</p>
<p>A7.iii.3 Fish and Invertebrates: Decrease the frequency and number of reversals and increase the duration of inundation in Taylor Slough</p>	<p><u>Metric</u>: number of times that depth is < 1 foot above ground surface in Sloughs <u>Target</u>: Toward NSM <u>Model Comparison</u>: Compare with NSM</p>	<p>Model: NSM, SFWMM, ModBranch</p>	<p>Is the PM generally consistent with RECOVER's PM? RECOVER does not have a PM for minimum water depth or reversals. Additionally, RECOVER recognizes that many effects or differences can not be seen in Taylor Slough using the SFWMM.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>A7.iv Wood Stork: Potential foraging habitat for wood stork. For this analysis wood stork habitat is defined as the number of acres with a depth of water between 0.1 and 0.25 meters.</p>	<p><u>Metric</u>: Acres wood stork habitat from November 1 and May 15 <u>Target</u>: Modeled water depths will be analyzed throughout the study area to determine where potential stork habitat would be found and how that habitat would be changed by each alternative relative to the base, current conditions and NSM. Alternatives will be qualitatively ranked by including predicted foraging habitat and a determination of sustained habitat availability with a minimum of disruptions (abrupt changes) to that availability. <u>Model Comparison</u>: Plotted curves of adequate wood stork foraging habitat.</p>	<p>Model: SFWMM, MBR, and NSM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p> <p>Although RECOVER does not have a performance measure specifically for Wood Stork, they are included in RECOVER PM GE-E20: Long-legged wading bird foraging conditions. GE-E20 is a RECOVER ATLSS Performance Measures and is not currently available for evaluation. RECOVER would like to note that 0.1 and 0.25 meters is within the error of the SFWMM and NSM does not appear to accurately reflect marl habitat.</p>
<p>A7.v Snail kite – Foraging habitat vegetation structure (Proposed replacement if different)</p>	<p><u>Metric</u>: See RET GE-E18</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER suggests this PM include occasional drydowns which have been shown by Bennetts to be necessary for habitat maintenance. The PDT may consider using RECOVER PM GE-E18: Snail Kite Habitat Foraging Structure, which includes these drydowns.</p>
<p>A7.vi Greater Everglades wetlands – Extreme high/low water levels</p>	<p><u>Metric</u>: See RET GE-E3</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM? YES</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
A7.vii Greater Everglades wetlands – Seasonal amplitude and interannual variability of water levels	<u>Metric:</u> See RET GE-E4	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? YES
A7.viii Greater Everglades wetlands – Seasonal and annual flow volumes	<u>Metric:</u> See RET GE-E5	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? RECOVER has recently tabled PM GE-E5 due to high levels of uncertainty.
Constraints: Federally Listed Species. Minimize adverse effects to federally listed species under the Endangered Species Act			
C1.i CSSS nesting requirements: Return frequencies for number of consecutive days with water levels below 6.0 feet at gage NP-205 between March 1 and July 15 (sub- population A)	<u>Metric:</u> Number of days water levels are below ground surface between March 1 and July 15 <u>Target:</u> For sub-population A, 60 consecutive days below 6.0 feet at NP-205 days in all years (all return periods) is the condition considered most desirable. <u>Model Comparison:</u> Return frequencies compared	Model: SFWMM	Is the PM generally consistent with RECOVER's PM? RECOVER does not have a performance measure to evaluate CSSS.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>C1.ii CSSS - habitat suitability: Return frequencies for number of days per year that one can expect CSSS habitats to be flooded.</p>	<p><u>Metric</u>: Days below ground between March 1 and July 15 <u>Target</u>: For the purposes of this evaluation: 0-2 month discontinuous hydroperiod - not expected to support vegetation favorable to CSSS nesting; 2-4 month discontinuous hydroperiod - considered favorable and supportive of Muhlenbergia dominated habitat; 4-6 month discontinuous hydroperiod - considered good for other vegetation favorable to CSSS nesting; > 6 month discontinuous hydroperiod - not expected to support vegetation favorable to CSSS nesting. <u>Model Comparison</u>: Return frequencies compared</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER does not have a performance measure to evaluate CSSS. However, RECOVER suggests the Metric for this PM read "Annual Discontinuous Hydroperiod"</p>
<p>C1.iii Wood Stork: Potential foraging habitat for wood stork. For this analysis wood stork habitat is defined as the number of acres with a depth of water between 0.1 and 0.25 meters.</p>	<p><u>Metric</u>: Acres wood stork habitat from November 1 and May 15 <u>Target</u>: Modeled water depths will be analyzed throughout the study area to determine where potential stork habitat would be found and how that habitat would be changed by each alternative relative to the base, current conditions and NSM. Alternatives will be qualitatively ranked by including predicted foraging habitat and a determination of sustained habitat availability with a minimum of disruptions (abrupt changes) to that availability. <u>Model Comparison</u>: Plotted curves of adequate wood stork foraging habitat.</p>	<p>Model: SFWMM, ModBranch, and NSM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>Although RECOVER does not have a performance measure specifically for Wood Stork, they are included in RECOVER PM GE-E20: Long-legged wading bird foraging conditions. GE-E20 is a RECOVER ATLSS Performance Measures and is not currently available for evaluation. Recover would like to note that 0.1 and 0.25 meters is within the error of the SFWMM and NSM does not appear to accurately reflect marl habitat.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>C1.iv Wood Stork: It has been shown that the timing of stork colony formation influences colony success rates, and that earlier colonies are more likely to be successful than are later forming colonies. It has also been shown that stork colonies in the park form earlier in years when extensive areas of the higher elevation, marl prairie marshes are flooded during the early dry season (November-December) than in years when these prairies are dry in these months. This performance measure looks at surface water flooding during November and December in the marl prairie portion of the project study area.</p>	<p><u>Metric</u>: Number of acres flooded during November and December <u>Target</u>: Target is NSM. The preferred alternative will be the plan that shows the greatest increase in flooded cells for the marl prairies in November and December. <u>Model Comparison</u>: In maps and tables this evaluation will compare predicted changes in the number of cells located in the marl prairie portion of the study area that show surface water flooding during November and December. Comparisons will be made between alternatives, base, current conditions, and NSM.</p>	<p>Model: ModBranch providing conditions for a wet year, dry year, and a normal rainfall year.</p>	<p>Is the PM generally consistent with RECOVER's PM? NO</p> <p>Rather than using NSM as a target for this PM, RECOVER suggests the PDT look at the possibility of using a relationship with the marl prairie PMs to define the target. If marl prairies PM perform as desired, it could be assumed that there will be a corresponding improvement in wood stork habitat.</p>
<p>C1.v Snail Kite: Potential foraging habitat for snail kite. For this analysis this performance measure estimates the number of acres with water depth between 0.2 and 1.3 meters for greater than 360 days/year.</p>	<p><u>Metric</u>: Acres Snail Kite habitat <u>Target</u>: Modeled water depths will be analyzed throughout the study area to determine where potential snail kite habitat would be found and how that habitat would be changed by each alternative relative to the base, current conditions and NSM shape of the curve. <u>Model Comparison</u>: Table of acres of suitable snail kite habitat by basin, for each alternative, base, current conditions and NSM.</p>	<p>Model: Modbranch, SFWMM and NSM</p>	<p>Is the PM generally consistent with RECOVER's PM? NO</p> <p>RECOVER suggests the target for this PM may be inconsistent. Note that a water depth of 1.3 meters may be too deep for snail kite foraging habitat. Some drydowns are also considered necessary for habitat maintenance. RECOVER suggests the PDT consider replacing this PM with RET PM GE-17 and GE-18</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>C1.vi Manatees and Crocodiles: The frequency of input of annual flow volumes towards Shark Slough estuaries.</p>	<p><u>Metric</u>: Frequency across transect. Crops - salinity regimes for juvenile development <u>Target</u>: NSM shape of the curve. <u>Model Comparison</u>: Relative frequency compared to NSM (volume and shape of the curve).</p>	<p>Model: SFWMM and NSM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. RECOVER suggests reviewing C-111 Spreader PM EC3.1 for possible use or adapting RET PMs based on salinity/stage relationships. (RET PM SE-E2) Targets from Restudy crocodile pm could be used with new stage/salinity methods.</p>
<p>C1.vii Manatees and Crocodiles: The distribution of mean monthly freshwater flow volumes into Shark Slough.</p>	<p><u>Metric</u>: Distribution across transect. Crops - juvenile dispersal in estuaries <u>Target</u>: NSM shape of the curve; October – December <u>Model Comparison</u>: Monthly distribution compared to NSM (volume and distribution pattern)</p>	<p>Model: SFWMM and NSM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER has recently tabled PMs based on flow volume across transect due to high levels of uncertainty. RECOVER suggests reviewing C-111 Spreader PM EC3.1 for possible use or adapting RET PMs based on salinity/stage relationships. (RET PM SE-E2 on www.evergladesplan.org) Targets from Restudy crocodile pm could be used with new stage/salinity methods (McSharry)</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
Constraint: State Listed Species. Minimize adverse effects to state listed endangered or threatened species or species of special concern consistent with Florida Statutes and regulations			
C2.i State listed species to be provided by FWCC	Metric: Target: Model Comparison:	Model: ATLSS, Wading Bird HSI	Is the PM generally consistent with RECOVER's PM? RECOVER ATLSS Performance Measures are not currently available for evaluation. RECOVER has also tabled the RET HSI PMs for more refinement.
Constraint: Water Quality Standards. Meet applicable water quality standards.			
Since the below WQ PMs deal with Phosphorus, RECOVER suggests modifying the objective to read "Meet applicable water quality standards for P".			
C3.i Phosphorus Transport by Soil Oxidation: During prolonged droughts, soil in the WCAs oxidizes by normal drying and/or fire which releases phosphorus bound in the sediments. At the onset of the next wet season, this phosphorus is transported to downstream areas. Water level depths below ground during 30-day dryouts beyond what is expected of NSM are reviewed.	Metric: Frequency Target: Minimize oxidation of organic soils Model Comparison: CSOP Base, NSM	Model: SFWMM, Modbranch	Is the PM generally consistent with RECOVER's PM? Suggest clearly indicating in the PM title that this is a hydrologic surrogate for WQ.

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>C3.ii Origin of S-356 Flows: S-356 is to be constructed to pump water into NESS. Marsh seepage water in L-30 from WCA-3 and WCA-2 is of good quality and should be returned to the Everglades. However, urban stormwater runoff generated east of G-119/G-380 in the C-4 canal is of poor quality and should not be discharged into the Everglades. 0% of flow being pumped from S-356 should pass through the G-119/G-380 structure.</p>	<p>Metric: Percentage of S-356 flows that passed through S-336. Target: 0% of flow through S-356 passes through S-336. Model Comparison: CSOP Base</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>Suggest clearly indicating in the PM title that this is a hydrologic surrogate for WQ.</p>
<p>C3.iii Water Quality Impacts: Total Phosphorus loading</p>	<p>Metric: Mean annual combined S-151 & S-349's structure inflows Target: No increase in loading for flows delivered to WCA 3B and the Southern Glades WEA Model Comparison: CSOP Base</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>Suggest clearly indicating in the PM title that this is a hydrologic surrogate for WQ. Although, there is no RECOVER PM for loading to the GE area, this EC is consistent with GE-E8 and GE-E9. Additionally, RECOVER suggests S-349 structure inflows be broken out into a separate metric. A link to water levels might also improve this PM.</p>

EVALUATION CRITERIA	PROJECT PM TARGET	EVAL METHOD	COMMENTS
<p>C3.iv Water Quality: Monitor concentrations of TP at new discharge points into WCA-3b</p>	<p>Metric: Concentrations in mg/L Target: State Class III Surface Water Quality Standards for flows delivered to unimpacted areas of the Everglades as required by the Everglades Forever Act Model Comparison: Compare to CSOP Base and current condition</p>	<p>Model:</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>This EC is consistent with GE-E7 and GE-A14 in that TP concentrations should not exceed 10 ppb. However, RECOVER suggests the target language be modified to read "applicable water quality standards for P for flows delivered..."</p>
<p>Constraint: Original C&SF Purpose. Maintain the Original Purpose of the C&SF Project</p>			
<p>C4.i Frequency of LEC SA3 Water Restrictions: Calculate and compare the number of water supply restrictions for LEC SA3</p>	<p>Metric: Table showing number of months (rows) with each year (column) that water shortages occur (in water years) Target: Maintain present LOS for LEC SA3 users Model Comparison: CSOP Base and current conditions (IOP)</p>	<p>Model: SFWMM</p>	<p>Is the PM generally consistent with RECOVER's PM?</p> <p>RECOVER suggests the PDT look at RECOVER PMs WS-E4, WS-E5, and WS-E2 for possible applicability.</p>
<p>C4.ii Water Supply: Total volume of water delivered to SDCS during major drought periods (1989-90, 2000-2001)</p>	<p>Metric: Target: Model Comparison:</p>	<p>Model:</p>	<p>Is the PM generally consistent with RECOVER's PM?</p>
<p>C4.iii Water Supply: Flows delivered to S18C to C-111 spreader canal</p>	<p>Metric: Target: Model Comparison:</p>	<p>Model:</p>	<p>Is the PM generally consistent with RECOVER's PM?</p>