Appendix 7-1: Summary of Systemwide Evaluation and Assessment Performance Measures

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Performance measures are the quantitative and qualitative indicators used to determine the degree to which alternative plans are likely to meet restoration objectives or to which implemented plans have met restoration objectives. The Comprehensive Everglades Restoration Plan (CERP) performance measures identify the systemwide hydrological, biological, and water quality indicators that are expected to be responsive to the implementation of the plan. These indicators in South Florida will be monitored in order to predict and to determine how well the CERP meets its goals. The draft Performance Measure Documentation Report (RECOVER [Restoration Coordination and Verification], 2003) contains all of the systemwide performance measures developed by the RECOVER teams as of April 30, 2003. This report describes two categories of CERP performance measures consisting of evaluation measures and assessment measures. Currently, 40 evaluation and 73 assessment systemwide performance measures have been developed and approved by RECOVER. The performance measures for both categories are summarized in the following sections.

SUMMARY OF EVALUATION PERFORMANCE MEASURES

The systemwide evaluation performance measures are summarized in **Table 1**. They are arranged by the four major physical features/landscape types in the CERP's study area plus water supply and flood protection. This table indicates the reference number, title, and source for the performance measure (the conceptual ecological model, law, or other source), the tool used to evaluate the measure (usually a computer model), and the evaluation target. This table provides a quick overview of all evaluation measures that will be applied for systemwide evaluations.

Table 1. Evaluation systemwide performance measures.

Reference Number	Title	Source	Evaluation Tool	Target
NE-E1	St. Lucie Salinity Envelope	St. Lucie Estuary and Indian River Lagoon CEM stressor	SFWMM	Low flow target of 207 months. No Lake Okeechobee regulatory discharges. No more than 21 months of mean monthly flows between 2,000 and 3,000 cfs. No more than 12 months of mean monthly flows of greater than 3,000 cfs.
NE-E2	Lake Worth Lagoon Salinity Envelope	C&SF Restudy	SFWMM	Inflow to achieve 23-35 ppt salinity (0-500 cfs).
NE-E3	Caloosahatchee Estuary Salinity Envelope	Caloosahatchee Estuary CEM stressor Chapter 62-303.400, F.A.C.	SFWMM	Freshwater discharges from the C-43 canal at the S79 structure to be maintained between 300 and 2,800 cfs. < 70 months with mean monthly flow < 300 cfs (basin runoff or S-79). Months with low flow should occur in the dry season (November through May). < 7 months with mean monthly flows > 4,500 cfs. < 26 months with mean monthly flows > 2,800 cfs (local basin runoff). No months with mean monthly flows > 2,800 cfs from Lake Okeechobee regulatory releases.
LO-E1	Lake Okeechobee Extreme Low Lake Stage	Lake Okeechobee CEM stressor	SFWMM	No events below 11 ft.
LO-E2	Lake Okeechobee Prolonged Moderate Low Lake Stage	Lake Okeechobee CEM stressor	SFWMM	No events below 12 ft >12 month.
LO-E3	Lake Okeechobee Extreme High Lake Stage	Lake Okeechobee CEM stressor	SFWMM	No events above 17 ft.
LO-E4	Lake Okeechobee Prolonged Moderate High Lake Stage	Lake Okeechobee CEM stressor	SFWMM	No event above 15 ft >12 month.
LO-E5	Spring Recession for Lake Okeechobee	Lake Okeechobee CEM stressor	SFWMM	Yearly stage decline from near 15.5 ft to near 12.5 ft, January to June, with no reversal >0.5 ft/month.
LO-E6	Lake Okeechobee TP Concentrations	Lake Okeechobee CEM stressor	LOWQM	Pelagic TP long-term average below 40 ppb.

Reference Number	Title	Source	Evaluation Tool	Target
LO-E7	Lake Okeechobee TN:TP Ratio	Lake Okeechobee CEM stressor	LOWQM	Pelagic TN: TP long-term average mass ratio higher than 22:1.
LO-E8	Lake Okeechobee Diatom: Cyano-bacteria Ratio	Lake Okeechobee CEM attribute	LOWQM	Long-term pelagic biovolume ratio (diatom: cyanobacteria) above 1.5:1.
LO-E9	Lake Okeechobee Algal Bloom Frequency	Lake Okeechobee CEM attribute	LOWQM	Fewer than 5% of daily chlorophyll *a* values > 40 ppb.
GE-E1	Number and Duration of Dry Events for Shark River Slough	Everglades Ridge and Slough CEM stressor	SFWMM	NSM version 4.6 prediction for the number of times and mean duration in weeks that water drops below ground for the indicator regions in Shark River Slough.
GE-E2	Inundation Pattern in the Greater Everglades Wetlands	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, and Big Cypress CEM stressor	SFWMM	The range of weeks of inundation and the number of inundation events or an envelope for the duration and number of inundation events that meet the NSM version 4.6 output for cells in the model categorized by landscape type. For WCA-1, the target is the existing condition (2000 Base). Corbett, Rotenberger, and Holey Land Wildlife Management Areas will have non-NSM based targets that will be set independently.
GE-E3	Extreme High and Low Events in the Greater Everglades Wetlands	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, and Big Cypress CEM stressor	SFWMM	Range for total duration of extreme high and low water events in weeks and the number of extreme high and low water events or an envelope of occurrences that meet the NSM version 4.6 output for cells in the model categorized by landscape type. For WCA-1 and Corbett Wildlife Management Area, the targets are the existing condition (2000 Base). Rotenberger and Holey Land Wildlife Management Areas will have non-NSM based targets.

Reference Number	Title	Source	Evaluation Tool	Target
GE-E4	Seasonal Amplitude and Interannual Variability of Water Levels in the Greater Everglades Wetlands	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, and Big Cypress CEM stressor	SFWMM	The target is 0% difference from NSM seasonal variation for each indicator region.
GE-E5	Seasonal and Annual Flow Volume in the Greater Everglades Wetlands	Total System CEM stressor	SFWMM	The percentage deviation of average monthly, seasonal, and annual flow volume computed from flows across selected groups of transects compared to flows predicted by NSM version 4.6 must be less than 10%.
GE-E6	Species Richness Suitability for Everglades Tree Islands	Everglades Ridge and Slough, and Marl Prairie and Rocky Glades CEM stressor	SFWMM	Minimize the deviation from NSM version 4.6.
GE-E7	Greater Everglades Wetlands TP Concentrations in Surface Water	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuarine Transition Zone, and Big Cypress CEM stressor	ELM	The TP concentration is not to exceed 10 µg/L for both the annual mean concentration at ponded surface water monitoring points and the flow-weighted annual mean at water control structures.
GE-E8	Greater Everglades Wetlands Basinwide TP Loading	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuarine Transition Zone, and Big Cypress CEM stressor	ELM	Since phosphorus loading is variable in space, targets can only be indicated for individual basins. However, an example target for WCA 2A would be less than 10 to 15 mt/yr TP via inflow water control structures.
GE-E9	Greater Everglades Wetlands Areal-Based Net TP Loading (Mass/Area)	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuarine Transition Zone, and Big Cypress CEM stressor	ELM	Overland/groundwater net TP loading should not exceed approximately 20 $mg/m^2/yr$.
GE-E10	Tracer of STA Bypass Flows	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuarine Transition Zone, and Big Cypress CEM stressor	ELM	All untreated flows into the Everglades must be minimized. Canal-to-marsh flows of STA bypass-derived water during transit through the Everglades must also be minimized. The target is to approach 0.0 mt/yr load of ELM-simulated conservative tracer load into the Everglades, and approach 0.0 $mg/m^2/yr$ tracer load into marshes from canals when bypasses occur.

Reference Number	Title	Source	Evaluation Tool	Target
GE-E11	Periphyton HSI	Everglades Ridge and Slough, and Marl Prairie and Rocky Glades CEM attribute	HSI and SFWMM	NSM-based target for all areas except Arthur R. Marshall Loxahatchee Wildlife Refuge, where applicable targets are the existing condition (2000 Base).
GE-E12	Alligator HSI	Everglades Ridge and Slough, and Marl Prairie and Rocky Glades CEM attribute	HSI and SFWMM	NSM-based target
GE-E13	Wading Bird HSI	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, and Big Cypress CEM attribute	HSI and SFWMM	The number of weeks where HSI_{land} is less than or equal to 0.5 during the months of March and April do not exceed the number of weeks predicted by the NSM.
GE-E14	Ridge and Slough HSI	Everglades Ridge and Slough CEM attribute	HSI and SFWMM	NSM-based target
GE-E15	Tree Island Flooding/Drought HSI	Everglades Ridge and Slough CEM attribute	HSI and SFWMM	NSM-based target
GE-E16	Fish HSI	Everglades Ridge and Slough CEM attribute	HSI and SFWMM	NSM-based target
GE-E17	Apple Snail Reproduction	Modified Water Deliveries Canals and Levees alternatives Interim Structural Operational Plan (ISOP) Interim Operational Plan (IOP)	SFWMM	Reduced numbers of years in which water levels fall below ground surface prior to May 1.
GE-E18	Snail Kite Foraging Habitat Vegetation Structure	Modified Water Deliveries Canals and Levees alternatives Interim Structural Operational Plan (ISOP) Interim Operational Plan (IOP)	SFWMM	Increased area providing suitable snail kite foraging habitat. Areas providing optimal habitat are most desirable.
SE-E1	Surface Water Discharges to Biscayne Bay	Biscayne Bay CEM stressor	SFWMM	Wet/Dry Season **Snake Creek** - 66,500/93,000 ac-ft **North Bay** - 99,000/41,000 ac-ft **Miami River** - 132,000/60,000 ac-ft **Central Bay** - 161,000/83,000 ac-ft **South Bay** - 158,000/68,000 ac-ft

Reference Number	Title	Source	Evaluation Tool	Target
SE-E2	Salinity in Florida Bay Coastal Basins Estimated from Upstream Water Stages	Florida Bay CEM stressor	SFWMM	Predicted stages at gauge NP67 and gauge P33 that produce lower and upper salinity levels in coastal basins: NP67 Lower/Upper **Joe Bay -** 2.63 ft/2.04ft **Little Madeira Bay** - 2.82 ft/2.02 ft **Terrapin Bay -** 2.91 ft/1.92 ft **Garfield Bight -** 2.99 ft/1.97 ft P33 Lower/Upper **North River Mouth -** 7.1 ft/6.2 ft
SE-E3	Freshwater Flow to Biscayne Bay from the Miami River	Outstanding Florida Waters, 62-302.700(9), F.A.C.; SWIM Act, 373.453(1)(c)1, F.S.	SFWMM	A total flow discharged through S-26+S-25B+S-25 over a 7-day period of 3,000 ac-ft 80% of the time and a daily flow rate through S-26+S-25B+S-25 less than 50 cfs (99 ac-ft) less than 10% of the time.
TS-E1	Continuity - Water Surface Elevations Across Barriers	Total System CEM stressor	SFWMM	Water surface elevation differences across a selected set of barrier similar to that predicted by the NSM. Differences of more than one depth class from NSM predictions are considered poor.
WS-E1	Frequency of Water Restrictions for the Lake Okeechobee Service Area	373.0361(2)(a)(1), F.S.	SFWMM	Provide at least a 1-in-10 level of service as indicated by simulations by the SFWMM in which three or less water years in the 31-year simulation period have water shortages in which significant supply-side management cutbacks are necessary.
WS-E2	Frequency of Water Restrictions for the Lower East Coast Service Area	373.0361(2)(a)(1), F.S.	SFWMM	Provide at least a 1-in-10 level of service as indicated three or less water years simulated with regionally significant water shortages in the 36-year evaluation period.
WS-E3	Potential for High Water Levels in South Miami-Dade Agricultural Area	C&SF Restudy	SFWMM	The target (goal) is not to exceed the daily stage duration curve taken from the model calibration and validation runs for each of the six indicator cells in the southern Dade area, based on the stage hydrographs from 1983 to 1993.

Reference Number	Title	Source	Evaluation Tool	Target
WS-E4	Prevent Saltwater Intrusion of the Biscayne Aquifer - Meet MFL Criteria for Biscayne Aquifer	373.044, F.S.	SFWMM	**Canal at Structure - Canal Stage (ft NGVD)** C-51 at S155 - 7.80 C-16 at S41 - 7.80 C-15 at S40 - 7.80 Hillsboro Canal at G56 - 6.75 C-14 at S37B - 6.50 C-13 at S36 - 4.00 North New River at G54 - 3.50 C-9 at S29 - 2.00 C-6 at S26 - 2.50 C-4 at S25B - 2.50 C-2 at S22 - 2.50
WS-E5	Prevent Saltwater Intrusion of the Biscayne Aquifer in South Miami-Dade County	C&SF Restudy	SFWMM	**Canal at Structure - Canal Stage (ft NGVD)** C-100A at S123 - 2.00 C-1 at S21 - 2.00 C-102 at S21A - 2.00 C-103 at S20F - 2.00
WS-E6	Comparison of Stage Differences of Water Levels in South Miami-Dade Agricultural Area	Interim Operational Plan (IOP)	SFWMM	Do not exceed the flood protection/risk that occurred during the ISOP 2001 operations.

SUMMARY OF ASSESSMENT SYSTEMWIDE PERFORMANCE MEASURES

The systemwide assessment performance measures are presented in **Table 2**. They are arranged by the four major physical features/landscape types in the CERP's study area plus water supply and flood protection. This table indicates the reference number, title, and source for the performance measure (the conceptual ecological model, law, or other source) and the restoration expectation. (Additional information also can be found in the draft CERP Monitoring and Assessment Plan [RECOVER, 2003]). This table provides a quick overview of all assessment measures that will be applied to develop the RECOVER adaptive assessment reports.

Table 2. Assessment systemwide performance measures.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
NE-A1	St. Lucie Estuary Salinity Envelope	St. Lucie Estuary and Indian River Lagoon CEM stressor	Northern Estuaries 3.3.3.1	Reestablish a salinity range most favorable to juvenile marine fish, shellfish, oysters, and SAV. This is estimated at 12 to 20 ppt for oysters.
NE-A2	Lake Worth Lagoon Salinity Envelope	C&SF Restudy	Northern Estuaries	Minimum salinity of 15 to 18 ppt.
NE-A3	Caloosahatchee Estuary Salinity Envelope	Caloosahatchee Estuary CEM stressor	Northern Estuaries 3.3.3.1	Reestablish a salinity range most favorable to juvenile marine fish, shellfish, oysters and SAV. This is estimated at 12 to 20 ppt for oysters. To maintain this salinity range, mean monthly flow needs to range between 300 and 800 cfs.
NE-A4	Loxahatchee River Estuary Salinity Envelope	Loxahatchee MFL documentation and C&SF Restudy	Northern Estuaries	Minimum inflow to achieve a bottom salinity of 2 ppt at the Jonathon Dickinson State Park boat ramp. This target should correspond with the Loxahatchee Lagoon salinity envelope target of 23 ppt.
NE-A5	Northern Estuaries Oysters	Caloosahatchee Estuary, and St. Lucie Estuary and Indian River Lagoon CEM attribute	Northern Estuaries 3.3.3.6	Provide 1,400 ac of suitable oyster habitat in the St. Lucie Estuary. Increase the abundance and health of oysters, restore oyster beds in suitable habitat, and maintain habitat function of oyster beds for fish, crabs, and birds in the Caloosahatchee Estuary.
NE-A6	St. Lucie Estuary Macro-invertebrates	St. Lucie Estuary and Indian River Lagoon CEM attribute	Northern Estuaries 3.3.3.8	Increase species richness, abundance, and diversity of benthic species in the St. Lucie Estuary to that typically found in a healthy estuarine community.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
NE-A7	Northern Estuaries Fish Communities	Caloosahatchee Estuary, and St. Lucie Estuary and Indian River Lagoon CEM attribute	Northern Estuaries 3.3.3.7	Restore estuarine fish assemblages with abundance, taxonomic composition, diversity, and representation of life stages characteristic of targeted salinity regimes for each estuary. Decrease fish abnormalities to less than 1% in the St. Lucie Estuary. Maintain or enhance SAV habitat for juvenile fish.
NE-A8	Northern Estuaries Submerged Aquatic Vegetation	Caloosahatchee Estuary, and St. Lucie Estuary and Indian River Lagoon CEM attribute	Northern Estuaries 3.3.3.3 - 3.3.3.5	For the South Indian River Lagoon and St. Lucie Estuary, increase cover of SAV beds to areas that are less than 1.7 m in depth. The St. Lucie Estuary has about 922 ac of suitable habitat (0% colonized). South Indian River Lagoon has 19,799 ac of suitable habitat, of which 7,808 ac (39%) are already colonized by seagrass. Maintain flows needed to achieve the proper salinity range for SAV within all northern estuaries.
NE-A9	Manatee Population Abundance, Distribution and Health in Caloosahatchee Estuary and Canals	Caloosahatchee Estuary CEM attribute	Northern Estuaries	Maintain and enhance current habitat and foraging areas for manatees in the Caloosahatchee Estuary and in canals to promote species recovery, especially near the Florida Power and Light warm water refugia. Manatee habitat values in canals should be maintained or enhanced, as reflected by continued use of canals by manatees. Decrease manatee deaths in categories "undetermined" and "calves".
NE-A10	Caloosahatchee Estuary Nutrient (TP and TN) Concentrations	Caloosahatchee Estuary CEM stressor	Northern Estuaries 3.3.3.2	- - -
NE-A11	St. Lucie Estuary Nutrient (TP and TN) Concentrations	St. Lucie Estuary and Indian River Lagoon CEM stressor	Northern Estuaries 3.3.3.2	The TP concentration of 81 ppb at the Roosevelt Bridge (50% reduction). Reduce current TN concentrations by 30%.
NE-A12	South Indian River Lagoon Nutrient (TP and TN) Concentrations	St. Lucie Estuary and Indian River Lagoon CEM stressor	Northern Estuaries 3.3.3.2	The targets are 0.053 mg/L TP and 0.692 mg/L TN.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
NE-A13	Loxahatchee River Estuary Nutrient (TP and TN) Concentrations	- - -	Northern Estuaries 3.3.3.2	Reduce or maintain TP concentrations lower than the statewide average of 0.080 mg/L. Reduce TN concentrations to 0.70 mg/L.
NE-A14	Lake Worth Lagoon Nutrient (TP and TN) Concentrations	- - -	Northern Estuaries 3.3.3.2	Do not increase the TP and TN concentrations in the Lake Worth Lagoon.
NE-A15	Northern Estuaries Algal Bloom Frequency	Caloosahatchee Estuary, and St. Lucie Estuary and Indian River Lagoon CEM attribute	Northern Estuaries 3.3.3.2	Restore conditions in the St. Lucie Estuary so that the frequency of algal blooms is reduced and the severity of peak estuarine algal blooms does not exceed 15 ppb chlorophyll *a* at any time. Do not increase algal bloom frequency in the Caloosahatchee Estuary. Continued absence of algal blooms in the Loxahatchee River Estuary.
NE-A16	Northern Estuaries Contaminants (Toxicants and Pathogens)	Caloosahatchee Estuary, and St. Lucie Estuary and Indian River Lagoon CEM stressor	Northern Estuaries 3.3.3.2	Geographic extent and degree of sediment toxicity should not increase.
NE-A17	Northern Estuaries Water Clarity	Caloosahatchee Estuary, and St. Lucie Estuary and Indian River Lagoon CEM attribute	Northern Estuaries 3.3.3.2	Improve the quality of water released to tide and reduce the quantity of water released to tide such that water clarity is sufficient to promote establishment of seagrasses and other SAV in estuaries. The specific targets for the St. Lucie Estuary are 1.44 Secchi and -1.2 PAR.
LO-A1	Lake Okeechobee Extreme Low Lake Stage	Lake Okeechobee CEM stressor	South Florida Hydrology Monitoring Network 3.5.3.1	No events below 11 ft.
LO-A2	Lake Okeechobee Prolonged Moderate Low Lake Stage	Lake Okeechobee CEM stressor	South Florida Hydrology Monitoring Network 3.5.3.1	No events below 12 ft lasting more than 12 months.
LO-A3	Lake Okeechobee Extreme High Lake Stage	Lake Okeechobee CEM stressor	South Florida Hydrology Monitoring Network 3.5.3.1	No events above 17 ft.
LO-A4	Lake Okeechobee Prolonged Moderate High Lake Stage	Lake Okeechobee CEM stressor	South Florida Hydrology Monitoring Network 3.5.3.1	No event above 15 ft lasting more than 12 months.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
LO-A5	Spring Recession for Lake Okeechobee	Lake Okeechobee CEM stressor	South Florida Hydrology Monitoring Network 3.5.3.1	Yearly stage decline from near 15.5 ft to near 12.5 ft, from January to June, with no reversal > 0.5 ft/month.
LO-A6	Lake Okeechobee Native Vegetation Mosaic - Littoral Plant Communities and Bulrush	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.2	**Littoral Plant Communities -** Recolonization of much of historic coverage areas by spikerush and beakrush. Large reduction of torpedograss and cattail. An increase of 500 to 1,000 ac in the distribution of continuous stands of willow and pond apple trees in areas that are surrounded by open water. **Bulrush -** A nearly continuous and thick band of bulrush located along the lakeward edge of the littoral zone from Clewiston north to the area near the mouth of the Kissimmee River (> 30 mi), and around Kings Bar and Eagle Bay Islands.
LO-A7	Lake Okeechobee Native Vegetation Mosaic - SAV	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.3	Maintain more than 40,000 ac of total SAV in the lake, and more than 20,000 ac of vascular plants (in particular, *Vallisneria* and *Potamogeton*) in most years (excluding years of extreme regional drought).
LO-A8	Lake Okeechobee Fish and Aquatic Fauna (Fish and Invertebrates)	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.5	Increased diversity and extent of forage fish and pollutant-sensitive taxa of invertebrates. For macroinvertebrates, the pelagic zone target is to reduce the relative abundance of pollution-tolerant oligochaetes to near 20%.
LO-A9	Lake Okeechobee Apple Snails and Snail Kite Population and Nesting	Lake Okeechobee CEM attribute	Lake Okeechobee	**Apple Snails -** Increased average population density of apple snails, and reduced occurrence of years when population is decimated by extreme drought. **Snail Kite -** Increased average number of Snail Kite nests in the littoral zone from the 1998 to 2000 value of 3 to a short-term value of approximately 9 nests/yr, and a long-term value of over 11 nests/yr. Have at least one chick fledge from more than 15% of the nests.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
LO-A10	Lake Okeechobee Wading Bird Feeding Aggregations and Nesting	Lake Okeechobee CEM attribute	Greater Everglades Wetlands 3.1.3.12 and 3.1.3.13	Increase the peak number of winter nests to 300 great blue heron, 1,000 great egret, 700 snowy egret, 600 tricolored heron, 800 little blue heron, and 1,000 white ibis.
LO-A11	Lake Okeechobee Fish Population Density, Age Structure and Condition	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.6	Improved density, age structure and condition of black crappie, largemouth bass, and brim in the littoral and nearshore regions of the lake. Reduced relative abundance of gizzard shad, threadfin shad, and blue tilapia.
LO-A12	Lake Okeechobee Alligator Population and Condition	Lake Okeechobee CEM attribute	Greater Everglades Wetlands 3.1.3.15	Maintain present population density and condition of alligators in the lake.
LO-A13	Lake Okeechobee Shoreline Organic Berm	Lake Okeechobee CEM attribute	Lake Okeechobee	Reduce the frequency of occurrence and spatial extent of a berm of dead plant material and sediments along the western lakeshore, with no continuous berm > 1 km in length.
LO-A14	Lake Okeechobee TP Concentration	Lake Okeechobee CEM stressor	Lake Okeechobee 3.4.3.1	Pelagic TP long-term average below 40 ppb.
LO-A15	Lake Okeechobee TN:TP Ratio	Lake Okeechobee CEM stressor	Lake Okeechobee 3.4.3.1	Pelagic TP long-term average ratio higher than 22:1.
LO-A16	Lake Okeechobee Diatom: Cyanobacteria Ratio	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.1	Pelagic long-term pelagic biovolume ratio above 1.5:1.
LO-A17	Lake Okeechobee Algal Bloom Frequency	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.1	Less than 5% of pelagic samples with > 40 ppb chlorophyll *a*.
LO-A18	Lake Okeechobee Water Clarity	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.1	Secchi disk visible on lake bottom in shoreline region from May to September.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
LO-A19	Lake Okeechobee Phosphorus Loads	Lake Okeechobee CEM stressor	Lake Okeechobee 3.4.3.1	105 mt/yr from surface inflows.
LO-A20	Lake Okeechobee Class I Surface Water Quality Standards	Lake Okeechobee CEM attribute	Lake Okeechobee 3.4.3.1	No increase in exceedances of Class I standards due to cumulative effects of CERP projects.
GE-A1	Greater Everglades Wetlands Hydropattern	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuary Transition Zone, and Big Cypress CEM stressor	Greater Everglades Wetlands 3.1.3.1 and South Florida Hydrology Monitoring Network 3.5.3.1 - 3.5.3.3	Restore NSM envelopes throughout the greater Everglades wetlands, except in areas where deviations from NSM have been deemed to be environmentally beneficial
GE-A2	Wetland Landscape Patterns - Freshwater and Estuarine Vegetation Mosaics	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuary Transition Zone, and Big Cypress CEM attribute	Greater Everglades Wetlands 3.1.3.4	Cease loss of pattern, location, directionality, and spatial extent of the greater Everglades wetlands plant communities.
GE-A3	Wetland Landscape Patterns - Ridge and Slough Community Sustainability	Everglades Ridge and Slough CEM attribute	Greater Everglades Wetlands 3.1.3.6	Maintain or restore processes that sustain coexisting tree islands and sloughs in the current ridge and slough landscape.
GE-A4	Wetland Landscape Patterns - Tidal Creek Sustainability	Mangrove Estuary Transition Zone CEM attribute	Greater Everglades Wetlands 3.1.3.7	Maintain and restore processes that recover and sustain tidal creeks.
GE-A5	Wetland Landscape Patterns - Marl Prairie Cape Sable Sparrow Habitat	Marl Prairie and Rocky Glades CEM attribute	Greater Everglades Wetlands 3.1.3.5	Increase number of stable subpopulations from 1 to 3, with one subpopulation west of Shark River Slough and two east of Shark River Slough. Achieve a minimum of approximately 4,000 individuals, with a final restoration target of 6,000 individuals, measured as a five-year running average.
GE-A6	Wetland Trophic Relationships - Regional Populations of Fishes, Crayfish, Grass Shrimp, and Amphibians	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, and Big Cypress CEM attribute	Greater Everglades Wetlands 3.1.3.10 - 3.1.3.11	Recover production and size distributions, abundance, and seasonal densities consistent with predrainage (NSM) hydropatterns and salinities in freshwater and estuarine wetlands.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
GE-A7	Wetland Trophic Relationships - Wading Bird Foraging Patterns in Overdrained Wetlands	Marl Prairie and Rocky Glades CEM attribute	Greater Everglades Wetlands 3.1.3.12	Increase flock sizes and numbers of birds foraging in overdrained southern marl prairies.
GE-A8	Wetland Trophic Relationships - Wading Bird Nesting Patterns	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuary Transition Zone, and Big Cypress CEM attribute	Greater Everglades Wetlands 3.1.3.13 - 3.1.3.14	Recover predrainage patterns of colony locations, timing and abundance, including recovery of estuarine super colonies (locations and frequency). This includes increasing and maintaining the total number of pairs of nesting birds to a minimum of 4,000 great egrets, 10,000 to 20,000 combined snowy egrets and tricolored herons, 10,000 to 25,000 white ibises, and 1,500 to 3,000 wood storks.
GE-A9	Wetland Trophic Relationships - American Alligator Distribution, Size, Nesting, and Condition	Everglades Ridge and Slough, Marl Prairie and Rocky Glades, Mangrove Estuary Transition Zone, and Big Cypress CEM attribute	Greater Everglades Wetlands 3.1.3.15	Recover abundance, distribution, and health patterns consistent with predrainage hydrology, including return of predrainage abundance to marl prairies and mangrove estuaries.
GE-A10	Wetland Trophic Relationships - Periphyton Mat Production and Composition	Everglades Ridge and Slough, and Marl Prairie and Rocky Glades CEM attribute	Greater Everglades Wetlands 3.1.3.8	Increase periphyton mat cover, biovolume, organic content, percent noncalcareous algae, and diatom composition.
GE-A11	Wetland Trophic Relationships - Mangrove Forest Production/Soil Accretion	Mangrove Estuary Transition Zone CEM attribute	Greater Everglades Wetlands 3.1.3.9	Increase the primary productivity and soil accretion of mangrove forests in coastal areas where natural patterns of hydrology and salinity are restored.
GE-A12	Greater Everglades Wetlands Coastal Salinity Gradients	Mangrove Estuary Transition Zone CEM attribute	Greater Everglades Wetlands 3.1.3.3	Push the salinity gradients seaward in the mangrove estuaries due to restoration of predrainage freshwater flow volume, timing, and distribution. Maintain broad coastal gradients of salinity in the southern Everglades, due to the restoration of predrainage freshwater flow, given predicted rates of sea level rise during the next century.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
GE-A13	American Crocodile - Juvenile Growth and Survival	Mangrove Estuary Transition Zone and Biscayne Bay CEM attribute	Greater Everglades Wetlands and Southern Estuaries 3.1.3.16	Increase in yearly survival for animals age 0-3 yrs as compared to baseline values for animals in Florida Bay (current values 1.5%) and an increase in growth rates for animals age 0-3 yrs from baseline values (0.10 cm/day) to values approaching those observed at North Key Largo and Turkey Point (0.137-0.146 cm/day).
GE-A14	Greater Everglades Wetlands Nutrient (TP and TN) Concentrations in Surface Water	Everglades Ridge and Slough, and Big Cypress CEM stressor	Greater Everglades Wetlands 3.1.3.1	The long-term TP requirement is 10 ppb for a location. If long-term TP is greater than 10 ppb, then the annual trend must be flat or decreasing. For TN, the target is no increase in concentrations from current conditions.
GE-A15	Greater Everglades Wetlands TP Concentrations in Peat Soil	Everglades Ridge and Slough and Big Cypress CEM stressor	Greater Everglades Wetlands 3.1.3.2	Decrease the areal extent of total phosphorus concentrations exceeding 500 mg/kg and maintain or reduce long-term average concentrations to 400 mg/kg or less in the upper 10 cm of soil.
GE-A16	Greater Everglades Wetlands Sulfate Concentrations in Surface Water	South Florida Ecosystem Assessment: Phase I/II - Everglades stressor Interactions (USEPA, 2000)	Greater Everglades Wetlands 3.1.3.1	Maintain or reduce sulfate concentrations to one ppm or less (approximates marsh background concentrations) in surface water throughout the greater Everglade.
GE-A17	Greater Everglades Wetlands Conductivity in Surface Water	- - -	Greater Everglades Wetlands 3.1.3.1	No more than 25% increase above background, while taking into consideration natural seasonal and annual variation.
GE-A18	Greater Everglades Wetlands Water Quality and Quantity Impacts on Periphyton Mat Composition and Production	Everglades Ridge and Slough, and Marl Prairie and Rocky Glades CEM stressor	Greater Everglades Wetlands 3.1.3.8	Increase the biomass, cell density and areal coverage of periphyton indicative of oligotrophic marshes.
SE-A1	Surface Water Discharges to Biscayne Bay	Biscayne Bay CEM stressor	Southern Estuaries 3.2.3.2 and South Florida Hydrology Monitoring Network 3.5.3.3	Wet/Dry Season **Snake Creek** - 66,500/93,000 ac-ft **North Bay** - 99,000/41,000 ac-ft **Miami River** - 132,000/60,000 ac-ft **Central Bay** - 161,000/83,000 ac-ft **South Bay** - 158,000/68,000 ac-ft

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
SE-A2	Southern Estuaries Salinity Pattern	Florida Bay, Biscayne Bay and Mangrove Estuary Transition Zone CEM stressor	Southern Estuaries 3.2.3.2	**Florida Bay -** Provide less abrupt and less extreme decreases in salinity in the northeastern bay. Reduce the frequency, extremity, and extent of hypersaline conditions in the central, southern, and western bay. Increase the frequency and extent of low salinity conditions in the central bay. Increase the frequency and extent of salinities less than that of seawater in the western bay, extending westward along the Gulf of a Mexico coastal shelf to Lostman's River. **Biscayne Bay -** Provide mesohaline salinity patterns in nearshore waters. Lower salinity in the mouths of tidal creeks. **Mangrove Estuary -** Lower salinity to oligohaline conditions in coastal lakes and basins.
SE-A3	Southern Estuaries SAV Distribution, Abundance and Community Structure	Florida Bay and Biscayne Bay CEM attribute	Southern Estuaries 3.2.3.3 - 3.2.3.4	**Florida Bay** - Recover seagrass beds over most of bay bottom, extending west along the Gulf of Mexico coastal shelf to Lostman's River. Replace *Thalassia* monoculture with mixed *Thalassia* and *Halodule*. **Biscayne Bay** - Increase cover of seagrass beds, consisting primarily of Halodule, in nearshore areas that are presently devoid of seagrasses. **Mangrove Estuary** - Increase cover and seasonal duration of *Ruppia*, *Chara*, *Najas,* and *Utricularia* in coastal lakes and basins.
SE-A4	Southern Estuaries Juvenile Pink Shrimp and Associated Epifauna	Florida Bay and Biscayne Bay CEM attribute	Southern Estuaries 3.2.3.5	**Florida Bay salinity -** Threshold of 20 ppt for eastern bay and 30 ppt for western bay. **Florida Bay algal blooms -** Threshold of 2 ppb of chlorophyll *a* in eastern bay and 3 ppb of chlorophyll *a* in central and western bay. **Associated epifauna -** The abundance and diversity of fish and macroinvertebrates associated with seagrass beds should increase in Biscayne Bay and Florida Bay and along the Gulf of Mexico coastal shelf westward to Lostman's River.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
SE-A5	Southern Estuaries Shoreline Fish Community	Florida Bay, Biscayne Bay, and Mangrove Estuary Transition Zone CEM attribute	Southern Estuaries 3.2.3.6	Increase diversity and density of fish assemblages along the mainland mangrove shorelines of Florida Bay and Biscayne Bay.
SE-A6	Florida Bay Juvenile Spotted Seatrout	Florida Bay CEM attribute	Southern Estuaries 3.2.3.7	Increase distribution, abundance, growth, and survival of juvenile spotted seatrout in north-central and western Florida Bay.
SE-A7	Southern Estuaries Roseate Spoonbill Nesting Patterns	Florida Bay and Mangrove Estuary Transition Zone CEM attribute	Greater Everglades Wetlands 3.1.3.14	Achieve roseate spoonbill nesting success in seven out of every 10 years. Return breeding spoonbill numbers to 1,000 pairs nesting in Florida Bay annually, half of which would be located in the northeastern region of the bay. Reestablish spoonbill nesting along the southwestern Gulf Coast between Lostman's River and the Caloosahatchee River.
SE-A8	Southern Estuaries Manatee Distribution	Biscayne Bay CEM attribute	Southern Estuaries	Manatee habitat values in canals and the bay should be maintained or enhanced, as reflected by continued use of canals and bay areas by manatees.
SE-A9	Southern Estuaries Nutrient (TP and TN) Concentrations in Surface Water	Florida Bay and Biscayne Bay CEM stressor	Southern Estuaries 3.2.3.1	**Florida Bay** - Current nutrient concentrations of surface water inputs from the Everglades and from Florida Keys should not be exceeded so the oligotrophic nature of the bay is maintained. **Biscayne Bay** - Maintain or reduce surface water nutrient concentrations so not to exceed historical background, and not to exceed a monthly average concentrations of 0.005 mg/L TP and 0.80 mg/L TN in open portions of the estuaries.
SE-A10	Southern Estuaries Nutrient (TP and TN) Loads	Florida Bay and Biscayne Bay CEM stressor	Southern Estuaries 3.2.3.1	**Florida Bay** - Maintain or reduce current nutrient loads from Everglades inflows and the Keys. **Biscayne Bay** - Maintain or reduce nutrient loads so not to exceed historical background. Achieve a 47% reduction in TN loading.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
SE-A11	Southern Estuaries Algal Bloom Frequency Intensity and Duration	Florida Bay and Biscayne Bay CEM attribute	Southern Estuaries 3.2.3.1	**Florida Bay -** Decrease or cause no net increase in the frequency, duration, intensity or spatial extent of algal blooms relative to conditions documented since 1991. **Northern Biscayne Bay** - No net increase in algal blooms and the annual mean chlorophyll *a* concentrations should range from 1 to 4 µg/L. **Open waters of central and southern Biscayne Bay** - Frequency of algal blooms should be zero and the annual mean chlorophyll *a* concentrations should less than 0.5 µg/L.
SE-A12	Southern Estuaries Water Clarity/Light Penetration (PAR)	Florida Bay and Biscayne Bay CEM attribute	Southern Estuaries 3.2.3.1	Light attenuation coefficient (Kd) should not exceed established background conditions, nor should the absolute value for a daily average exceed 0.7 in any area. **Florida Bay -** Light penetration should be sufficient to support net production by seagrasses. **Biscayne Bay -** Maintain existing water transparency (clarity) in clear regions supporting healthy seagrass communities, and improve water clarity in those regions where reduced water clarity is limiting growth of seagrasses.
SE-A13	Contaminants (Toxicants and Pathogens) in Biscayne Bay Tributaries and Coastal Sediments	Biscayne Bay CEM stressor	Southern Estuaries 3.2.3.1	The geographic extent and concentration of sediment toxicity and water column toxicants/pathogens in Biscayne Bay and the coastal wetlands should not increase.
WS-A1	Frequency, Severity and Duration of Water Restrictions for the Lake Okeechobee Service Area	373.0361(2)(a)(1), F.S. and C&SF Restudy	South Florida Hydrology Monitoring Network 3.5.3.5	Decrease seepage losses and harmful releases of excess water for the natural system while providing at least a 1-in-10-year level of service for the Lake Okeechobee and Lower East Coast Service Areas through regional water deliveries and seepage from Lake Okeechobee, the water conservation areas and Everglades National Park.
WS-A2	Frequency of Water Restrictions for the Lower East Coast Service Area	373.0361(2)(a)(1), F.S. and C&SF Restudy	South Florida Hydrology Monitoring Network 3.5.3.5	Meet demands on water supply during droughts up to a 1-in-10 year frequency.

Reference Number	Title	Source	Monitoring Module and Section	Restoration Expectations
WS-A3	Potential for High Water Levels in South Miami-Dade Agricultural Area	373.0361(2)(a)(1), F.S. and C&SF Restudy	South Florida Hydrology Monitoring Network 3.5.3.6	Maintain existing flood protection in accordance with applicable laws.
WS-A4	Prevent Saltwater Intrusion of Biscayne Bay Aquifer - Meet MFL Criteria for the Biscayne Aquifer	Chapter 40E-8, F.A.C.	South Florida Hydrology Monitoring Network 3.5.3.5	**Canal at Structure - Canal Stage (ft NGVD)** C-51 at S155 - 7.80 C-16 at S4 - 7.80 C-15 at S40 - 7.80 Hillsboro Canal at G56 - 6.75 C-14 at S37B - 6.50 C-13 at S36 - 4.00 North New River at G54 - 3.50 C-9 at S29 - 2.00 C-6 at S26 - 2.50 C-4 at S25B - 2.50 C-2 at S22 – 2.50
WS-A5	Prevent Saltwater Intrusion of Biscayne Bay Aquifer in South Miami-Dade County	373.044, F.S. and C&SF Restudy	South Florida Hydrology Monitoring Network 3.5.3.5	**Canal at Structure - Canal Stage (ft NGVD)** C-100A at S123 - 2.00 C-1 at S21 - 2.00 C-102 at S21A - 2.00 C-103 at S20F - 2.00