

## FY 2015 NWPG Measure Definitions South Florida

Measure Code: SFL-SP45



**Measure Language:** Achieve "no net loss" of stony coral cover (mean percent stony coral cover) in the Florida Keys National Marine Sanctuary (FKNMS) and in the coastal waters of Dade, Broward, and Palm Beach Counties, Florida, working with all stakeholders (federal, state, regional, tribal, and local).

**Type of Measure:** Indicator measure; cumulative measure

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### Measure Definition

**Terms and Phrases:** *Stony corals* (scleractinians) make up the largest order of corals and are the group primarily responsible for laying the foundations of, and building up, reef structures.

**Methodology for Computation of Results:** The Florida Keys Coral Reef Evaluation and Monitoring Project (CREMP) was initiated in 1995 to provide data on status and trends of coral habitat in the FKNMS. The major criteria for monitoring the coral reefs included determining the sanctuary-wide spatial coverage of the coral communities, repeatedly surveying them, and statistically documenting the status and trends of the coral communities.

Percent cover of live coral is determined annually from high resolution digital photographs taken at each monitoring site. Abutting frames with minimal overlap are extracted from a mosaic and analyzed using a custom software application called Point Count for coral reefs.

The current fiscal year's results will reflect the previous fiscal year's data.

**Units:** Stony coral cover, expressed as a percentage

**Universe:** A total of 40 sites are monitored annually to determine percent stony coral cover throughout the FKNMS. The Southeast Coral Reef Evaluation and Monitoring Project was established in 2003 with a total of ten sites to provide data on status and trends of coral habitat in southeast Florida (coastal waters of Dade, Broward, and Palm Beach Counties).

**Baseline:** The stony coral cover in FKNMS and in SE Florida at a point in time (FY 2005)

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Measure Code: SFL-SP46

**Measure Language:** Annually, maintain the overall health and functionality of seagrass beds in the Florida Keys National Marine Sanctuary (FKNMS) as measured by the long-term seagrass monitoring project that addresses composition and abundance, productivity, and nutrient availability.

**Type of Measure:** Indicator measure; cumulative measure

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### Measure Definition

**Terms and Phrases:** *Thalassia* is the dominant species of seagrass within the Florida Key National Marine Sanctuary (FKNMS).

**Methodology for Computation of Results:** The Seagrass Monitoring Project (SMP) for the FKNMS was initiated in 1995 and uses the rapid visual assessment technique known as the Braun-Blanquet method to measure benthic plant community structure. This method is quick, yet robust and highly repeatable, thereby minimizing among-observer differences. A summary metric or species composition indicator (SCI) that assesses the relative importance of slow-growing plants to community composition is computed for the 30 permanent seagrass monitoring sites throughout the FKNMS. The 30 sites are sampled semi-annually. The seagrass indicator is based on species composition of seagrass beds. During the first 10 years of monitoring, the SCI had an average of .48. Any decrease in this SCI is interpreted as a decrease in water quality in the FKNMS. The SMP also assesses seagrass nutrient availability using tissue concentration assays. Elemental content (nitrogen/N and phosphorus/P) of seagrass leaves is determined by cleaning the leaves of all epiphytes, drying the leaves at low temperature, and grinding to a fine powder. Elemental content is then measured using established methods. A summary elemental content indicator measure or elemental indicator (EI), which is the mean absolute deviation of N:P ratio of seagrass tissue from 30:1 is computed for the 30 permanent monitoring sites. The long-term average mean absolute difference in the N:P of *Thalassia* leaves at the 30 monitoring sites 8.3. A decrease in EI from the long-term average will indicate a decrease in water quality.

Success for this measure is achieved if both the species composition indicator and elemental indicator are maintained.

The current fiscal year's results will reflect the previous fiscal year's data.

**Units:** Both SCI and EI are unit-less measures.

**Universe:** 30 permanent seagrass monitoring sites throughout the FKNMS.

**Baseline** The elemental indicator (EI) and species composition indicator (SCI) at a point in time (FY 2005)

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Measure Code: SFL-SP47a

**Measure Language:** At least seventy five percent of the monitored stations in the near shore and coastal waters of the Florida Keys National Marine Sanctuary will maintain Chlorophyll a(CHLA) levels at less than or equal to 0.35 ug l<sup>-1</sup> and light clarity( Kd)) levels at less than or equal to 0.20 m<sup>-1</sup>.

**Type of Measure:** Target measure; annually reported

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### Measure Definition

#### Terms and Phrases:

- *Chlorophyll a* (CHLA) estimates the amount of algae in the water.
- *Light clarity* (Kd) measures the water clarity.

**Methodology for Computation of Results:** The Water Quality Monitoring Project (WQMP) was initiated in 1995 and samples and data are collected quarterly from 112 stations throughout the FKNMS. The WQMP uses a stratified random design based upon EPA's Environmental Monitoring and Assessment Program (EMAP) and stations are randomly located along near shore to offshore transects. By stratifying the sampling stations according to depth, distance from shore, proximity to tidal passes, and influence of water masses outside the Florida Keys, the project has been able to report on the relative importance of external versus internal factors affecting the ambient water quality within the FKNMS. Numerous (about 18) physical and chemical water quality parameters are tracked by the WQMP. However, for purposes of strategic measures, only four critical water quality metrics are considered. For reef stations, chlorophyll less than or equal to 0.2 micrograms/liter (ug/l) and vertical attenuation coefficient for downward irradiance (Kd, i.e., light attenuation) less than or equal to 0.13 per meter; for all stations in the FKNMS, dissolved inorganic nitrogen less than or equal to 0.75 micromolar and total phosphorus less than or equal to 0.2 micromolar; water quality within these limits is considered essential to promote coral growth and overall health. The "number of samples" exceeding these targets is tracked and reported annually.

The current fiscal year's results will reflect the previous fiscal year's data.

**Units:** Monitored stations

**Universe:** The total number of stations throughout the FKNMS.

**Baseline:** The amount of algae (CHL A measured in ug/L) and water clarity (Kd in m<sup>-1</sup>) at a point in time (FY 1995–2005).

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Measure Code: SFL-SP47b

**Measure Language:** At least seventy five percent of the monitored stations in the near shore and coastal waters of the Florida Keys National Marine Sanctuary will maintain dissolved inorganic nitrogen (DIN) levels at less than or equal to 0.75 uM and total phosphorus (TP) levels at less than or equal to .25 uM.

**Type of Measure:** Target measure; annually reported

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### Measure Definition

**Methodology for Computation of Results:** The Water Quality Monitoring Project (WQMP) was initiated in 1995 and samples and data are collected quarterly from 112 stations throughout the FKNMS. The WQMP uses a stratified random design based upon EPA's Environmental Monitoring and Assessment Program (EMAP) and stations are randomly located along near shore to offshore transects. By stratifying the sampling stations according to depth, distance from shore, proximity to tidal passes, and influence of water masses outside the Florida Keys, the project has been able to report on the relative importance of external versus internal factors affecting the ambient water quality within the FKNMS. Numerous (about 18) physical and chemical water quality parameters are tracked by the WQMP. However, for purposes of strategic measures, only four critical water quality metrics are considered. For reef stations, chlorophyll less than or equal to 0.2 micrograms/liter (ug/l) and vertical attenuation coefficient for downward irradiance (Kd, i.e., light attenuation) less than or equal to 0.13 per meter; for all stations in the FKNMS, dissolved inorganic nitrogen less than or equal to 0.75 micromolar and total phosphorus less than or equal to 0.2 micromolar; water quality within these limits is considered essential to promote coral growth and overall health. The "number of samples" exceeding these targets is tracked and reported annually.

The current fiscal year's results will reflect the previous fiscal year's data.

**Units:** Monitored stations

**Universe:** The total number of stations throughout the FKNMS.

**Baseline:** The dissolved inorganic nitrogen (DIN measured in uM) and total phosphorus (TP measured in uM) at a point in time (FY 1995–2005).

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Measure Code: SFL-1

**Measure Language:** Increase percentage of sewage treatment facilities and onsite sewage treatment and disposal systems receiving advanced wastewater treatment or best available technology as recorded by EDUs in Florida Keys two percent (1500 EDUs) annually.

**Type of Measure:** Indicator measure; annually reported

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**Measure Definition** The septic tanks and cesspits traditionally utilized for wastewater disposal in the nutrient sensitive waters of the Florida Keys provide little to no treatment due to the Keys unique environment of poor or little soil, highly porous limestone and elevated groundwater tables. The nutrients from the poorly treated sewage is contributing to water quality and aquatic life degradation and presents a human health risk from bacteria and viruses. Florida enacted legislation in 1999 requiring all sewage treatment facilities and onsite sewage treatment and disposal systems in the Florida Keys achieve advance wastewater treatment standards or best available technology as determined by Florida Department of Environmental Protection.

**Terms and Phrases:** *EDU* is equivalent to wastewater effluent from one home -- 167 gallons per day per home

**Units:** sewage treatment facilities and onsite treatment and disposal systems, expressed as a percentage

**Universe:** The total number of sewage treatment facilities and onsite treatment and disposal systems.

**Baseline:** The number of sewage treatment facilities and onsite treatment and disposal systems at a point in time (FY 2009).

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Measure Code: SFL-2

**Measure Language:** The number of Everglades Stormwater Treatment Areas (STAs) with the annual total phosphorus (TP) outflow less than or the same as the five-year annual average TP outflow, working towards the long-term goal of meeting the 10 parts per billion annual geometric mean.

**Type of Measure:** Target measure; annually reported

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**Measure Definition** The Everglades has been subjected to phosphorus pollution since the 1960s. Interior Everglades marshes removed from anthropogenic nutrient sources have extremely low total phosphorus (TP) concentrations in surface water, as low as the method detection limit of 2 parts per billion (ppb). Phosphorus loading in stormwater from the Everglades Agricultural Area (EAA) and urban areas has significantly increased phosphorus concentrations in the downstream Everglades (as high as 100 ppb), causing eutrophic impacts to these oligotrophic wetlands. Among the progressive eutrophic impacts are loss of the natural communities of algae and periphyton that are defining characteristics of the Everglades, loss of water column dissolved oxygen, increased soil phosphorus content, conversion of the native wet prairie-sawgrass vegetation mosaic to dense single-species stands of cattail with no open water, and consequent loss of wading bird foraging habitat. These collective changes impact the structure and function of the aquatic ecosystem. By 1990, over 40,000 acres of the public Everglades were estimated to be impacted.

In 2005, Florida adopted and EPA approved a 10 ppb water quality criterion for TP in the Everglades in order to prevent nutrient-induced imbalances in natural populations of aquatic flora or fauna. A phosphorus control program was initiated in the 1990s in order to prevent further loss of Everglades plant communities and wildlife habitat due to phosphorus enrichment. Control is to be achieved by agricultural Best Management Practices along with about 60,000 acres of constructed treatment wetlands within the EAA, referred to as Stormwater Treatment Areas (STAs). This \$1 billion effort to treat large volumes of stormwater down to 10 ppb TP is unprecedented. In 2012, STA NPDES permits and Consent Orders for STAs were issued that include a protective phosphorus Water Quality Based Effluent Limit (WQBEL), about \$900 million of flow equalization basins and STA expansions to store and treat water, a robust monitoring and research plan to confirm that restoration is moving forward, and an enforceable compliance schedule with project completion dates of 2018 to 2025.

The flow-weighted mean is used to report phosphorus at the outflow from the treatment systems. Flow-weighting accounts for varying flow from the treatment systems at the time that the phosphorus concentration is determined and provides an indication of the load of phosphorus being delivered by the treatment system. For each STA, the South Florida Water Management District (SFWMD) calculates weekly flow-weighted TP concentrations at the outflow of each STA, and the annual average flow-weighted TP concentration is calculated from these weekly measurements. These annual averages are reported by the SFWMD in September in the draft annual South Florida Environmental Report (SFER) for the water year that runs from May to April. The STA is determined to meet the measure if the annual average flow-weighted outflow TP concentration for the current year is lower than or the same as the 5-year arithmetic mean of the annual flow-weighted TP concentrations, i.e., is improving.

**Terms and Phrases:** Stormwater Treatment Areas (STAs) are constructed wetlands, designed and operated to remove phosphorus from water before discharge into the Everglades.

**Units:** Stormwater Treatment areas (STAs)

**Universe:** The total number of Stormwater Treatment Areas (STAs)

**Baseline:** The 5-year baseline takes into account variability due to climatic conditions including extremely wet or dry years which are common in South Florida. For FY 2015, the 5-year baseline, 2010 to 2015, is 36 parts per billion (ppb) for STA-1E, 35 ppb for STA-1W, 21 ppb for STA-2, 17 ppb for STA-3/4, and 54 ppb for STA-5/6.