

A Framework for Coastal Water-Resources Monitoring in Florida

A. Executive Summary

The Coastal Monitoring Framework provides an organizational structure within which to develop an integrated network for monitoring Florida’s coastal waters, the Florida Coastal Monitoring Network. This framework describes a means to weave existing monitoring efforts into a cooperative monitoring system. After potential gaps in existing coverage are addressed, this system will provide information useful at local, regional, and national scales.

This document describes the framework and the general goals and methods by which this integration can be achieved. It recognized that existing monitoring efforts are generally designed and conducted to meet the needs of the conducting agency/entity, and that these needs will remain the driving force behind that agency/entities involvement in the coastal monitoring network. It is also recognized that a minority of existing monitoring programs may not perceive sufficient benefit from being a partner in the Florida Coastal Monitoring Network and may reasonably choose to not participate.

Detailed implementation plans are needed to complete the guidance for establishing this monitoring network. Development of such plans are moving forward under the auspices of the Florida Water Resources Monitoring Council.

- 1) **What** and **Why** one monitors is driven by each agency’s mission and the information they need to assess how well they are accomplishing that mission.
- 2) **Indicators** (i.e., measures) of conditions are what one monitors. Indicators are chosen for their ability to tell one about some larger community or condition. Generally, one is interested in what the indicator’s status—or change in status—tells about the larger community that the indicator represents, not necessarily about the indicator itself.
- 3) **How** the station locations for sampling (i.e., where one takes measurements of the indicators) are determined is driven by which indicators are selected and the type of question that is being answered.

B. Introduction and Overview

1) *Statement of Intent*

Developing a framework for a comprehensive coastal water resources monitoring network is a Secretarial Strategic Priority of the Department of Environmental Protection. This document has been drafted in response to this high priority call for greater protection of Florida’s coastal and marine environments.

Florida's coasts and ocean waters are the basis for the state's economy. Obvious declines in coastal water quality and reduction in available resources such as in the sport and commercial fishery prompt FDEP to establish expanded monitoring along Florida's entire coastline and adjacent waters. The goal is to incorporate existing monitoring efforts where appropriate as part of forming a new and more comprehensive effort and to integrate the coastal monitoring with Florida's freshwater Integrated Water Resource Monitoring network.

This framework document will be followed with a more detailed monitoring plan laying out implementation details and strategies for each part of the Monitoring Framework.

2) *Process description*

FDEP assembled a Technical Advisory Group (TAG) formed of representatives from state and federal agencies, and academia to provide input on creating a framework around which to build the coastal monitoring network.

The state's monitoring needs were assessed as a function of the state agencies' previously established Management Needs. A master list of these needs were collected by the Florida Oceans and Coastal Resources Council as part of their effort to prioritize research needs around Florida's coasts. From this was extracted a list of the Management Needs of the state agencies with coastal resource management responsibilities and those NGOs (non-governmental organizations) that are involved in similar efforts. The TAG also considered the needs of cooperative programs such as those the state currently has with EPA and NOAA.

3) *Goals*

The goals established for the monitoring framework were to arrive at a monitoring network that, at a minimum, provided information about both status (the condition of the resource at the time of sampling) and trend (the change in status over time). The network will be based on the referenced Management Needs of the member agencies and will provide an annual "Report Card" of easily understood information about the status and trends of coastal water resources for each of the "Reporting Areas" that are identified.

4) *Types of Monitoring*

Monitoring can provide information on physical-chemical factors (for instance, salinity, temperature, contaminant concentrations), habitat (for instance, the size of seagrass beds, changes in coral reef coverage), and measurements that reveal the overall condition of the ecosystem (for instance, information on the relative health of a biological community).

5) *Hurdles*

Different state and federal agencies operate with different goals and duties. It is not reasonable to expect them to all have the same monitoring needs or to want to change their ongoing monitoring unless there is benefit to their programs.

6) Approach

An overall monitoring structure was developed that will be initially populated with monitoring that is useful by multiple agencies. The framework will be populated with existing monitoring programs and funding will be sought to fill in where present programs leave gaps in the network coverage. To the extent possible, present programs will be expanded to fill gaps rather than new programs being initiated. The Florida Water Resources Monitoring Council will provide the vehicle by which agency participation in the monitoring network is coordinated.

The monitoring structure allows other agencies to add their agency-specific monitoring programs to the network if they operate--or can be adjusted to operate--in a manner that allows them to be incorporated into the report card program. This could require changes in their QA/QC procedures or sampling methodology to provide necessary compatibility.

C. Coastal Monitoring Framework

1) Broad-scale Monitoring (Coastal Tier 1)

a) Scale

Tier 1 monitoring is intended to provide information regarding the overall status and trends for areas ranging from statewide to regional. For instance, this monitoring will allow one to know what the status or trend of conditions are “on average” for the state as a whole and to determine if those conditions differ among regions, for instance between the Florida panhandle and southeast Florida. Each region (or the statewide monitoring) will constitute a *reporting area* because the reported information will generally describe the area as a whole, not places within the area. This monitoring generally will not provide useful information about status or trends at particular locations within the reporting area, with the exception of monitoring that incorporates biological assessment methods. Bioassessment methods provide information that is useable in multiple Tiers.

The reporting areas for Tier 1 will separate the coastal waters into two major types: those waters for which state management actions can be expected to readily affect the existing conditions of that area (e.g., water quality status and trends), and those for which conditions may depend substantially on factors beyond state control. For water-quality parameters, this would generally separate intracoastal, bay, estuary, and nearshore waters (within approximately 1-3 miles of the coastline, depending on the part of the state) from offshore waters (those where water quality is dominated by influences outside state control). For non-water-quality parameters (e.g., fishery or habitat measures), where the influence of human activities extends farther offshore, this separation may not be appropriate within waters of the state.

b) Timeframe

Tier 1 monitoring will provide annual statements of status and trends at its intended scale. Some monitoring may be concentrated on sampling occurring once per year

during a period deemed to be that in which the ecosystem is most stressed or which otherwise provides the best information on system health.

Additional Tier 1 information may be generated by combining Tier 2 data from a region or the entire state once a Tier 2 monitoring program is fully established for that reporting area. This annual report may include statements about status and trends at seasonal or other shorter intervals.

c) Methods

The sampling methods used will be appropriate for the measures that are selected for this Tier. Measures will be selected to help address the Management Needs of the agencies as submitted to the Florida Oceans and Coastal Resources Council and generally fall into one of more categories of physical, chemical and/or biological types.

Methods will be selected which provide the most cost-effective collection of the necessary information. For Tier 1 assessments, probabilistic, stratified-random sampling methods similar to those used by U.S. EPA's EMAP, FWC's IMAP, and DEP's freshwater IWRM Tier 1 monitoring program may be appropriate in many cases for assessing status. Fixed station locations may be necessary in addition to help assess trend.

Note: Intensive Studies

The intensive studies described below for Tier 2 will also be used to optimize placement of Tier 1 fixed trend stations.

2) Local-scale Monitoring and Assessment (Coastal Tier 2)

a) Scale

Tier 2 monitoring is intended to provide information regarding the status and trends for areas that are relatively small as compared to Tier 1. Monitoring at this scale will provide information about the range of conditions within the monitored area as well as the overall condition.

For instance, Tier 2 monitoring will produce information about status and trends of waters within a single estuary, such as describing conditions in different functional parts of the estuary. The estuary or other area being monitored will constitute a reporting area and monitoring will be expected to provide useful information about status or trends at particular locations or regions within the reporting area. The goal of Tier 2 monitoring is enabling the assessment of the health of the different parts of the ecosystem within the reporting area. These parts can be agglomerated to make statements about the entire estuary/area, similar to the manner in which specific reaches within a watershed (WBIDS) are agglomerated in the 305b reports.

b) Timeframe

Tier 2 monitoring will provide annual statements of status and trends for the areas assessed plus as many regions within the area as are necessary to provide information regarding changes in system health of the reporting unit as a whole. This annual report may include statements about status and trends at seasonal or other shorter intervals.

c) Methods

The sampling methods used will be appropriate for the measures that are selected for this Tier. Measures will be selected to help address the Management Needs of the agencies as submitted to the Florida Oceans and Coastal Resources Council. Tier 2 monitoring will take place in two phases:

1. Intensive study:

The first year of monitoring in an area (for instance, a bay, estuary, or coastal segment) will be with intensive sampling regimes intended to provide an understanding of the overall system of habitats and physical-chemical conditions found within the area. For those areas where the information collected during the Intensive Study is already available, this phase can be skipped and one can move on to the description below under “Long term”.

A combination of sampling from mobile vessels and from fixed monitoring sites (established in conjunction with the Integrated Ocean Observing Systems) will be performed to allow creation of circulation (i.e., hydrodynamic) models in those areas where suitable ones are not already available. It is the intent to eventually also generate water quality models for these areas (models describing and forecasting the changes in physical-chemical parameters as water flows through the system).

At the finish of this first year, the information gained will be used to identify the best locations for fixed monitoring sites for Tier 1 trend monitoring and to design a long-term Tier 2 monitoring program optimized for that area. Excess fixed monitoring stations (i.e., those not staying behind as part of the permanent fixed station network) and sampling equipment will then be transferred to a new area for intensive study.

2. Long-term:

Initially, existing monitoring programs will be used to provide Tier 2 monitoring. Once an area has received a year of Intensive Study, a monitoring program will be designed to provide the most cost-effective monitoring of status and trends for that area.

d) Integration and coordination

Tier 2 monitoring is intended to be both integrated with Florida’s freshwater Integrated Water Resource Monitoring network (IWRM) and coordinated with the Impaired Waters Program.

The coastal Tier 2 sampling times and locations will be to the extent possible complementary to IWRM sampling schedule to maximize our understanding of the

effects of freshwater flow on the coastal receiving waters and to help identify cause-effect relationships between inflowing water quality and the receiving water's biological assemblages.

The coastal Tier 2 sampling will also be coordinated with the 5-yr rotating-basin schedule of the Impaired Waters Program and its efforts to identify if water bodies are impaired and to develop Total Maximum Daily Loads (TMDLs) for those that are. The one-year intensive surveys of the coastal monitoring program will be coordinated to coincide with the year of sampling and data collection that takes place during the second year of the Impaired Waters Program's five-year rotating schedule.

3) Site-specific Monitoring (Coastal Tier 3)

Tier 3 monitoring is intended to be that which is performed to address site-specific issues, including permit-related monitoring, identification of cause-effect relationships, sources of impacts, and similar studies. Information gathered in Tier 3 monitoring efforts that occur within a Tier 2 reporting unit will be included among the data analyzed in creating the report card for that area.

a) Scale

Determined by needs of agency carrying out monitoring

b) Timeframe

Determined by needs of agency carrying out monitoring

D. Reporting

Annual Report Cards will present easily-interpreted information about the status and trends of the Reporting Area. Components of the Coastal and Marine Resources Annual Report Card could include:

- “Landscape” Report - this would be a kind of resource-characterization/atlas, to include but not limited to:
 - the latest info on population densities along coastal areas,
 - land uses,
 - mapped water classifications
 - coastal land ownership information
 - the Landscape Development Intensity Index values
 - % change from last annual report in above categories
- Public Health Report – specific measurements of interest to public health
 - Beach advisory data
 - Shellfish harvesting area data
 - Fish consumption advisory data
 - Fish kill data
 - Red tide/harmful algal bloom data
- Targeted Species and Habitats Report – for species or resources of special concern
 - Manatee data

- Commercial fisheries data
- Endangered species data
- Seagrass data
- Corals data
- Coastal wetlands data
- Sea turtles
- Water Quality Report
 - Mercury data
 - Physical/Chemical monitoring data - status & trends (nutrient levels, dissolved oxygen, etc.)
- Ecological Indicators Report
 - Coastal/Marine Indexes of Biotic Integrity –this will require research to develop but will be an important element of ecosystem management. Once developed, these indexes will be added to the developing coastal water quality monitoring network.
- Coastal/Marine Environmental Issues Report
 - TMDL listings & other info
 - Exotics/Invasives data
 - Beach erosion/renourishment data
 - Hurricane effects
 - Sediment contamination
 - Marine debris
 - Dredge & fill
 - Sea level rise