

Coastwide Reference Monitoring System (CRMS)

Overview

In 1990, the U.S. Congress enacted the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) in response to the growing awareness of Louisiana's land loss crisis. The CWPPRA was the first Federal, statutorily mandated program with a stable source of funds dedicated exclusively to the short- and long-term restoration of the coastal wetlands of Louisiana. Between 1990 and 2008, 77 restoration projects have been constructed through the CWPPRA program. These projects include diversions of freshwater and sediments to improve marsh vegetation; dredged material placement for marsh creation; shoreline protection; sediment and nutrient trapping; hydrologic restoration through outfall, marsh, and delta management; and vegetation planting on barrier islands.

Need for a Monitoring System

The coastal protection and restoration efforts implemented through numerous CWPPRA projects require monitoring and evaluation of project effectiveness. There is also a need to assess the cumulative effects of all projects to achieve a sustainable coastal environment. In 2003, the Louisiana Office of Coastal Protection and Restoration (OCPR) and the U.S. Geological Survey (USGS) received approval from the CWPPRA Task Force to implement the Coastwide Reference Monitoring System (CRMS) (fig. 1) as a mechanism to monitor and evaluate the effectiveness of CWPPRA projects at the project, region, and coastwide levels (fig. 2) (Steyer and others, 2003). The CRMS network is currently funded through CWPPRA and



Figure 1. The Coastwide Reference Monitoring System logo was developed so that the program can be easily and consistently identified because CRMS data and information are widely used by agencies, researchers, modelers, landowners, and consulting firms.

provides data for a variety of user groups, including resource managers, academics, landowners, and researchers.

Approach and Design of the CRMS

The effectiveness of a traditional monitoring approach using paired treatment and reference sites is limited in coastal Louisiana because of difficulty in finding comparable test sites; therefore, a multiple reference approach using aspects of hydrogeomorphic functional assessments and probabilistic sampling was adapted into the CRMS design.

The CRMS approach gathers information from a suite of sites (fig. 3) that encompass a range of ecological conditions

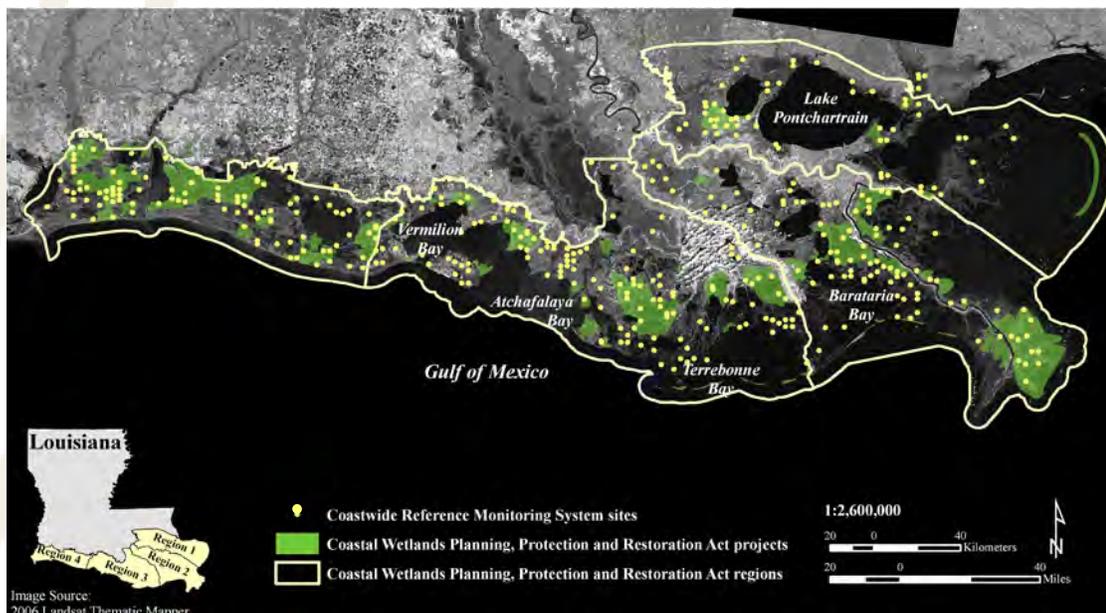


Figure 2. Map of Coastwide Reference Monitoring System (CRMS) sites throughout coastal Louisiana in relation to four regions defined by the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) and CWPPRA projects coastwide.



Figure 3. Examples of sites within the Coastwide Reference Monitoring System. *A*, Typical site located in attached marsh. *B*, Typical site located in swamp.

across the coast. Trajectories of changing conditions within the reference sites can then be compared with trajectories of change within project sites. The CRMS design not only allows for monitoring and evaluating the effectiveness of each project but will also support ongoing evaluation of the cumulative effects of all CWPPRA projects throughout the coastal ecosystems of Louisiana.

Simulations made by using the resampling methodology described in Steyer and others (2003) indicated that 100 randomly selected reference sites would accurately represent the true composition of coastwide vegetation at a 95 percent confidence level. However, in order to detect a 20 percent change in coastal marsh vegetation between two time periods, at least 80 percent of the time, approximately 400 reference sites were needed. Because of land rights and other technical issues, 390 sites with a fixed annual sampling design were approved and secured for CRMS data collection. These 390 CRMS sites are located within nine coastal basins and four CWPPRA regions, covering the entire Louisiana coast. Site construction and data collection began in 2005.

The CRMS Web Site

Because of the quantity of products and data that will be produced over the lifetime of the CRMS project, a Web site

(<http://www.lacoast.gov/crms>) was designed to be a one-stop shop for CRMS information, products, and data. The ecological data available through the Web site are linked to the official Louisiana OCPD database, which houses all CWPPRA monitoring data, on topics such as the following: hydrology, herbaceous marsh vegetation, forested swamp vegetation, soil properties, soil accretion, and surface elevation. Data provided by the Louisiana OCPD are available for downloading at <http://dnr.louisiana.gov/crm/coastres/monitoring.asp> and can be selected by project name, CRMS site, or station number.

The basic viewer (under Mapping) on the CRMS Web site provides a user-friendly interface for viewing information on specific sampling sites, including photos, data summaries, and report cards (fig. 4). Analytical teams are developing mechanisms by which individual sampling sites can be assessed in relation to other sites within the same marsh type, hydrologic basin, and CWPPRA project. These multiscale evaluations will be presented on a “Report Card” tab within the basic viewer.

The CRMS program is as dynamic as the coastal habitats it monitors. The program continues to develop new products and analysis tools while providing data for model improvement and scientific research. The CRMS Web site is the current dissemination mechanism for all activities related to the program.



Figure 4. Example of information provided in the basic viewer of the Web site for the Coastwide Reference Monitoring System (<http://www.lacoast.gov/crms>).

Reference

Steyer, G.D., Sasser, C.E., Visser, J.M., Swensen, E.M., Nyman, J.A., and Raynie, R.C., 2003, A proposed coast-wide reference monitoring system for evaluating wetland restoration trajectories in Louisiana: Environmental Monitoring and Assessment, v. 81, p. 107–117.

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