



Watershed Database and Mapping Projects/Calcasieu Estuary (Louisiana)

Protection and restoration of coastal watersheds requires the synthesis of complex environmental issues. Contaminated site remediation, dredging and disposal of contaminated sediments, and restoring injured habitats are a few of the challenges facing coastal managers. The evaluation of multiple environmental issues can be significantly improved by combining scientific data and watershed characteristics into a Geographic Information System (GIS). NOAA's Assessment and Restoration Division (ARD) has developed decision - support tools for specific watersheds that combine the use of a standard database structure, database-mapping application (Query Manager™/ MARPLOT®) and an ArcView® GIS project (i.e., Watershed Database and Mapping Projects). Contaminant concentrations in sediment and tissues of aquatic organisms, results of sediment toxicity tests, natural resource occurrence, and potential habitat restoration projects are overlaid on a watershed's features and land uses, to be analyzed and displayed on maps at flexible spatial scales. This integrated approach simplifies data synthesis and communication of critical information.

NOAA has used this approach in several watersheds, which have been affected by contaminant releases from Superfund sites and other sources. Some of these watersheds include the Anacostia River, Calcasieu Estuary, Charles River, Christina River, Hudson River, Newark Bay, Puget Sound, Sheboygan River, St. Andrew's Bay, and San Francisco Bay. Watershed Projects use the standard structure along with information tailored to the major objectives of each watershed. For example, the Newark Bay Watershed Project supports decisions about remediation and disposal of contaminated sediment, while the San Francisco Bay Watershed Project focuses on Superfund site remediation and habitat restoration. The common organizational structure for data and spatial information promotes data sharing among Federal, state, and local agencies working within a watershed.

The Calcasieu Estuary in southwest Louisiana is a highly productive estuarine habitat system that supports fisheries for shrimp, oysters, catfish, blue crabs, redfish, and menhaden. Industrialization of the upper portion of the Calcasieu Estuary began in the 1940s with oil refineries and petrochemical industries predominating in the upper 10 miles of the 37-mile long estuary. Because of this history and accidental spills, the upper Calcasieu Estuary is contaminated with hazardous substances from Moss Lake in the south to the saltwater barrier north of Lake Charles. Portions of Bayous d'Inde, Olsen, and Verdine historically were severely contaminated, resulting in advisories against fish and shellfish consumption and swimming/water sports.



The Calcasieu Watershed project helps demonstrate the spatial component of ecological risk to coastal resource managers and communities. This figure depicts sediment risks to the aquatic resources as well as amphipod toxicity in Bayou d'Inde and Lockport Marsh.

The Calcasieu Estuary watershed database and mapping project uses ArcView to show the geographic distribution of contaminant and toxicity test data from several U.S. EPA Superfund site investigations, RCRA offsite facility investigations, and other studies. Base maps depict habitat classification, land use, bathymetry, industrial site locations, and other information. The project was used in combination with EPA's Fully Integrated Environmental Location Decision System (FIELDS) tool to assist in the development of a synoptic sediment and biota

contaminant sampling plan. As a result EPA, Louisiana Department of Environmental Quality (LDEQ) and the cooperative PRPs (e.g., PPG Industries, Conoco and Olin) completed sampling phases I and II. The efforts supported development of ecological and human health risk assessments associated with exposure to environmental contaminants in the Calcasieu Estuary. Both risk assessments are available for download at <http://www.epa.gov/earth1r6/6sf/sfsites/calcinit.htm>. The types of data sampled included sediment chemistry, sediment toxicity (invertebrates and fish), pore water toxicity, benthic invertebrate community structure, tissue chemistry (invertebrates and fish), and fish community status. The assessments will be used to identify areas of the estuary that should be addressed to reduce and mitigate risks due to hazardous substance exposures. The watershed project will be used by the agencies to show where risks exist in the estuary and to support remedial and restoration decision-making.

Users of this watershed project can quickly compare historical information in the database to the synoptic data set in order to evaluate temporal trends in sediment contamination. Layers of information available through ArcView also can be used to select and evaluate potential restoration sites needed for development of a natural resources compensation plan for the estuary. Mapping and spatial analysis will be used to illustrate and communicate concerns to the public and the various agencies involved in the cleanup regarding contaminant threats, potential impacts of cleanup actions, and the restoration needs in the Calcasieu estuary.

NOAA's approach is to provide a rapid, convenient way to create maps of the watershed that display analyzed, sorted, and summarized data that coastal managers have selected from a menu of programmed queries. The primary data types include sediment chemistry, sediment toxicity, and tissue chemistry data. The base maps display geomorphology, habitat characteristics, and land use information. Integrating remedial investigation data with landscape information in a single system helps investigators associate the distribution of contaminants with specific sources and evaluate the possibility of contaminant effects in potential habitat restoration areas. Combining natural resource information and contaminant distributions across the watershed enhances the potential for successful restoration of wide-ranging populations. The watershed projects have benefited a variety of user groups and have enhanced cooperation and data sharing.

The Watershed Projects run on standard desktop Microsoft Windows®-based personal computers. The database and mapping application, Query Manager, is an easy-to-use, interactive system that allows users to query the database and rapidly display the results on a map in MARPLOT or export the data to any program that supports standard spreadsheet, database, or tab-delimited text files. Custom tools developed by ARD facilitate the seamless import of data from Query Manager into an ArcView GIS project to simplify and enhance further data analysis and presentation. The Query Manager application (including MARPLOT), watershed databases and MARPLOT base maps, and GIS tools are available for download on the ARD website. The Watershed ArcView GIS projects, which include both standard layers (e.g., wetlands, Superfund sites, and other regulated industrial facilities) and customized basemaps and other spatial data layers, are available for public distribution on CD-ROM and require that the user have their own copy of ArcView. Watershed projects provide valuable information and tools to a broad spectrum of users ranging from school children and civic groups to academic and governmental communities.

ARD's Watershed Projects are proving useful throughout the Superfund remedial decision-making process, from identifying locations for the collection of additional samples to providing the historical context for interpreting data, to identifying areas for restoration. This versatile tool improves NOAA's ability to protect and restore the biodiversity of watersheds that contribute to healthy coastal habitats, and has the potential to help address other important environmental issues.

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