User's Guide

Welcome to the Location File for Port Arthur and Sabine Lake, in southeastern Texas! Sabine Lake is an inland estuary that straddles the Texas/Louisiana border near Beaumont, Texas. The lake is adjacent to a portion of the Gulf Intracoastal Waterway (GIWW), a coastal canal that extends about 1300 miles from Florida to Texas' southern tip. Port Arthur is an industrial city and deepwater port, located 90 miles east of Houston on Sabine Lake. With the cities of Beaumont (to the northwest) and Orange (to the northeast), it forms the "Golden Triangle," a large petrochemical and industrial complex.

NOAA has created Location Files for different U.S. coastal regions to help you use the General NOAA Oil Modeling Environment, GNOME. In addition, on a case-by-case basis, NOAA develops international Location Files when working with specific partners.

Each Location File contains information about local oceanographic conditions that GNOME uses to model oil spills in the area covered by that Location File. Each Location File also contains references (both print publications and Internet sites) to help you learn more about the location you are simulating.

As you work with the Location File for Sabine Lake, GNOME will prompt you to:

1. Choose the model settings (start date and time, and run duration).
2. Set the flow rates for the Sabine and Neches Rivers.
3. Input the wind conditions.

GNOME will guide you through each of these choices. Each window has a button that leads you to helpful information and the general Help topic list. Click the Help button anytime you need help setting up the model. For example, when you are prompted to set the river flow rates, you can either choose a climatological estimate of the flow rate (Low, Medium/Mean, or High), or enter your own value. To learn how to obtain flow rates for the Sabine and Neches Rivers, click the button, "Finding River Flow Data", or check the "Finding River Flow Data" Help topic. Similarly, when you need to input the wind conditions in GNOME, you can click the "Finding Wind Data" button to see a list of web sites that publish wind data for this region.

More information about GNOME and Location Files is available at http://response.restoration.noaa.gov/software/gnome/gnome.html .

Technical Documentation

Background

Port Arthur and Sabine Lake are located on a flat coastal plain in the western Gulf of Mexico. Elevations range from sea level to 9 feet on land. Deep areas in Sabine Pass and the canals are dredged to keep them open. Freshwater flows into Sabine Lake from the Sabine and Neches Rivers. Water flows out of Sabine Lake through Sabine Pass into the Gulf of Mexico.

The Sabine River flows for 555 miles. Its total drainage basin area is 9,756 square miles, of which 7,426 is in Texas and the remainder in Louisiana. Unlike most Texas rivers, the Sabine is entirely in an area of abundant rainfall. Average annual precipitation is between 37 inches at its source and 50 inches at its mouth. Overall, the river has a remarkably strong flow for its length, and it discharges the largest volume of water (over 6 million acre-feet) of all Texas rivers.

The Neches River flows southeast for 416 miles to its mouth on Sabine Lake, on the northeastern edge of Port Arthur. The river has a drainage area estimated at

10,011 square miles. Abundant rainfall in its basin results in a flow of about 4.6 million acre-feet per year.

Current Patterns

The Sabine Lake and Port Arthur Location File contains five circulation patterns created in the NOAA CATS (Current Analysis for Trajectory Simulation) hydrodynamic model. In this Location File, the tides, the Sabine River, the Neches River, and the northward and eastward wind-driven circulations are each simulated with separate current patterns. The NOAA Tide Station for "Texas Point, 1.7 SSE of," was used to calibrate the tidal currents. The wind-driven currents were calculated using CATS and agree well with wind-driven circulation calculated with the Calcasieu-Sabine model from the University of Louisiana, Baton Rouge (Meselhe and Noshi 2001, and Meselhe 2001 and 2002).

River flows were scaled by flow volume using the USGS stations 08030500 and 08041000 for the Sabine and Neches Rivers, respectively. More historical data was available for the Neches River, so a mean river flow could be calculated, while a medium flow was estimated for the Sabine River, based on the maximum and minimum flow values found.

References

You can get more information about the Sabine Lake area from these publications and web sites.

Oceanography

Murray, S. P. 1997. An Observational Study of the Mississippi-Atchafalaya Coastal Plume: Final Report. OCS Study MMS 98-0040. U.S. Dept. of the Interior, Minerals Mgmt. Service, Gulf of Mexico OCS Region, New Orleans, LA. 513 pp.

Nowlin, W. D. Jr., A. E. Jochens, R. O. Reid, and S. F. DiMarco. 1998. Texas-Louisiana Shelf Circulation and Transport Processes Study: Synthesis Report, Volume I: Technical Report. OCS Study MMS 98-0035. U.S. Dept. of the Interior, Minerals Mgmt. Service, Gulf of Mexico OCS Region, New Orleans, LA. 502 pp.

Stronach, J.A., J.O. Backhaus, and T.S. Murty. 1993. An update on the numerical simulation of the waters between Vancouver Island and the mainland: the GF8 model. Oceanography and Marine Biology Annual Review. 31, 1-86.

Hydrography

Forbes, M.J. 1988. Hydrologic Investigations of the Lower Calcasieu River, Louisiana. Water-Resources Investigations Report 87-4173. U.S. Geological Survey in cooperation with the Louisiana Department of Environmental Quality.

Gammill S., K. Balkum, K. Duffy, J. Porthouse, E. Meselhe, E. Ramsey, and R. Walters. 2001. "Hydrologic Investigation of the Louisiana Chenier Plain." Main report prepared for the Louisiana Coastal Wetland Planning, Protection and Restoration Act Task Force.

Meselhe E.A. 2001. "Trajectory Analysis Planner Program for the Calcasieu Estuary." Final report submitted to the Oil Spill Research and Development Program, Baton Rouge, Louisiana.

Meselhe E.A. 2002. "Trajectory Analysis Planner Program for Sabine Lake." Final report submitted to the Oil Spill Research and Development Program, Baton Rouge, Louisiana.

Meselhe, E.A, and Noshi, H. 2001. Hydrodynamic and salinity modeling of the Calcasieu-Sabine basin. Final report submitted to Louisiana Department of Natural Resources, Coastal Restoration Division, Baton Rouge, Louisiana.

United States Department of Agriculture, Natural Resources Conservation Service. 1997. Plan Environmental Assessment: Brown Lake Hydrologic Restoration (CS-09) Calcasieu and Cameron Parishes, Louisiana.

Wyman, B.C. 1989. A Risk Model For Hazardous Material Transportation Spills in Calcasieu Parish, Louisiana. Ph.D. Dissertation: the University of Texas at Dallas, 1-219.

Wind and Weather

Interactive Weather Information Network (IWIN): Texas State Information
http://iwin.nws.noaa.gov/iwin/tx/tx.html
Click "KBPT" in the southeast section of the map to view current weather conditions at Beaumont/Port Arthur, Southeast Texas Regional Airport. Click "KRPE" to view current conditions at Sabine Pass, Texas.

National Weather Service, Internet Weather Source (IWS): Louisiana Weather
http://weather.noaa.gov/weather/LA_cc_us.html
Select a location from the appropriate menu for current weather conditions or forecasts for locations throughout Louisiana.

National Weather Service Forecast Office, Lake Charles, LA
http://www.srh.noaa.gov/lch/
Forecasts, warnings, and observations for Lake Charles area locations. Click a location on the interactive map to obtain a forecast.

Oil Spill Response

NOAA Hazardous Materials Response Division (HAZMAT)
http://response.restoration.noaa.gov
Tools and information for emergency responders and planners, and others concerned about the effects of oil and hazardous chemicals in our waters and along our coasts.