

LMRIS

Living Marine Resources



Information System™

Living Marine
Resources
Information
System
(LMRIS)



SPAWAR
Systems Center
San Diego

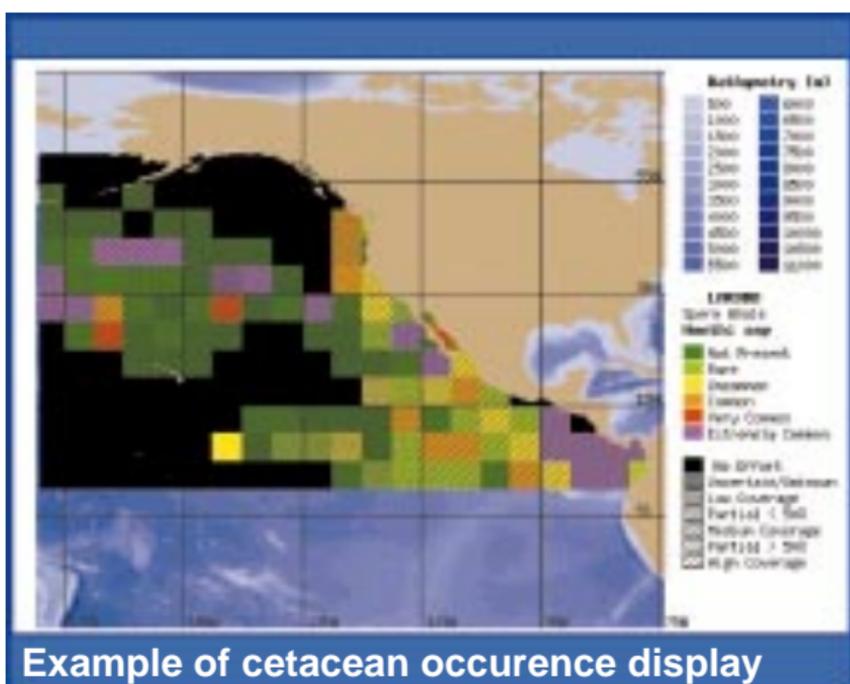
SSC San Diego
San Diego, CA 92152-5001

Living Marine Resources Information System (LMRIS)

Background and Objective

Design and development of the Living Marine Resources Information System (LMRIS) began in November 1996 under the sponsorship of the Office of Naval Research (ONR). The objective of the LMRIS project is to develop a science-based living marine resources (LMR) capability whereby the Navy can assess and mitigate the impact of future operations on protected marine animals. Major project success has been achieved with the design and development of a system that displays temporal LMR occurrence levels and population estimates over large ocean regions for those marine animals of most concern to the Fleet. The information is displayed via a Geographic Information System (GIS) through a web browser.

The LMRIS is primarily used by Navy system developers early in the planning process to mitigate or avoid negative impact of an at-sea event on LMR. The LMRIS can also be used by those charged with demonstrating Navy compliance with environmental laws through developing National Environmental Policy Act (NEPA) and related documentation (e.g., environmental assessments, environmental impact statements, Executive Order 12114).



Example of cetacean occurrence display

Structure

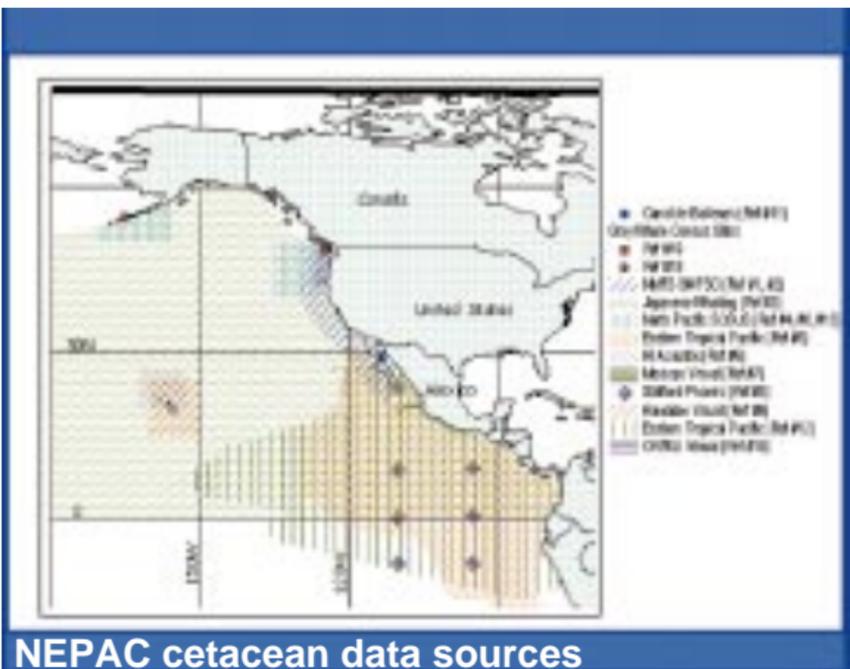
LMRIS has five main elements.

- 1. Living Marine Resource Monthly Occurrence Levels.** This system element provides information on the distribution and timing of LMRs in large ocean regions. Regions covered by the LMRIS to date include the northeast Pacific (west to 180°W, from the equator north to 60°N) and the northwest Atlantic (east to 30°W, from the equator north to 50°N), including the Gulf of Mexico and the Caribbean Sea. While the term “living marine resources” includes all species of marine mammals, as well as all protected (endangered or threatened) marine animals, the LMR “species of concern” (SOC) addressed in the LMRIS prototype include all mysticete whales, the sperm whale, sea otter, manatee, and all protected pinniped (seal and sea lion) and sea turtle species. Additionally, the dwarf/pygmy sperm whale group and beaked whale group were included for the northwest Atlantic region.

All SOC distribution and occurrence data included in the LMRIS are based on referenced data—either peer-reviewed journals or government and institutional reports (e.g., “gray” literature). All non-cetacean and Pacific cetacean data were ranked based on a contrived index (i.e., variable criteria). Atlantic cetacean data were ranked on an absolute index (i.e., fixed criteria). Meta-data were derived from visual data (e.g., aerial and vessel surveys), as well as acoustic data (for some mysticetes) and tag data (for some sea turtles, manatees, and pinnipeds) were included.

- 2. LMR Population Estimates.** This element provides information about each SOC, including individual stocks. Protection status, stock attributes (including population or abundance estimates), stock areas, and a brief natural-history narrative for populated basins are included for all SOC.

3. **LMR Sanctuaries, Reserves, and Critical Habitats.** This element provides information on geographic areas that have been specifically set aside for protection of critical habitats or other resources important to LMRs. Data included in this part of the database include habitat types, geographic boundaries, listed species that occur regularly, and administration information.
4. **LMR Meta Data.** This element provides the criteria used to determine the occurrence indices for each species and region. The meta-data provide full citations and an index as to how each reference was used.
5. **Browser-based Information and Mapping System.** The database is served through a web-accessible LMRIS server that provides immediate access to authorized users over the Internet. This element displays all LMRIS data geographically, provides access to the database tables, and features user help, print and display options. The system allows co-display of LMR data with Navy standard bathymetry.



The Future of LMRIS

The initial version of the LMRIS is being transitioned to the Navy's Oceanographic and Atmospheric Master Library (OAML) where it will be maintained as a Navy Standard database. Continuation of the LMRIS project will be sponsored by the Environmental Planning Division of the Chief of Naval Operations (CNO-N45G). On-going development efforts will focus on adding absolute density values to the LMRIS occurrence tables. The LMRIS team is working in close coordination with the National Marine Fisheries Service (NMFS) Southwest Fisheries Science Center (SWFSC) in the development and integration of a predictive model for estimating cetacean distribution and abundance. Extension of the LMRIS to include additional LMR species and geographic regions will be based on LMRIS user priorities.

The LMRIS was developed as a planning tool for the U.S. Navy. The scope of the LMRIS, in terms of geographic region, type and number of species included, and magnitude of data indexed, is unprecedented. The LMRIS is not intended to replace original research but to be an instrument for collating research and the resulting data. The LMRIS provides access to consolidated information on what is known about LMR distribution and abundance over large ocean regions. Such information is critical to our primary goal: the protection and conservation of our Living Marine Resources.

**For information on administration and
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