Northwestern Hawaiian Islands Coral Reef Research Partnership:
Ocean Mapping, Ecosystem Threats, and Information Management

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Marine and Coastal Ecosystems Theme
Pacific Region Integrated Data Enterprise Workshop
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Presentation Overview

• Monument Background
• Scope of Northwestern Hawaiian Islands Coral Reef Research Partnership
• Project Objectives
• Project Approach
• Data Visualization
• Application to Management Need: Spatial Threat Assessment
• Application to Scientific Need: Global Symbiodinium Database
Monument Background

- Created by Presidential Proclamation on June 15, 2006
- Largest fully-protected marine conservation area in the world
- Co-managed by NOAA, USFWS and the State of Hawaii
  - All access is restricted and requires notification
  - All activities are regulated and assessed for impacts
- Unique opportunity to advance ecosystem science in support of management needs
The Northwestern Hawaiian Islands
A Living Natural Laboratory

- Relatively pristine ecosystem
- A gradient of human disturbances
- Comprised of isolated banks, atolls and reefs all interconnected by ecosystem processes
- Opportunity to advance ecosystem science
Big Picture

Distributed virtual data base

Catalog is the key to data discovery

Access data where they reside wherever possible.
The Hawai‘i Institute of Marine Biology signed a memorandum of agreement with the National Marine Sanctuary Program (NOS, NOAA) on March 28, 2005, to assist the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve (NWHICRER) with scientific research required for the development of a science-based ecosystem management plan.

With this overriding objective, a scope of work was developed to:

Understand the population structures of bottomfish, lobsters, reef fish, endemic coral species, and adult predator species in the NWHI.

Characterize the genetic diversity of corals in the NWHI and determine the background levels of coral health in the NWHI.

Support mapping activities that will be used in the Sanctuary designation and management zones.

Identify the pool of invasive species in the Main Hawaiian Islands (MHI) and develop measures to prevent the spread of these species to the NWHI.

Support sound ecosystem management.
Objectives and Approach

Objective: Enhance capacity for the discovery and dissemination of data collected for the HIMB NWHI Coral Reef Research Partnership.

- ArcGIS Server hosted onsite (geoDB/SQL/SDE)
- ArcMarine Data Model
- Taxonomic Schema: ITIS, CoRIS
- Place and Keywords: NASA GCMD, CoRIS
- Text and map-based searches of HIMB data
- Integrate with regional IOOS efforts
- Metadata to NODC/CoRIS
- Partnerships with USGS PBIN & NOAA Pacific Services Center to facilitate data submission to OBIS
Visualizing Data
Northwestern Hawaiian Islands Threat Assessment

Objective: Create habitat-based threat maps for the Northwestern Hawaiian Islands with the expert survey data.

Habitat Data for Midway Atoll
(Interpreted IKONOS – NOS)

Vulnerability scores mapped by habitat
Spatial Vulnerability Scores

Midway Atoll Ecozones

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AVERAGE 1.09 1.12 0.91 1.56 1.64 0.98 0.80 0.70
Northwestern Hawaiian Islands Vessel Traffic

Objective: Identify spatial data sets to use for habitat-based threat assessment. Example using patterns of vessel traffic in the Northwestern Hawaiian Islands.

(Franklin, in press)
Northwestern Hawaiian Islands Threat Scores
Northwestern Hawaiian Islands Thermal Anomalies

Gradient of thermal anomalies along NWHI facilitates research on effects of sea temperature on resilience of reef communities.
Global Symbiodinium Database and Map Site

Objective: A web-enabled database and mapping website for coral symbiont (Symbiodinium) sequence data and attribute information (host, locale, investigator, year).

photo credits: bleached corals by James Watt, symbiodinium cells by Scott Santos
• Information management to ensure long-term data integrity

• HIMB-NWHI data to integrate with Monument Information Management System and Pacific regional IOOS efforts and contribute biological data

• Threat assessment provides cumulative impact framework for management of the NWHI Marine National Monument

• Coral symbiont research in NWHI can be catalyst for global data portal that facilitates coral reef resilience studies
Thank You!

Questions?

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http://www.hawaii.edu/HIMB/nwhi_crrp/index.htm