

# **Collaborative Fisheries Research to Support the Evaluation of Marine Protected Area Proposals and Adaptive Management in the Marine Life Protection Act Initiative, North Coast Study Region**

Research Proposal Submitted to the Resources Legacy Fund Foundation by the Humboldt Bay Harbor, Recreation and Conservation District

## **Applicant Background**

The Humboldt Bay Harbor, Recreation and Conservation District (Harbor District) was enabled in 1970 by the State of California. The Harbor District's main office is located in Eureka, CA. The Harbor District also owns a boat yard in Fields Landing, CA and several other properties around Humboldt Bay that are leased for various uses. The Harbor District employs fourteen staff and has a five member Board of Commissioners. The Harbor District was formed for "...the acquisition, construction, maintenance, operation, and regulation of harbor works and improvements, including rail, water, and air terminal facilities, for the development, operation, maintenance, control, regulation, and management of Humboldt Bay upon the tidelands and lands lying under the inland navigable waters of Humboldt Bay, for the promotion of national and international commerce, navigation, fisheries, and recreation thereon, and for the development and protection of the natural resources of the area." The Harbor District is currently guided by the Humboldt Bay Management Plan which was developed through a stakeholder driven process. The Humboldt Bay Management Plan Advisory Committee, a nineteen member stakeholder group, currently assists the Harbor District with implementing the Humboldt Bay Management Plan. Major programs include: mapping and eradication of invasive non-native species; compilation of existing data regarding water quality and restoration efforts; eelgrass monitoring; development of water trails; and marine terminal and marina improvements. In partnership with other agencies, the Harbor District recently completed an acoustic tracking study of coho salmon in Humboldt Bay, the Humboldt Bay and Eel River Delta Integrative Wetlands Strategy, and the Humboldt Bay and Eel River Delta Historic Atlas.

## **Situation Analysis/Needs Assessment/Baseline**

Recently, the Resources Legacy Fund Foundation (RLFF) awarded Humboldt State University (HSU) a grant to develop a database of available scientific information to support Marine Life Protection Act (MLPA) implementation in the North Coast Study Region. This study concluded that "Based upon the apparent availability of information for the North Coast region, there are substantial gaps among sub-regions, habitat types and depths zones." Our proposed research will tier off this study by filling data gaps, thereby benefiting Marine Protected Area (MPA) planning, MPA adaptive management and fisheries management decisions.

Additionally there is a need to build local capacity for collaborative fisheries research which will support future research priorities. Our project will enhance local capacity for collaborative fisheries research by developing a research partnership between Humboldt State University, the Harbor District and local fishers.

## **Justification**

### Contribution to CCMI Outcomes

The proposed project will directly contribute to achievement of *CCMI Outcome 1: Marine Ecosystem Protection: Statewide network of MPAs designed, designated, and effectively implemented.*

Members of the MLPA Master Plan Science Advisory Team have developed the UC Davis Spatial Sustainability and Yield Model and the Equilibrium Delay Difference Optimization Model. These models incorporate assumptions about the spatial distribution of fishing pressure and predict changes in fishing pressure and fish communities that would result from different MPA configurations. The information collected during our project, regarding cumulative fishing pressure in relation to ports, will allow for refinement of the assumptions used in these models. Additionally, predicted fishing effort will be compared to observed fishing effort and the models will be improved (tuned) accordingly. Collected information will also be beneficial for adaptive management of MPAs. Additionally, our project will build local capacity for conducting future MPA related research, while involving the fishing community in the MLPA planning and implementation process.

### Experience Implementing Similar Programs

It is common for the Harbor District to organize and administer research projects that involve multiple organizations. For example, the Harbor District administers quarterly eelgrass monitoring which is a partnership of the Harbor District, the California Department of Fish and Game and the US Fish and Wildlife Service. Another example is the recent completion of an acoustic tracking study of coho salmon which involved a partnership between the Harbor District and the US Fish and Wildlife Service. Past research efforts have been limited to Humboldt Bay, however, the Harbor District recently hired a new Conservation Director (Adam Wagschal) who has background in off-shore studies of marine fish and will be overseeing this project for the Harbor District. The project will also be overseen by Dr. Tim Mulligan and Dr. David Hankin from Humboldt State University's Department of Fisheries Biology, both of whom have decades of experience conducting marine fish research.

### Integration of Research into Local and State Strategies and Programs

The information gathered will improve models that will support MPA proposal evaluation during the MLPA Initiative North Coast Study Region planning process. Additionally, the information and understanding gained will be beneficial for MPA adaptive management. Finally, the increased understanding of how fishing pressure effects fish communities on the North Coast will be informative to ongoing fisheries management decisions by the California Department of Fish and Game and the Pacific Fisheries Management Council.

### Complimentary Activities of other Organizations

The partnership of local fishers and scientists that will be built through this research will be of great assistance to future research that will be conducted through the Collaborative Fisheries Research Organization that is being formed by the Ocean Protection Council. Collaborative

research will be an efficient and effective process for implementing MPA monitoring and other marine research on the North Coast. North Coast communities greatly desire such a program.

The proposed research also supports the Humboldt Bay Initiative's conservation goal to protect productivity patterns for marine bird, fish and mammal populations in the nearshore environment. The Humboldt Bay Initiative is an ecosystem-based management program in the Humboldt Bay region. The Harbor District is a member of the Humboldt Bay Initiative's core team.

## **Project Description**

### Project Outcomes

1. We will develop a collaborative research partnership between North Coast scientists and fishers, capable of efficient and effective marine research. We have assembled a group of scientists and fishers with strong interest in conducting collaborative fisheries research. Specifically, scientists from HSU will collaborate with the Harbor District and fishers from Crescent City Harbor, Trinidad Bay, the Port of Humboldt Bay and Noyo Harbor. The proposed project will develop a working relationship among these partners and facilitate the process of implementing future research priorities.
2. We will collect spatially explicit information regarding fish communities associated with rocky habitats in the MLPA North Coast Study Region. Information gathered will include: species diversity, relative abundance (based upon catch per unit effort), length frequencies, feeding habits and age structure. Understanding these fish community characteristics is critical for sustainable fishery and ecosystem management.
3. We will assess the spatial distribution of fishing effort. Spatially explicit information on fishing pressure is currently not available. Furthermore, directly assessing the distribution of fishing effort is impractical because of confidentiality issues and the fact that the fishing fleet is mobile, dispersed, and not permanently on the water. However, for assemblages of low-mobility species (e.g., rockfish (*Sebastes* spp.)), the legacy effects of fishing pressure can result in spatial gradients in the size and structure of individual as well as mixed species' populations. Consequently, our assessment of fish community structure at varying distances from ports will provide insight into the spatial distribution of fishing effort.
4. We will assess differences in fish communities across gradients of fishing pressure. Results will increase our understanding of how different levels of fishing effort affect fish communities in terms of species composition, relative abundance, size, age structure and feeding habits. This information will be used to develop and refine models of fish community and fishing fleet response to MPAs and will increase our understanding about the implications of different MPA designs and fishing regulations.

## Short Term Results

Short term results which may be measured as benchmarks of the projects success will include: (1) formation of a collaborative research partnership among fishers and scientists; (2) collection and immediate posting of data regarding sampled fish species and fish lengths on a website; (3) integration of the data into the MLPA Initiative's MPA evaluation process; (4) hosting two public workshops to present and discuss the information obtained; (5) preparation of a report describing results from the first year of sampling; and (6) preparation of a final report that presents and analyzes all the information collected.

## Activities

Each step in the process will involve a collaborative effort among fishers and scientists. The process will consist of the following steps:

### *Identification of Sampling Sites*

Transects that will be surveyed in this study extend approximately 20 miles north of Noyo Harbor and Trinidad Bay, and 20 miles south of Crescent City Harbor (Figure 1). In each of these areas, two parallel transects will be examined, one that follows an 8 fathom depth contour and one that follows a 16 fathom depth contour. The first step of this study will be to map the seafloor along these transects in order to identify rocky areas to be sampled. Seafloor maps will be developed by slowly traveling the transects while collecting data with a recording fathometer. With the resulting maps, a systematic sample of at least six rocky sites, along each transect, will be selected for surveying. The sites will represent a distance gradient from each port.

Fine-scale seafloor mapping of this area is currently being conducted to support the MLPA Initiative. If the resulting maps are available in time, they will be used to identify the sampling sites. In this case, seafloor mapping will not need to be conducted and project costs will be reduced accordingly.

### *Sampling Methods*

Sampling will occur from sport-fishing charter boats operated out of Crescent City Harbor, Trinidad Bay, and Noyo Harbor. The boats will be chartered specifically for this study and each crew will consist of a boat captain, researchers, and students enrolled in HSU's science

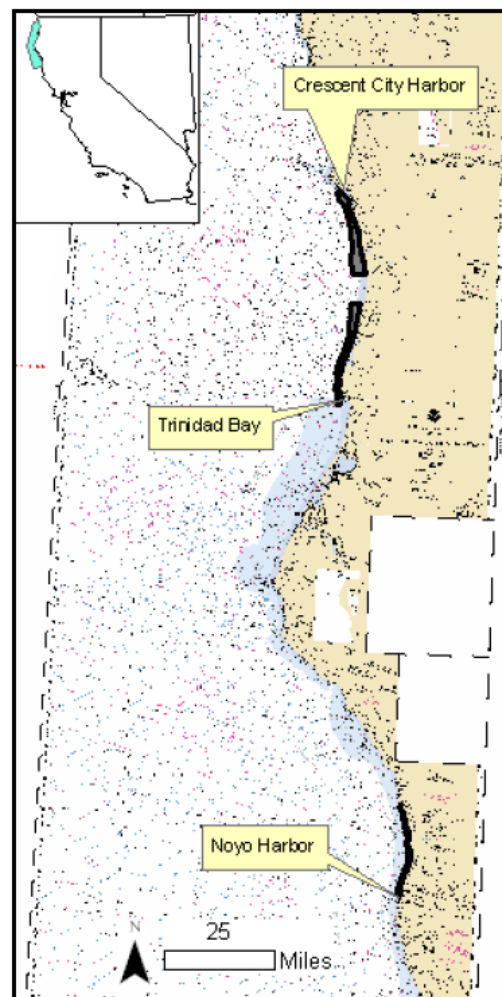


Figure 1. Locations of Sampling Transects.

programs. Between March 15 – September 15, 2010 and March 15 – September 15, 2011, each transect will be sampled a minimum of five times (a total of ten sampling events along each transect). To the extent possible, sampling events will be evenly distributed throughout these time periods, with the limitation being weather and ocean conditions that do not allow for sampling. Six fishers will fish at each sampling site for 45 minutes. We will use hook-and-line sampling methods similar to those being used to monitor MPAs in the MLPA Initiative Central Coast Study Region (i.e., lingcod bars, baited shrimp flies and un-baited shrimp flies), thus allowing for data comparison between the MLPA Initiative's Central Coast and North Coast Study Regions. All fish will be identified and measured to the nearest millimeter.

A sub-sample of the dominant fish species will be used to identify feeding habits and age structure. Stomachs will be removed at the junction with the pyloric caeca. Prey items will be removed and sorted using a dissecting microscope, identified to the lowest possible taxonomic level, and enumerated. Feeding habits will be analyzed using standard methodologies including index of relative importance (IRI), percent IRI, and diversity indices. Aging will be done using standard techniques at the HSU Department of Fisheries Biology, Age and Growth Laboratory.

### *Outreach*

The study's results will be analyzed and presented at two workshops. One workshop will be held after completion of the field work, but prior to the final analysis and interpretation of the data. The purpose of this workshop will be to obtain feedback from diverse scientists and the fishing community as to the implications of the data. At the second workshop, the final analysis and interpretation of the data will be presented.

### *Data Reporting*

To support ongoing MPA design and evaluation, data depicting the location and length of captured fish will be made available on the Harbor District's website within three weeks after every sampling effort. By November 1, 2010 the research team will develop a report describing the results of the first year's (2010) sampling effort. A comprehensive report of the entire study will be developed by December 1, 2011. This report will fully address the issues outlined above (see project outcomes section) and will include information from the final workshop, at which fishers and scientists will discuss the implications of the data for MPA adaptive management and sustainable fisheries management. As appropriate, results of the study will be submitted to peer-reviewed journals for publication and presented at professional conferences.

### Indicators of Success

- Implementation of the project as a working partnership between fishers and scientists in the North Coast. This will be assessed based upon the number of fishers and scientists involved in the research.
- Integration of the information obtained into MPA evaluation for the MLPA Initiative North Coast Study Region planning process.

- Making the results and analysis regarding the distribution and structure of fish communities and the relationship to fishing effort available for utilization by the public and resource managers.

### Assumptions

It is assumed that ocean conditions will be suitable to allow for sampling at the proposed times. Based upon the experience of the fishers and scientists developing the proposal, this is a reasonable assumption.

### External Factors

Changes in the planned timing of the MLPA Initiative could affect the success of the project. Under the current MLPA Initiative timeline, the first year of data collected will be available to evaluate MPA proposals. If the MLPA Initiative proceeds faster than is currently planned, than the data from this project may not be available in time for MPA evaluation. However, based on discussions with MLPA Initiative staff, it is unlikely that the existing MLPA Initiative timeline will be compressed.

### **List of Principle Staff**

**Adam Wagschal** is the Conservation Director at the Harbor District. Mr. Wagschal has a B.S. degree from HSU in Marine Fisheries and a M.S. degree from San Diego State University in Geography, with a concentration in geographic information science and spatial modeling. Relevant work previously conducted by Mr. Wagschal includes research regarding the efficacy of the Channel Islands MPAs and terrestrial preserve design planning in eastern San Diego County.

**Dr. David Hankin** is full professor in the Department of Fisheries Biology, Humboldt State University, and currently serves as Acting Associate Dean for Marine Sciences. Dr. Hankin serves as one of two US members on the Committee for Scientific Cooperation of the Pacific Salmon Commission. By training, Dr. Hankin is a quantitative fishery scientist. At HSU, he teaches sampling theory and fish population dynamics. Dr. Hankin's marine research has focused on life history, population dynamics and fishery management of Chinook salmon and Dungeness crabs. He has published extensively on the life history and fishery status of the northern California Dungeness crab fishery and is a recognized authority on female Dungeness crabs. Dr. Hankin's work on Chinook salmon has concerned harvest sharing between ocean and freshwater stakeholders, analysis of coded wire tag recovery data, inheritance of age at maturity, and development of marking programs to ensure reliable statistical separation of production from wild and hatchery fish.

**Dr. Tim Mulligan** is a full professor in the Department of Fisheries Biology at Humboldt State University. Dr. Mulligan's research and teaching interests focus on the ecology of marine fishes. He has collected baseline data on coastal fishes in Florida, Chesapeake Bay, the Gulf of Alaska, and northern California. Currently, Dr. Mulligan is studying the ecology of fishes in Humboldt Bay, Trinidad Bay and adjoining coastal waters. His peer reviewed publications have focused on the distribution and ecology of fishes in Humboldt Bay, the Smith River

Estuary, and the coastal waters of northern California. Dr. Mulligan has also completed final reports on fish investigations done in the intertidal and subtidal waters of Humboldt and Del Norte counties, California. Most relevant to the study proposed here is a recent two year trawling and hook and line survey of fishes inhabiting the subtidal waters of Redwood National and State Parks, California.

## Outcomes Framework

<b>Needs Assessment/Statement of Baseline Condition</b>				
<ul style="list-style-type: none"> <li>• There is limited biological data on the North Coast to support the evaluation of Marine Protected Area proposals, Marine Protected Area adaptive management and fisheries management.</li> <li>• Collaborative fisheries research (research conducted by partnerships between fishers and scientists) has been limited on the North Coast and it would be beneficial to improve the regions capacity for collaborative research.</li> </ul>				
<b>Activities</b>	<b>Short-term results</b>	<b>Project Outcomes</b>	<b>Indicators</b>	<b>Achievement of CCMI Outcomes</b>
<ul style="list-style-type: none"> <li>• Collect data regarding fish community species composition, age structure, length frequency and feeding habits at rocky habitats of varying distance from three major North Coast ports.</li> <li>• Use collected data to improve models which will be used to evaluate North Coast MPA proposals.</li> <li>• Make the data and analysis available to support MPA adaptive management and fisheries management.</li> <li>• Hold two public workshops to evaluate the implications of the data for ecosystem and fishery management.</li> </ul>	<ul style="list-style-type: none"> <li>• Formation of a collaborative research partnership among fishers and scientists.</li> <li>• Collection and immediate posting of data regarding sampled fish species and fish lengths on a website.</li> <li>• Integration of the data into the MLPA Initiatives MPA evaluation process.</li> <li>• Hosting two public workshops to present and discuss the information obtained.</li> <li>• Preparation of a report describing results from the first year of sampling.</li> <li>• Preparation of a final report that presents and analyzes all the information collected.</li> </ul>	<ol style="list-style-type: none"> <li>1. Established partnership of fishers and scientists to conduct efficient and robust marine research on the North Coast.</li> <li>2. Improved information and understanding available for evaluation of MPA proposals, MPA adaptive management and fisheries management.</li> </ol>	<ul style="list-style-type: none"> <li>• Number of partners meaningfully engaged in research.</li> <li>• Use of information for MPA evaluation, MPA adaptive management, and fisheries management</li> <li>• Results and analysis made publicly available for utilization by resource managers.</li> </ul>	<p><u>Outcome 1: Marine Ecosystems</u></p> <ul style="list-style-type: none"> <li>• Improvement of the models which will evaluate MPA proposals, thereby improving the MPA proposal selection process.</li> <li>• Information gained will contribute to long-term MPA monitoring and adaptive management.</li> <li>• The project will benefit MPA implementation by developing local capacity for collaborative marine research.</li> </ul>
<p><b>Assumptions</b> It is assumed that ocean conditions will be suitable to allow for sampling at the proposed times. Based upon the experience of the fishers and scientists developing the proposal, this is a reasonable assumption.</p>				
<p><b>External Factors</b> Changes in the planned timing of the MLPA Initiative could affect the success of our project. Under the current timeline, the first year of data collected will be available to evaluate MPA proposals. If the MLPA Initiative proceeds faster than is currently planned, than the data from this project may not be available in time for MPA evaluation. However, based upon discussions with MLPA Initiative staff it is unlikely that the MLPA Initiative timeline will be compressed.</p>				

## Budget

Cost	Year 1 (March 2010 – December 2010)	Year 2 (January 2011 – December 2011)	Total Costs	Support from RLFF	Other Fundors <sup>1</sup>
Project Personnel (salaries)	\$58,637	\$58,637	\$117,274	\$76,382	\$40,892
Fringe Benefits	\$11,059	\$11,059	\$22,118	\$22,118	
Travel					
Equipment (> \$300)	\$6,600		\$6,600	\$6,600	
Supplies (< \$300)	\$3,750	\$3,750	\$7,500	\$7,500	
Contractual Services	\$30,000	\$30,000	\$60,000	\$60,000	
Monitoring and Evaluation					
Other (please specify)					
<b>Total Direct Costs</b>	\$110,046	\$103,446	\$213,492	\$172,600	\$40,892
Indirect Costs (not to exceed 15% of direct costs)	\$16,507	\$15,517	\$32,024	\$25,890	\$6,134
<b>TOTAL PROJECT COSTS</b>	\$126,553	\$118,963	\$245,516	\$198,490	\$47,026

<sup>1</sup> Other funding sources include an in-kind match from Humboldt State University for \$20,892 which will be for Dr. Mulligan's work and from the Humboldt Bay Harbor District for \$20,000 which will be for Mr. Wagschal's work. Additionally, the Humboldt Bay Harbor District will host the two public workshops.

### Project Personnel

- Two Master's of Science graduate students. The graduate students will be primarily responsible for collection, analysis and dissemination of data (\$86,000 support from RLFF).
- Undergraduate students to assist on research cruises (\$12,500 support from RLFF).
- Dr. Tim Mulligan to assist with data collection, analysis and dissemination (\$20,892 provided by Humboldt State University).
- Adam Wagschal to assist with data collection, analysis and dissemination (\$20,000 provided by the Harbor District).

### Equipment

- Two recording fathometers (\$6,600 provided by RLFF).

### Supplies

- Laboratory supplies associated with fish aging and diet analysis (\$7,500 provided by RLFF).

### Contractual Services

- Ship time which includes the boats, captains and tackle (\$60,000 provided by RLFF).

Budget Allocation per CCMI Outcome

<b>Budget per CCMI Outcome (list specific CCMI outcome below)</b>	<b>Percent</b>
Marine Ecosystem Protection/MPAs	100%
Improved Governance	
Supportive Ocean and Coastal Constituencies	
State and New Sources of Funding for Key Programs	
<b>Total</b>	100%

**Other Grants Received by the Applicant from the David and Lucile Packard Foundation, the Resources Legacy Fund, or the Resources Legacy Fund Foundation**

None

**Supporting Material**

See attached project support letters from Senator Pat Wiggins, Assemblymember Wesley Chesbro, Dr. Eric Bjorkstedt (MLPA Science Advisory Team member), Susan Schlosser (California Sea Grant), and Dr. Peter Nelson (HT Harvey and Associates).

**Board Members / Harbor Commissioners**

Commissioner Ronnie Pellegrini: Term: 2007-2011

- Member of the American Legion, Fort Humboldt Post 212
- Founding member and former Treasurer of the Pacific Marine Conservation Council
- Secretary/Treasurer of Western Fish Boat Owner's Association
- Member of the Ellis Island Foundation

Commissioner Roy L. Curless: Term: 2007-2011

- Member of the Fortuna Chamber of Commerce
- Member of the Rotary Fortuna Rodeo Association

Commissioner Mike Wilson: Term: 2005-2009

- Board member of Friends of the Dunes
- Member of the Water Environment Federation
- Member of the Society for Ecological Restoration
- Member of the California Native Plant Society
- Member of Engineers Without Borders
- Member of Architects, Planners and Designers for Social Responsibility

Commissioner Patrick Higgins: Term: 2007-2011

- Profession: Consulting Fisheries Biologist
- American Fisheries Society

- Salmonid Restoration Federation
- Redwood Forest Foundation, Humboldt Group
- Redwood Community Action Agency Board (1982-1994), Chairman (1986-1994)
- Eureka Bicycle Committee (1978-1980), Chairman

Commissioner Dennis Hunter: Term: 2005-2009

- Member of Easter Seals
- Member of the American Cancer Society
- Member of the Eureka Rotary Club
- Board Member of the Eureka Chamber of Commerce
- Member of the Redwood Region Economic Development Commission
- Member of the Humboldt County Convention and Visitors Bureau

**Support from other Foundations**

None

**Organizational Budget**

(See Attachment)

**IRS Letter**

(Not applicable because the Harbor District is a government agency)

**Financial Statement**

(See Attachment)