PROJECT TITLE:
Integration of Marine Protected Areas and Fishery Science and Management

PROJECT LEADERS:
National Marine Fisheries Service, Santa Cruz Laboratory and the National Marine
Protected Areas, Science Institute

PROJECT DESCRIPTION
Differing scientific views and interpretations have tended to create confusion and
concerns over the role of marine protected areas (MPAs) in the management of the
nation's fisheries and the conservation of its marine biodiversity. To address this
problem, the NOAA Fisheries Santa Cruz Lab (SCL) and NOAA's National Marine
Protected Areas Center-Science Institute (NMPAC-SI) are convening a technical working
group to develop the scientific information necessary to integrate MPAs with the broader
context of fisheries. The working group will participate in a series of focused workshops
over a span of two years to discuss and define the critical concepts and issues and using
in-depth analysis and synthesis develop a rational approach for integration of MPAs and
traditional fishery science and management. The working group will be composed of
scientists, fishery managers and representatives from the fishing industry and
conservation community with appropriate expertise in marine ecology, and fishery
science and management.

STATUS REPORT
Prior to convening the working group, we organized a NOAA planning effort in February
2004 to assist us with developing the terms of reference for the working group. The
NOAA planning committee consisted of members representing the various line offices
within NOAA, the Pacific Fishery Management Council (PFMC), and the MPA Federal
Advisory Committee. The planning committee produced and prioritized a list of main
topics for the working group (see attachment A), and identified prospective members of
the working group. The first working group meeting is scheduled for September 2004.

Additionally, our efforts to improve the scientific knowledge of the function and impact
of MPAs and fisheries have been coordinated with a similar and ongoing effort by the
National Fisheries Conservation Center (NFCC) and the PFMC's Science and Statistical
Committee (SSC) marine reserve subcommittee. In fact, products of their efforts served
as a starting point at the NOAA planning meeting to develop our working group's terms
of reference. Furthermore we continue to work closely with PFMC staff to ensure that
the information generated by the working group has effective and timely applications for
PFMC's management schedule.

PROJECT DELIVERABLES
- Peer reviewed papers and reports
- Novel analytical approaches and scientific models for integrating fisheries and
  MPAs
- A conceptual framework to improve the integrative management of fisheries and
  MPAs

Attachment A

List of MPA topics for working group consideration

A) MPAs and management of natural resources (fisheries and natural heritage)

1) Develop common currencies for evaluating the biological and socio-economic impacts resulting from implementation of MPAs and other management tools.
Examples of currencies:
- Spawning biomass protection
- Fishing mortality rate control
- Gear impacts on non-target species (e.g., by-catch) and benthic forage base
- Gear impacts on physical and biogenic habitat.
- Indicators of ecosystem function and relative status relevant to MPAs.

2) Compare the demographic implications of MPAs (e.g., maternal effects and size-age composition) with those resulting from implementing more conventional measures.

3) What are the costs/benefits and trade-offs for fisheries and ecosystems of fully versus partially protected MPAs (e.g., areas closed to bottom fishing yet open to pelagic fishing)?

4) How are benthic and pelagic communities coupled?

5) Evaluate fisheries and ecosystem consequences (e.g., benefits and costs) of various types of restrictions within an MPA.

B) MPAs and conventional fishery management

1) Identify strengths/weaknesses and trade-offs of different fishery management measures – MPAs being one of them - in terms of common currencies.

2) How can the use of MPAs benefit traditional fishery management objectives in ways that conventional management tools cannot?

3) Evaluate the potential for fishery induced change in heritable versus phenotypic characteristics of populations, influenced by or resulting from MPA use versus traditional measures (e.g., selection for slow growth and early maturation by fishing, or selection for sedentary individuals by MPAs).

C) MPAs and natural heritage management

1) What is the maximum amount of fishing effort that still allows one to reach the goals of an MPA implemented to protect and conserve natural heritage?

D) MPAs as insurance in the face of uncertainty

1) Determine if the establishment of MPAs can provide an insurance effect for marine fisheries, considering the following:
- Uncertainty in implementation (e.g., statistical estimation, enforcement, and compliance)
- Protection of non-target species in multi-species systems
- Protection of population structure (genetic and maternal effects)
- Maintenance of population and community resilience against catastrophe

2) Juxtapose the use of MPAs as a precautionary adjustment versus other alternatives and compare targets and expectations.

3) Evaluate MPAs as a last resort measure when quantitative fishery management cannot be applied.

E) MPA design and evaluation

1) Evaluate the state of the art and promising developments in spatially explicit modeling of marine populations and fisheries, and prioritize data and modeling requirements to support analyses of individual MPAs and networks (i.e., effects outside MPAs).

2) Propose statistically based monitoring designs (e.g., BACI) for evaluating the effects of an MPA, include evaluation of impacts inside MPAs.

3) Survey, and where appropriate, develop more sophisticated empirical and theoretical tools to evaluate spillover and seeding effects (e.g., integrate oceanographic models, genetic and microchemical tools, and fishery dependent and independent population models).

4) Survey current socio-economic data and tools and where appropriate develop more sophisticated socio-economic tools to determine MPA effects (e.g., changes in use patterns, and effects of effort displacement on fishing industry, fish stocks, and ecosystem function).

5) What are reasonable benchmarks/targets and time lines for various MPA goals (e.g., forecast modeling)?

6) Evaluate benthic and pelagic coupling in design considerations.

7) How do activities outside MPAs hinder the achievement of MPA goals (e.g., what are the effects on MPAs of fishing outside MPAs, and what are the effects of fishing inside an MPA on the goals of the MPA)?

8) How does the implementation of an MPA affect harvest policies for populations of target species (e.g., are fish in the MPA included in the harvest quota)?

9) How do we monitor and assess populations and communities in MPAs without adversely affecting MPA goals (e.g., by extractive sampling)?

10) Evaluate the design of MPAs or network of MPAs to achieve multiple objectives (e.g., maximize gain from a minimum number of MPAs).

11) Evaluate alternative adaptive management scenarios (e.g., testing a sequential series of hypotheses).