

Summary Report

Note: This document has been revised as of Nov. 24, 2008, reflecting a rescheduling of the second workshop previously scheduled for Dec 8-9, 2008.

North Central Coast Marine Protected Areas Monitoring Planning Workshop

**October 22-23, 2008
Pacifica, California**

*Prepared by Eric Poncelet and Janet Thomson
Kearns & West*

INTRODUCTION – WORKSHOP PURPOSE AND ORGANIZATION

This report summarizes the key outcomes from the North Central Coast Marine Protected Areas Monitoring Workshop held October 22-23, 2008 in Pacifica, California.¹ The workshop was convened by the California Marine Protected Areas Monitoring Enterprise (Monitoring Enterprise) and the California Department of Fish and Game (CDFG).

Workshop Objectives and Intended Outcomes

The purpose of the workshop was to help inform the development of a monitoring plan for North Central Coast marine protected areas (MPAs), which are expected to be implemented in 2009.

Key objectives of the workshop were to:

1. Develop a set of *ecosystem features* that define the scope of status and trends monitoring for the North Central Coast ecosystem. Note: Status and trends monitoring describes the status of, and change in, key components of the system that collectively encompass and represent the North Central Coast system.
2. Define a prioritized set of *effectiveness questions* most important and feasible for monitoring to address in order to inform future management decisions. Note: these questions explore the link between particular MPA network design aspects or decisions and their effects on the system or parts of the system.
3. Launch Scientific Working Groups charged with a) developing, evaluating and recommending attributes and indicators for each ecosystem feature, and b) developing and evaluating approaches to address categorized effectiveness questions and recommending methods and associated indicators that will best address these questions. Note: the Scientific Working Groups will summarize their analyses and present their recommendations to a second workshop, to be held Dec 8-9, 2008 (*update: the second workshop will be held in early 2009*), in Pacifica, CA.

¹ This report represents our efforts to synthesize the key outcomes from the workshop; it is not intended to serve as a transcript of all issues discussed or points made.

Workshop Participation and Conveners

Twenty-eight invited participants participated in the October 22-23, 2008 workshop.² The attendees included 12 scientists and 16 former members of the North Central Coast Regional Stakeholder Group.³ *The list of workshop participants is attached as Appendix 1.* Together, the invited participants represented a broad variety of stakeholder interests and scientific expertise. Members of the public were also invited to attend the workshop as observers. Approximately 20 members of the public attended.

California Fish and Game Commission President Richard Rogers and MLPA Initiative Executive Director Ken Wiseman opened the meeting with welcoming comments and support for the new and innovative approach to monitoring being implemented for the North Central Coast region. Cheri Recchia, Director of the Monitoring Enterprise, and John Ugoretz, Resource Assessment Program Manager, Marine Region, for the CDFG, additionally welcomed participants and convened the workshop.

Cheri Recchia provided a brief overview of the Monitoring Enterprise. The Monitoring Enterprise is housed within the California Ocean Science Trust and was created in 2007 to lead the development of sustainable, informative, and innovative monitoring of California's MPA network. The mission of the Monitoring Enterprise is to provide timely information that enables assessment of the condition and functioning of MPAs, identifies emerging threats, informs MPA management, and improves understanding of marine ecosystems. The Monitoring Enterprise has three core elements of its work: science, to support and encourage development, testing, and refinement of new monitoring approaches and tools needed to provide timely and useful monitoring information; information management, to manage, assemble, and provide online access to MPA monitoring data; and communications, to develop and deliver monitoring information products to decision-makers, resource managers, researchers, stakeholders, and the public.

Workshop Organization

The workshop took place over a 1.5-day period. The first day was structured to provide an overview and introduction to the concepts and policy context surrounding development of a North Central Coast MPA monitoring plan. Invited participants also recommended the key *ecosystem features* (both ecological and socioeconomic) they felt best encompassed and represented the North Central Coast system. The ecosystem features will provide the focus for status and trends monitoring. On the morning of the second day of the workshop, invited participants suggested and then categorized *effectiveness questions* linking MPA network design aspects or decisions with ecosystem features or elements of features. The focus of the workshop was on identifying high-level questions that could most usefully inform adaptive management of the MPAs in future.

The workshop agenda is included as Appendix 2. Workshop PowerPoint presentations and other supporting materials can be found on the MPA Monitoring Enterprise website at: http://www.calost.org/monitoring_ent.html.

² In all, fifty individuals were invited to participate in the workshop. All of the former members of the North Central Coast Regional Stakeholder Group were asked to indicate their interest in participating in the workshop. Some of these North Central Coast Regional Stakeholder Group members indicated that they were not interested in participating or did not respond to the inquiry.

³ In one case, a regional stakeholder group member who could not attend was replaced by another member of his organization.

PROCESS OVERVIEW AND PLANNING APPROACH

Process Overview

At the workshop, Monitoring Enterprise staff provided an overview of the process and timeline for developing a monitoring plan for the North Central Coast MPAs. The monitoring plan will consist of both baseline and long-term monitoring components.

The timing for developing the North Central Coast MPA monitoring plan is driven by several key factors:

- The California Fish and Game Commission is expected to adopt MPAs for the North Central Coast region by early 2009.
- Given that the North Central Coast MPAs are expected to take effect in 2009, baseline monitoring should begin as soon as feasibly possible, likely in the summer of 2009
- To facilitate the initiation of baseline monitoring in summer 2009, a request for proposal (RFP) for baseline monitoring fieldwork needs to be distributed by mid-January 2009.

The process for developing the monitoring plan for North Central Coast MPAs is proceeding in two main phases:

1. Develop the monitoring framework. The framework establishes the structure for monitoring, identifying the key components of monitoring and how they fit together. The framework includes the ecosystem features, the attributes and indicators used for status and trends monitoring, the effectiveness questions, and the approaches and indicators for effectiveness monitoring. Initial input for the development of the framework was provided through the Oct. 22-23 workshop and is being used to launch analyses by several Scientific Working Groups of possible and recommended attributes, approaches and indicators for North Central Coast MPA monitoring. At the second workshop, scheduled for December 8-9, 2008 (*update: the second workshop will be held in early 2009*), stakeholders and scientists will consider the recommendations of the Scientific Working Groups and provide additional input on the monitoring framework.
2. Develop the monitoring plan. The monitoring framework will be used to develop baseline and long-term monitoring plans, which will be designed to fit together and collectively implement the framework. The baseline monitoring plan will be used to guide development of the North Central Coast Baseline MPA Monitoring Request for Proposals, which is scheduled to be released in mid-January, 2009. The long-term monitoring plan will be circulated in draft form for review, likely in the spring of 2009. The plan will also be submitted to the California Fish and Game Commission for adoption or approval.

For additional details on process and timing, please see *Appendix 3: Planning Overview and Timeline*.

Planning Focus

To help focus workshop discussions, Monitoring Enterprise staff provided an overview of several key factors guiding the Monitoring Enterprise's approach to MPA monitoring.

The Marine Life Protection Act (MLPA) and the MLPA Master Plan provide an important policy context for North Central Coast MPA monitoring. These documents specify that monitoring should evaluate the MPA network's performance relative to MLPA goals, facilitate adaptive management, improve understanding of marine systems, and assess selected individual MPAs,

regional MPA network components, and the statewide network. Additionally, the North Central Coast Regional Stakeholder Group adopted goals and objectives for the North Central Coast region and identified site-specific objectives for each proposed MPA. All of this information served as guidance to the workshop participants in considering which ecosystem features and effectiveness questions should serve as the basis for North Central Coast MPA monitoring.

Monitoring Enterprise staff also described several key principles intended to guide monitoring planning. Given the large geographical scale of the North Central Coast region and the broad scope of the MLPA goals, it is critically important for the monitoring framework to clearly articulate monitoring priorities, explaining what information monitoring should produce and why that information is important. Monitoring must focus on providing information that will be most useful for making management decisions in the future, working in an adaptive management framework as stipulated by the MLPA and the MLPA Master Plan. The North Central Coast MPA Monitoring Plan will not “reinvent” the wheel but will build on the existing wealth of expertise and data in California and elsewhere. Lastly, the Plan will be integrated within the policy context mentioned above.

Planning Approach

To develop a monitoring plan, it is important to identify what information monitoring should produce, and how that information will be obtained (for a schematic of the monitoring framework, please see *Appendix 4: Monitoring Framework Schematic*). For the North Central Coast MPA Monitoring Plan, these decisions will be made and articulated through development of the monitoring framework. The central piece of the framework is the ecosystem features. Features are ecological or non-ecological, and are chosen to collectively represent the North Central Coast system. Ecosystem features provide the basis for two complementary types of monitoring: status and trends monitoring, which will provide information about how the North Central Coast system is doing; and effectiveness monitoring, which will assess how particular MPA network design aspects or decisions are affecting the North Central Coast System.

Status and trends monitoring is developed by identifying key *attributes* for each ecosystem feature. Key attributes are those characteristics of the ecosystem feature required to sustain that feature over time, reflecting, for example, aspects of the feature’s structure or function. Then *indicators* are identified for each attribute – indicators are what are actually measured to describe the status of and change in the attribute, and thus the status of and change in the corresponding ecosystem feature.

Effectiveness monitoring is developed by identifying key MPA design aspects or decisions, and assessing the effects of those design aspects or decisions on ecosystem features or components of features. Effectiveness monitoring also uses indicators, which are selected to measure the specific way or ways that a design aspect or decision may affect the system. It is important to note that effectiveness monitoring is not a determination of whether MPAs are an effective management tool, but rather the effect of specific MPA design aspects and/or decisions on the overall system. This type of monitoring will most directly inform adaptive management, as required by the MLPA.

Clarifying Questions Raised

During the workshop, invited participants asked a series of questions of Monitoring Enterprise and CDFG staff that helped to clarify the scope and intent of the process. Key questions included:

Q. What is the relationship between the long-term and baseline monitoring plans?

A. Both plans will be guided by the same monitoring framework being developed, and they will be designed to fit together to meet the identified monitoring priorities. Because an RFP for baseline monitoring must be released in January 2009, the baseline portion of the monitoring plan will have to be completed sooner than the entire monitoring plan can be developed. The long-term monitoring plan will be fleshed out and reviewed through the spring of 2009. While techniques and methods may be the same for baseline and long-term monitoring, frequency, locations or other factors may differ.

Q. Will we be dealing with monitoring separately on a system level and a specific MPA level?

A. No. The intent is to create one monitoring framework that operates on multiple spatial scales, focusing on ecosystem features (i.e., aspects of the North Central Coast region that collectively represent and encompass the whole of the system), and enabling monitoring at the regional scale and at selected individual MPAs, as well as contributing to monitoring at the statewide scale once the full MPA network is completed.

Q. How will the baseline for monitoring be characterized? Will it take historical and recent conditions into consideration?

A. In establishing baseline, it is important to characterize temporal and spatial variability, so historical and recent data, where available, will be taken into account. Baseline needs will be identified for each monitoring indicator as part of the planning process, and may involve analysis or re-analysis of existing data, and collection of new data, depending on what is needed. While a baseline is in some ways a “snapshot” in time, it must be collected over a long enough period to account for natural variability and sampling protocols.

Q. Who will make the final decision on a monitoring approach?

A. The monitoring plan will be submitted to the Fish and Game Commission for approval or adoption, as appropriate. We expect that RFP processes will be used to determine who gathers which monitoring data, and how.

INPUT TOWARD DEVELOPING THE MONITORING FRAMEWORK

Ecosystem Features

Elizabeth Whiteman, Lead Scientist for the Monitoring Enterprise and Nick Salafsky of Foundations of Success described the ecosystem features approach, in which a small number of ecological and non-ecological features are identified to collectively represent and encompass the North Central Coast system. The ecosystem features form the core of the monitoring framework, and guide both status and trends monitoring and effectiveness monitoring. Invited participants were then tasked with proposing sets of up to 10 ecosystem features they felt best met this requirement.

Workshop participants collectively developed the following list of key ecosystem feature.

Additional details can be seen in Appendix 5: Ecosystem Features Proposed by Participants.

Proposed Ecosystem Features	
<i>Ecological Features (in no particular order)</i>	<i>Non-Ecological Features (in no particular order)</i>
Estuarine systems	Viable coastal communities
Kelp systems	Consumptive use
Soft-bottom sub-tidal systems	Non-consumptive use
Soft-bottom intertidal and beach systems	
Rocky sub-tidal systems (deep and shallow)	

Rocky intertidal systems	
Apex predators	
Open ocean systems	

Effectiveness Questions

To explain the policy context and purpose of effectiveness monitoring, Liz Whiteman highlighted relevant text from the MLPA and the Master Plan. The MLPA states that monitoring must occur at selected sites to facilitate adaptive management of MPAs. The Master Plan states that marine reserves and protected areas must be monitored and evaluated to determine if goals are being met and to provide information for refining the design of current and future MPAs and reserves. The overarching theme of these documents is that the intent is to gather monitoring information that can inform adaptive management.

The intent of effectiveness monitoring is to help inform future management decisions, uncover relationships between MPA network design aspects and system response, and improve the best available science. It is not intended to set targets for performance, provide “yes/no” or “pass/fail” answers, or recommend changes in management action in and of itself. Effectiveness monitoring is difficult and raises many legitimate questions, some of which cannot feasibly be answered with current scientific capabilities, cannot be robustly answered with the array of MPAs, or may take years to answer.

Effectiveness monitoring explores the link between MPA network design aspects and decisions and ecosystem features. As an example of an approach to inform an *effectiveness question*, monitoring can assess the effect of MPA size on kelp forest habitat. In order to understand that relationship, monitoring must explore the *mechanisms and effects* involved. For example, a mechanism might involve the possible movement of adult fish, and a range of *indicators or methods* (such as tagging) can measure the functioning of that mechanism.

Elizabeth Whiteman and Nick Salafsky then tasked invited workshop participants with identifying 3-6 specific possible management effectiveness questions that explicitly linked an MPA design aspect or decision with an ecosystem feature or component of a feature. The identified questions were then categorized.

Workshop participants identified effectiveness questions in the following main categories. Additional details, including the specific effectiveness questions posed, can be seen in *Appendix 6: Effectiveness Questions Proposed by Participants*.

Proposed Effectiveness Question Categories (in no particular order)	
Clusters and configurations of MPAs	Levels of protection
Size and spacing of MPAs	Special closures
Habitat siting	Enforcement and compliance
Network effect	Socioeconomics and resource usage
State Marine Reserves (SMR) vs. State Marine Conservation Areas (SMCA)	

CHARGE TO THE SCIENTIFIC WORKING GROUPS

After workshop participants had completed development of a set of ecosystem features and categories of effectiveness questions, Monitoring Enterprise staff provided an overview of how the Scientific Working Groups would build on this information to inform the second workshop

scheduled for December 8-9, 2008 (*update: the second workshop will be held in early 2009*). Several scientist participants met following the workshop to begin coordinating Scientific Working Group activities for the interim period.

Scientific Working Groups on Status and Trends Monitoring

At this workshop, invited participants proposed a set of ecosystem features. The status and trends scientific working groups will spend the next six weeks developing a set of recommended attributes and indicators for the ecosystem features. The scientific working groups will present their deliberations, advice, and recommendations on these attributes and indicators to the participants at workshop 2 (December 8-9, 2008; *update: the second workshop will be held in early 2009*) and will seek comments and suggestions from participants on the content. The groups will then consider and address the input received.

Scientific Working Groups on Effectiveness Questions

The invited participants developed and categorized a list of effectiveness questions that may be useful to inform adaptive management (e.g., what is the effect of MPA size on kelp forest habitat?). The effectiveness scientific working groups will develop recommendations of mechanisms/effects and indicators/methods to test these effectiveness questions. As with the status and trends scientific working groups, the effectiveness scientific working groups will present their deliberations, advice, and recommendations to the participants at workshop 2 (December 8-9, 2008; *update: the second workshop will be held in early 2009*) and will seek comments and suggestions from participants on the content. The groups will then consider and address the input they receive.

A summary of the monitoring framework that shows the components to be developed by the Scientific Working Groups is attached in *Appendix 6: Monitoring Framework Schematic*.

PUBLIC COMMENT AND PARTICIPANT REFLECTIONS

Members of the public were given the opportunity to ask questions and make comments during designated public comment periods on both days of the workshop. Several members of the public suggested that their organizations would be available and eager to assist with providing or gathering monitoring data. This included the Point Reyes Bird Observatory (PRBO) and the Central and Northern California Ocean Observing System (CeNCOOS).

Invited participants were also given the opportunity to reflect on the workshop. Key comments from invited participants included:

- Encouraging connections between this effort and volunteer/academic efforts would be useful, as would connections across scientific disciplines and ensuring that the program is using existing sources of data.
- Finding ways to increase available funds for monitoring will be crucial.
- Participants requested that information from the meetings be made available so that participants can assist with broader outreach and education to broader constituencies about monitoring plan development.

NEXT STEPS

Key next steps in the North Central Coast MPA monitoring planning process are summarized below:

1. Facilitation staff to prepare a workshop summary report and post this on the Monitoring Enterprise website (http://www.calost.org/monitoring_ent.html).
2. Monitoring Enterprise staff to assist in the convening and charging of Scientific Working Groups. Note: a logistical meeting for the Scientific Working Groups was convened immediately following the adjournment of the workshop on October 23, 2008.
3. Scientific Working Groups to draw on the information provided by the invited workshop participants to develop recommendations on both status and trends attributes and indicators, and effectiveness methods and indicators. Scientific Working Groups to prepare summary materials for presentation and discussion at the second workshop.
4. Invited workshop participants participate in second workshop, scheduled for December 8-9, 2008 (*update: the second workshop will be held in early 2009*) in Pacifica, CA. The focus of the second workshop will be reviewing the recommendations of the Scientific Working Groups and providing additional input to the monitoring plan framework.
5. Scientific Working Groups to consider and address comments from invited participants.
6. Monitoring Enterprise staff to draw on the above information to develop a draft baseline monitoring plan and an associated RFP for conducting baseline monitoring work by mid-January 2009.
7. Monitoring Enterprise staff to draw on the above to develop a draft North Central Coast Long-Term MPA Monitoring Plan for public and scientific review and submission to the Fish and Game Commission.

APPENDICES

1. Roster of attendees
2. Workshop Agenda
3. Planning Overview and Timeline
4. Monitoring Framework Schematic
5. Ecosystem Features Proposed by Participants
6. Effectiveness Questions Proposed by Participants

Appendix 1: North Central Coast MPA Monitoring Planning Workshop 1

Roster of Invited and Attending Participants

October 22-23, 2008, Pacifica, CA

Name	Affiliation
Debbie Aseltine-Nielsen*	California Department of Fish and Game
Ben Becker	National Park Service
Bill Bernard*	Abalone Advisory Group
Eric Bjorkstedt*	NOAA Southwest Fisheries Science Center /Humboldt State University
Bob Breen*	Educator
Mark Carr*	University of California, Santa Cruz
Josh Churchman*	Commercial Fisherman
Jim Estes*	University of California, Santa Cruz
Ellen Furot-Daniels*	CA Coastal Commission
John Field	NOAA Southwest Fisheries Science Center
Steve Gaines	University of California, Santa Barbara
Karen Garrison*	Natural Resources Defense Council
Mary Gleason	The Nature Conservancy
Aaron Golbus*	Port of San Francisco
Dominic Gregorio*	State Water Quality Control Board
Jim Hobbs	University of California, Berkeley
Jules Jaffe	University of California, San Diego
Patty King*	Ocean Conservationist and Docent
Francesca Koe	Recreational Diver
Irina Kogan*	Gulf of the Farallones National Marine Sanctuary
Tony Koslow	CalCOFI/ University of California, San Diego
Chris La Franchi*	Channel Islands National Marine Sanctuary
John Largier	Bodega Marine Laboratory, University of California, Davis
Phil Levin	NOAA Northwest Fisheries Science Center
James Lindholm	California State University Monterey Bay
Alec MacCall	NOAA Southwest Fisheries Science Center
Tom Mattusch*	F/V Huli Cat
Gerry McChesney	US Fish and Wildlife Service
Lance Morgan*	Marine Conservation Biology Institute
Samantha Murray	Ocean Conservancy
Kellyx Nelson*	San Mateo Resource Conservation District
Karina Nielson	Sonoma State
Jeff Paduan	Naval Postgraduate School
Ed Parnell*	Scripps Institution of Oceanography
Carrie Pomeroy	California Sea Grant Extension Program, University of California, Davis
Pete Raimondi*	University of California, Santa Cruz
Laura Rogers-Bennett*	California Department of Fish and Game
Jim Sanchirico	University of California, Davis
Fred Smith	Environmental Action Committee of West Marin
Jay Stachowicz*	University of California, Davis
Rick Starr	UC Cooperative Extension Sea Grant Program
Bill Sydeman	Farallon Institute
Lynn Takata*	California Department of Fish and Game
Ed Tavasieff*	California Fresh Fish
Nick Tipon*	Federated Indians of Graton Rancheria
Jason Vasques*	California Department of Fish and Game
Dean Wendt	California Polytechnic University San Luis Obispo
Bob Wilson*	The Marine Mammal Center
Dan Wolford*	Coastside Fishing Club
Jay Yokomizo*	F/V New Huck Finn

*Attending Participants

Appendix 2: Agenda

North Central Coast MPA Monitoring Planning – Workshop 1

*Best Western Lighthouse Hotel, Pacifica, CA
Wednesday, October 22, 2008 (9:30 AM – 5:30 PM)
Thursday, October 23, 2008 (8:00 AM – 1:00 PM)*

Meeting Objectives

1. Develop a set of ecosystem features that define the scope of status & trends monitoring for the North Central Coast ecosystem.
2. Define a prioritized set of management/effectiveness questions most important and feasible for monitoring data to address in order to inform future management decisions.
3. Launch scientific working groups charged with a) developing, evaluating and recommending attributes and indicators for each ecosystem feature, and b) developing and evaluating approaches to address priority effectiveness questions and recommending information to be collected that will address these questions.

Agenda

Note that this agenda is constructed for 2 days starting on the morning of the first day.

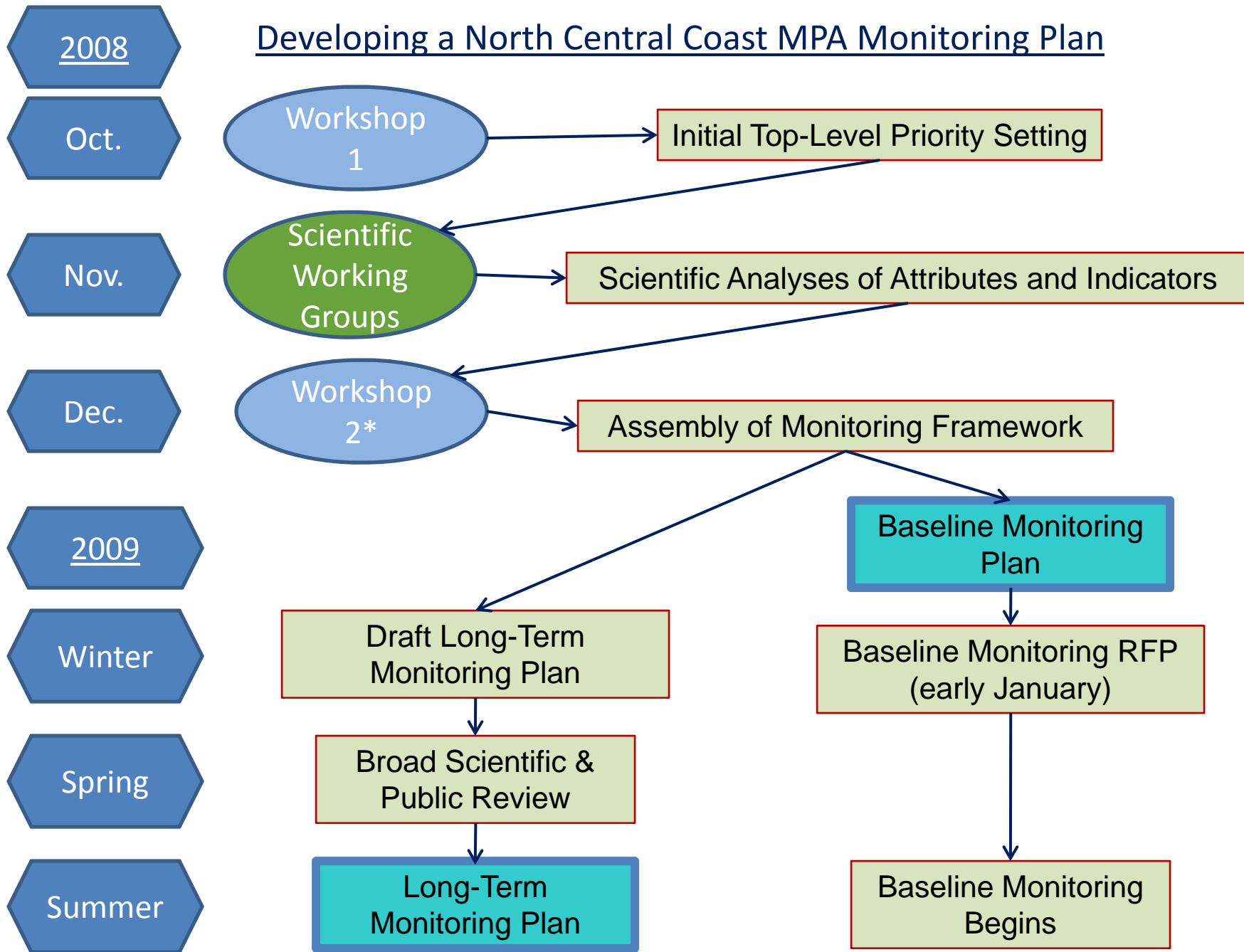
Day 1

9:30 – 10:00	Breakfast (provided for invited participants) and Sign-in
10:00 – 11:00	Introduction <ul style="list-style-type: none">• Welcome and introductions• Agenda review and process guidelines
11:00 – 12:00	Overview and Project Framing <ul style="list-style-type: none">• Overview of overall process• Overview of planning methods• Context within MLPA goals and policies
12:00 – 1:00	Lunch (provided for invited participants)
1:00 – 3:30	Introduction to Status & Trends Measures and Ecosystem Feature Selection <ul style="list-style-type: none">• Overview of types of monitoring• Introduction to ecosystem features• Group identification of ecosystem features
3:30 – 4:00	Coffee Break
4:00 – 4:45	Charge to Scientific Working Groups: Status & Trends Measures <ul style="list-style-type: none">• Presentation of viability concepts, attributes, and indicators• Presentation of charge to scientific working groups developing and evaluating attributes and indicators for each ecosystem feature
4:45 – 5:30	Public Comment and Participant Reflections
5:30	Plenary Adjourns
6:30	Dinner (provided for invited participants)

Day 2

7:00 – 8:00	Breakfast (provided for invited participants) and Sign-in
8:00 – 8:15	Recap and Review
8:15 – 11:00	Introduction to Effectiveness Measures and Identification of Effectiveness Questions <ul style="list-style-type: none">• Examples and explanation of management effectiveness questions• Group identification of effectiveness questions
11:00 – 11:30	Coffee Break
11:30 – 12:00	Charge to Scientific Working Groups: Effectiveness Measures <ul style="list-style-type: none">• Presentation of effectiveness monitoring and results chains concepts• Presentation of charge to scientific working groups developing and evaluating approaches to effectiveness questions
12:00 – 12:30	Public Comment and Participant Reflections
12:30 – 1:00	Next Steps and Workshop Close <ul style="list-style-type: none">• Discuss next steps• Conduct evaluation
1:00	Adjourn

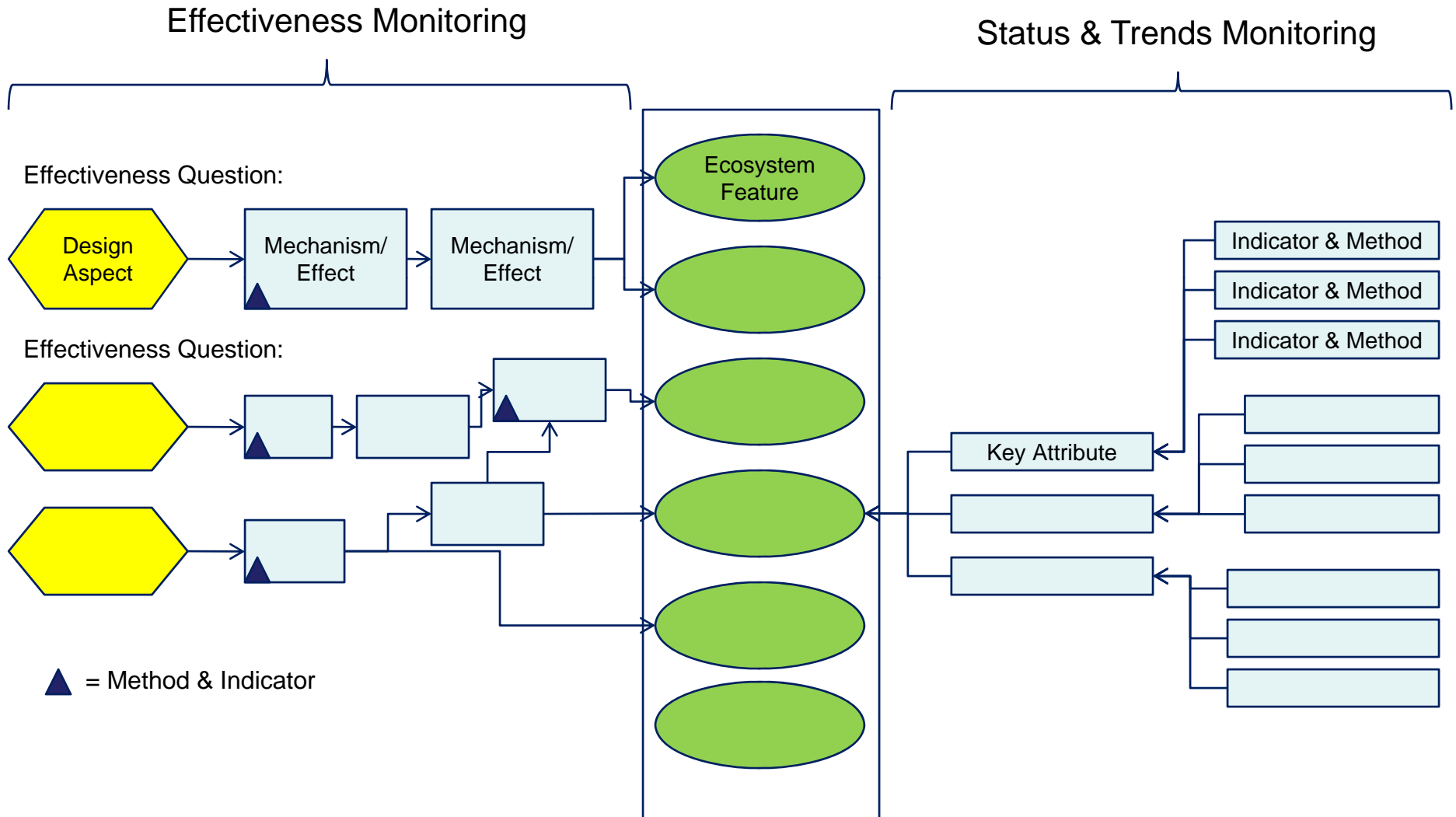
Appendix 3: Planning Overview and Timeline



* Note: Workshop 2 has been deferred until early 2009.

Appendix 4: Monitoring Framework Schematic

MPA Monitoring Framework



Appendix 5: Ecosystem Features Proposed by Participants

Proposed Ecosystem Features, North Central Coast MPA Monitoring Planning Workshop 1, October 22-23, 2008, Pacifica, CA

Estuarine Systems	Kelp System	Apex Predators	Soft-bottom Systems and Sub-tidal	Rocky Sub-tidal (shallow and deep) Systems	Open Ocean Systems	Rocky Intertidal Systems	Soft Bottom Intertidal and Beach Systems	Consumptive Use	Non-consumptive Use	Viable Coastal Communities
Bays/ Estuaries	Kelp System	Sharks	Soft-bottom Habitats	Deep Rock	Water Column	Rocky Intertidal	Sandy Beach	Sustainable recreational and commercial fishing	Economics for coastal communities (1/2 card)	Profits for charter industry and key local businesses
Seagrass Systems	Kelp Forests (shallow rock)	Apex Predators	Soft Bottom	Rocky Reef (½ card)	Pelagic Systems	Rocky Reef Ecosystem	Intertidal Habitat (½ card)	Fishing	Non-consumptive uses	Economics for coastal communities (1/2 card)
Wetland Systems	Rocky Reef (½ card)	Marine Mammals	Soft Sediment Systems	Rocky Reef System	Water Column	Intertidal Habitat (½ card)		Salmon	Participation in recreational activities	Viable coastal communities
Estuaries	Kelp Forest System	Seabirds	Shallow Soft-bottom	Rocky Reefs	Ocean Water Conditions	Rocky Intertidal		Fisheries	Recreational and educational non-consumptive viability	Seabirds
Estuarine System	Kelp Forest	Rookery, Roost, Haul out Areas	Soft-bottom	Hard-bottom Communities	Upwelling Areas	Rocky Intertidal Communities		Fishing Fleets		Rookery, roost, haul out areas
Estuaries	Kelp Communities	Nesting Seabirds	Deep Soft-bottom					Persistence of consumptive activities		Nesting Seabirds

KEY:

CLUSTER

CARD
Card colors correspond to input from different participant groups

Persistence of consumptive activities

Cultural Uses

Additional suggested ecosystem features included:

- Islands - viewed by the group as captured under combination of rocky intertidal and rocky subtidal.
- Access - viewed by the group as not an ecosystem feature.

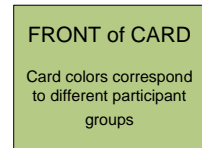
Note: Ecosystem features are a limited suite of key aspects of the North Central Coast region that together can collectively represent and encompass the region. These will provide a high-level framing of monitoring moving forward.

Appendix 6: Effectiveness Questions Proposed by Participants

Proposed Effectiveness Question Clusters, North Central Coast MPA Monitoring Planning Workshop 1, October 22-23, 2008, Pacifica, CA

Clusters and Configuration	Size and Spacing	Habitat Siting	Network Effect**	SMR vs. SMCA**	Levels of Protection	Special Closures	Enforcement and Compliance	Socioeconomic and Usage	Socioeconomic and Usage
MPA Design: stacked vs. east-west	MPA Sizing: is bigger better ±	Effects of habitat diversity on feature response within MPA	Network Effect ±	Effect of SMR vs SMCA on enforceability and compliance	Effect of pelagic fishing shallower than 50m on rockfish (rocky reef) and halibut (soft bottom)	Special closure dimension on apex predators (birds) ±	Effect of community based enforcement ±	MPAs and community involvement access ±	What is the effect of the NCC MPAs on the recreational abalone fishery
Habitat Partitioning: non-ecological vs. ecological features	Is the spatial scale of protection sufficient to recover natural biodiversity ±	What's effect of habitat rugosity/ complexity on rocky subtidal systems and species diversity ±	Structure of network vs. experimental design	What are the effects of multiple fishing targets on SMCA vs SMR	Effect of salmon fishing on rockfish populations in shallow rocky subtidal zones ±	Effect of special closures on bird colony productivity?	Community support on enforcement cost and effectiveness ±	Ecotourism and MPAs ±	Minimization of socioeconomic impacts on goals and objectives
Effect of distance between MPA and similar habitat on fishing success	Size vs. ecological features	What's effect of encompassing 2 or more diverse habitats on ecosystem features	Were size and spacing sufficient to achieve connectivity / larval dispersal ±	How does MPA type affect community stability and productivity? Bio-community	Effect of shore-based fishing on intertidal ±	Will the special closures help recover the species of interest ±		How does the Salt Point / Stewarts Point complex affect tourism in that community ±	Siting adjacent to parks ±
Effect of size and replication of MPAs on concentrating fishing effort (also socioeconomics)	MPA sizing: many small vs. few large MPAs (rocky) ±	What's effect of initial diversity on recovery potential	Larval drift and recruitment ±	What measures could be employed in SMCA to avoid serial depletion issue for abalone	Designation of levels of protection on all ecological features ±			MPA locations bordering north and south of a launch point affect behavior ±	
What is effect of split reef on rocky subtidal and consumptive use	Network effects on community structure ±	Effect of discharges on features. Runoff ±	Percent fishing range vs. port economics (cons. vs. non-cons.) ±		Comparative effect of allowing/ disallowing urchin taken on kelp systems			MPAs and socioeconomic effects ±	
Effect of coupled shallow-deep MPAs and habitats on system response ±		Siting adjacent to parks-education ±	Does/can network provide resilience to climate change		Effect of disallowing dungeness crab take on crab populations and soft bottom community ±			What are the effects of MPAs on cultural and religious practices ±	
					Effect of multiple take in a single level of protection category on overall protection of rocky and soft communities				

KEY:



FRONT of CARD
Card colors correspond to different participant groups

Note: Effectiveness questions explore the link between MPA network design aspects or decisions and ecosystem features or feature components.

*Participants discussed climate change as a potential effectiveness question and decided that it should be subsumed under all of the other effectiveness questions. The specific question raised asked: Do MPAs protect and buffer vis-à-vis climate change?

**These two categories were viewed as linked.

± Symbol indicates that additional information was provided on the back of card (see page 2)

Front of Card-- Potential Effectiveness Question

Back of Card--Additional Details Regarding Effectiveness Question

Effect of coupled shallow-deep MPAs and habitats on system response?	Are responses in MPAs greater if they include completed nearshore and offshore component MPAs (SMRs-SMCAs) habitats (continuous reefs)
MPA sizing - is bigger better?	Benefit of minimum vs. preferred size MPAs
Is the spatial scale of protection sufficient to recover natural biodiversity?	1) What was pristine (pre-human) state of system? 2) How close will reserve array return to that state? 3) How much is difference attributable to large mobile predators? What is magnitude of response in reserves relative to pristine ecosystem state?
MPA sizing: many small vs few large MPAs (rocky)	Single large or several small
Network effects on community structure	Effect of network on community structure within each habitat/feature
What's effect of habitat rugosity/complexity on rocky subtidal systems and species diversity	Would Bodega Marine Reserve (and cluster) be more effective at protecting rocky subtidal and biodiversity if shifted northward to encompass high relief rocky habitat and pinnacles?
Effect of discharges on features? Runoff.	Proximity to discharge influence response on MPA? Especially intertidal?
Siting adjacent to parks - education	Does siting adjacent to parks and protected areas on land help promote education and enforcement (e.g. Fitzgerald, non-consumptive and education uses; southern portion of Stewarts Point enforcement, etc.)
Network effect	Individual reserve and network (region) effects on groundfish production
Were size and spacing sufficient to achieve connectivity / larval dispersal	Kelp beds / hard bottom
Larval drift and recruitment	What is effect of species diversity from larval drift on neighboring MPAs (effectiveness of spacing guidelines)
Percent fishing range vs. port economics (cons. Vs. non-cons.)	How much of a port's fishing grounds are in protection - size, location, fleet (range of operations - speed, fuel dollars, safety)
Effect of salmon fishing on rockfish populations in shallow rocky subtidal zones	Does salmon trolling have significant bycatch issues with respect to rockfish species
Effect of shore-based fishing on intertidal	Effect of shore hook and line fishing on intertidal systems and what is the area ("foot print") of that effect?
Designation of levels of protection on all ecological features	Cumulative effects of multiple takes. Specific takes: salmon trolling vs. rocky reefs, halibut vs. rocky reefs and soft bottoms, SWB vs. reefs, etc.
Effect of disallowing dungeness crab take on crab populations and soft bottom community	Related to levels of protection guidelines validation
Special closure dimension on apex predators (birds)	How do disturbance rates change? How do fledgling consequences change?
Will the special closures help recover the species of interest?	Stellar sea lions, birds
Effect of community based enforcement	Are there differences in response of human communities to traditional enforcement (wardens) vs. "community based"
Community support on enforcement cost and effectiveness	How does local community support affect ability to enforce regulations. Sea Ranch/Stewarts Point is the target region. How does poaching / peer group?
MPAs and community involvement access	What is effect of public vs private land on access to MPAs
Ecotourism and MPAs	Do MPAs enhance ecotourism
How does the Salt Point / Stewarts Point complex affect tourism in that community	Tourism dollars, campground dollars, launches, fishing (effort shift, overuse, and other effects)
MPA locations bordering north and south of a launch point affect behavior	Effort shift, # of launches, fishing effort, Point Arena / Montara / Bodega
MPAs and socioeconomic effects	Can we measure effectiveness of MPAs on socioeconomic factors (salmon and crab fisheries)
What are the effects of MPAs on cultural and religious practices	Need to understand cultural and religious values of Native Americans; identify specific plants and animals of cultural significance; gather baseline info; collection guidelines. Viable coastal communities
Siting adjacent to parks	Does siting adjacent to parks and protected areas on land help promote education and enforcement (e.g. Fitzgerald, non-consumptive and education uses; southern portion of Stewarts Point enforcement, etc.)