

# Climate-Smart Adaptation for the North-central California Coast and Ocean

## Focal Resources Workshop Summary

February 11, 2014  
San Francisco, California





Point Blue  
Conservation  
Science



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## SPONSORS

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California Landscape Conservation Cooperative  
Farallones Marine Sanctuary Association  
Gulf of the Farallones National Marine Sanctuary  
Golden Gate National Parks Conservancy

*Cover Photos: (left) Brandt's Cormorant: Jason Thompson/Beach Watch; (center) North-central California Coast: GFNMS/Beach Watch; (right) California hydrocoral: Steve Lonhart, MBNMS*

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## INTRODUCTION

On February 11, 2014, Gulf of the Farallones National Marine Sanctuary, along with project partners Bay Area Ecosystems Climate Change Consortium, California Academy of Sciences, California Landscape Conservation Cooperative, EcoAdapt, Farallones Marine Sanctuary Association, Golden Gate National Recreation Area, National Park Service Pacific West Region, Point Blue Conservation Science, and Point Reyes National Seashore, held the first of a 2-part workshop series to develop climate change vulnerability assessments for a set of North-central California coast and ocean species, habitats, and ecosystem services (termed focal resources).

This workshop series is the first phase of the project, Climate-Smart Adaptation for the North-central California Coast and Ocean, a collaborative effort to develop adaptive management actions for the sanctuary, and other natural resource management agencies, to take in response to, and in preparation for, climate change impacts.

## GOALS AND OBJECTIVES

The project goal is to protect and maintain healthy ecosystems of the north-central California coast and ocean by enhancing the resilience of species, habitats and ecosystem services to the impacts of climate change through collaboratively developed adaptive management solutions that are feasible, effective, and nature-based.

The goal of the Focal Resources Workshop was to finalize a list of North-central California coast and ocean focal resources (species, habitats and ecosystem services) for use in vulnerability assessments.

The objectives of the Workshop were to:

- Understand the project vision and goals, and the purpose of Workshop 1: Focal Resources.

- Produce a recommended list of focal resources through breakout group exercises and large group discussion.
- Understand the purpose of Workshop 2: Vulnerability Assessment and the process of vulnerability assessments.
- Determine information needs and available resources for Workshop 2.

## WORKSHOP STRUCTURE

The majority of the workshop was spent in breakout groups to discuss and develop consensus recommendations for species, habitats and ecosystem services for inclusion in the vulnerability assessments. Brief presentations were given to provide a project and workshop overview, summary of pre-workshop survey data, and an introduction to the second workshop on vulnerability assessments.

## PRESENTATION SUMMARIES

### Introduction and Overview

**Sara Hutto, Ocean Climate Initiative Specialist, Gulf of the Farallones National Marine Sanctuary**

Sara Hutto provided an introduction to the Ocean Climate Initiative at Gulf of the Farallones National Marine Sanctuary, and an overview of the Climate-Smart Adaptation project. She provided a description and local examples of climate-smart adaptation, and described the project and workshop goals and objectives, as well as logistics for the day. Her presentation is available at: [http://ecoadapt.org/data/documents/GFNMS\\_Overview\\_SurveyResults\\_Workshop\\_final\\_FocalResources\\_small.pdf](http://ecoadapt.org/data/documents/GFNMS_Overview_SurveyResults_Workshop_final_FocalResources_small.pdf).

### Pre-Workshop Survey Results

**Sara Hutto, Ocean Climate Initiative Specialist, Gulf of the Farallones National Marine Sanctuary**

Following her introductory presentation, Sara Hutto provided an overview of the results of a pre-workshop survey that was distributed to all workshop invitees. Thirty-seven responses were analyzed, and the results were provided as graphs for the habitats and ecosystem services, and a rank-ordered checklist for the species (Appendix C). Sara also discussed the alterations made to the initial draft list of focal resources based on the survey feedback (available in the presentation linked above).

### **Vulnerability Assessments: Foundational Elements and Key Steps**

#### **Lara Hansen, Executive Director, EcoAdapt**

Lara Hansen provided an introduction to the vulnerability assessment process, and the role this plays in the larger adaptation planning framework. Lara provided a definition and examples of vulnerability, and walked participants through the key steps in the process. Lara then facilitated a discussion of the group's information needs for the vulnerability assessments and gathered recommendations for available sources of local data that may assist staff in preparing the necessary information. Her presentation is available at: [http://ecoadapt.org/data/documents/GFNMS\\_HansenVAIntro\\_FocalResources.pdf](http://ecoadapt.org/data/documents/GFNMS_HansenVAIntro_FocalResources.pdf).

## **BREAK-OUT GROUP SUMMARIES**

### **Coastal habitat assemblage**

*Sandy beach, dunes, cliffs*

The coastal break-out group decided to retain the 3 proposed habitats for final recommendation, and recommended 11 species and 8 ecosystem services for inclusion in the vulnerability assessments. The group also discussed the inclusion of altered habitats, and recommended that the Nearshore group consider including riprap and seawalls in their discussions. They created 2 species assemblages: shorebirds and primary/mid successional dune species (see Appendix D for

these recommendations). The group also generated an extensive list of local sources of data that may be useful in preparation for the vulnerability assessments.

### **Estuaries habitat assemblage**

*Lagoons, estuaries, river mouths, tidal creeks*

The estuaries break-out group decided on 2 consensus habitats, 13 species and 7 ecosystem services. The group recommended a few species that may be adequately covered in the habitat assessments, and recommended a number of sources for further information.

### **Nearshore habitat assemblage**

*Intertidal, subtidal, kelp forest, nearshore rocks and islands*

The nearshore break-out group decided on 3 recommended habitats, 4 ecosystem services, and 26 species. The group identified bull kelp as a species that may be adequately assessed in the kelp forest habitat and recommended local sources of data for use in the vulnerability assessments.

### **Offshore habitat assemblage**

*Pelagic water column, continental shelf and slope*

The offshore break-out group settled on 1 habitat recommendation, 5 ecosystem services, and 14 final species. This group used a different method for habitat selection than the other groups. Rather than focus on the general preliminary habitats provided, the group preferred to include special habitat features under one habitat category for use in the vulnerability assessments. The group recommended assessing specific shallow banks in the deep water environment, including the banks' benthic habitat and the pelagic water column above the banks.

## **INFORMATION NEEDS AND RESOURCES**

Information needs:

- Climate projections
- Better understanding of fisheries and off-shore environment

- Common understanding of time horizon
- For each focal taxa:
  - Distribution, population size, dispersal potential
  - Species that are at the southern end of their range and at the northern end of their range
  - Species that are more genetically depauperate in our region
  - Species' capacity to acclimate
- Consider *new species* to our region
  - What is likely to invade?
  - What are we worried about?
- Projections of non-climate impacts

#### Resources:

- NOAAs integrated ecosystem assessment
  - Includes risk assessment
- Monitoring data for all of these habitats/species that has not been published (state agencies, compliance documents)
- Consider other vulnerability assessments underway
  - Marin County - 1<sup>st</sup> exposure assessment due around June, remainder next February (on SLR)
  - Sonoma County- on same timeline
- Cultural: Sonoma State, Tribes, PRNS/GGNRA/GFNMS cultural reports
- MLPA: for many of the ecosystem services
- Beach Watch: beach visitation data from PRNS, GGNRA, State Parks, City Parks; economic value for Marin and San Francisco
- Mole Crab Monitoring
- PRNS unpublished dune data, State Park and Sonoma County Beaches
- USGS: sediment transport data for sand supply and beach erosion
- NMFS: marine mammal data
- State Park shorebird monitoring in San Mateo, Marin Bolinas Study, baseline MPA data
- Fisheries catch data
- Chamber of Commerce
- Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) data
- West Coast Ocean Data Portal: <http://portal.westcoastoceans.org>

## FINAL FOCAL RESOURCES

Given the time and resources available for the vulnerability assessments, it is not feasible to assess all 72 recommended focal resources individually. Therefore, the project planning committee finalized a smaller list of focal resources (Appendix E) based on feedback received from the break-out groups using the following process:

#### *Species*

Any species that were suggested by a break-out group to be adequately assessed in the habitat assessment or with another species were removed from the final list (e.g. Bull kelp, Cordgrass). Any species that displayed similar life history characteristics as another listed species were removed (e.g. Steelhead trout, Humpback whale). All species with multiple recommendations from break-out groups were retained in the final list. The recommended group of invertebrates remained very large, so the planning committee decided to base any further culling of this group on available expertise (species may not be assessed at the workshop if the required expertise is not available), and by the participants of the vulnerability assessment workshop.

#### *Habitats*

The list of habitats was finalized by combing the dune and beach habitats and by combining offshore rocks with the rocky intertidal habitat. Islands were removed, and will be assessed by a suite of other habitats (e.g. rocky intertidal).

#### *Ecosystem Services*

The list of ecosystem services was finalized by combining protection from erosion and protection from flooding, and removing scientific discovery (it was determined by the planning committee this would be too difficult to assess).

## NEXT STEPS

The project planning committee is in the process of planning for Workshop 2: Vulnerability Assessments for the Climate-Smart Adaptation project. This workshop will be a 2-day meeting on June 10 and 11, 2014 to assess the vulnerability of the final focal resources. The same group of invited experts for Workshop 1 will be invited to participate in Workshop 2, with additional experts invited based on gaps in expertise identified at Workshop 1. Project staff are preparing materials for Workshop 2, including a climate impacts table, habitat information packets and focal resource worksheets. The impacts table will support the evaluation of the exposure component of the vulnerability assessments by providing information about historical and projected changes of climate impacts on the study region. The habitat information packets will support the evaluation of the sensitivity and adaptive capacity components of the vulnerability assessments by providing a review of known impacts of climate and non-climate driven stressors on the focal habitats (and associated species if time allows). The focal resource worksheets will be used by Workshop 2 participants as the primary method of assessing vulnerability by asking for specific information regarding a resource's sensitivity, exposure and adaptive capacity in the context of climate change impacts.

An informational webinar will be provided to Workshop 2 participants on May 8, 2014 at 2:00 pm. This webinar will address the specifics of the vulnerability assessment process, provide a case study of the process, and prepare participants for what will be expected of them during the 2-day workshop.

A pre-workshop survey will be distributed to workshop participants to assess participants' areas of expertise and desired participation in the break-out group vulnerability assessments.

**Appendix A. Workshop Agenda**

North-central California Coast and Ocean Climate-Smart Adaptation

Workshop 1: Focal Resources  
California Academy of Sciences

February 11, 2014

9:30 am – 3:00 pm

Time	Subject
9:00 – 9:30	Sign-in and Coffee <ul style="list-style-type: none"> <li>Attendees will select Habitat Assemblage Break-out Group to participate in at sign-in</li> </ul>
9:30 – 9:40	Welcome <i>Terry Gosliner, Dean of Science and Research Collections, California Academy of Sciences and Maria Brown, Superintendent, Gulf of the Farallones National Marine Sanctuary (GFNMS)</i>
9:40 – 10:00	Project and Workshop Overview <i>Sara Hutto, GFNMS</i>
10:00 – 10:20	Survey results: analysis, data, and orientation to materials <i>Sara Hutto, GFNMS</i>
10:20 – 10:30	Break (reconvene in break-out groups)
10:30 – 11:55	Habitat Assemblage Break-out Groups <ul style="list-style-type: none"> <li>Complete worksheet as a group and develop recommendations for final focal resources</li> </ul>
12:00 – 12:45 <i>5 min for each group, 20 min for discussion</i>	Reports from Break-out Groups <ul style="list-style-type: none"> <li>Each group report their recommended habitats, species and ecosystem services</li> <li>Discuss proposed removals/additions to list</li> </ul>
12:45 – 1:45	Lunch
1:45 – 2:15	Finalize focal resources <i>Sara Hutto, GFNMS</i>
2:15 – 2:50	Planning for Workshop 2: <ul style="list-style-type: none"> <li>Review of the vulnerability assessment process</li> <li>Discuss information needs and available resources for the vulnerability assessments</li> </ul> <i>Lara Hansen, EcoAdapt</i>
2:50 – 3:00	Next Steps and Close-out <i>Sara Hutto, GFNMS</i>



**Appendix B. Workshop Attendees and Habitat Break-out Groups**

<b>Coastal</b>	<b>Estuaries</b>	<b>Nearshore</b>	<b>Offshore</b>
Ben Becker *	Maria Brown	Amy Dean	Meredith Elliott *
Joel Gerwein	Rebecca Fris *	Holly Gellerman	Kelley Higgason
Eric Hartge	Matt Gerhart	Lara Hansen	Dan Howard
Daphne Hatch	Andrea Graffis	Rebecca Johnson *	Jaime Jahncke
Hilary Papendick	Denise Greig	Dina Liebowitz	Dani Lipski
Lorraine Parsons	Suzanne Landridge	Steve Lonhart	Lisa Wooninck
Jan Roletto	Steven Morgan	Gerry McChesney	
Claire Simeone	Karen Reyna	Jonathon Stillman	

\* group facilitator

Appendix C. Pre-Workshop Survey results

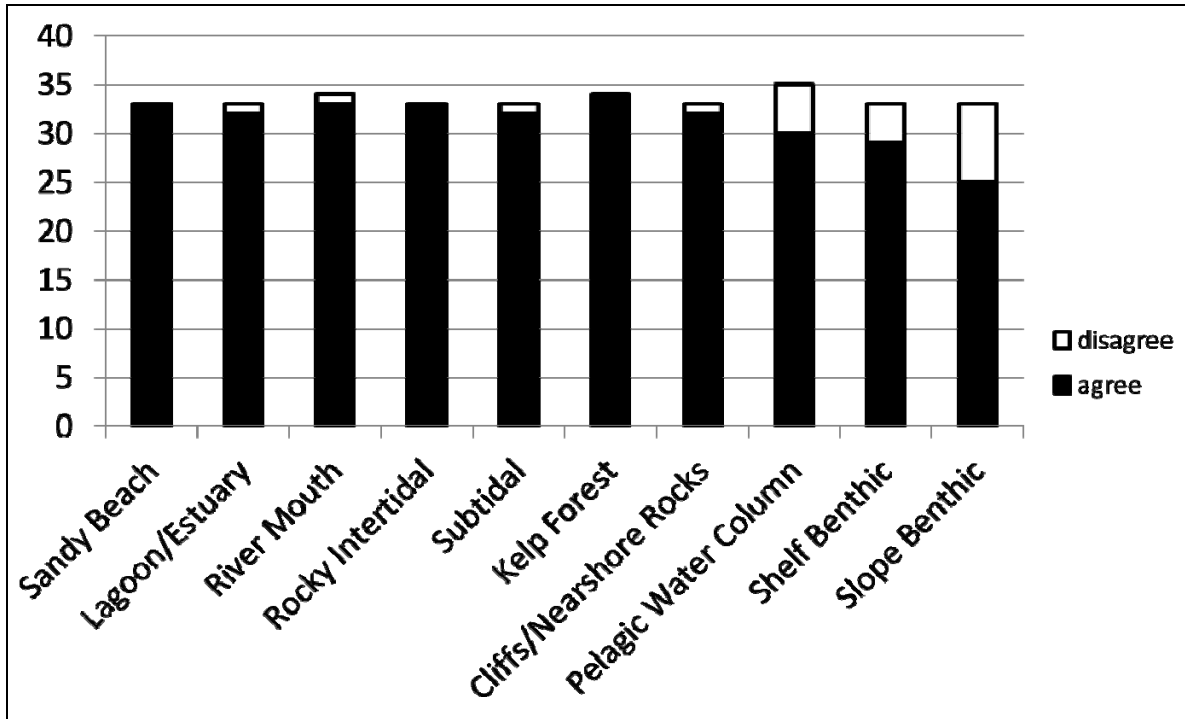


Figure I. Number of respondents that agreed and disagreed that a particular habitat should be included as a focal habitat.

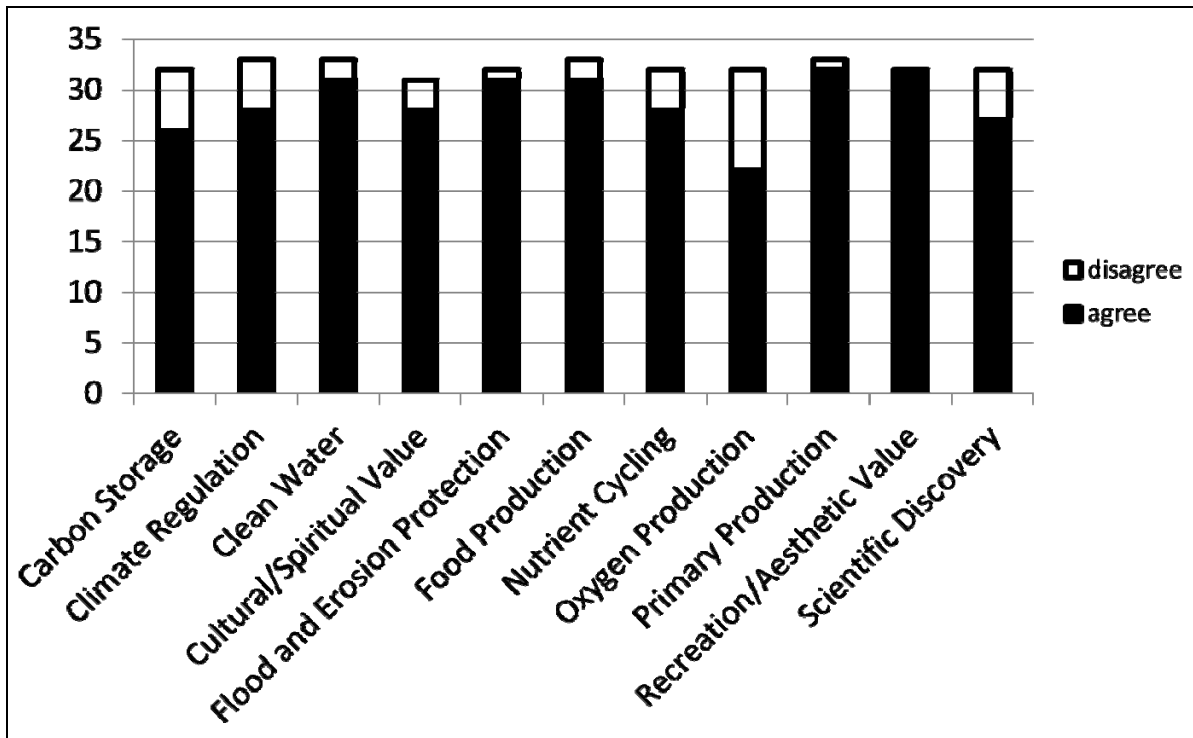


Figure II. Number of respondents that agreed and disagreed that a particular ecosystem service should be included as a focal habitat.

	Common Name	Species Name	Survey Score	Listed Status: <a href="http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf">http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf</a>
Plants/Algae	Cordgrass	<i>Spartina foliosa</i>	6.33	
	Pickleweed	<i>Salicornia virginica, Salicornia pacifica</i>	6.20	
	Eelgrass	<i>Zostera marina</i>	6.14	IUCN LC
	Bull Kelp	<i>Nereocystis luetkeana</i>	6.00	
	Tidestrom's Lupine*^	<i>Lupinus tidestromii</i>	5.00	
	Surfgrass	<i>Phyllospadix scouleri, Phyllospadix torreyi</i>	4.88	IUCN LC
	Beach Layia^	<i>Layia carnosa</i>	4.33	
	Sea Palm	<i>Postelsia palmaeformis</i>	4.12	
	Sand Verbena^	<i>Abronia umbellata</i>	4.00	
	Sea moss	<i>Endocladia muricata</i>	3.47	
	Rockweed	multiple species	3.33	
	Coralline Algae	multiple species	3.30	
Invertebrates	California Mussel	<i>Mytilus californianus</i>	5.69	
	Market Squid*^	<i>Loligo opalescens</i>	5.00	
	Ochre Seastar	<i>Pisaster ochraceus</i>	4.90	
	Sand/Mole Crab	<i>Emerita analoga</i>	4.83	
	Copepod	subclass with 12,000+ species	4.58	
	Krill	<i>Thysanoessa spinifera</i>	4.33	
	Black Abalone	<i>Haliotis cracherodii</i>	4.25	Na: G3 G4 S3, ESA:EN, IUCN:CR
	Red Abalone	<i>Haliotis rufescens</i>	4.24	
	North Pacific Krill	<i>Euphasia pacifica</i>	3.92	
	Red Sea Urchin	<i>Strongylocentrotus franciscanus</i>	3.91	
	Gaper Clam^	<i>Tresus capax, Tresus nuttalli</i>	3.50	
	Gooseneck Barnacle	<i>Pollicipes polymerus</i>	3.40	
	Dungeness Crab	<i>Metacarcinus magister</i>	3.20	
	Giant Green Anemone	<i>Anthopleura xanthogrammica</i>	2.95	
	Pteropod^	marine opisthobranch gastropods	2.67	
	Volcano Barnacle	<i>Tetraclita rubescens</i>	2.33	
	California Hydrocoral	<i>Stylaster californicus</i>	2.33	
	Sunburst Anemone	<i>Anthopleura sola</i>	2.00	
	Mysid Shrimp*^		2.00	
	Strawberry Anemone	<i>Corynactis californica</i>	0.20	
Horseneck Clam^	<i>Tresus capax</i>	0.00		
Common Little Neck Clam^	<i>Protothaca staminea</i>	0.00		

Table I. Survey score and listed status of draft focal species. Survey score was calculated from the fraction of “yes” answers to “no” answers of six weighted criteria by survey respondents. Table key is available on page 11.

	Common Name	Species Name	Survey Score	Listed Status: <a href="http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf">http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf</a>
<b>Invertebrates (continued)</b>	Sandy Beach Tiger Beetle^	<i>Cicindela hirticollis</i>	-1.00	Na: G5 T2 S1
	Red Sponge^	<i>Ophlitaspongia pennata</i>	-1.00	
	Commercial Oyster^	multiple species	n/a	
<b>Fish</b>	Shortbelly Rockfish	<i>Sebastes jordani</i>	4.68	
	Pacific Herring	<i>Clupea pallasii</i>	4.6	
	Pacific Sardine	<i>Sardinops sagax caerulea</i>	4.5	
	Northern Anchovy	<i>Engraulis mordax</i>	4.375	
	Coho Salmon	<i>Oncorhynchus kisutch</i>	4.2	Na: G4 S2, ESA: EN, CESA: EN, AFS:EN
	Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	4	Na: G5 S1, ESA: TH, AFS:TH
	Blue Rockfish	<i>Sebastes mystinus</i>	4	
	Steelhead Trout	<i>Oncorhynchus mykiss</i>	3.87	Na: G5 T2 Q S2, ESA: TH, AFS:TH, DFG: SSC
	White Shark	<i>Carcharodon carcharias</i>	3.41	IUCN: VU
	California Halibut^	<i>Paralichthys californicus</i>	3	
	Shiner Surfperch^	<i>Cymatogaster aggregata</i>	3	IUCN: LC
	Gopher Rockfish^	<i>Sebastes carnatus</i>	3	
	Cabezon^	<i>Scorpaenichthys marmoratus</i>	3	
	Longfin Smelt^	<i>Spirinchus thaleichthys</i>	2.66	Na: G5 S1, CESA: TH, DFG:SSC, IUCN:LC
	Lingcod	<i>Ophiodon elongatus</i>	2.5	
	Boccacio^	<i>Sebastes paucispinis</i>	2	
	Canary Rockfish^	<i>Sebastes pinniger</i>	2	
	Starry Rockfish^	<i>Sebastes constellatus</i>	2	
	Widow Rockfish^	<i>Sebastes entomelas</i>	2	
	Yellowtail Rockfish^	<i>Sebastes flavidus</i>	2	
	Rosy Rockfish^	<i>Sebastes rosaceus</i>	2	
	Staghorn Sculpin^	<i>Leptocottus armatus</i>	2	
	Tidewater Goby	<i>Eucyclogobius newberryi</i>	1.92	Na: G3 S2 S3, ESA: EN, AFS:EN, DFG:SSC, IUCN:VU
Threespine Stickleback^	<i>Gasterosteus aculeatus</i>	1	IUCN: LC	
Pacific Lamprey^	<i>Lampetra tridentata</i>	0.67	Na: G5 S4, AFS:VU	
<b>Birds</b>	Scaup* ^	<i>Aythya marila</i>	5	
	Western Grebe*^	<i>Aechmophorus occidentalis</i>	5	
	Common Murre	<i>Uria aalge</i>	4.6	IUCN:LC
	Clapper Rail	<i>Rallus longirostris obsoletus</i>	4.13	Na: G5 T1 S1, ESA: EN, CESA:EN, ABC:BCC, DFG:FP, IUCN:LC
	Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>	4	IUCN:LC
	Western Gull*^	<i>Larus occidentalis</i>	4	
	Sanderling*^	<i>Calidris alba</i>	4	
	Marbled Murrelt	<i>Brachyramphus marmoratus</i>	3.85	Na: G3 G4 S1, ESA:TH, CESA:EN, ABC:BCC, CDF:S, IUCN:EN
	Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	3.8	Na: G4 S2 S4, DFG:SSC, IUCN:LC, USFWS:BCC
	Brown Pelican	<i>Pelecanus occidentalis californicus</i>	3.11	Na: G4 T3 S1 S2, ESA:delisted, DFG:FP, IUCN:LC

	<b>Common Name</b>	<b>Species Name</b>	<b>Survey Score</b>	<b>Listed Status:</b> <a href="http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf">http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf</a>
<b>Birds (continued)</b>	Least Tern	<i>Sternula antillarum browni</i>	3.16	Na: G4 T2 T3 Q S2 S3, ESA:EN, CESA:EN, ABC:BCC, DFG:FP, IUCN:LC
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	3.03	Na: G5 S2, CESA:EN, CDF:S, DFG:FP, IUCN:LC, USFS:S, USFWS:BCC
	Ashy Storm Petrel	<i>Oceanodroma homochroa</i>	3	Na: G2 S2, ABC:BCC, DFG:SSC, IUCN:EN, USFWS:BCC
	Pelagic Cormorant*^	<i>Phalacrocorax pelagicus</i>	3	
	Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	2.9	Na: G4 T3 S2, ESA:TH, ABC:BCC, DFG:SSC, USFWS:BCC, IUCN:LC
	Saltmarsh Common Yellowthroat	<i>Geothlypis trichas sinuosa</i>	2.83	Na: G5 T2 S2, DFG:SSC, USFWS:BCC, IUCN:LC
	Black Rail	<i>Laterallus jamaicensis coturniculus</i>	2.62	IUCN:NT
	Pigeon Guillemot	<i>Cephus columba</i>	2.55	IUCN:LC
	Rhinoceros Auklet	<i>Cerorhinca monocerata</i>	2.5	Na: G5 S3, DFG:WL, IUCN:LC
	Peregrine Falcon	<i>Falco peregrinus anatum</i>	2.45	Na: G4 T3 S2, ESA:delisted, CDF:S, DFG:FP, USFWS:BCC, IUCN:LC
	Surf Scoter	<i>Melanitta perspicillata</i>	2.3	IUCN:LC
	Sooty Shearwater	<i>Puffinus griseus</i>	2.2	IUCN:NT
	Osprey	<i>Pandion haliaetus</i>	2.2	Na: G5 S3, CDF:S, DFG:WL, IUCN:LC
	Elegant Tern	<i>Thalasseus elegans</i>	2.08	Na: G2 S1, ABC:BCC, DFG:WL, IUCN:LC
	Tufted Puffin	<i>Fratercula cirrhata</i>	1.95	Na: G5 S2, DFG:SSC, IUCN:LC
	Black Oyster catcher	<i>Haematopus bachmani</i>	1.83	Na: G5 S2, IUCN:LC, USFWS:BCC
	American Bittern	<i>Botaurus lentiginosus</i>	1.33	Na: G4 S3, IUCN:LC
	White faced ibis	<i>Plegadis chihi</i>	1	Na: G5 S1, DFG:WL, IUCN:LC
	Black-footed Albatross	<i>Phoebastria nigripes</i>	1	IUCN:NT
	Double-crested Cormorant*^	<i>Phalacrocorax auritus</i>	1	
Fork-tailed Storm Petrel	<i>Oceanodroma furcata</i>	0.83	Na: G5 S1, DFG:SSC, IUCN:LC	
Bristle-thighed Curlew	<i>Numenius tahitiensis</i>	0.83	IUCN:VU	
<b>Mammals</b>	Sea Otter	<i>Enhydra lutris nereis</i>	5.16	Na: G4 T2 S2, ESA:TH, DFG:FP, IUCN:EN, MMC:SSC
	Killer Whale (Transient)*^	<i>Orcinus orca</i>	4	
	Blue Whale	<i>Balaenoptera musculus</i>	3.90	IUCN:EN
	Humpback Whale	<i>Megaptera novaeangliae</i>	3.89	IUCN:LC
	Northern Elephant Seal	<i>Mirounga angustirostris</i>	3.5	IUCN:LC
	Steller Sea Lion	<i>Eumetopias jubatus</i>	3.40	Na: G3 S2, ESA:TH, IUCN:NT, MMC:SSC
	Killer Whale (so res)	<i>Orcinus orca</i>	3.36	IUCN:DD
	Gray Whale	<i>Eschrichtius robustus</i>	3.25	IUCN:LC
	Harbor Seal	<i>Phoca vitulina</i>	3.11	IUCN:LC
	Harbor Porpoise	<i>Phocoena phocoena</i>	3.06	IUCN:LC
Northern Fur Seal	<i>Callorhinus ursinus</i>	2.77	Na: G3 S1, IUCN:VU	

<b>Mammals (continued)</b>	<b>Common Name</b>	<b>Species Name</b>	<b>Survey Score</b>	<b>Listed Status:</b> <a href="http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf">http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf</a>
	California Sea Lion*^	<i>Zalophus californianus</i>	2.5	
	Bottlenose dolphin	<i>Tursiops truncatus</i>	1.75	IUCN:LC
	Pacific white-sided dolphin	<i>Lagenorhynchus obliquidens</i>	1.26	IUCN:LC
	River Otter	<i>Lontra canadensis</i>	1.1	IUCN:LC

<b>Key</b>	
	top third of survey results
^	received 1 or 2 survey responses
*	new species suggested by survey

<b>Agency Codes</b>	
ABC	American Bird Conservancy
AFS	American Fisheries Society
CESA	CA Endangered Species Act
DFG	Department of Fish and Game
ESA	Endangered Species Act
IUCN	The World Conservation Union
MMC	Marine Mammal Commission
Na	NatureServe
USFS	US Forest Service
USFWS	US Fish and Wildlife Service

<b>Designation Codes</b>	
CR or EN	Endangered
TH	Threatened
VU	Vulnerable
NR	Near Threatened
LC	Least Concern
SSC	Species of Special Concern
FP	Fully Protected
WL	Watch List
BCC	Birds of Conservation Concern
S	Sensitive

<b>NatureServe Codes</b>	
G	Global Conservation Rank
S	State Conservation Rank
T	Infraspecific taxa
Q	Questionable taxonomy
1	Critically imperiled
2	Imperiled
3	Vulnerable
4	Apparently secure
5	Secure

## **Appendix D1. Habitats and Ecosystem Services Recommended at Workshop**

### Habitats:

#### **Coastal:**

1. Sandy Beach
2. Dunes
3. Cliffs

#### **Estuaries:**

4. Ephemeral estuaries (seasonal)
5. Estuaries/Bays (open year-round, including River Mouths)

#### **Nearshore (<30m):**

6. Rocky Intertidal and Offshore rocks (including artificial hard stratum)
7. Kelp Forest
8. Islands and Offshore rocks (including rookery and haul out sites)
9. Nearshore water column and non-rocky substrate/subtidal

#### **Offshore (>30m):**

10. Pelagic water column and associated benthic habitats for specific shallow banks in the deep water region: Cordell, Rittenburg, Fanny Shoals

### Ecosystem Services:

#### High Priority:

1. Aesthetic/Cultural/Spiritual value
2. Biodiversity
3. Food Production
4. Habitat
5. Protection from erosion
6. Protection from flooding
7. Recreation/Tourism value
8. Water Quality
9. Scientific Discovery

#### Low Priority:

10. Carbon Storage
11. Climate Regulation
12. Nutrient Cycling
13. Oxygen Production
14. Primary Production

**Appendix D2. Species Recommended at Workshop**

	<b>Common name</b>	<b>Species name</b>
<b>Plants/Algae</b>	Cordgrass	<i>Spartina foliosa</i>
	Pickleweed	<i>Salicornia virginica, Salicornia pacifica</i>
	Eelgrass	<i>Zostera marina</i>
	Bull Kelp	<i>Nereocystis luetkeana</i>
	Tidestrom's Lupine, Beach Layia, Sand Verbena	<i>Lupinus tidestromii, Layia carnosa, Abronia umbellata</i>
	Sea Palm	<i>Postelsia palmaeformis</i>
	American dune grass	<i>Leymus mollis</i>
	Coralline algae	multiple species
<b>Invertebrates</b>	Myrtle's Silverspot Butterfly	<i>Speyeria zerene myrtleae</i>
	California Mussel	<i>Mytilus californianus</i>
	Ochre Seastar	<i>Pisaster ochraceus</i>
	Sand/Mole Crab	<i>Emerita analoga</i>
	Copepod	subclass with 12,000+ species
	Krill	<i>Thysanoessa spinifera</i>
	Black Abalone	<i>Haliotis cracherodii</i>
	Red Abalone	<i>Haliotis rufescens</i>
	Red and Purple Sea Urchin	<i>Strongylocentrotus franciscanus, Strongylocentrotus purpuratus</i>
	Gaper Clam	<i>Tresus capax, Tresus nuttalli</i>
	Dungeness Crab	<i>Metacarcinus magister</i>
	Pteropod	marine opisthobranch gastropods
	California Hydrocoral, Red Sponge	<i>Stylaster californicus, Ophlitaspongia pennata</i>
	Oyster	Commercial and native species
	Red Octopus, Giant Pacific Octopus	<i>Octopus rubescens, Enteroctopus dofleini</i>
<b>Fish</b>	Monkeyface eel	<i>Cebidichthys violaceus</i>
	Pacific Herring	<i>Clupea pallasii</i>
	Pacific Sardine	<i>Sardinops sagax caerulea</i>
	Northern Anchovy	<i>Engraulis mordax</i>
	Coho and Chinook Salmon	<i>Oncorhynchus kisutch, Oncorhynchus tshawytscha</i>
	Blue Rockfish	<i>Sebastes mystinus</i>
	Steelhead Trout	<i>Oncorhynchus mykiss</i>
	White Shark	<i>Carcharodon carcharias</i>
	Widow Rockfish	<i>Sebastes entomelas</i>
	Tidewater Goby	<i>Eucyclogobius newberryi</i>
	Rockfish Assemblage	Choose representative species



	<b>Common name</b>	<b>Species name</b>
<b>Birds</b>	Egret	Species undecided
	Common Murre	<i>Uria aalge</i>
	Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>
	Cassin's Auklet	<i>Ptychoramphus aleuticus</i>
	Ashy Storm Petrel	<i>Oceanodroma homochroa</i>
	Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>
	Black Rail	<i>Laterallus jamaicensis coturniculus</i>
	Pigeon Guillemot	<i>Cephus columba</i>
	Tufted Puffin	<i>Fratercula cirrhata</i>
	Black Oyster catcher	<i>Haematopus bachmani</i>
	Double-crested Cormorant	<i>Phalacrocorax auritus</i>
	Shorebirds (Sanderling, Willet, Marbled Godwit)	<i>Calidris alba, Tringa semipalmata, Limosa fedoa</i>
<b>Mammals</b>	Sea Otter	<i>Enhydra lutris nereis</i>
	Blue Whale	<i>Balaenoptera musculus</i>
	Humpback Whale	<i>Megaptera novaeangliae</i>
	Northern Elephant Seal	<i>Mirounga angustirostris</i>
	Steller Sea Lion	<i>Eumetopias jubatus</i>
	Harbor Seal	<i>Phoca vitulina</i>
<b>Other</b>	Legless lizard	Species undecided

## Appendix E1. Final Habitats and Ecosystem Services

### Habitats:

#### **Coastal:**

1. Sandy Beach and Dunes
2. Cliffs

#### **Estuaries:**

3. Ephemeral estuaries (seasonal)
4. Estuaries/Bays (open year-round, including River Mouths)

#### **Nearshore (<30m):**

5. Rocky Intertidal and Offshore rocks (including artificial hard stratum, rookery and haul out sites)
6. Kelp Forest
7. Nearshore water column and non-rocky substrate/subtidal

#### **Offshore (>30m):**

8. Pelagic water column and associated benthic habitats for specific shallow banks in the deep water region: Cordell, Rittenburg, Fanny Shoals

### Ecosystem Services:

1. Aesthetic/Cultural/Spiritual value
2. Biodiversity
3. Food Production
4. Habitat
5. Protection from erosion and flooding
6. Recreation/Tourism value
7. Water Quality

## Appendix E2. Final Species

	Common name	Species name
<b>Plants/Algae</b>	Sea Palm	<i>Postelsia palmaeformis</i>
	American dune grass	<i>Leymus mollis</i>
	Coralline algae	multiple species
<b>Invertebrates</b>	Myrtle's Silverspot Butterfly	<i>Speyeria zerene myrtleae</i>
	California Mussel	<i>Mytilus californianus</i>
	Ochre Seastar	<i>Pisaster ochraceus</i>
	Sand/Mole Crab	<i>Emerita analoga</i>
	Copepod and Pteropod	subclass with 12,000+ species
	Krill	<i>Thynsanoessa spinifera</i>
	Black Abalone	<i>Haliotis cracherodii</i>
	Red Abalone	<i>Haliotis rufescens</i>
	Red and Purple Sea Urchin	<i>Strongylocentrotus franciscanus</i> , <i>Strongylocentrotus purpuratus</i>
	Gaper Clam	<i>Tresus capax</i> , <i>Tresus nuttalli</i>
	Dungeness Crab	<i>Metacarcinus magister</i>
	California Hydrocoral, Red Sponge	<i>Stylaster californicus</i> , <i>Ophlitaspongia pennata</i>
	Oyster	multiple species
	Red Octopus, Giant Pacific Octopus	<i>Octopus rubescens</i> , <i>Enteroctopus dofleini</i>
<b>Fish</b>	Monkeyface eel	<i>Cebidichthys violaceus</i>
	Pacific Herring	<i>Clupea pallasii</i>
	Pacific Sardine	<i>Sardinops sagax caerulea</i>
	Northern Anchovy	<i>Engraulis mordax</i>
	Coho and Chinook Salmon	<i>Oncorhynchus kisutch</i> , <i>Oncorhynchus tshawytscha</i>
	Blue Rockfish	<i>Sebastes mystinus</i>
	White Shark	<i>Carcharodon carcharias</i>
	Widow Rockfish	<i>Sebastes entomelas</i>
	Tidewater Goby	<i>Eucyclogobius newberryi</i>
	<b>Birds</b>	Snowy Egret, Great Egret, and/or Great Blue Heron
Common Murre		<i>Uria aalge</i>
Brandt's Cormorant		<i>Phalacrocorax penicillatus</i>
Cassin's Auklet		<i>Ptychoramphus aleuticus</i>
Ashy Storm Petrel		<i>Oceanodroma homochroa</i>
Western Snowy Plover		<i>Charadrius alexandrinus nivosus</i>
Black Rail		<i>Laterallus jamaicensis coturniculus</i>
Pigeon Guillemot		<i>Cepphus columba</i>
Tufted Puffin		<i>Fratercula cirrhata</i>

	<b>Common name</b>	<b>Species name</b>
<b>Birds (cont.)</b>	Black Oyster catcher	<i>Haematopus bachmani</i>
	Sanderling, Willet, Marbled Godwit	<i>Calidris alba, Tringa semipalmata, Limosa fedoa</i>
<b>Mammals</b>	Sea Otter	<i>Enhydra lutris nereis</i>
	Blue Whale	<i>Balaenoptera musculus</i>
	Northern Elephant Seal	<i>Mirounga angustirostris</i>
	Steller Sea Lion	<i>Eumetopias jubatus</i>
	Harbor Seal	<i>Phoca vitulina</i>