



North-central California Coast and Ocean Climate-Smart Adaptation

Gulf of the Farallones National
Marine Sanctuary
Ocean Climate Initiative
Focal Resources Workshop

Sara Hutto, Ocean Climate
Initiative Specialist
11 February 2014



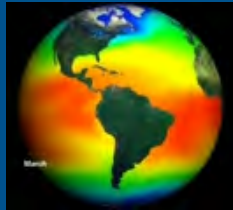
GFNMS Climate Smart Conservation

Integrating climate change adaptation, monitoring, mitigation, and communication into sanctuary management.



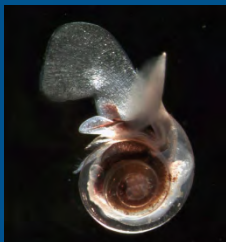
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Working group developed over 130 strategies and annual emissions audits are conducted



✓ **Climate Change Impacts Report**

Joint CB/GF working group determined observed and predicted climate change impacts, foundation to guide future monitoring and inform outreach and management actions



✓ **Ocean Climate Indicators Monitoring Plan**

Regional scientific consensus on physical and biological indicators, working group developed comprehensive monitoring inventory and plan

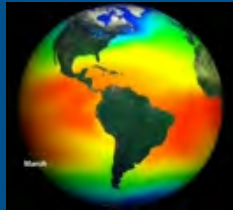
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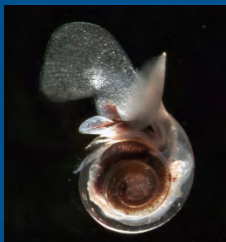
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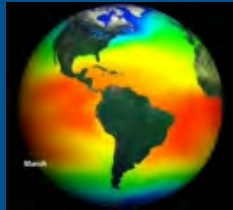
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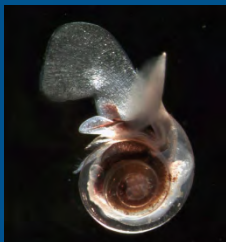
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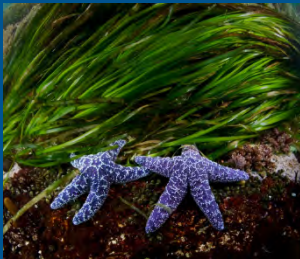


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Climate-Smart Adaptation

Develop adaptive management actions to address climate change impacts



Communication

Initiate in 2014 to outline current and prioritize new climate change education programs for youth and adults and develop project-specific communication strategies

Climate-Smart Adaptation Benefits Communities and Ecosystems

Conservation strategies and actions that specifically address impacts of climate change in concert with other threats.



Hydrocoral. Credit: Steve Lonhart, MBNMS



Pacifica. Credit: Jack Sutton



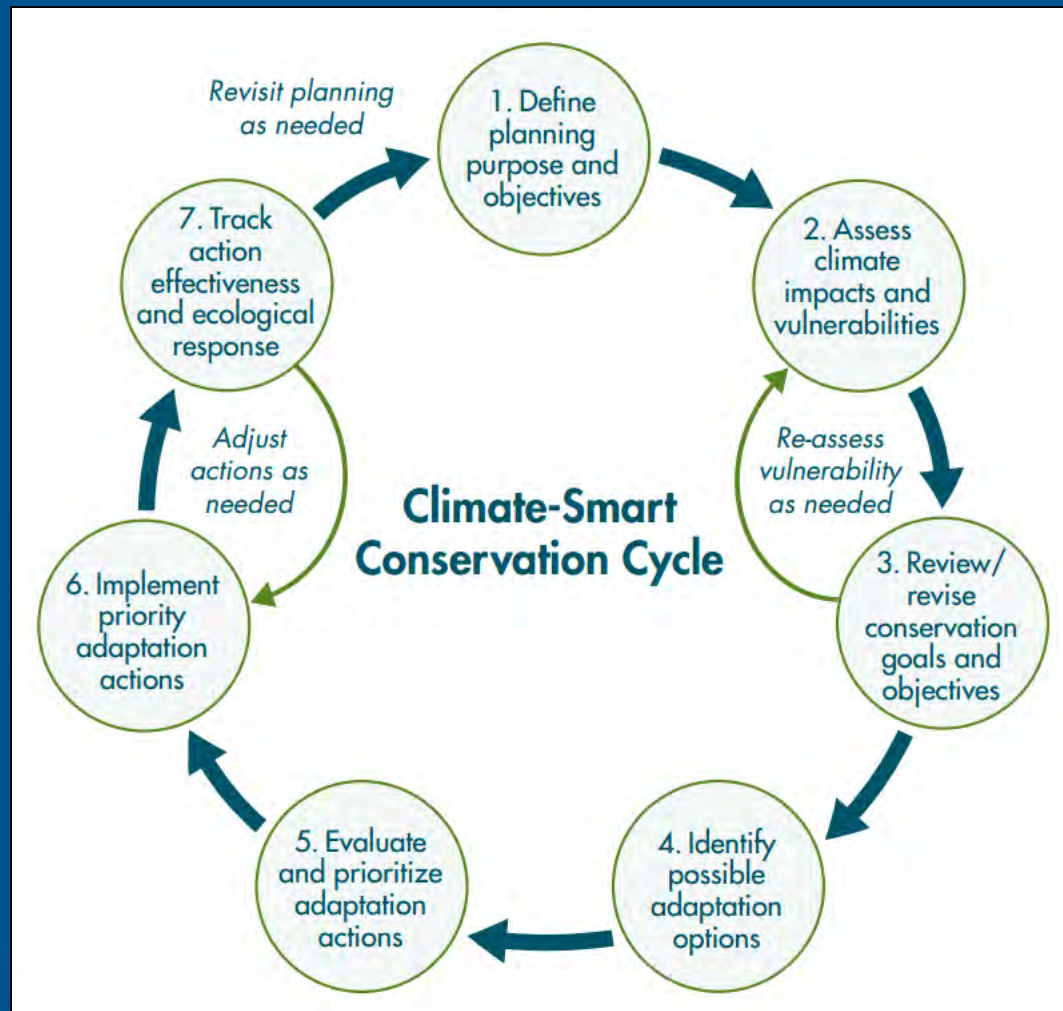
Taylor's Sea Hare. Credit: Jennifer Stock, CBNMS

Climate-Smart Adaptation Benefits Communities and Ecosystems

Future-focused
Ecosystem context
Adaptive and Flexible



Climate-Smart Adaptation is an Iterative Process



Climate-Smart Adaptation

Goal

Protect and restore habitats, species, and ecosystem services vulnerable to climate change impacts through collaboratively developed adaptive management solutions that are feasible, effective, and nature-based.

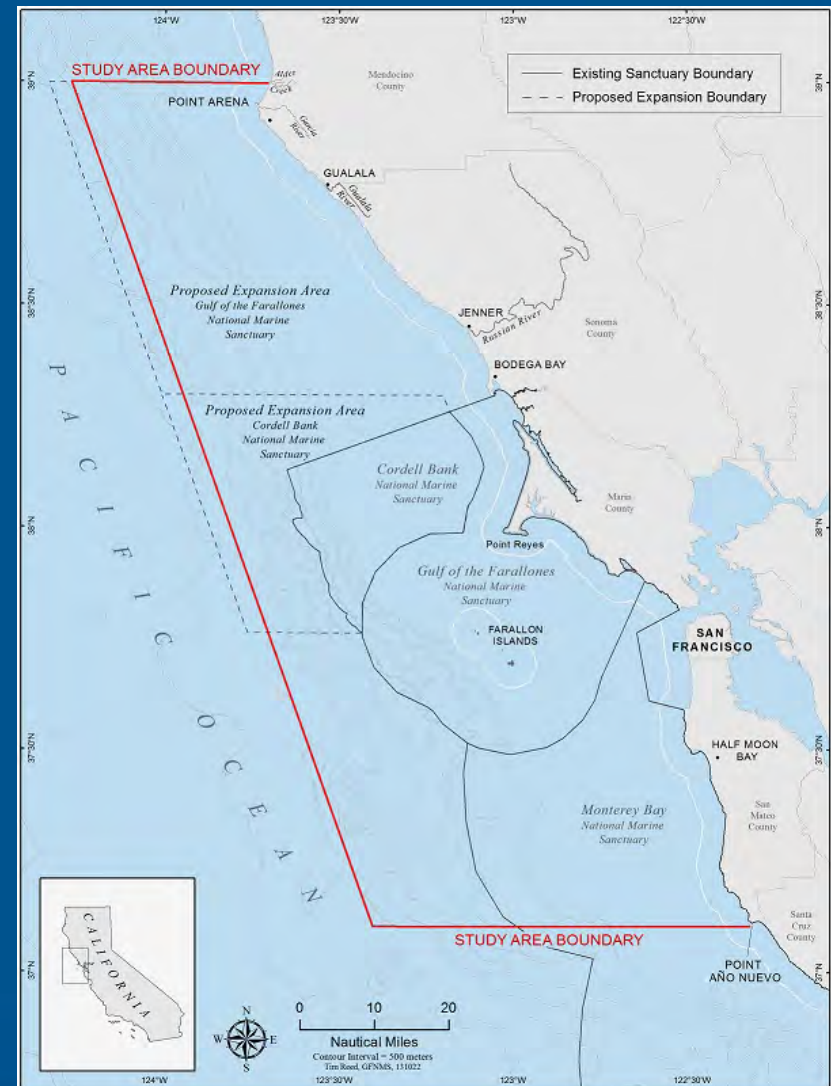
Climate-Smart Adaptation

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Geographic Scope

- Phase 1: Año Nuevo, San Mateo County to Alder Creek, Mendocino County
- Phase 2: Año Nuevo, San Mateo County to Marin/Sonoma County line



Project Partners



CALIFORNIA
ACADEMY OF
SCIENCES



Point Blue
Conservation
Science



Phase 1: Vulnerability Assessment

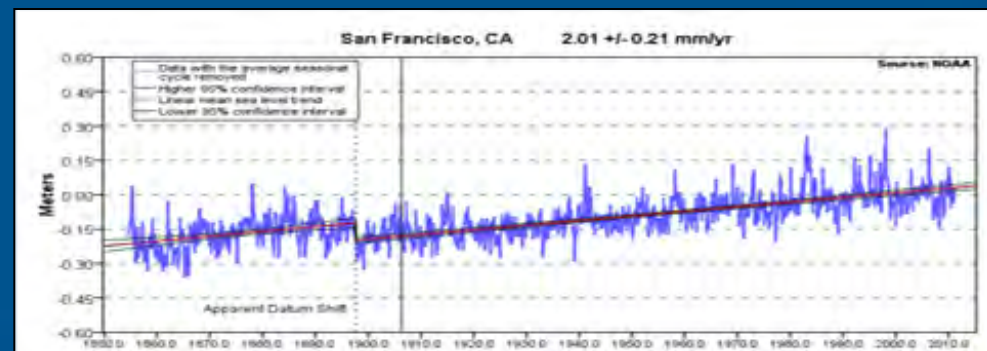
Workshop 1: Define focal resources (Today)

- Species
- Habitats
- Ecosystem services



Workshop 2: Assess Vulnerability (May 2014)

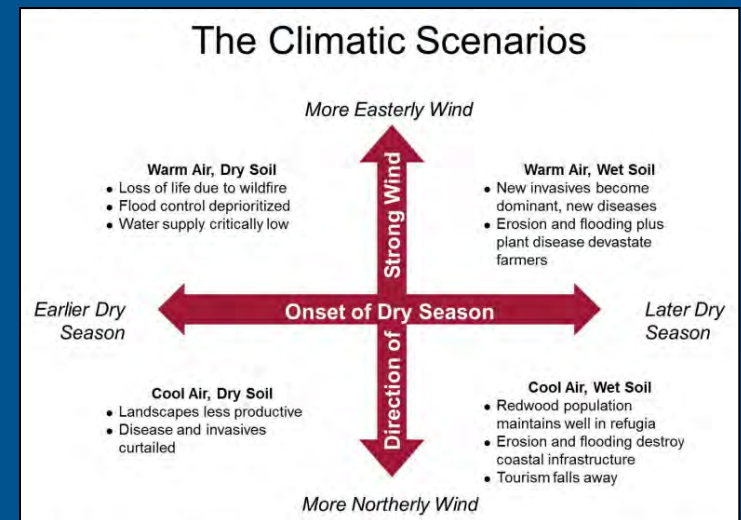
- Literature review
- Expert elicitation
- Relevant regional modeling



Phase 2: Working Group Recommendations

Request Sanctuary Advisory Council Working Group to:

1) **Define distinct climate scenarios** – multiple plausible futures based on most uncertain and impactful drivers of change



Futures of Wild Marin, Scenario Planning for Climate Change Adaptation

2) **Provide Adaptation Recommendations:**

Develop, evaluate and prioritize potential actions for each climate scenario

Phase 2: Implementation Plan and Pilot Green Resilient Shoreline Projects

Implementation Plan (GFNMS)

- Summary of approved and/or modified adaptation actions
- Implementation prioritization and schedule

Pilot Green Resilient Shorelines Projects

- Ex: restore hydrologic function in Bolinas Lagoon, seagrass restoration in Tomales Bay
- Timeline, project costs
- Monitoring Plan, Outreach Plan



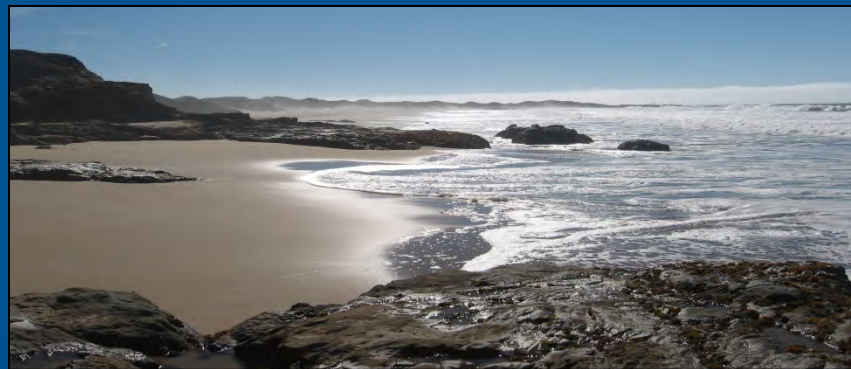
Today: Focal Resources Workshop

Workshop Goal:

Finalize a list of North-central California coast and ocean focal resources (species, habitats and ecosystem services) for use in vulnerability assessments.

Tools:

- Survey results
- Species checklist
- Each other!



Today: Focal Resources Workshop

Workshop 1 Objectives:

- Understand the project vision and goals, and the purpose of Workshop 1
- Consider focal species and ecosystem services in the context of focal habitats
- Summarize habitat break-out group discussions and report to large group
- Finalize the list of focal resources
- Understand Workshop 2 and the process of vulnerability assessments
- Determine information needs and available resources for Workshop 2

Today: Logistics

Venue

Parking

Lunch

Museum admission

Agenda

Questions?



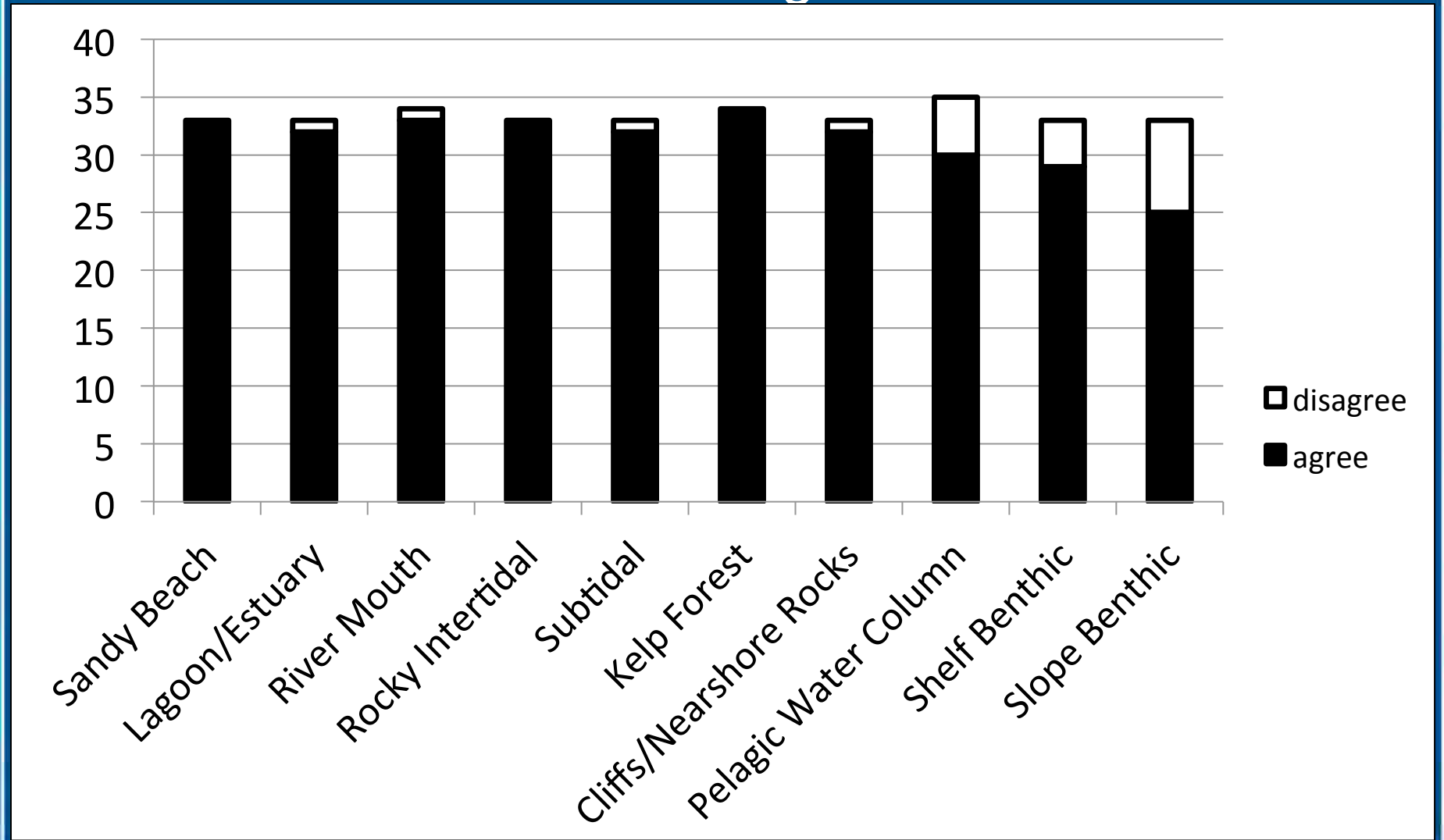
Pre-workshop survey results

- Distributed to all participants
- Sharing encouraged
- 37 responses

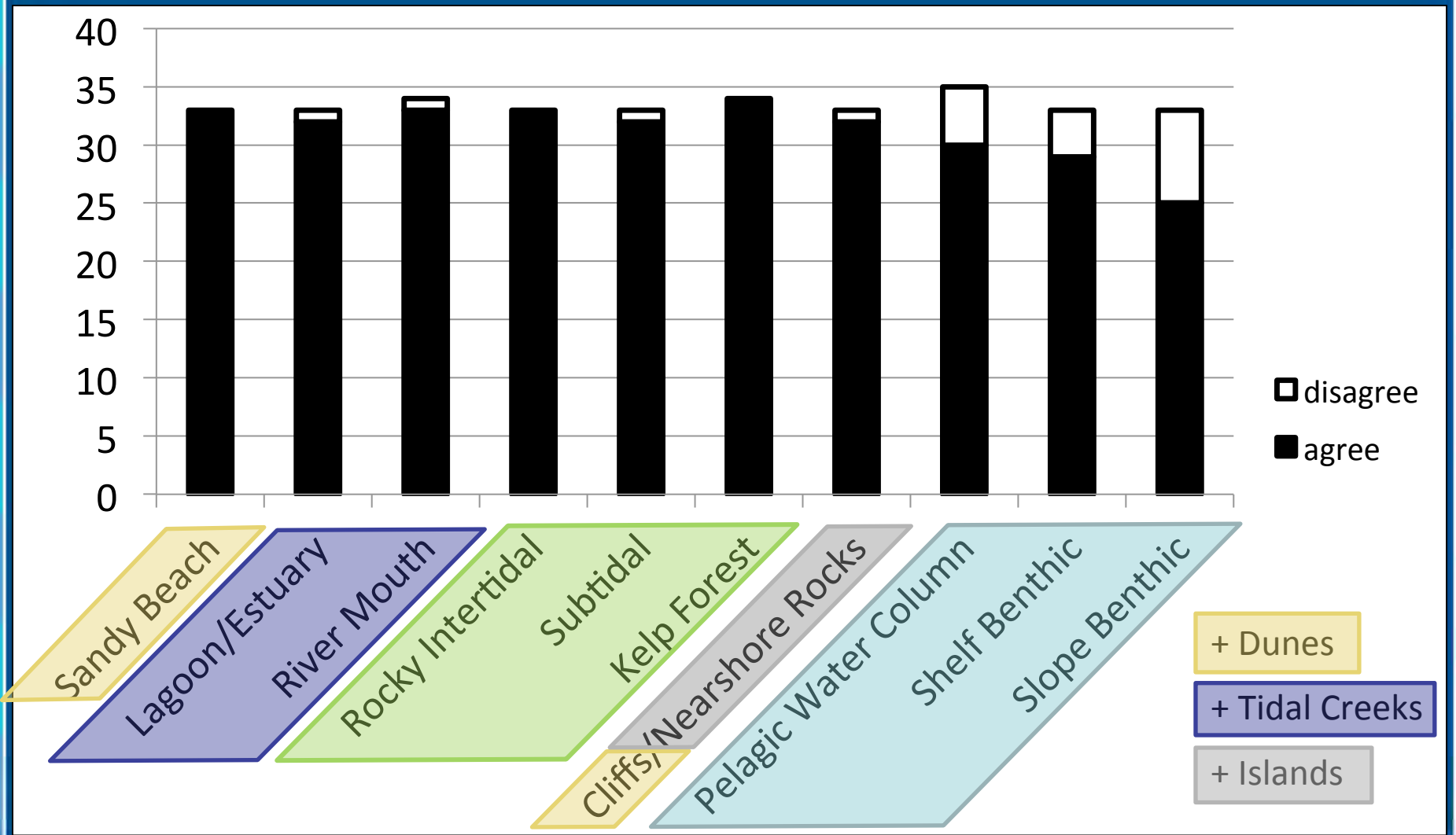


SurveyMonkeyTM

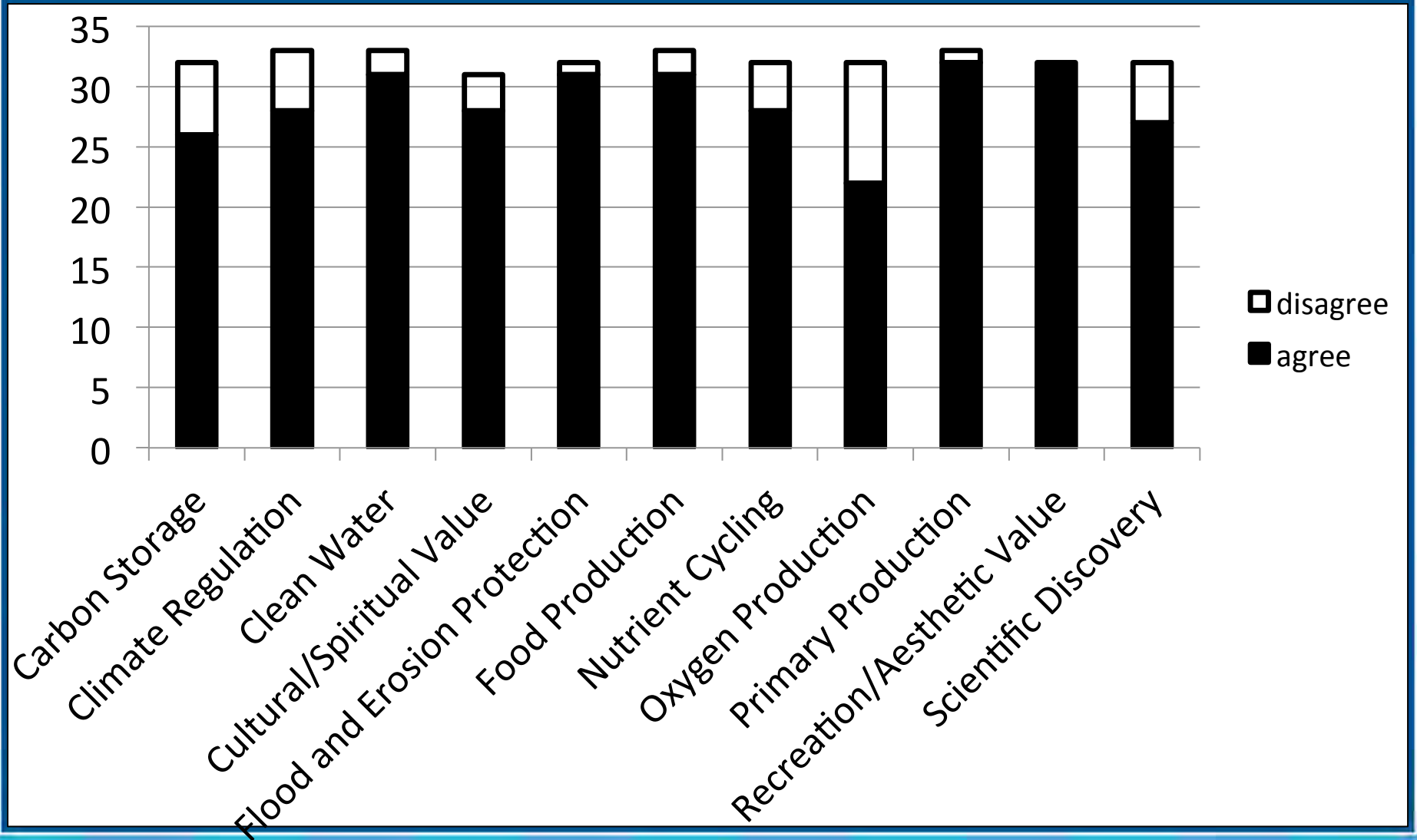
Please indicate below if you do or do not agree that a habitat should be included as a focal habitat for this region:



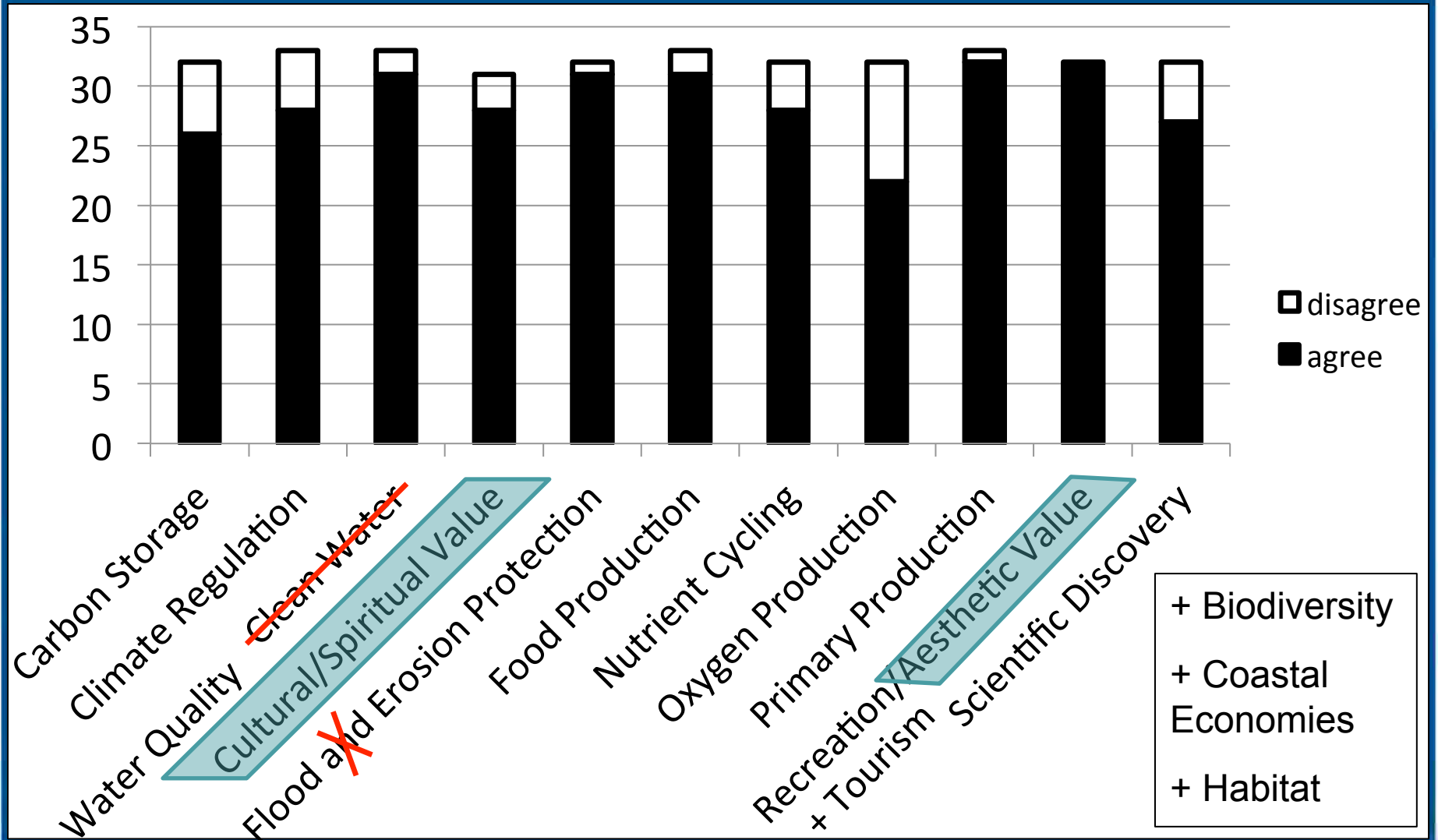
Please indicate below if you do or do not agree that a habitat should be included as a focal habitat for this region:



Please indicate below if you do or do not agree that an ecosystem service should be included as a focal resource for this region:



Please indicate below if you do or do not agree that an ecosystem service should be included as a focal resource for this region:



Species Data Analysis

- Yes or no to 6 criteria for all species
- (Yes votes/total votes) + weight = criterion score
- Scores for 6 criteria summed for total score for each species
- Species ranked by total score

Criterion	Weight
The species is considered a keystone, key, ecologically foundational, strong interactor, or umbrella species.	2
The species has available data and information upon which to base the vulnerability assessment.	2
The species has socio-economic and/or cultural significance.	1
The species is considered to be, or used as, a surrogate for a larger group of species.	1
The species is widely represented across the California Current (Southern Baja peninsula to US-Canadian border).	-1
The species is present only, or predominantly, in the study region (Ano Nuevo to Pt Arena).	1

Species Data Checklist

	Common Name	Species Name	Survey Score	Listed Status: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf	
Plants/Algae	<input type="checkbox"/>	Cardgrass	<i>Spartina foliosa</i>	6.33	
	<input type="checkbox"/>	Pickleweed	<i>Salicornia virginica, Salicornia pacifica</i>	6.20	
	<input type="checkbox"/>	Eelgrass	<i>Zostera marina</i>	6.14	IUCN LC
	<input type="checkbox"/>	Bull Kelp	<i>Nereocystis luetkeana</i>	6.00	
	<input type="checkbox"/>	Tidestrom's Lupine**	<i>Lupinus tidestromii</i>	5.00	
	<input type="checkbox"/>	Surfgrass	<i>Phyllospadix scouleri, Phyllospadix torreyi</i>	4.88	IUCN LC
	<input type="checkbox"/>	Beach Layia^	<i>Layia carnosa</i>	4.33	
	<input type="checkbox"/>	Sea Palm	<i>Postelsia palmaeformis</i>	4.12	
	<input type="checkbox"/>	Sand Verbena^	<i>Abronia umbellata</i>	4.00	
	<input type="checkbox"/>	Sea mass	<i>Endocladia muricata</i>	3.47	
	<input type="checkbox"/>	Rockweed	multiple species	3.33	
	<input type="checkbox"/>	Coralline Algae	multiple species	3.30	
Invertebrates	<input type="checkbox"/>	California Mussel	<i>Mytilus californianus</i>	5.69	
	<input type="checkbox"/>	Market Squid**	<i>Loligo opalescens</i>	5.00	
	<input type="checkbox"/>	Ochre Seastar	<i>Pisaster ochraceus</i>	4.90	
	<input type="checkbox"/>	Sand/Mole Crab	<i>Emerita analoga</i>	4.83	
	<input type="checkbox"/>	Copepod	subclass with 12,000+ species	4.58	
	<input type="checkbox"/>	Krill	<i>Thysanoessa spinifera</i>	4.33	
	<input type="checkbox"/>	Black Abalone	<i>Haliotis cracherodii</i>	4.25	Na: G3 G4 S3, ESA:EN, IUCN:CR
	<input type="checkbox"/>	Red Abalone	<i>Haliotis rufescens</i>	4.24	
	<input type="checkbox"/>	North Pacific Krill	<i>Euphausia pacifica</i>	3.92	
	<input type="checkbox"/>	Red Sea Urchin	<i>Strongylocentrotus franciscanus</i>	3.91	
	<input type="checkbox"/>	Gaper Clam^	<i>Tresus capax, Tresus nuttalli</i>	3.50	
	<input type="checkbox"/>	Gooseneck Barnacle	<i>Pollicipes polymerus</i>	3.40	
	<input type="checkbox"/>	Dungeness Crab	<i>Metacarcinus magister</i>	3.20	
	<input type="checkbox"/>	Giant Green Anemone	<i>Anthopleura xanthogrammica</i>	2.95	
	<input type="checkbox"/>	Pteropod^	marine opisthobranch gastropods	2.67	
	<input type="checkbox"/>	Volcano Barnacle	<i>Tetraclita rubescens</i>	2.33	
	<input type="checkbox"/>	California Hydrocoral	<i>Stylaster californicus</i>	2.33	
	<input type="checkbox"/>	Sunburst Anemone	<i>Anthopleura sola</i>	2.00	
	<input type="checkbox"/>	Mysid Shrimp**		2.00	
	<input type="checkbox"/>	Strawberry Anemone	<i>Corynactis californica</i>	0.20	
	<input type="checkbox"/>	Horseneck Clam^	<i>Tresus capax</i>	0.00	
	<input type="checkbox"/>	Common Little Neck Clam^	<i>Protothaca staminea</i>	0.00	
	<input type="checkbox"/>	Sandy Beach Tiger Beetle^	<i>Cicindela hirticollis</i>	-1.00	Na: G5 T2 S1
	<input type="checkbox"/>	Red Sponge^	<i>Ophlitaspongia pennata</i>	-1.00	
	<input type="checkbox"/>	Commercial Oyster^	multiple species	0 (not scored)	
	<input type="checkbox"/>	Shortbelly Rockfish	<i>Sebastes jordani</i>	4.683333333	
	<input type="checkbox"/>	Pacific Herring	<i>Clupea pallasii</i>	4.6	
<input type="checkbox"/>	Pacific Sardine	<i>Sardinops sagax caerulea</i>	4.5		
<input type="checkbox"/>	Northern Anchovy	<i>Engraulis mordax</i>	4.375		
<input type="checkbox"/>	Coho Salmon	<i>Oncorhynchus kisutch</i>	4.2	Na: G4 S2, ESA: EN, CESA: EN, AFS:EN	
<input type="checkbox"/>	Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	4	Na: G5 S1, ESA: TH, AFS:TH	
<input type="checkbox"/>	Blue Rockfish	<i>Sebastes mystinus</i>	4		

Break-out Worksheet

Gulf of the Farallones: Focal Resources Workshop

Habitat Assemblage: _____

1. Habitat Selection

Define the boundaries of each habitat in your assemblage (landward, seaward, depth, etc.)

Consider the habitats included in your assemblage. Are they distinct, or can they be combined for the vulnerability assessment?

List your recommendations for habitats in your assemblage to be included in the vulnerability assessment. *Please transfer this list to your flipchart to share with the larger group.*

Habitat Break-Out Groups

Coastal: Board room (here)

Estuaries: Conference room L1-east

Nearshore 1: East Garden (outside, covered)

Nearshore 2: East Garden (outside, covered)

Offshore: Board room (here)

Thank you!

Contact:

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415-970-5253

