

# Ecotrust's OCEAN Tools: Developing Fisheries Mapping and Economic Valuation

8 January 2009 – Territorial Sea Plan Working Group  
Ed Backus, Charles Steinback and Astrid Scholz

# Ecotrust

- Portland-based, non-profit, 17 years
- 55 staff, 6m annual budget
- Economics, Ecosystems, Equity
- Alaska to Northern California
- Focus on solutions middle ground to resource management issues; knowledge, tools, methods, real projects, finance, hands on management...
- Ecotrust Forests LLC, North Pacific Fisheries Trust

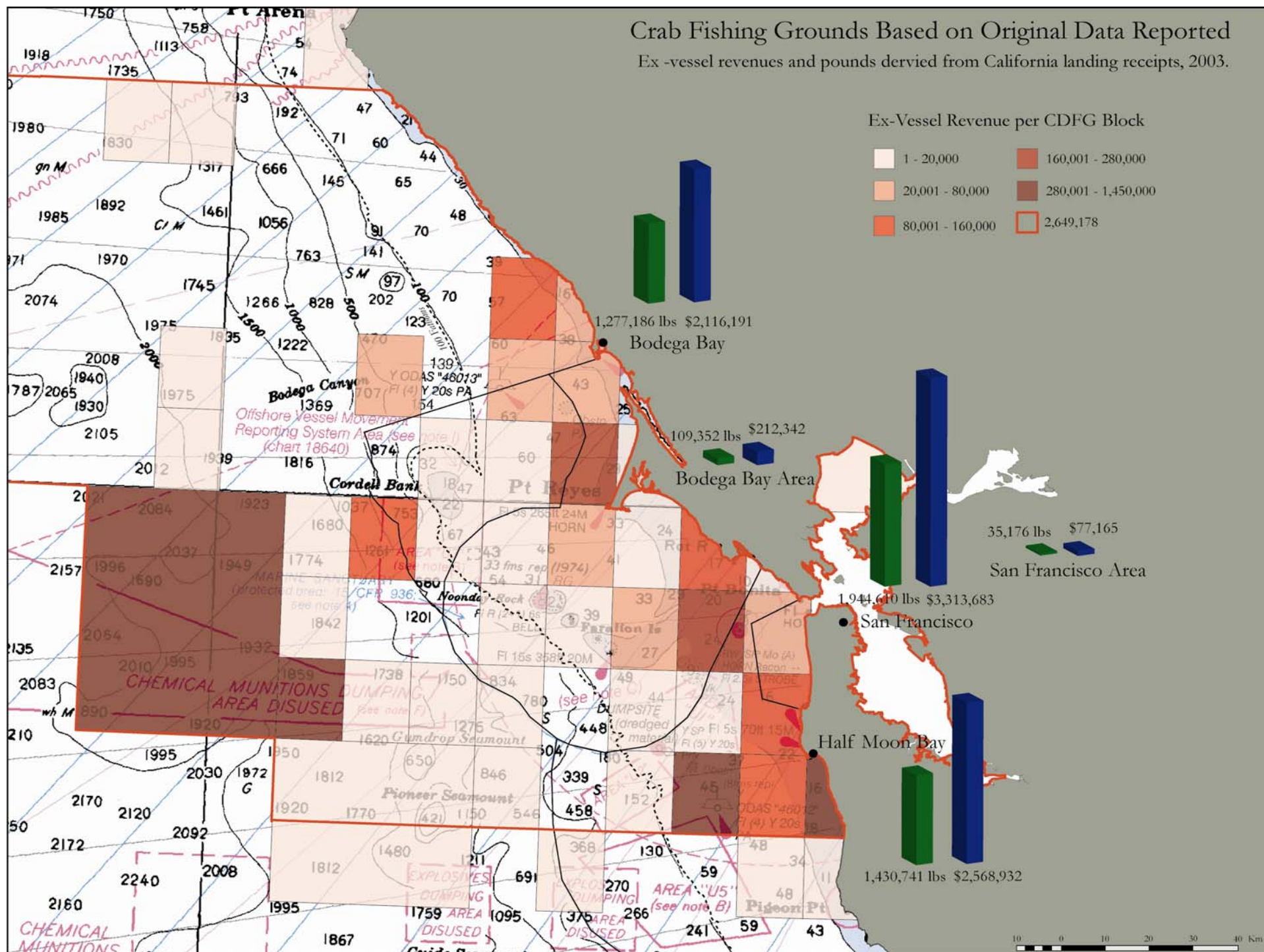
# Fisheries Knowledge Mapping

- Collect socioeconomic data on commercial and recreational fishing (use and values) – data used by the stakeholders to inform their design processes
- Evaluate the economic (gross and net) impacts of any proposal
- Do it once: results can be used for multiple evaluations: wave energy, offshore aquaculture, marine reserves...



Ex -vessel revenues and pounds derived from California landing receipts, 2003.

Ex -vessel revenues and pounds derived from California landing receipts, 2003.



# Socioeconomic Data Collection

- Components involved:
  - Outreach – (one-on-one meetings, informational group meetings, and port liaisons – members of the fishing community)
  - Survey design
  - Data collection (under non-disclosure agreements)
  - Quality assurance & control
  - Analysis
  - Results

# Survey Design – Example

- Identify the fisheries in the region
  - Differentiate in terms of practices (target strategy) and/or gear configurations
- Stratify study area into geographic regions
- At least 50% of the total landings and/or ex-vessel revenue from time period “x – y” (years) by fishery, gear type, and port complex
- At least 5 fishermen, except in cases where the sample population is fewer than 5, then 100%.



# Data Collection

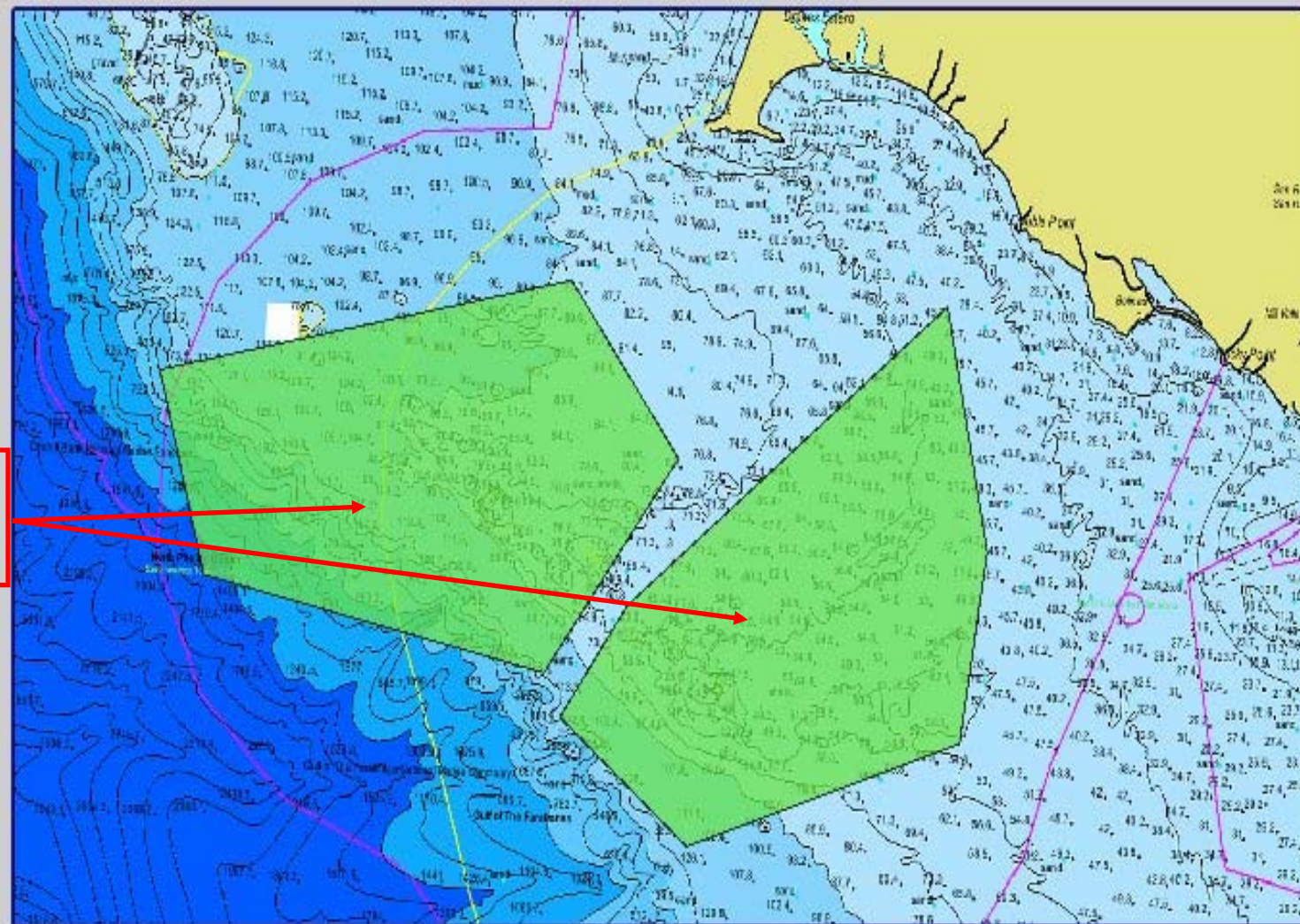
- All interviews follow a shared protocol for each fishery the interviewee participates in
  - Fishermen are asked to identify all fishing areas/locations that are of economic importance over their cumulative fishing experience, and to rank these using a weighted percentage - an imaginary “bag of 100 pennies” that they distribute over the fishing grounds
  - Non-spatial information pertaining to demographics and basic operations (costs) are also collected



## Legend

- ☒ NOAA ENC
- ☒ Kayak\_Points
- ☒ Access\_Points
- ☒ aaronr4

Not an actual  
fisherman!



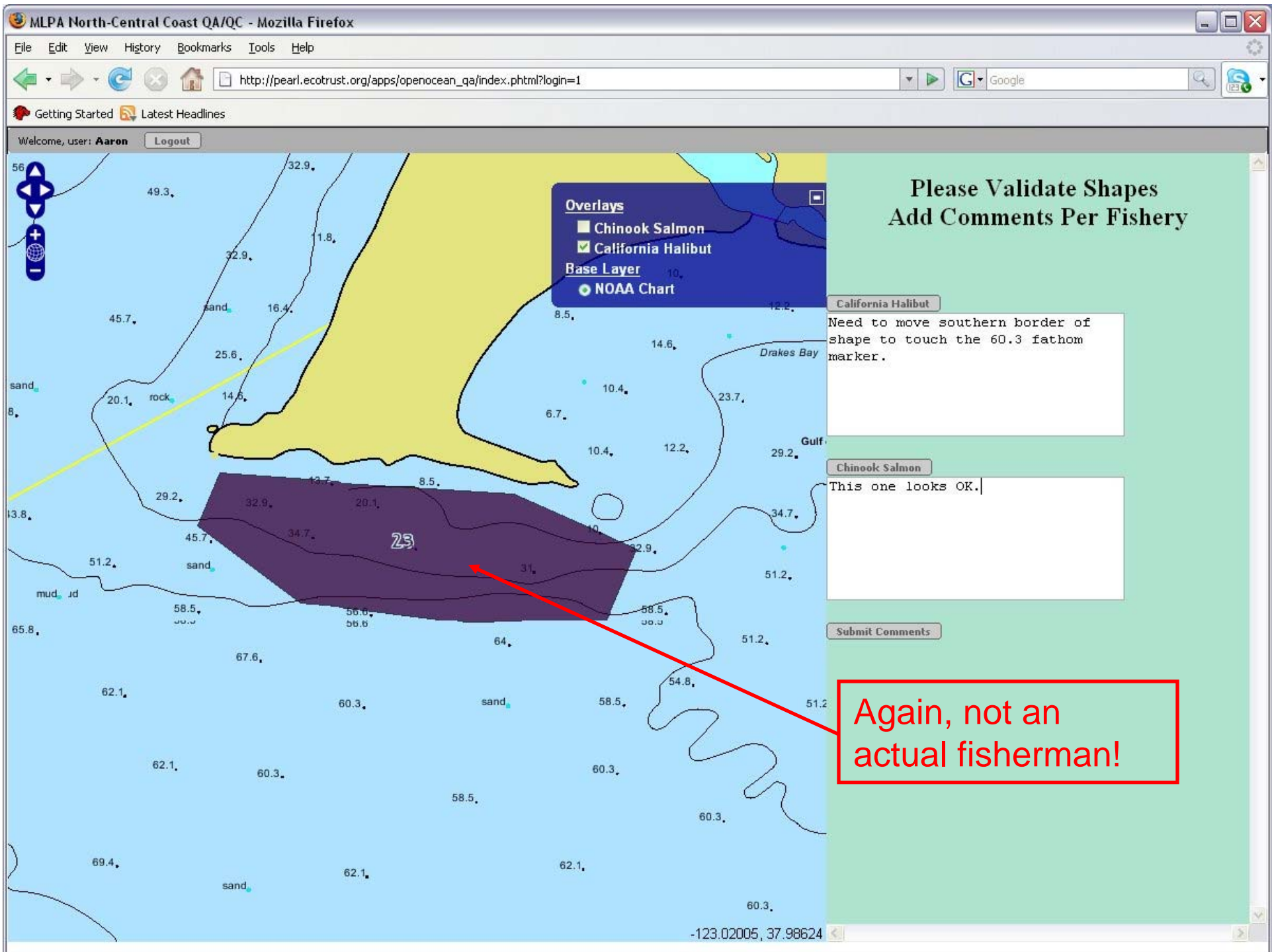
Debug

-292688.836422, -17526.3420801



# Quality Assurance & Control

- As data was being collected, edits needed to be made:
  - For shape A, fishermen K12345 – 10 fathoms shore side and 50 fathoms ocean side, from X Cove to ....
- After all edits have been made, we send each fishermen a set of their maps (paper and electronic) for them to review.



# Analyzing the Fishing Grounds

- Create a weighted surface that represents the stated importance of different areas for each fishery
- Measure of weighting:
  - multiply the values by the proportion of in-study region landings - ex-vessel revenue per fisherman, specific to each fishery/port (a crude revenue based measure)
- Produce datasets (maps) for each fishery at both the regional and port level





# Comments on Weighting

- Weighting is done only within each fishery sector for best estimates of individual contributions to the economic aggregate results.
- Commercial weighting is based on the landings data.
- Recreational weighting is “neutral”.
- Our model and results are not used in the decision-making process to weight one sector against another.
- Our tools are decision support not decision making.

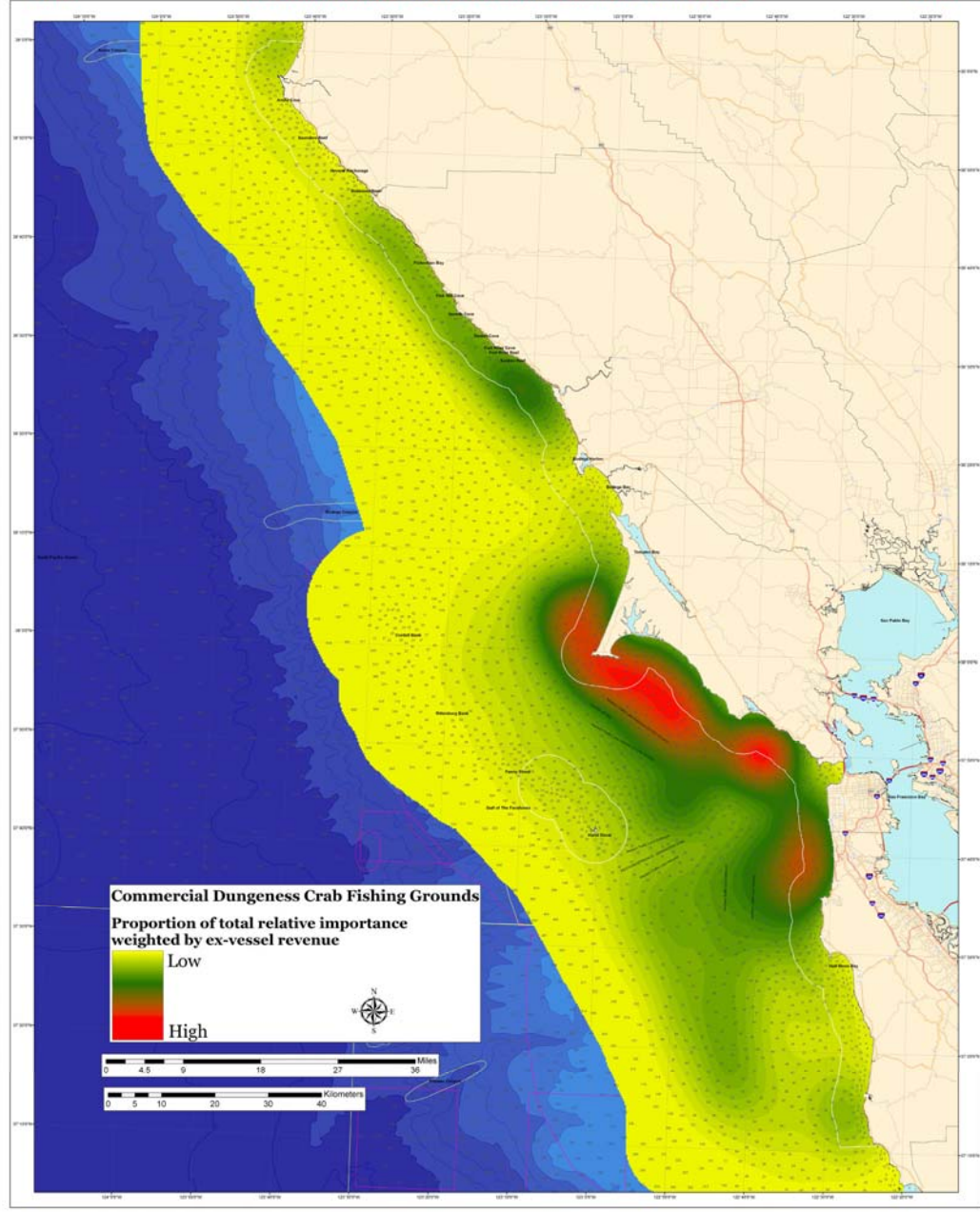
# Commercial Dungeness Crab Grounds in the North Central California Coast Study Region

MLPA Initiative - North Central Coast Study Region Fisheries Uses and Values Project - Data Analysis Preliminary Results

DRAFT

THESE DATA ARE DRAFT RESULTS FOR DISCUSSION PURPOSES ONLY - NOVEMBER 10, 2007

DRAFT



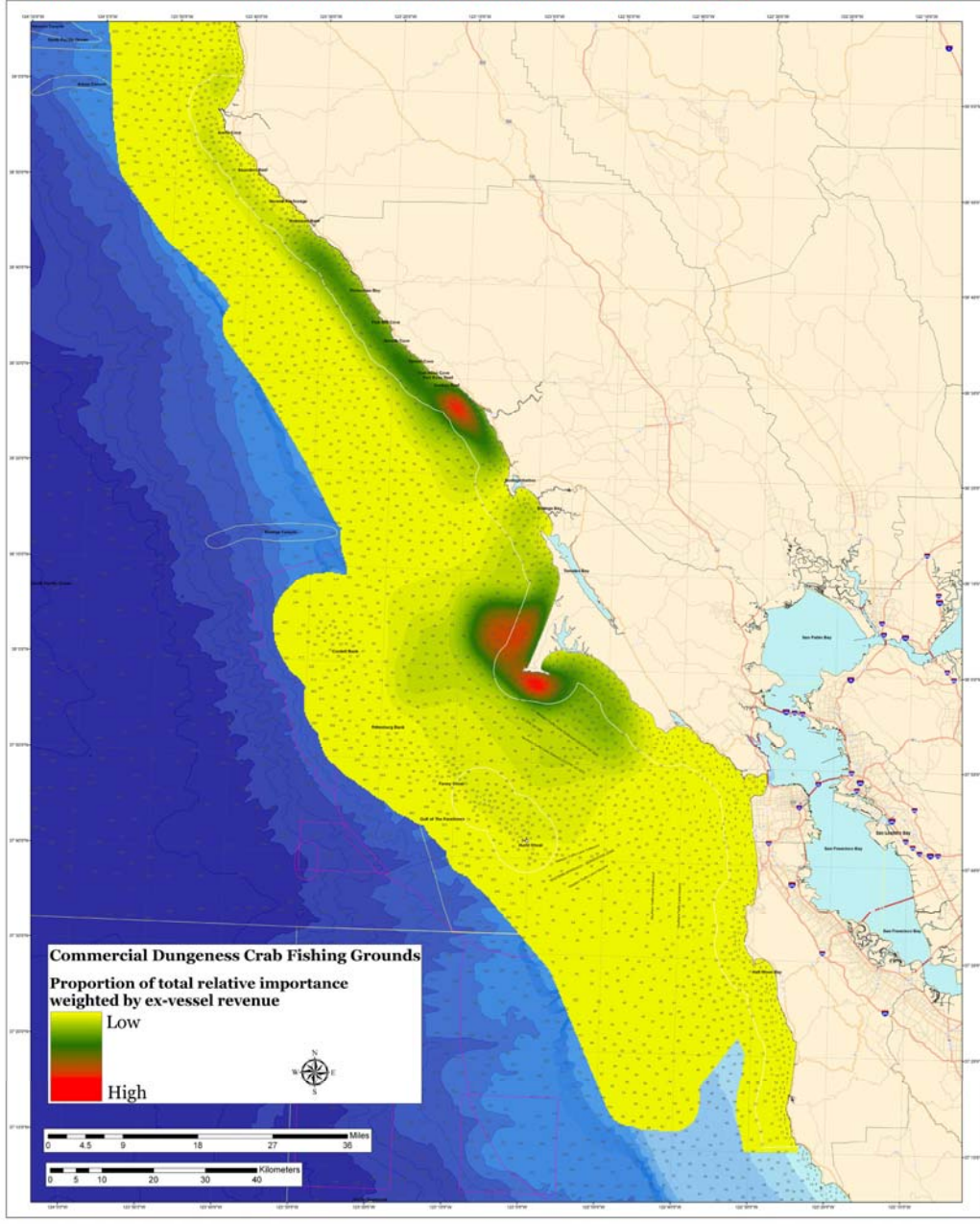
**Commercial Dungeness Crab Grounds in the North Central California Coast Study Region**  
**Bodega Bay Area Ports**

MLPA Initiative - North Central Coast Study Region Fisheries Uses and Values Project - Data Analysis Preliminary Results

THESE DATA ARE DRAFT RESULTS FOR DISCUSSION PURPOSES ONLY - NOVEMBER 10, 2007

DRAFT

DRAFT



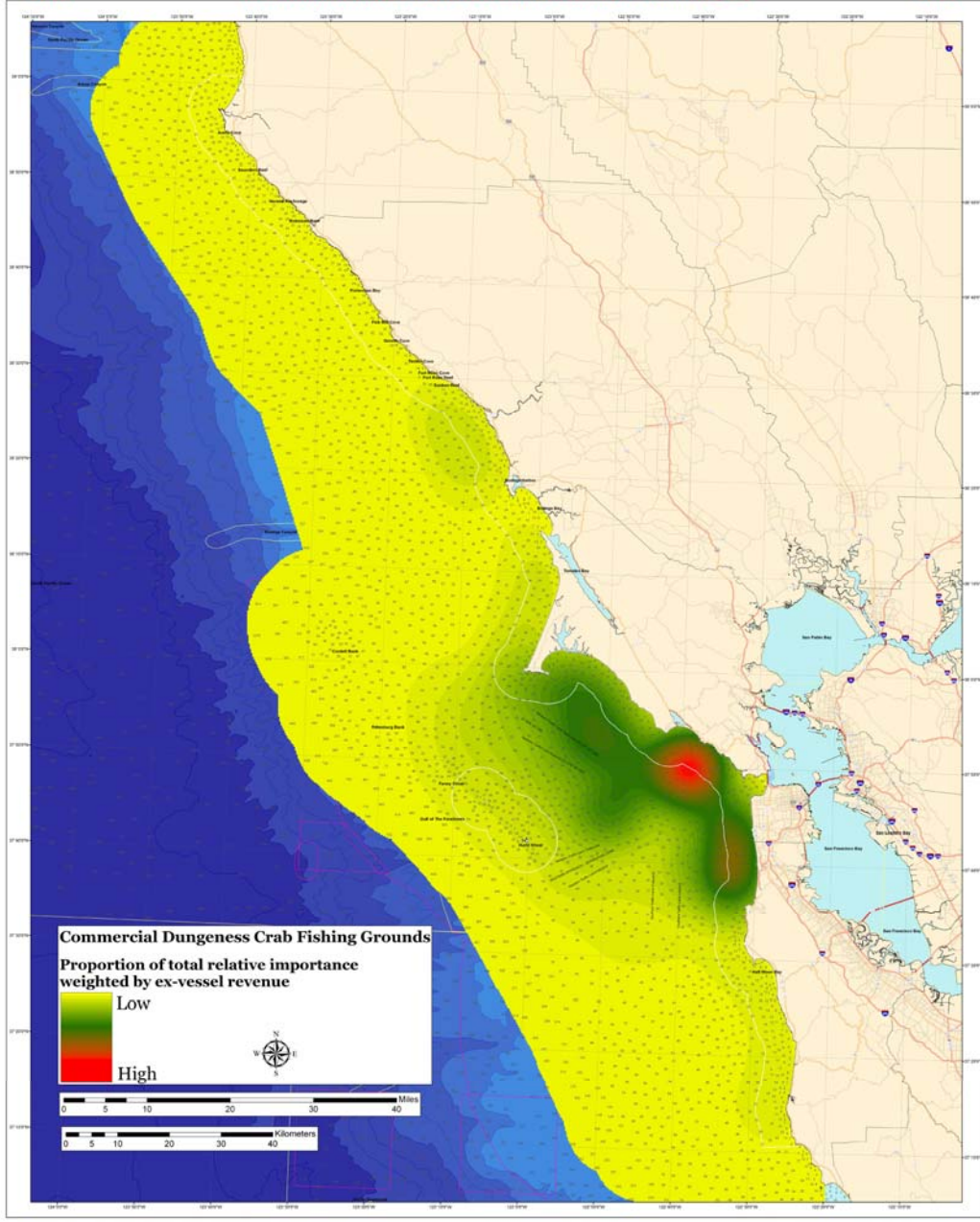


**Commercial Dungeness Crab Grounds in the North Central California Coast Study Region**  
**San Francisco Area Ports**

MLPA Initiative - North Central Coast Study Region Fisheries Uses and Values Project - Data Analysis Preliminary Results  
**THESE DATA ARE DRAFT RESULTS FOR DISCUSSION PURPOSES ONLY - NOVEMBER 10, 2007**

DRAFT

DRAFT



# Evaluate Impacts

- Collect socioeconomic data on commercial and recreational fishing (use and values) – data used by the stakeholders to inform their design process
- Evaluate the economic (gross and net) impacts of the proposals designed by stakeholders – for various applications (wave energy, offshore aquaculture, marine reserves...)

# Economic Evaluation

- Based on the fishing grounds and cost estimates derived from the data collection effort:
  - Distinguish between total fishing grounds and fishing grounds in state waters
  - Determine percent area and value impacted
  - Consider or identify “outliers” – i.e. fishermen likely to experience disproportional impacts
  - Effect of existing fishery management area closures and other constraints on fishing grounds (Rockfish Conservation Area)





# Economic Evaluation – Gross Impacts

- Proposals vary; both between and across fisheries
  - Percentage of total fishing grounds area affected
  - Percentage of study area fishing grounds affected
  - Percentage of total fishing grounds value affected
  - Percentage of study area value affected

MLPA Science Advisory Team  
January 22, 2008  
Summary of potential impacts on commercial and recreational fisheries in North Central Coast Study Region  
Table 9: Percentage value of total commercial fishing grounds affected by landing port

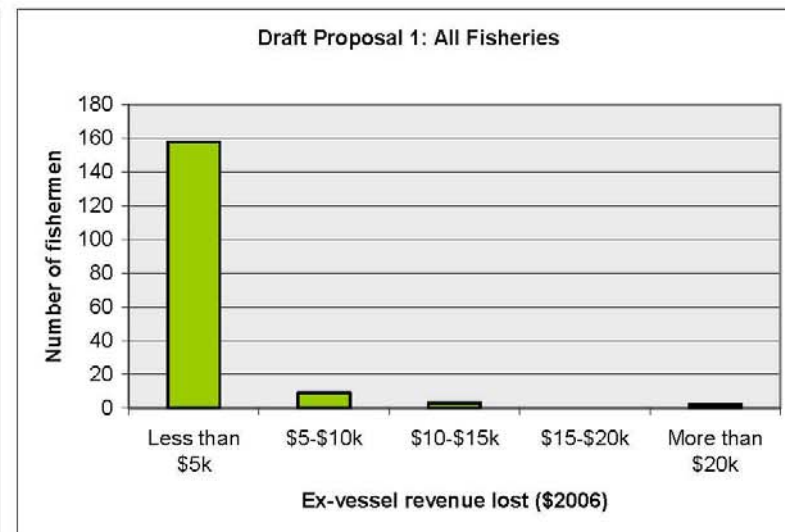
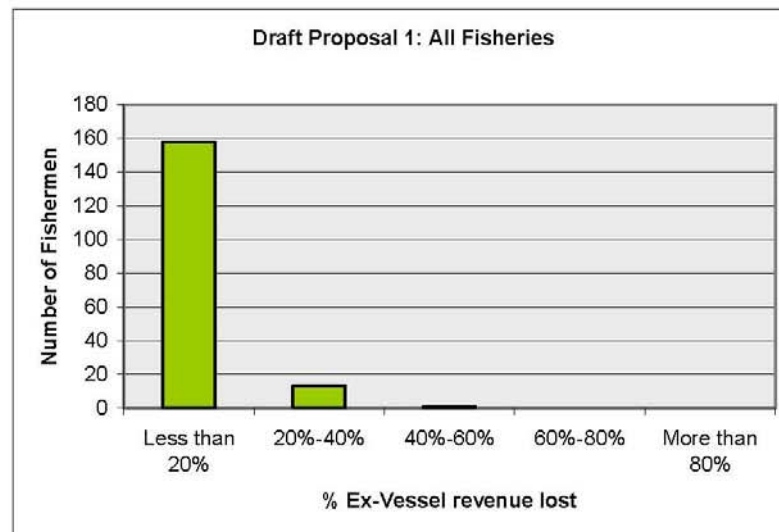
Fisheries	1	2	3	4	A
Point Arena	California Halibut	—	—	—	—
	Coastal Pelagics	—	—	—	—
	Market Squid	—	—	—	—
	Deeper Nearshore Rockfish	36.0%	40.8%	35.9%	36.7%
	Nearshore Rockfish	31.9%	35.3%	29.5%	32.8%
	Urchin	12.2%	10.8%	8.2%	11.0%
	Dungeness Crab	15.9%	6.1%	14.6%	16.1%
	Salmon	5.3%	13.8%	14.4%	14.2%
Bodega Bay	California Halibut	12.3%	8.0%	15.7%	13.7%
	Coastal Pelagics	—	—	—	—
	Market Squid	—	—	—	—
	Deeper Nearshore Rockfish	28.9%	12.9%	20.7%	30.9%
	Nearshore Rockfish	23.6%	22.8%	42.6%	22.3%
	Urchin	38.9%	27.2%	38.4%	36.5%
	Dungeness Crab	9.8%	2.0%	6.0%	9.3%
	Salmon	4.1%	1.8%	5.0%	4.9%
Bolinas	California Halibut	17.1%	12.8%	20.2%	17.9%
	Coastal Pelagics	—	—	—	—
	Market Squid	—	—	—	—
	Deeper Nearshore Rockfish	31.8%	6.0%	24.1%	35.9%
	Nearshore Rockfish	—	—	—	—
	Urchin	—	—	—	—
	Dungeness Crab	2.2%	0.0%	2.9%	2.2%
	Salmon	6.1%	0.7%	6.4%	5.7%
San Francisco	California Halibut	0.5%	0.4%	0.7%	0.5%
	Coastal Pelagics	—	—	—	—
	Market Squid	—	—	—	—
	Deeper Nearshore Rockfish	21.2%	12.7%	18.8%	26.2%
	Nearshore Rockfish	14.1%	11.0%	14.3%	15.6%
	Urchin	29.5%	23.8%	25.8%	26.8%
	Dungeness Crab	2.2%	0.8%	2.4%	2.6%
	Salmon	2.2%	0.5%	2.1%	2.6%
Half Moon Bay	California Halibut	0.7%	0.2%	0.6%	0.7%
	Coastal Pelagics	0.2%	0.0%	0.9%	0.0%
	Market Squid	0.5%	0.2%	22.7%	27.3%
	Deeper Nearshore Rockfish	13.8%	5.1%	9.2%	18.4%
	Nearshore Rockfish	1.9%	1.9%	1.9%	1.9%
	Urchin	—	—	—	—
	Dungeness Crab	1.4%	0.5%	1.2%	1.8%
	Salmon	3.0%	0.7%	2.6%	3.0%

FINAL DRAFT – 22 January 2008

8

**Table 12: Individual Impacts for Draft Proposal 1**

Fishery	n=	Annual Ex-vessel Revenue Loss (%)					Annual Ex-vessel Revenue Loss (\$ 2006)				
		Less than 20%	20%-40%	40%-60%	60%-80%	More than 80%	Less than \$5k	\$5-\$10k	\$10-\$15k	\$15-\$20k	More than \$20k
C. Halibut	14	11	3	0	0	0	14	0	0	0	0
Coast. Pelagics	1	1	0	0	0	0	1	0	0	0	0
Market Squid	1	1	0	0	0	0	1	0	0	0	0
D.N. Rockfish	15	7	7	1	0	0	15	0	0	0	0
N. Rockfish	9	4	5	0	0	0	8	1	0	0	0
Urchin	22	12	8	1	0	1	20	2	0	0	0
D. Crab	102	94	7	1	0	0	95	3	3	1	0
Salmon	136	135	1	0	0	0	135	1	0	0	0
<b>All Fisheries</b>	<b>172</b>	<b>158</b>	<b>13</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>158</b>	<b>9</b>	<b>3</b>	<b>0</b>	<b>2</b>



# Economic Evaluation – Net Impacts

- By collecting information on costs (labor and fuel), we can then estimate net economic impacts that are specific to the fisheries in the region.

Name	n=	Mean % of Gross Economic Revenue			
		Crew	Fuel	Fixed	Total
California Halibut	19	5.4%	13.9%	26.6%	45.9%
Coastal Pelagics	1	40.0%	15.0%	5.0%	60.0%
Squid	1	40.0%	15.0%	5.0%	60.0%
Deeper Nearshore and Nearshore Rockfish	18	5.3%	17.3%	28.3%	50.9%
Dungeness Crab	101	14.8%	10.3%	23.3%	48.5%
Urchin	21	7.6%	10.7%	21.4%	39.7%
Salmon	138	9.8%	11.8%	25.0%	46.6%
All Fisheries Combined	174	10.9%	12.1%	24.4%	47.5%



Summary of potential impacts on commercial and recreational fisheries in North Central Coast Study Region

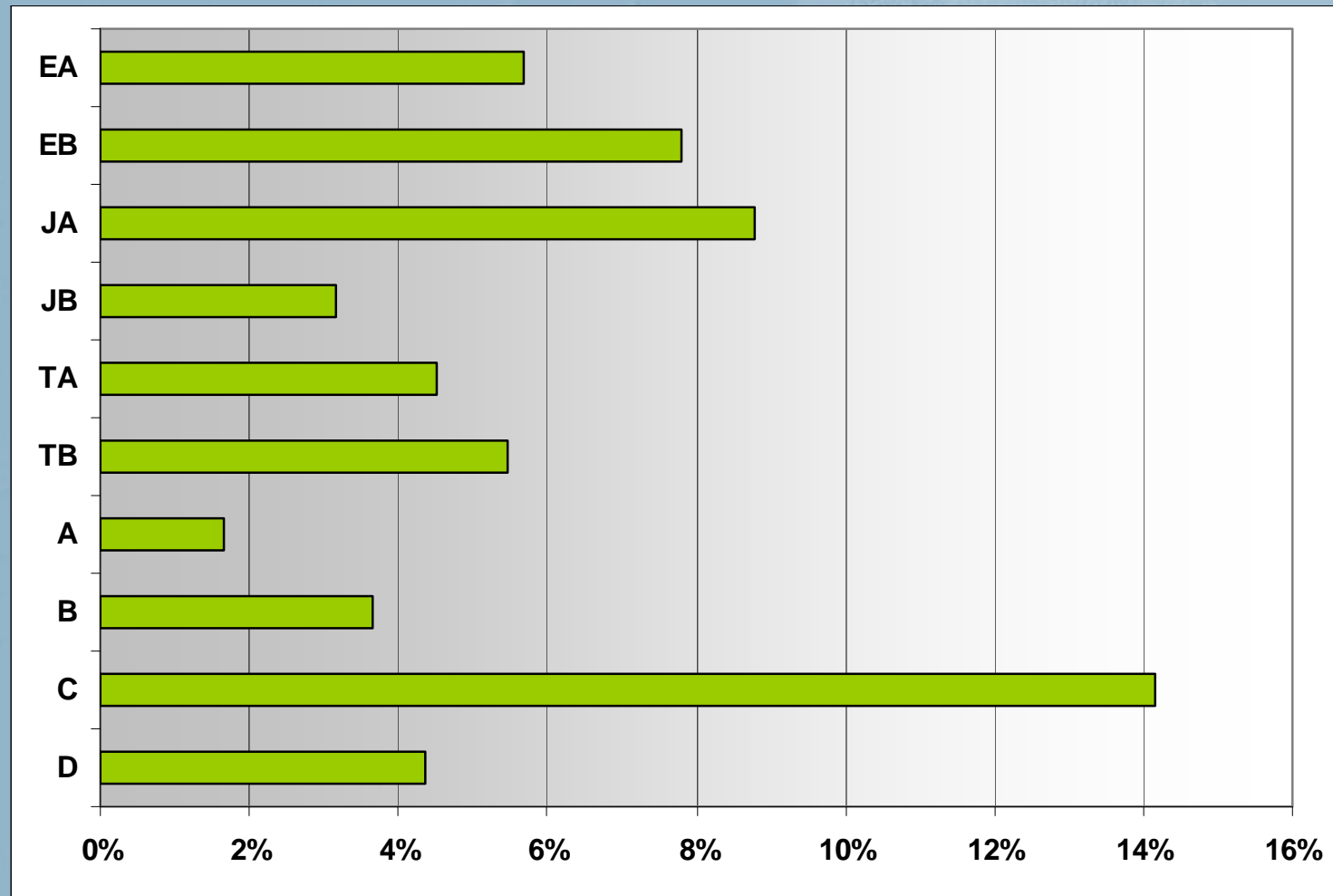
**Table 23: Estimated Annual Net Economic Impact (NEI) for the NCCSR**

Fishery	Baseline GER	Baseline NER (Profit)	Estimated Annual Net Economic Impact of Draft Proposal (\$ 2006)				
			1	2	3	4	A
Ca. Halibut	\$279,764	\$151,220	\$6,133	\$4,301	\$7,476	\$13,519	\$4,033
Coastal Pelagics	\$29,816	\$11,926	\$16	\$0	\$68	\$0	\$0
Squid	\$303,466	\$121,386	\$441	\$147	\$20,896	\$25,067	\$5,164
D. N. Rockfish	\$107,902	\$52,967	\$18,346	\$9,604	\$14,792	\$21,821	\$9,256
N. Rockfish	\$152,597	\$74,907	\$28,166	\$28,535	\$33,016	\$28,758	\$13,997
Urchin	\$867,381	\$523,320	\$140,683	\$109,994	\$119,417	\$129,925	\$73,362
Dungeness Crab	\$8,387,032	\$4,323,049	\$261,923	\$66,309	\$196,854	\$270,546	\$76,312
Salmon	\$5,761,401	\$3,077,826	\$141,024	\$53,040	\$155,177	\$165,746	\$59,490
<b>All Fisheries</b>	<b>\$15,889,359</b>	<b>\$8,336,602</b>	<b>\$596,732</b>	<b>\$271,930</b>	<b>\$547,694</b>	<b>\$655,381</b>	<b>\$241,613</b>

Fishery	Estimated Annual Net Economic Impact of Draft Proposal (% reduction in Profit)				
	1	2	3	4	A
Ca. Halibut	4.1%	2.8%	4.9%	8.9%	2.7%
Coastal Pelagics	0.1%	0.0%	0.6%	0.0%	0.0%
Squid	0.4%	0.1%	17.2%	20.7%	4.3%
D. N. Rockfish	34.6%	18.1%	27.9%	41.2%	17.5%
N. Rockfish	37.6%	38.1%	44.1%	38.4%	18.7%
Urchin	26.9%	21.0%	22.8%	24.8%	14.0%
Dungeness Crab	6.1%	1.5%	4.6%	6.3%	1.8%
Salmon	4.6%	1.7%	5.0%	5.4%	1.9%
<b>All Fisheries</b>	<b>7.2%</b>	<b>3.3%</b>	<b>6.6%</b>	<b>7.9%</b>	<b>2.9%</b>

# Economic Evaluation – Net Impacts



## POORT MPA Decision Support Tool

## Instructions

## Navigation:

To get started use the navigation tools found in the upper right and left corners of the map window. The navigation tools will allow you to zoom in/out and pan .

to the location of your MPA proposal.

## Creating proposed MPAs:

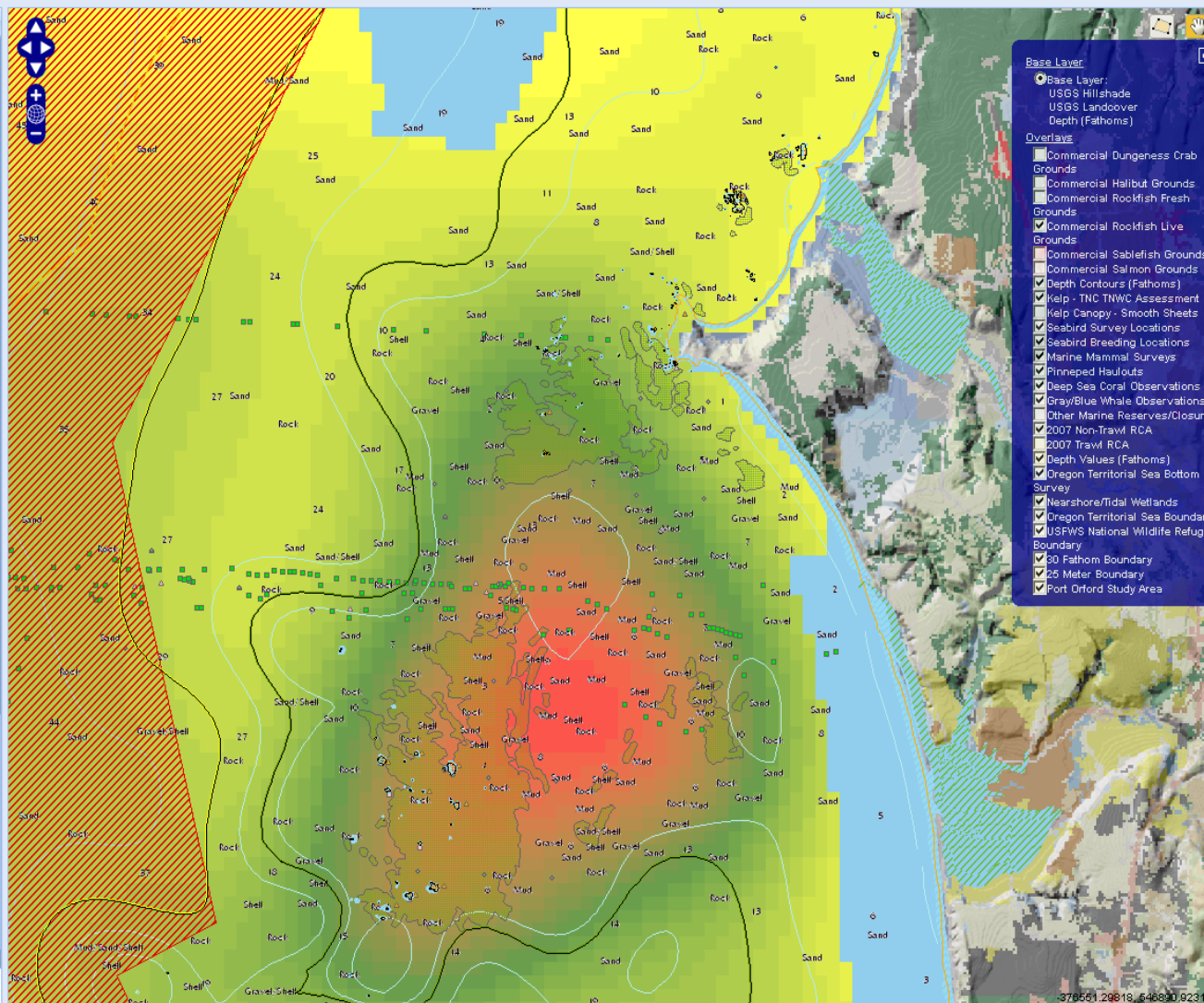
Using the draw tool you can create a polygon of any size and shape to propose as an MPA. The draw tool is located in the upper right corner of the map window next to the pan tool.

To use the tool click on the button then click on the map window where you want to start drawing the polygon; drag the mouse and click to create a vertex. When you have finished double click on the shape and a dialogue box asking for a description will appear. Using a descriptive and intuitive name will make it easier when reviewing the shapes later. An alternative way to create your proposed MPA is to hold the shift key and the right mouse button; this turns on the free-hand function. This function will allow you to follow specific features like fathom lines more accurately. When you have completed your shape let go of the shift key and right-mouse button and the MPA description dialogue box will appear.

## Saving MPA's:

After you have created your shapes using the draw tool and added a description, you will see them listed in the panel on the right under the Draw New MPA's tab. Under this tab you'll be able to review your shapes and determine if you would like to submit them for analysis. To save the MPA for further analysis highlight the MPA and click the "Submit MPA's For Analysis" button under the list of new MPA's. This will move the shape to the Saved MPA's

## Legend



## Base Layer

- ☒ Base Layer:
- ☐ USGS Hillshade
- ☐ USGS Landcover
- ☐ Depth (Fathoms)

## Overlays

- ☐ Commercial Dungeness Crab Grounds
- ☐ Commercial Halibut Grounds
- ☐ Commercial Rockfish Fresh Grounds
- ☒ Commercial Rockfish Live Grounds
- ☐ Commercial Sablefish Grounds
- ☐ Commercial Salmon Grounds
- ☒ Depth Contours (Fathoms)
- ☒ Kelp - TNC TNWC Assessment
- ☒ Kelp Canopy - Smooth Sheets
- ☒ Seabird Survey Locations
- ☒ Seabird Breeding Locations
- ☒ Marine Mammal Surveys
- ☒ Pinniped Haulouts
- ☒ Deep Sea Coral Observations
- ☒ Gray/Blue Whale Observations
- ☒ Other Marine Reserves/Closures
- ☒ 2007 Non-Trawl RCA
- ☒ 2007 Trawl RCA
- ☒ Depth Values (Fathoms)
- ☒ Oregon Territorial Sea Bottom Survey
- ☒ Nearshore/Tidal Wetlands
- ☒ Oregon Territorial Sea Boundary
- ☒ USFWS National Wildlife Refuge Boundary
- ☒ 30 Fathom Boundary
- ☒ 25 Meter Boundary
- ☒ Port Orford Study Area

## Draw New MPA's

## Saved MPA's

## Description

Done



# Thanks

 Questions and Answers

