



ecotrust

# Socioeconomic considerations in marine resource management

Or, how to deal with people, places and communities

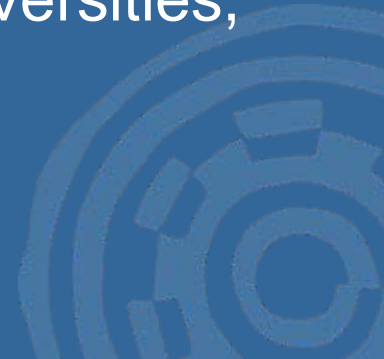
FISH 693 Management of Renewable Marine Resources

19 March 2004

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# Introduction

- Ecotrust is a non-profit think tank and community development organization;
- Working to build Salmon Nation—where economy, ecology, and equity are in balance;
- Sector programs in Fisheries, Food & Farm, First Nations, Forestry;
- In-house GIS department and research;
- Collaborate with federal and state agencies, universities, industry, tribes & NGOs
- For more info, see [www.ecotrust.org](http://www.ecotrust.org)



# Outline

- Magnuson Stevens Act – from bioeconomics to social science;
- Review of social science tools and new technologies (GIS);
- Examples and applications:
  - Integrated geospatial tools (OCEAN);
  - Participatory science, local knowledge for MPAs;
  - Community based management.



# Magnuson Stevens Fishery Conservation and Management Act, 1976 (revised 1996)

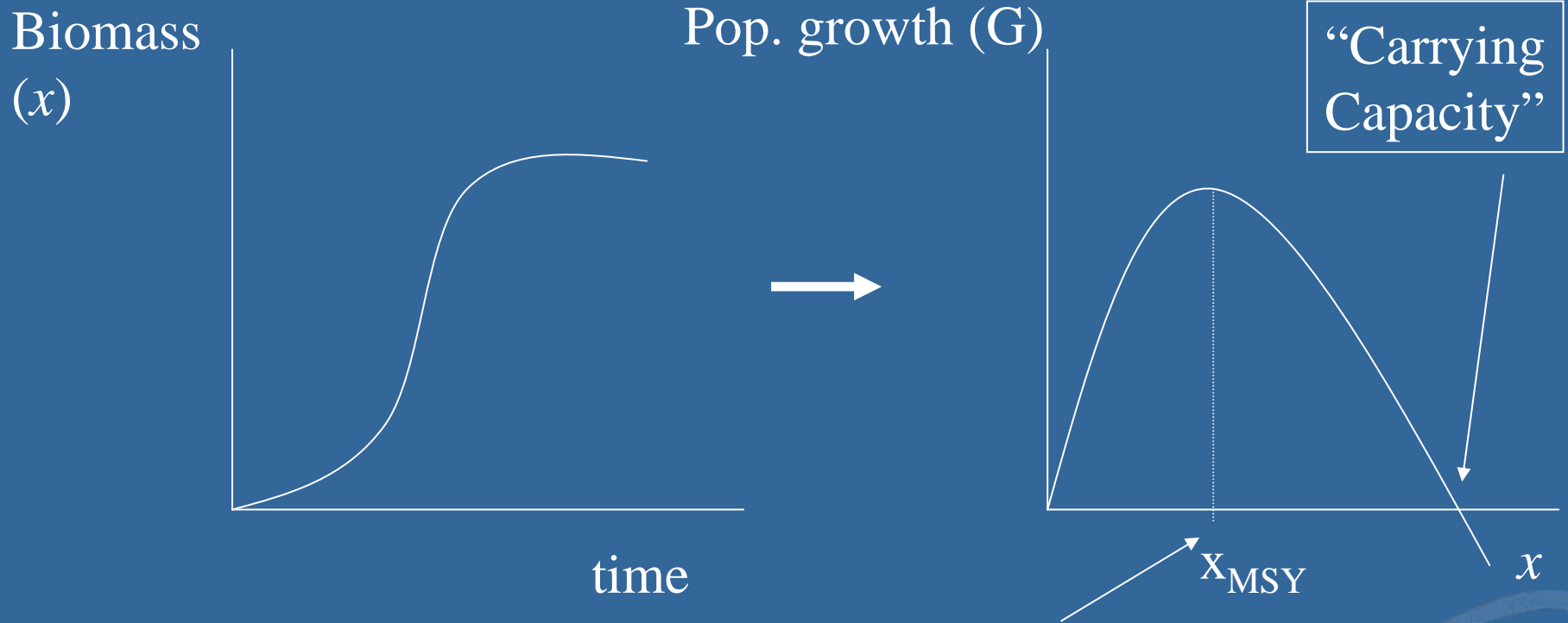
- National Standards:
  - (1) Prevent overfishing while achieving optimal yield;
  - (8) Take into account the importance of fishery resources to fishing communities to provide for the sustained participation of, and minimize adverse impacts to, such communities (consistent with conservation requirements).
- NS (1) begs the question “what is optimal?”
- NS (8) sets up the environment vs. economics
- (caveat: other reg’s do, too: NEPA, CEQA, RFA etc)



# Bioeconomics

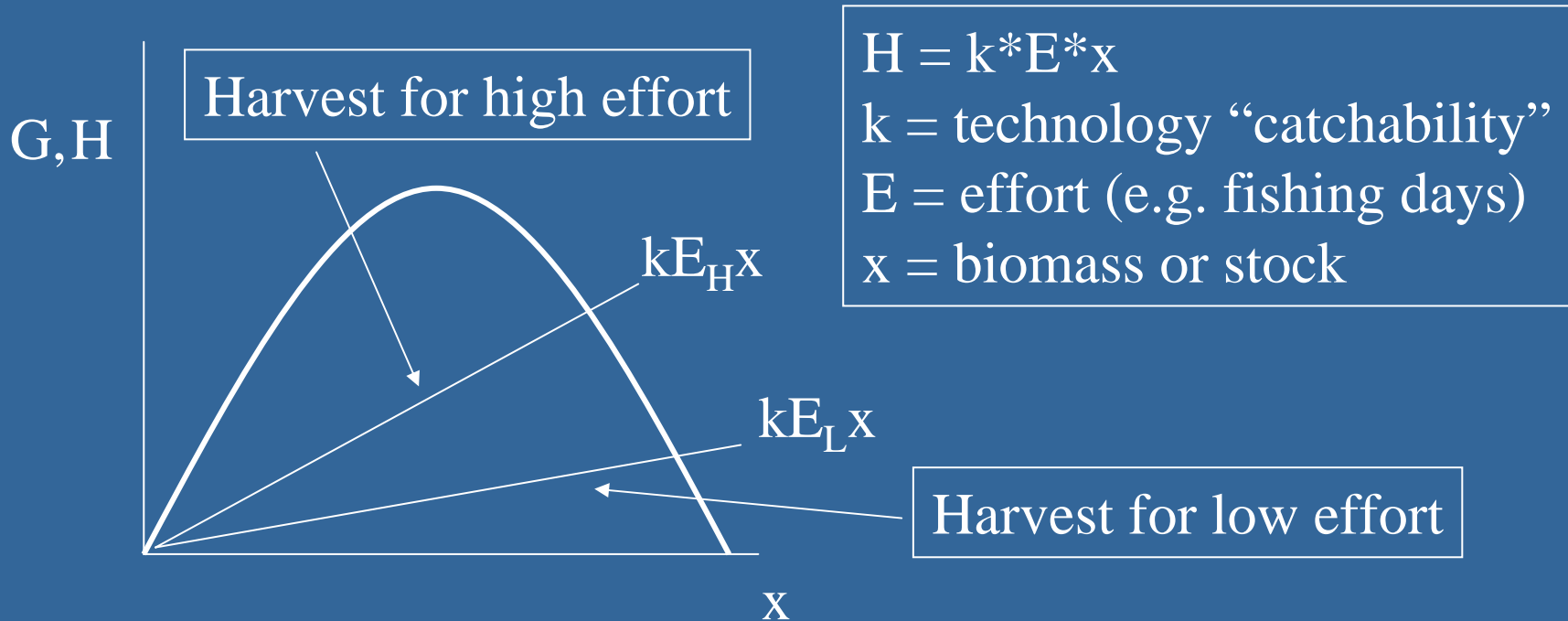


# Logistic population growth



Stock that gives "maximum sustainable yield"

# Harvest



- Harvest depends on effort, stock size, and technology;
- for any given effort, sustainable harvest level is  $H=G$ , i.e. “skimming the cream off the top”;
- yield curve gives the sustainable harvest level as a function of effort level.

# Fishery Economics

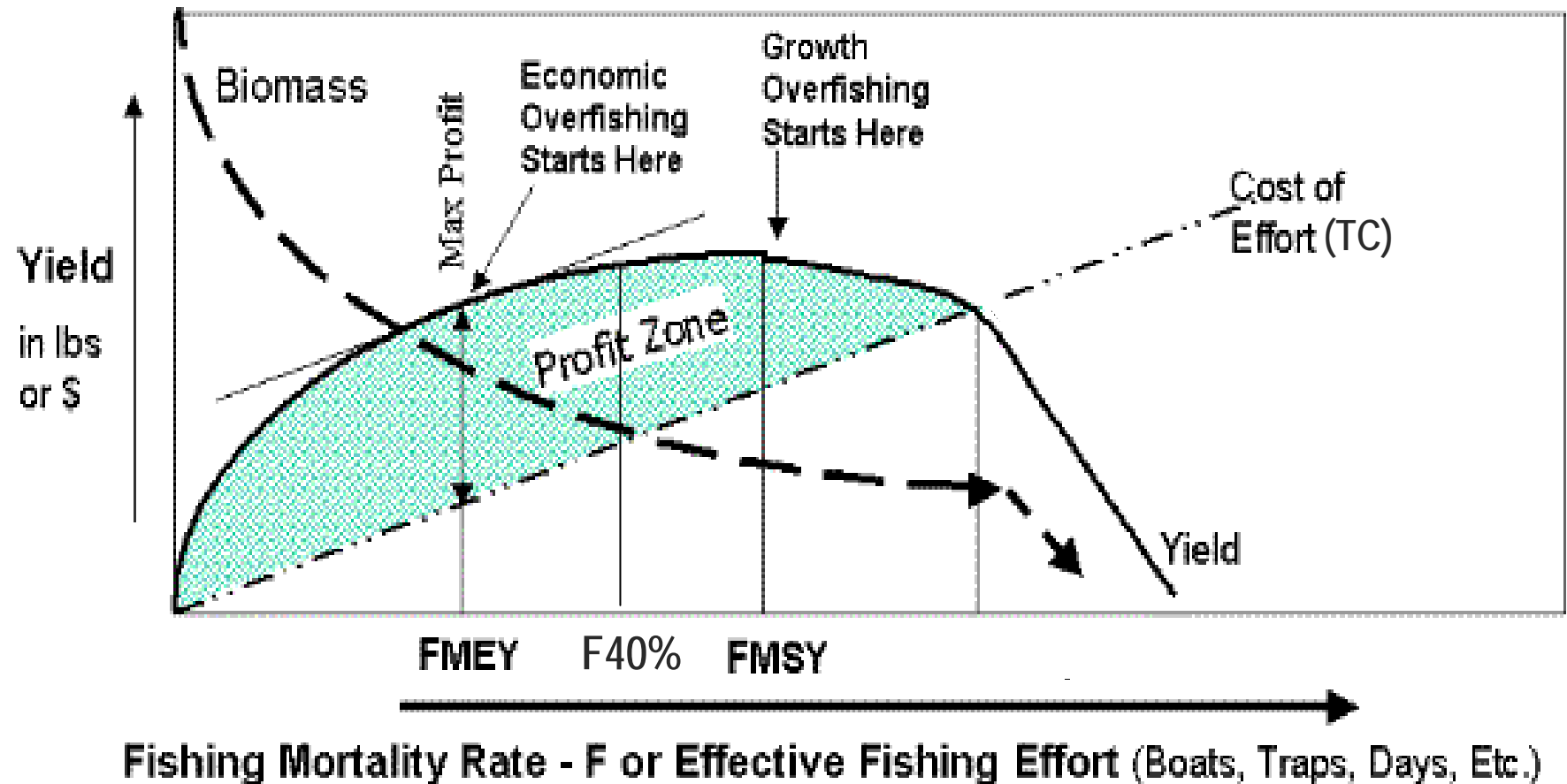
- Harvest, or yield, has a per-unit-effort cost ( $w$ ), and total cost,  $TC = w * E$ ;
- Revenues from harvesting,  $TR = p * H(E)$ , where  $p$ =price;
- From Microeconomics, revenues are maximized where marginal costs = marginal revenues,  $MC=MR$ ;
- This is the economically optimal level of fishing;
- Under open access regime, those profits, or rents, attract new entrants to fishery until  $TR = TC$  (“open access equilibrium”).

# Fishery Economics – cont'd

- So, does limiting entry result in economic optimum?
- Typically, fisheries are not managed for economic optimum, but rather for MSY;
- MSY differs for different species;
  - most FMPs set TAC's reflecting fishing mortalities ( $F$ ) that preserve between 35–45% of virgin biomass, and
  - at levels lower than MSY;
- Recruitment overfishing (i.e., harvest outpaces population growth) is thought to occur at  $\sim F10\%$ .

# Fishery Bio-economics

(See the "Fishery Management Short Course" slide show for a more complete explanation of the diagram.)




MEY - Maximum Economic Yield

MSY - Maximum Sustainable Yield


**So much for the economics...  
on to the “social” in  
socioeconomics**




# The “social” in socioeconomics

- People and communities depend on fishing for subsistence and livelihood
  - Every management decision about fishing mortalities, catch (TAC's, quotas), and effort controls (time and place of fishing, capacity) affects somebody's stomach or pocket book
  - Given the conservation mandate of the MSFCMA, potential for conflict abounds!
  - Factoring people, places and communities into decisions critical to the success of management
  - First, some definitions
- 


# Socioeconomic analysis...

- ... is the systematic study of people's values, attitudes and experiences, and how they will be affected by management decisions;
  - ... uses economic, sociological, and other social science tools to derive statements about the size and nature of relative changes and their effects on communities;
  - ... does not provide any guidance as to which decisions are the right ones.
- 
- A decorative graphic of a gear or cogwheel is located in the bottom right corner of the slide. It is rendered in a lighter shade of blue than the background, with a circular center and several teeth around the perimeter.

# Socioeconomic analysis...

- ... helps identify likely obstacles to the successful implementation of management measures;
  - ... relies on the study of people: it tends to be more process-oriented and requires field work, whereas natural science relies on experiments and laboratory work;
  - ... is contentious: it goes to the heart of what makes people tick and what they care about.
- 

# Tools

- Local knowledge interviews
  - Participant observation
  - Ethnographic interviews
  - Surveys
  - Focus groups
  - Participatory and collaborative science, “joint fact finding” for management processes
  - Shared information and data resources (GIS)
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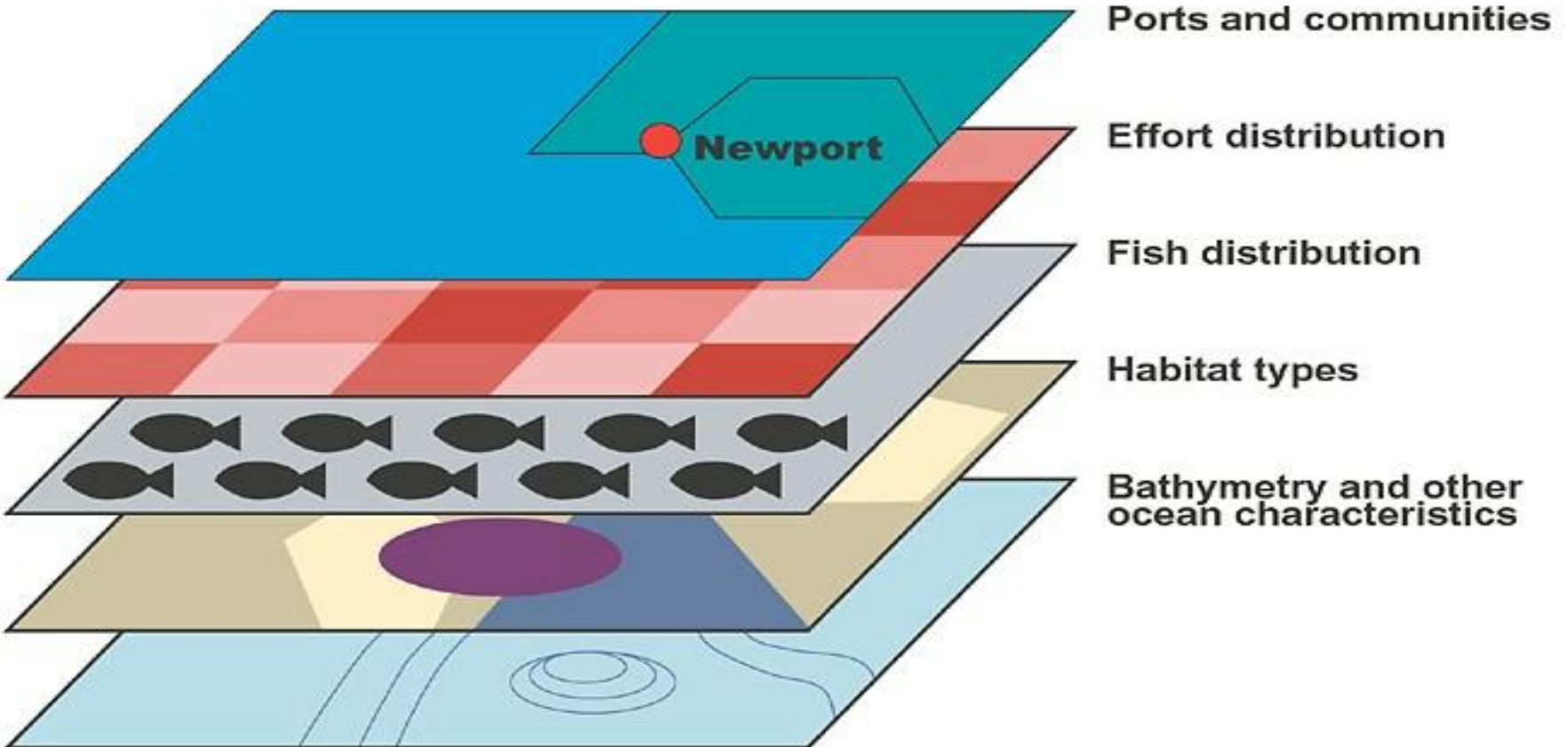
# Examples

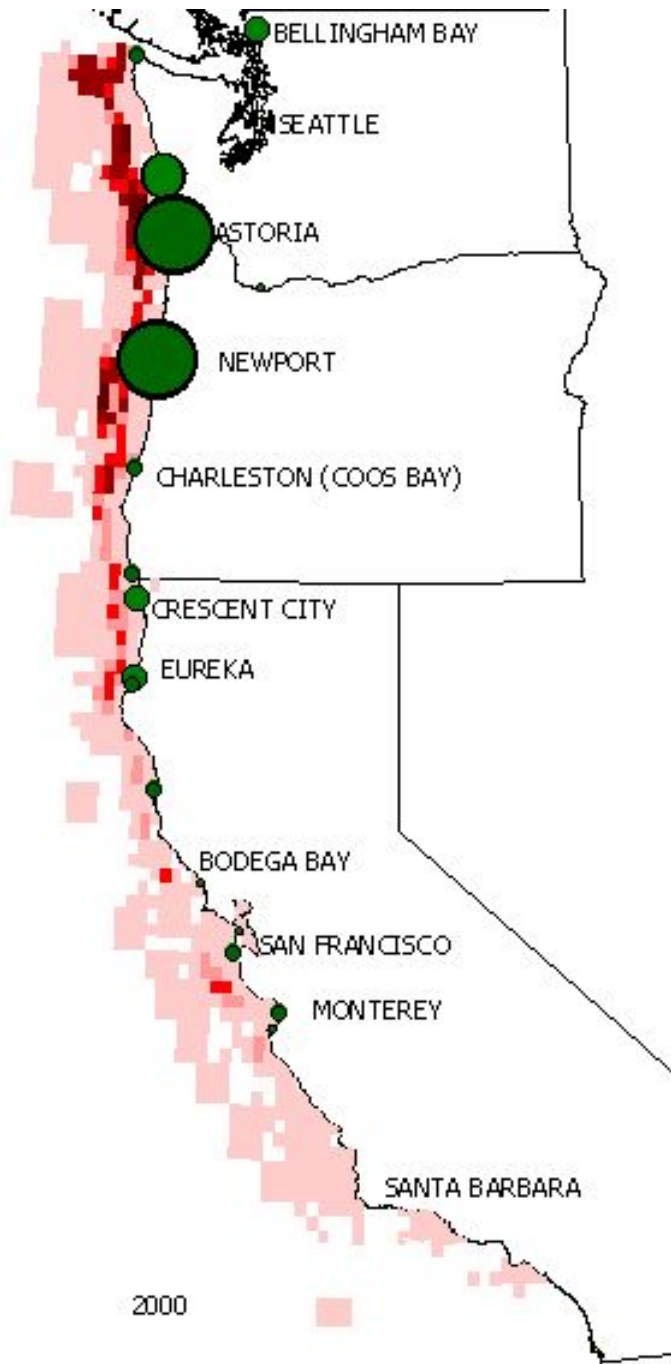
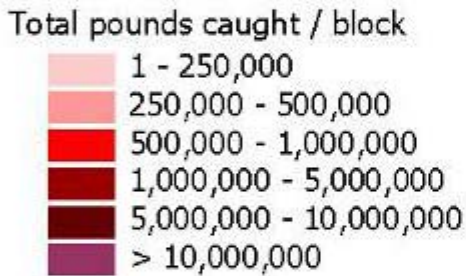
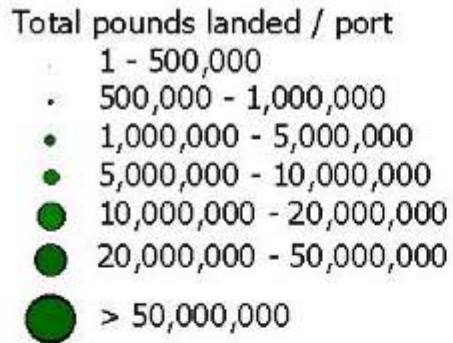
- Relating areas of the ocean to communities on land (OCEAN);
- Fishermen's knowledge for marine protected area management in California;
- Community based management
  - Port Orford, Oregon
  - West Vancouver Island and 'Namgis Nation, British Columbia
  - Collaborative stakeholder process in the Pribilof Islands, Alaska



# OCEANI

Ocean Communities **Equity Ecology Analysis Economy**





Distribution of  
trawl catch and  
landings, 1987 -  
2000

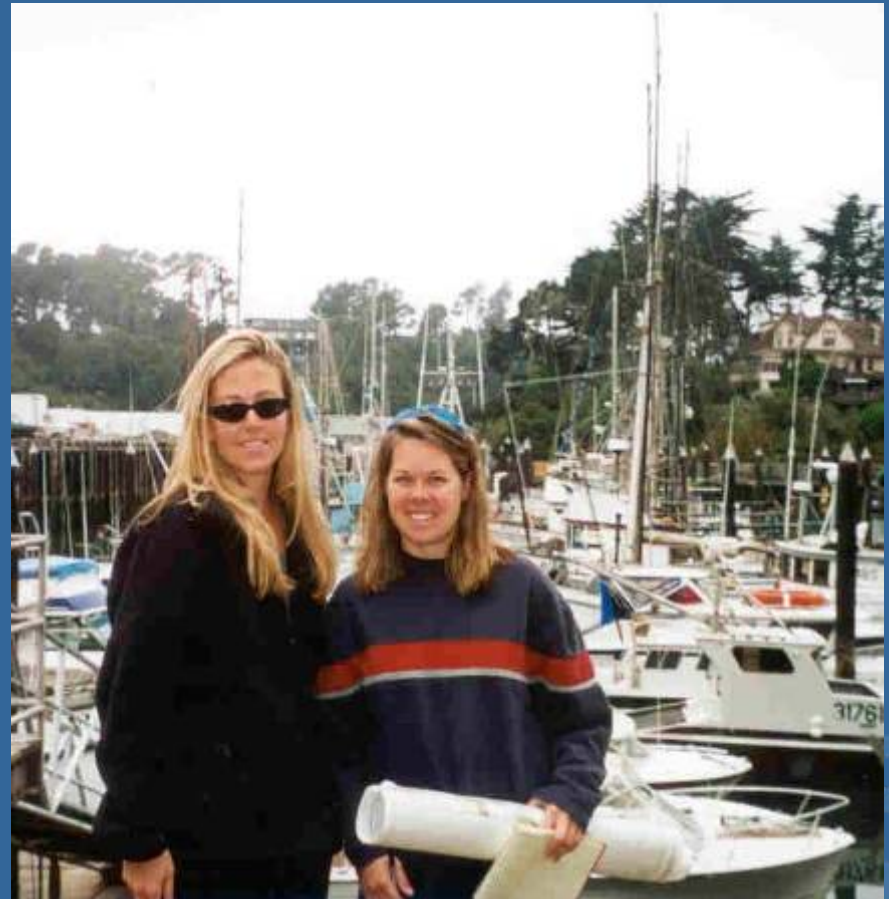
# Fishermen's knowledge for MPA planning in California

- Collaborative pilot project (summer 2002) to elicit ecological and economic information from fishermen for MLPA process;
- Motivated by lessons from CINMS:
  - Socioeconomic analysis: “too little, too late”;
  - Process matters;
  - “I felt like the socioeconomic panel took fishermen’s knowledge seriously”.
- 1st round of MLPA had already tripped up over process...



# Local knowledge — methods

- Participatory, field-based research;
- Designed questions and protocol with fishermen advisors (gatekeepers);
- Semi-structured interviews in six ports, 28 fishermen;
- Focus:
  - historically productive areas;
  - “bread and butter” areas;
  - Highly biodiverse areas;
  - Important anchorages;
  - (closure candidates)



Nicole and Kate in action!

# Critical Economic Areas, Biodiverse Areas, and Historically Productive Areas

Arena Rock has good habitat and has been historically productive

Arena Rock has very high biodiversity

Sea Ranch from Gualala to Black Pt is biologically diverse

Fisk Mill Cove to Forest Ross Cove is an important spawning area with high biodiversity

the area from the Russian River to Bodega Head is very diverse with a range of habitat types

Cordell Bank has been historically productive - may be fished down

loss of biodiversity at Pt Reyes because of the current patterns. Larvae collect and settle

Rittenburg Bank is diverse, and area between Cordell and Farallon experiences lots of upwelling which brings up bait fish

Fanny Shoal has been historically productive has been fished down

Gualala Pt has been historically productive, now being fished down

area was historically productive, has been fished down

areas around Bodega Head were historically productive, but have been fished down

Drakes Estero has high biodiversity and is important for spawning, etc.









Double Pt. is area of high biodiversity, esp seals and sharks. Colony = about 80.

Duxbury Reef has extremely high biodiversity

area from Shelter Cove to Pt Montara has good habitat and has been historically productive

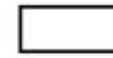
Colorado Reef has very high biodiversity

stretch of coast from San Gregorio to South of Ano Nuevo is biologically very rich

	Critical Anchorages
	Biodiverse Areas
	Historically Productive Areas
<b>Critical economic Areas</b>	
	1 - 2 Fishermen Agreed upon These Areas
	3 - 5 Fishermen Agreed upon These Areas
	4 - 5 Fishermen Agreed upon These Areas
	6 - 7 Fishermen Agreed upon These Areas
	8 - 10 Fishermen Agreed upon These Areas



# Central Region Draft MPAs



Draft MPAs

north-central- Point Arena

Del Mar Point

Salt Point

Fort Ross

Sonoma Coast Beach

Bodega

Bird Rock

Estero Americano

Estero de San Antonio

Estero de Limantour

Point Reyes Headlands

Duxbury Reef

Farallon Islands

Fitzgerald

Ano Nuevo


South-central Ano Nuevo

Natural Bridges


0 20 40 Miles



# Results

- 41.7% overlap between critical economic areas and initial set of DFG MPA sites;
  - 26.9% overlap between acceptable closure candidates and initial DFG sites;
  - Sometimes they overlap with each other (~17%) – important to make visible which areas are important to whom and why;
  - Other things matter: safe anchorages, temporal, seasonal and species variations, equity/access concerns, etc.
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- A decorative graphic of a gear or cogwheel is located in the bottom right corner of the slide, rendered in a lighter shade of blue than the background.

# Results (continued)

- Participants liked this process;
  - It's cheap, effective, replicable;
  - Information compatible with other databases and GIS used in marine resource processes – e.g. habitat maps;
  - Fishermen asked for copies of maps, and may choose to use them in MLPA process;
  - Currently expanding project to larger sample and other user groups.
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# Community based management

- Port Orford, Oregon
- West Vancouver Island and 'Namgis Nation, British Columbia
- Pribilof Islands, Alaska



# 1. Port Orford, OR



Picture: Vicki  
Wedell



# POORT

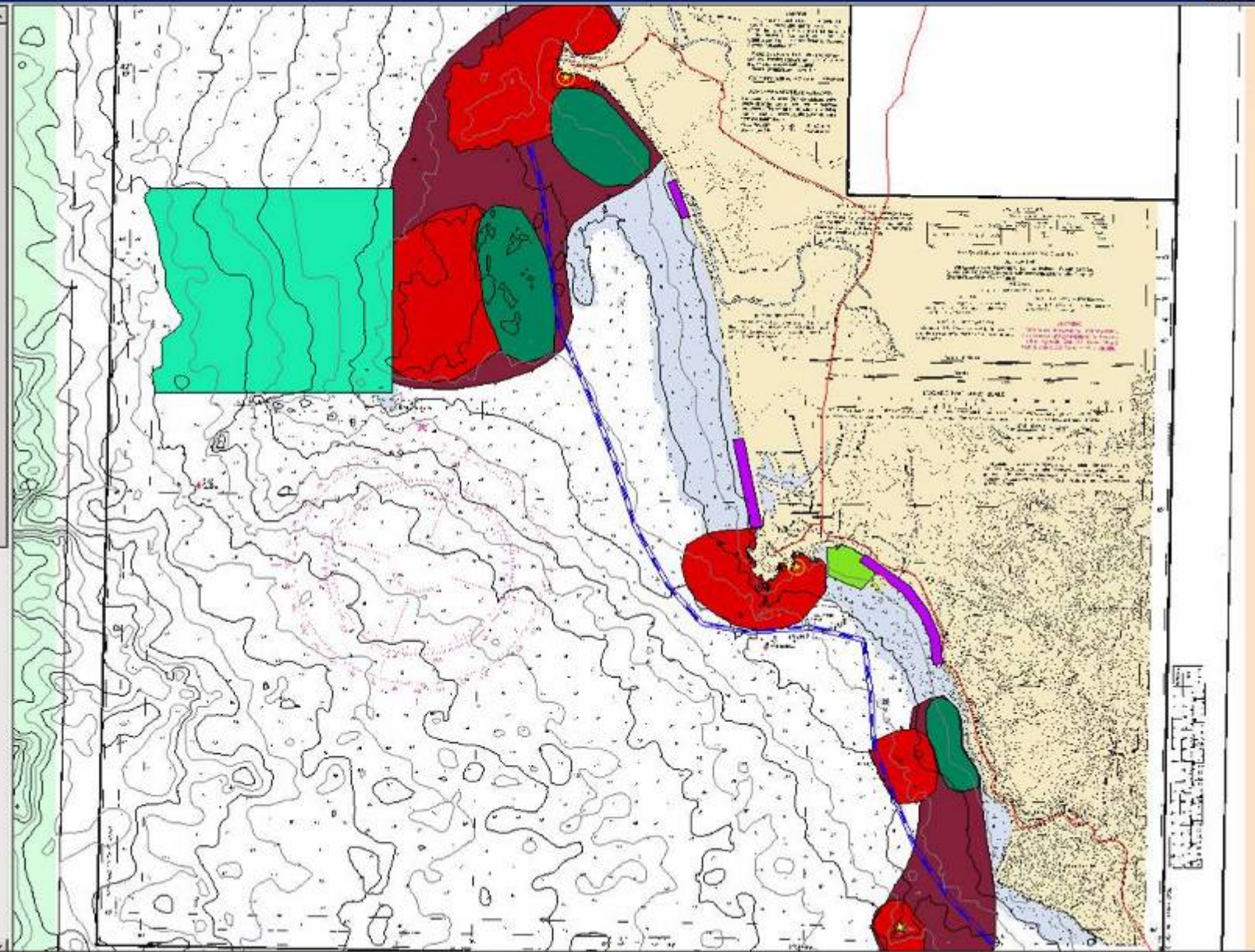
- POORT = Port Orford Ocean Resources Team;
- Goal: engage the Port Orford fishermen and other community members in developing and implementing a strategic plan that enhances the sustainability of the Port Orford fishery ecosystem and social system dependent on it
- Long-term planning objectives include:
  - increased input into local fishery management decisions
  - diversification of economic opportunities, and
  - ensuring that conservation strategies balance economic and ecological sustainability with social equity



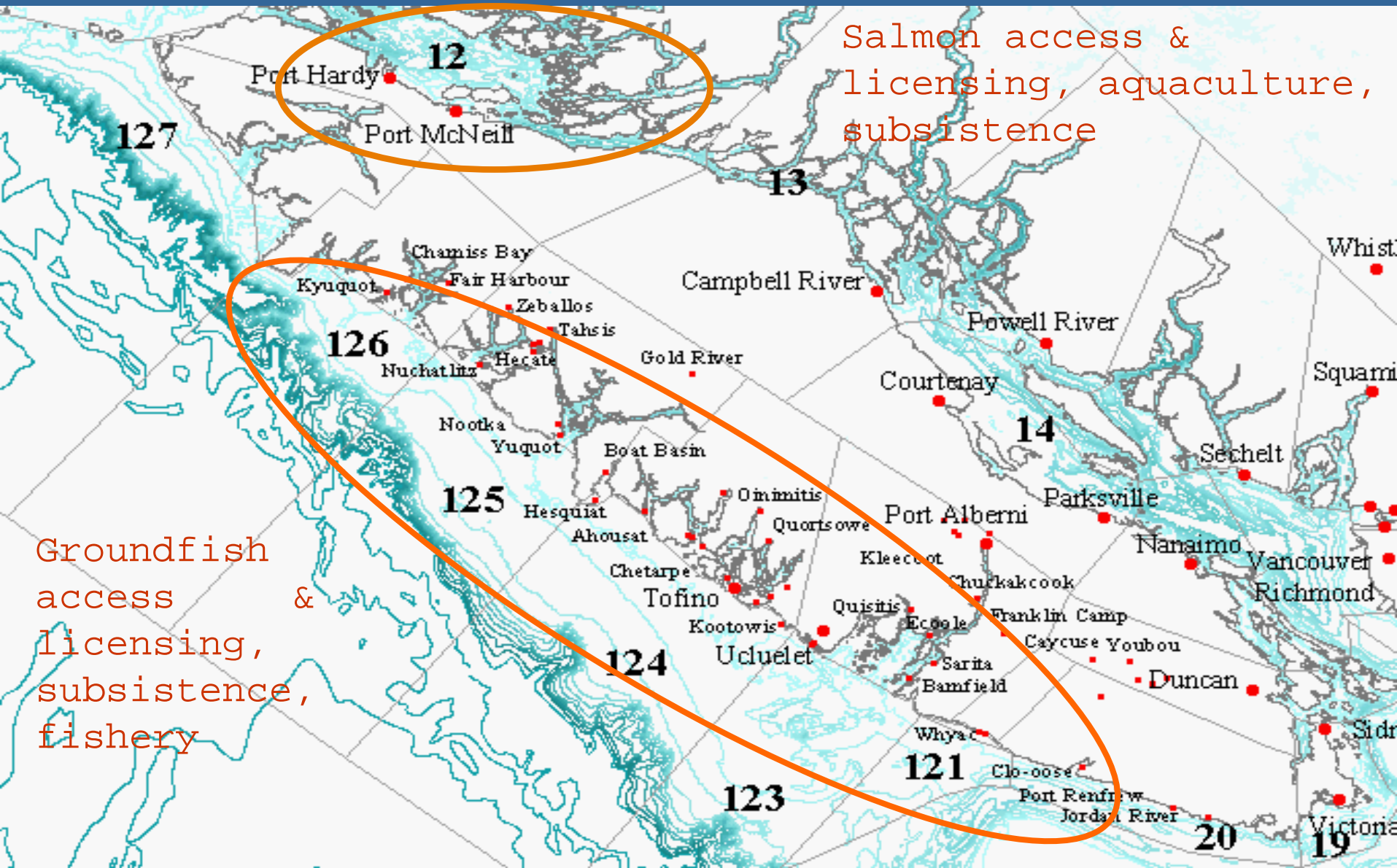


View 1

- 5fath\_odtw.shp
- 10fath\_contour.shp
- 5fath\_contour.shp
- Sealion\_haulouts.shp
- Murres.shp
- Whalerubspots.shp
- Grayhale\_migration.shp
- Safeanchorages.shp
- Shorefishing.shp
- Recreationaluse.shp
- Smalltrawleruse.shp
- Kelp.shp
- Urchin.shp
- Seatrout.shp
- Quilback\_copper\_china.shp
- Cabezon.shp
- Starfish.shp
- Octopus.shp
- Canary\_yt\_ye\_ling.shp
- Blacks\_blues.shp
- Chilli\_grnstripe\_rosethrn\_rosy.
- Highways.shp
- Poohart\_utm.tif
- Orford\_odtw.img




## 2. WVI AMB & 'Namgis Nation, BC



# 3. Pribilof Islands Collaborative

The Pribilof Collaborative process is intended to establish a forum of stakeholders and controlling government agencies dedicated to identifying issues confronting the environment surrounding the Pribilof Islands and take decisive actions to address these concerns through methods and actions recommended by the collaborative. The collaborative recognizes the inhabitants of the Pribilofs as the primary stakeholders with respect to such issues and will advocate the equal contribution and importance of Western science and Traditional Environmental Knowledge in addressing these issues.





St. Paul



St. George

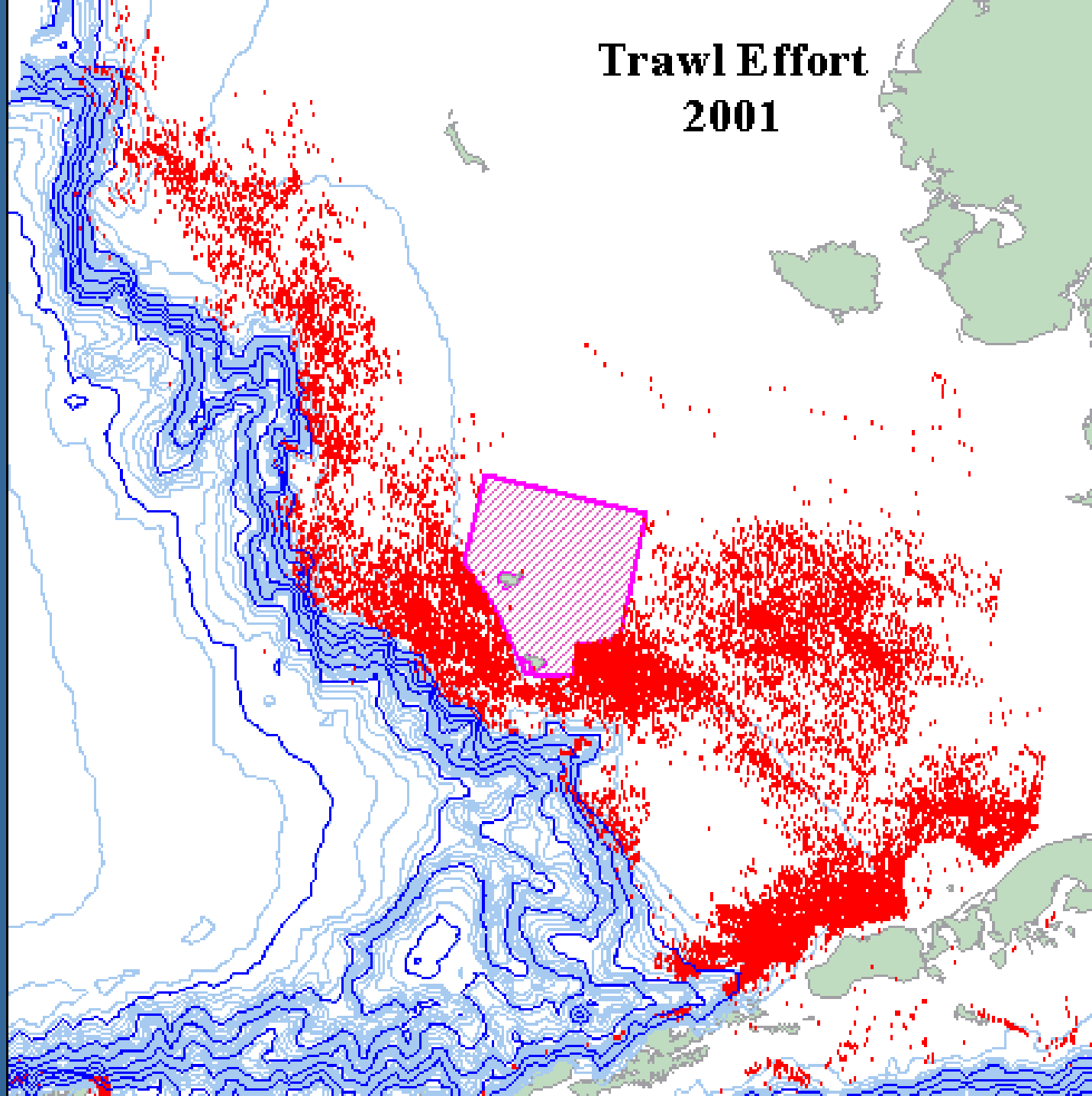
Issues of concern:

- subsistence harvest
- fur seal foraging
- interactions with
- (pollock) fishery



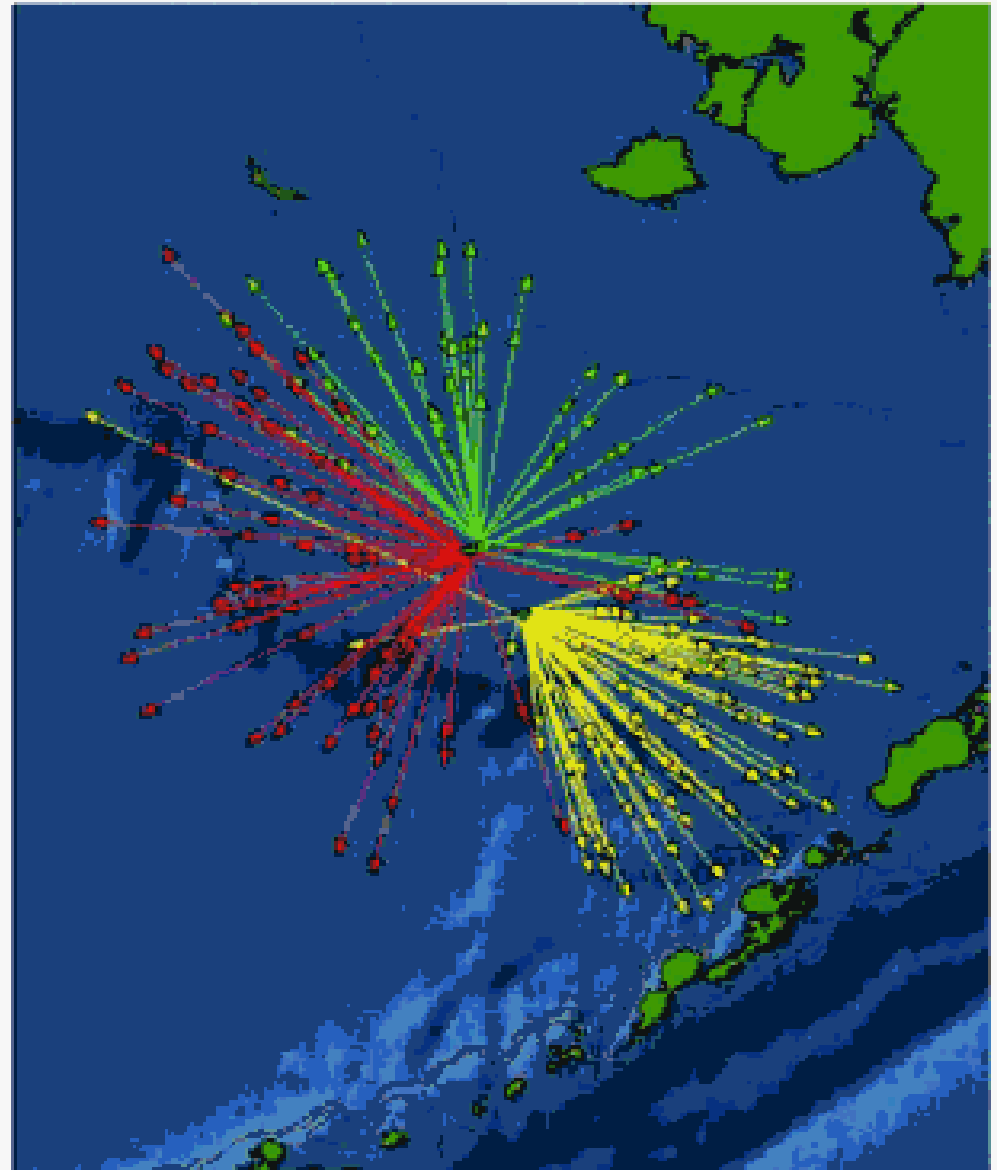
## Trawl Effort 2001

Trawl effort is concentrated near or on subsistence halibut grounds.



# Distinct patterns of foraging by fur seals on St. Paul and St. George Islands

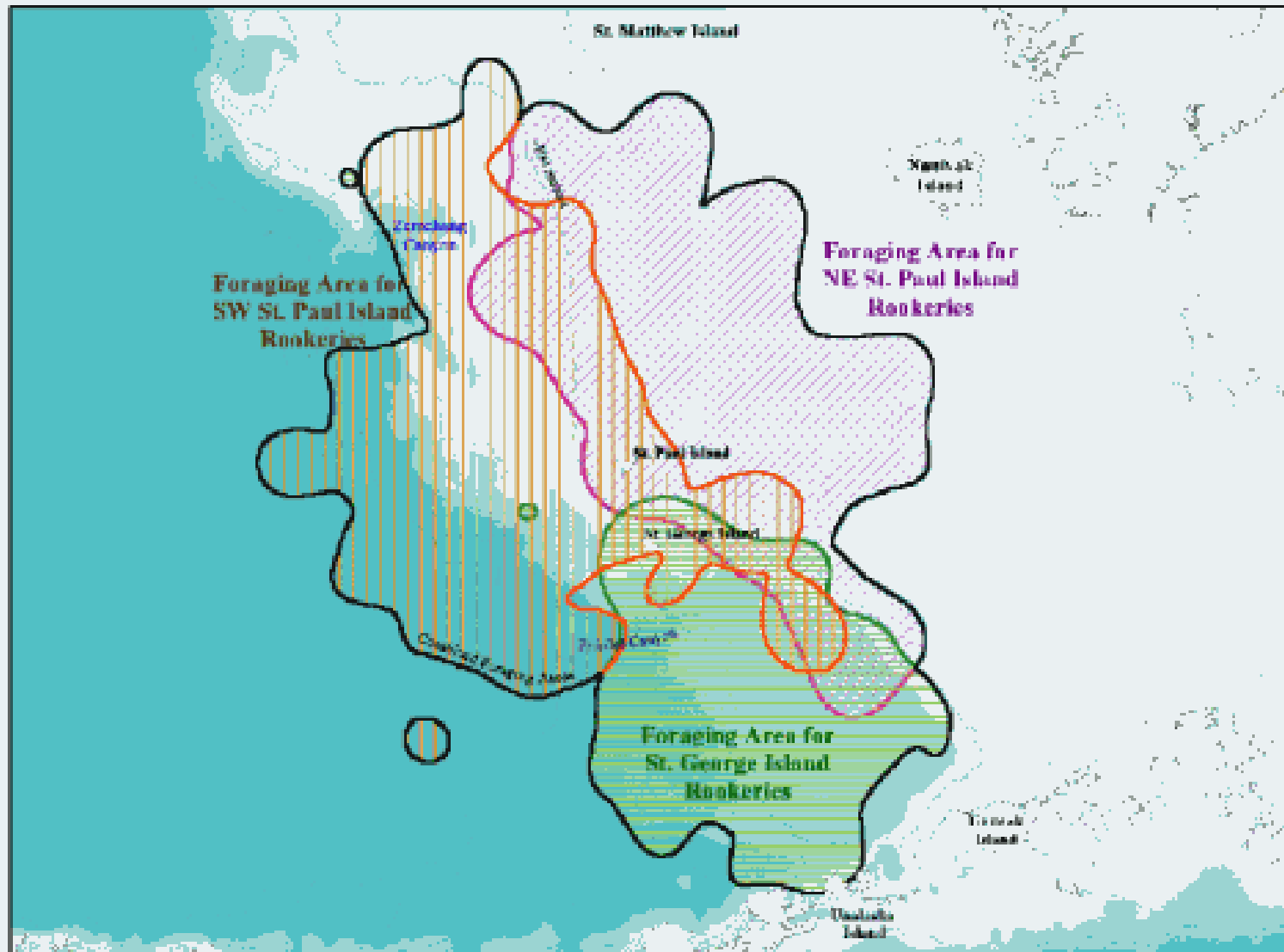
Directional vectors showing the median (arrowhead at end of solid section) and maximum (arrowhead at end of dashed section) distance from the breeding site for lactating fur seals from southwest St. Paul (red), northeast St. Paul (green) and St. George Island (yellow) during 1995 and 1996.



Robson, B. 2001. The relationship between foraging areas and breeding sites of lactating northern fur seals, *Callorhinus ursinus* in the eastern Bering Sea. MS Thesis Univ of Washington, Seattle 62 pp

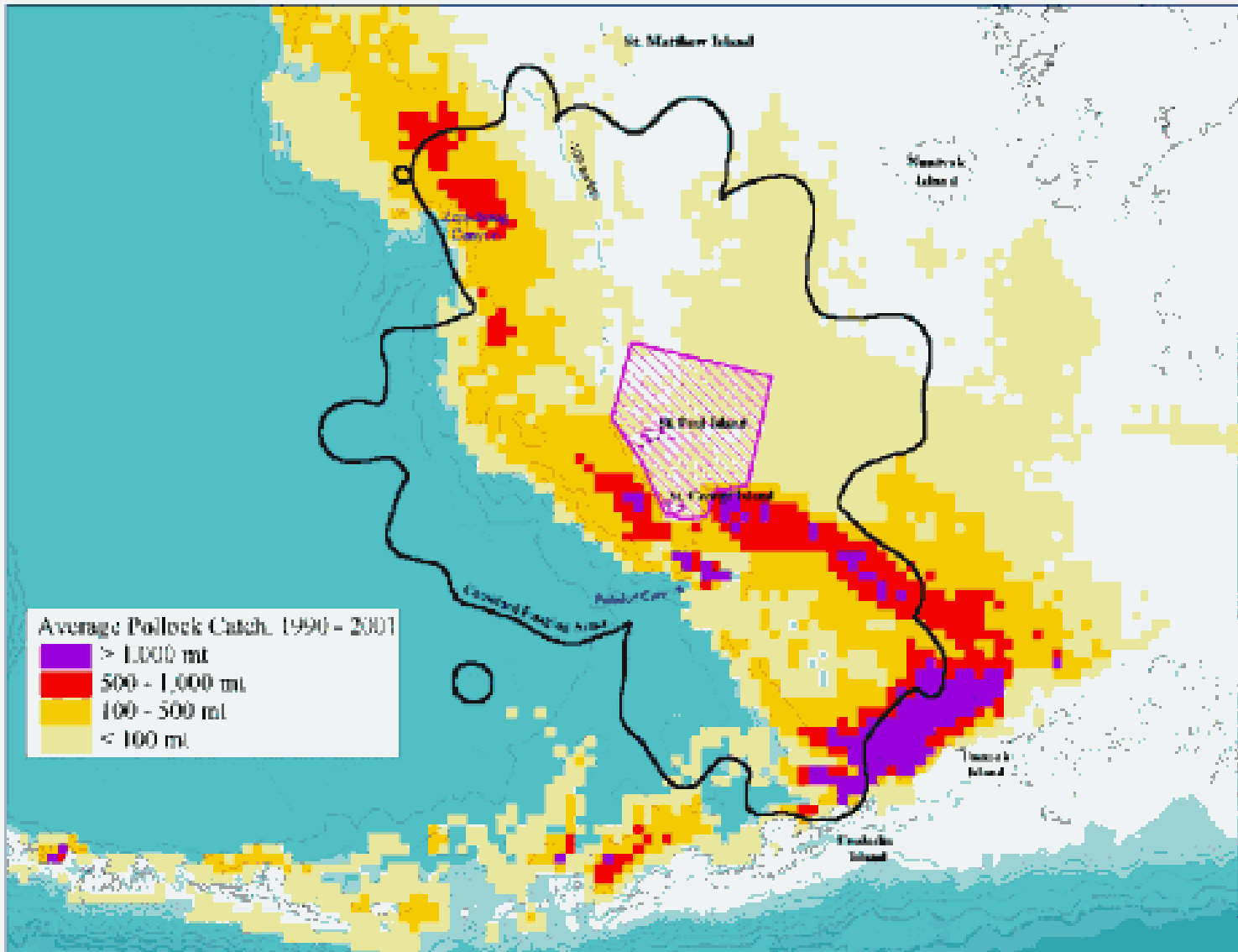
# Combined Foraging Areas

for lactating northern fur seals from St. Paul and St. George islands.




# Average annual Pollock catch, 1990 - 2001

Based on NMFS Observer database of 10km x 10km blocks.  
Blocks with <3 vessels were excluded for purposes of confidentiality.



# Conclusion

- MSFCMA and other reg's require that socioeconomic issues be addressed alongside environmental concerns;
  - GIS tools and analyses can be used to integrate social, economic and ecological data;
  - Examples show the utility of this, for fishery management (West Coast groundfish), participatory decision-analysis (MPA planning in California), and community-driven processes from Oregon to Alaska.
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# Questions?

## Contact information:

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