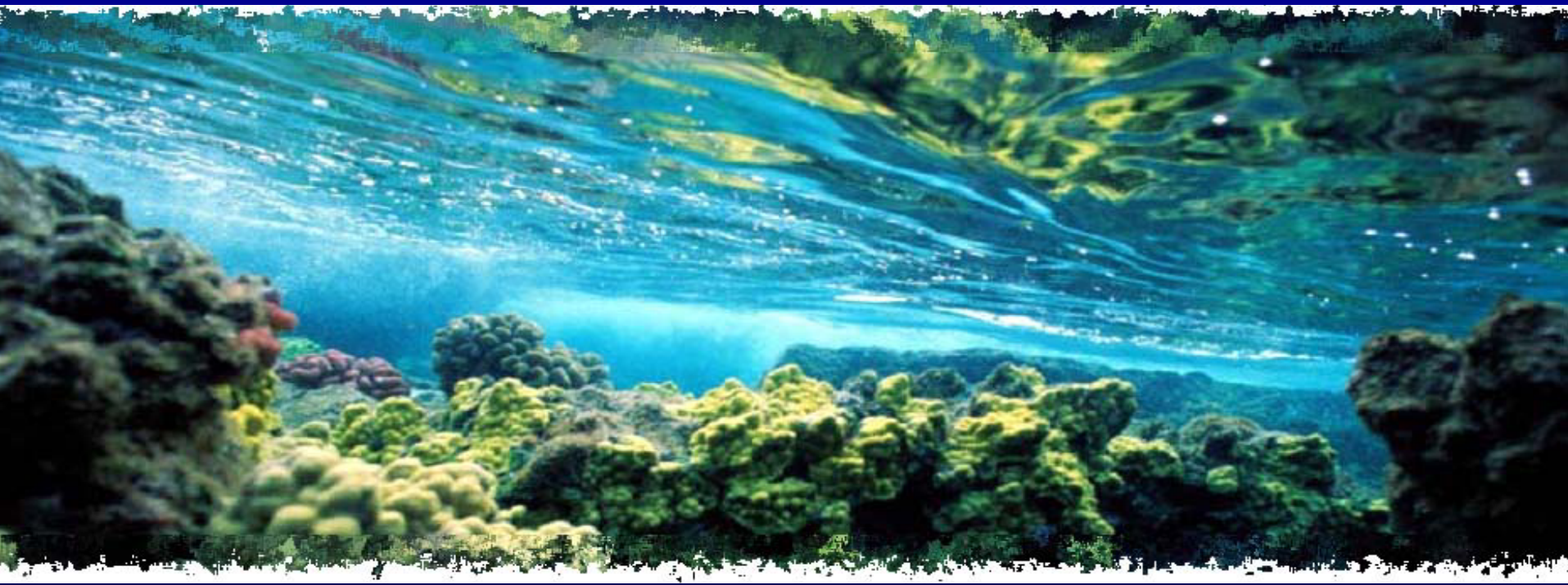
Priority Conservation Areas: Baja California to Bering Sea



MCBI
MARINE CONSERVATION BIOLOGY Institute

Lance Morgan, Chief Scientist
Marine Conservation Biology Institute


Goal :
Identify
Unique
Places

How do you start conservation planning for an area 4.8×10^6 km^2 ?

- Define the question – what is a priority conservation area ?
- Develop a methodology
- Determine data needs
- Gather and compile baseline data in a Geographic Information System (GIS)
- Analyze data and use expert knowledge to address question
- Identify priority areas – consensus mapping workshop

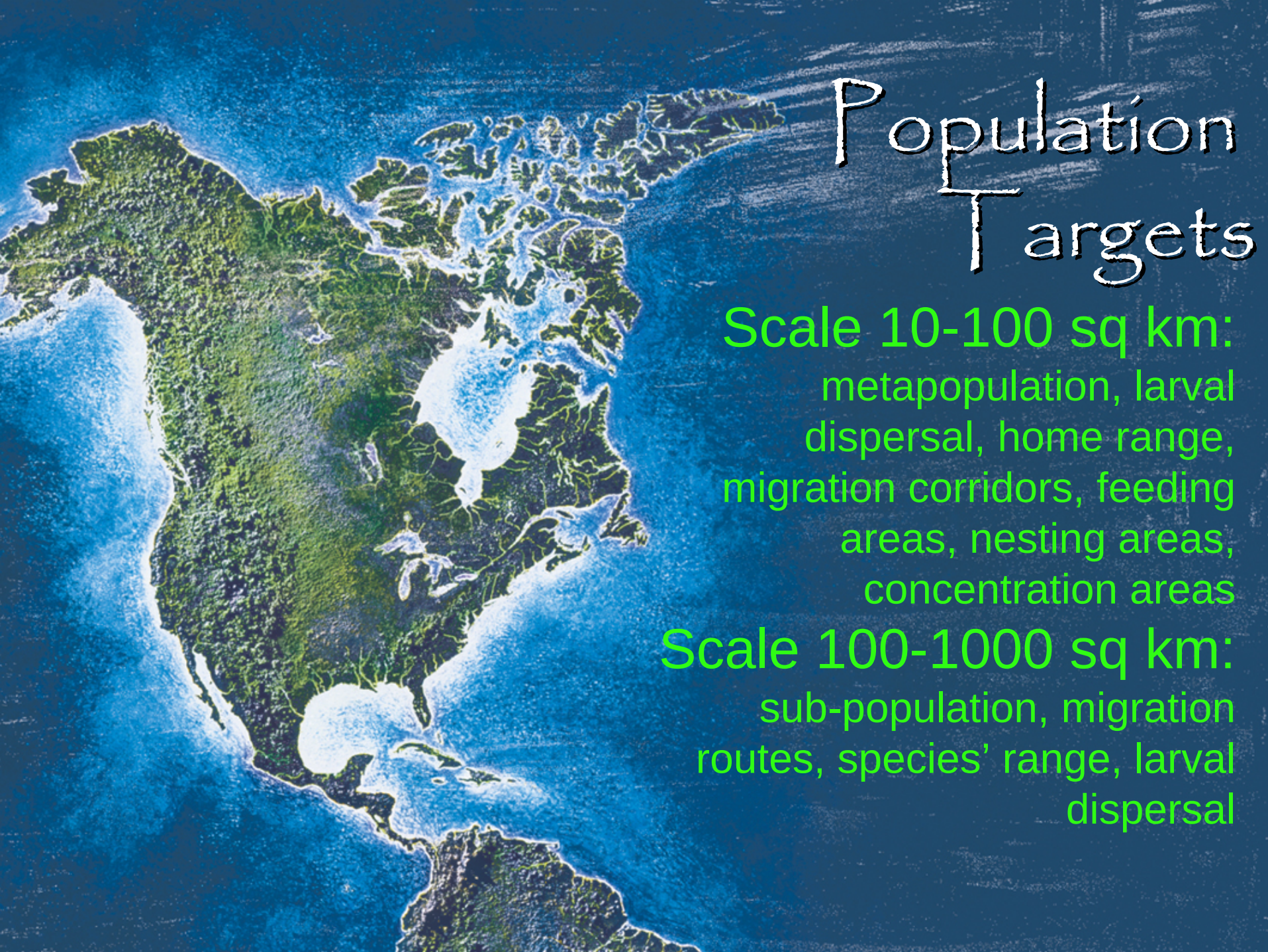
What is a Priority Conservation Area?

Area with high:

- ecological value
- anthropogenic threat
- conservation opportunity

Ground Rules:

1. Work with ongoing MPA initiatives
2. Try to us common data sets across regions
3. Establish a hierarchical GIS framework for regional initiatives



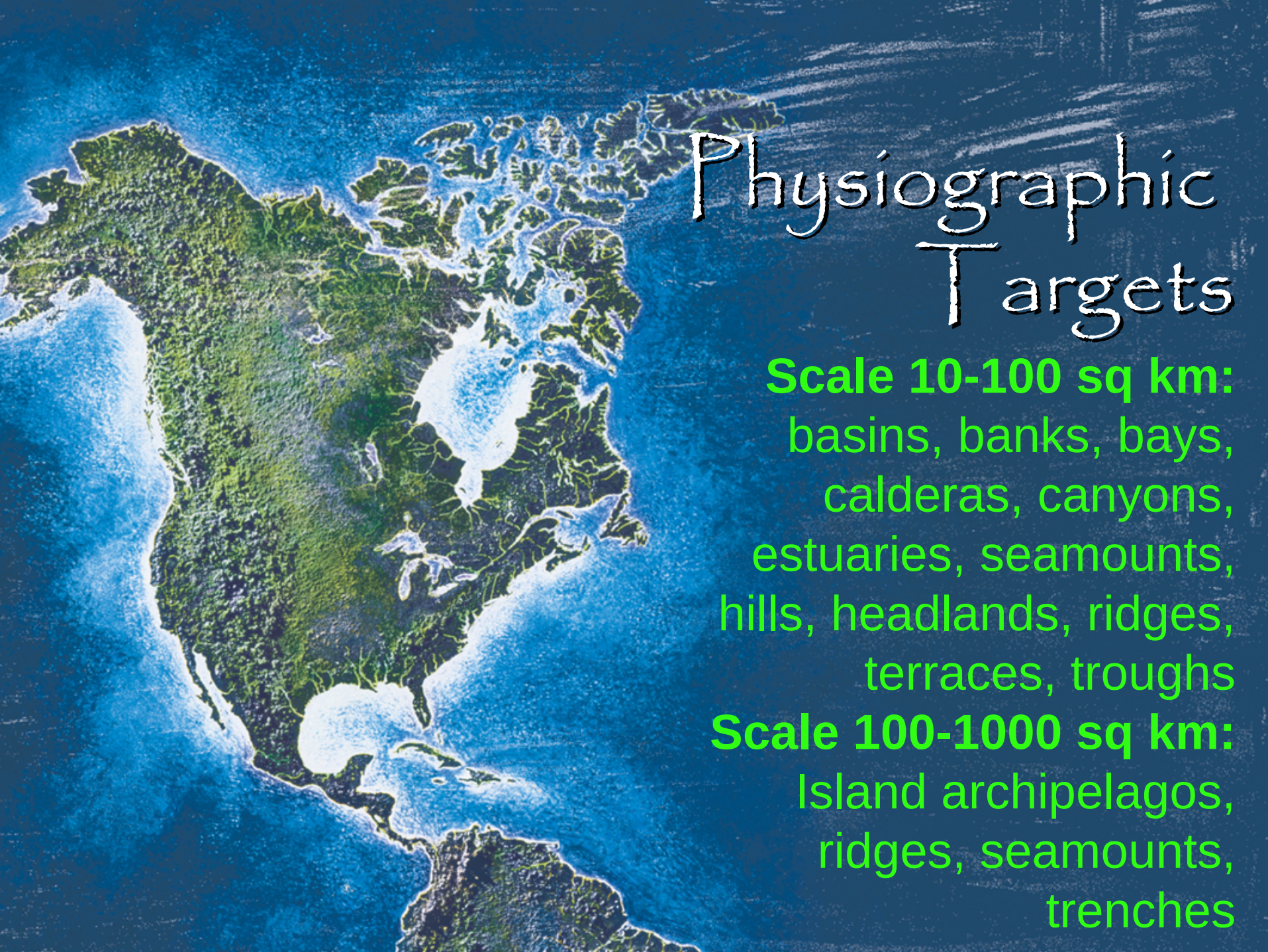
Population Targets

Scale 10-100 sq km:

metapopulation, larval dispersal, home range, migration corridors, feeding areas, nesting areas, concentration areas

Scale 100-1000 sq km:

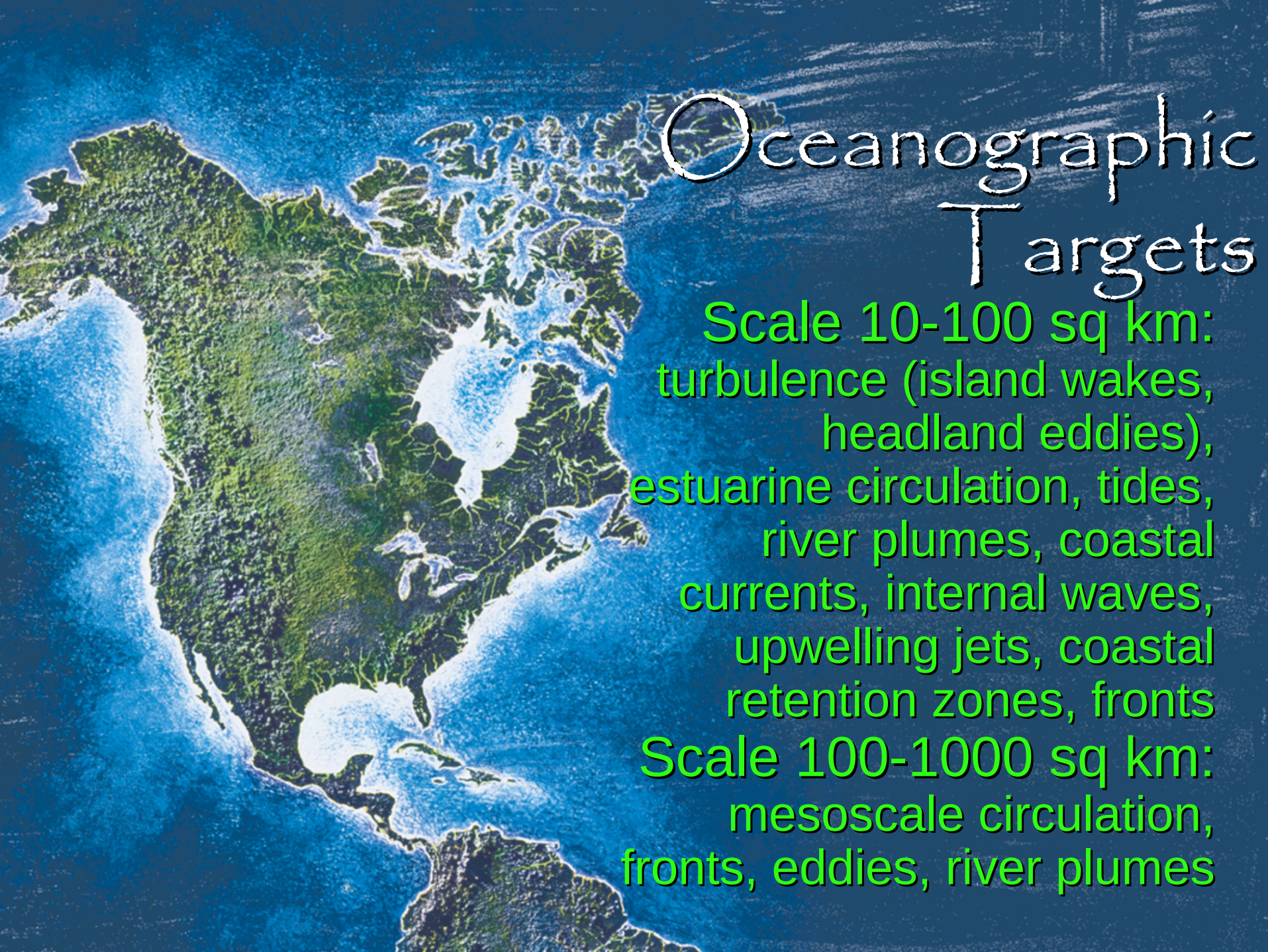
sub-population, migration routes, species' range, larval dispersal



Physiographic Targets

Scale 10-100 sq km:
basins, banks, bays, calderas, canyons, estuaries, seamounts, hills, headlands, ridges, terraces, troughs

Scale 100-1000 sq km:
Island archipelagos, ridges, seamounts, trenches


Oceanographic Targets
Scale 10-100 sq km:
turbulence (island wakes, headland eddies), estuarine circulation, tides, river plumes, coastal currents, internal waves, upwelling jets, coastal retention zones, fronts
Scale 100-1000 sq km:
mesoscale circulation, fronts, eddies, river plumes

Threats and Opportunities

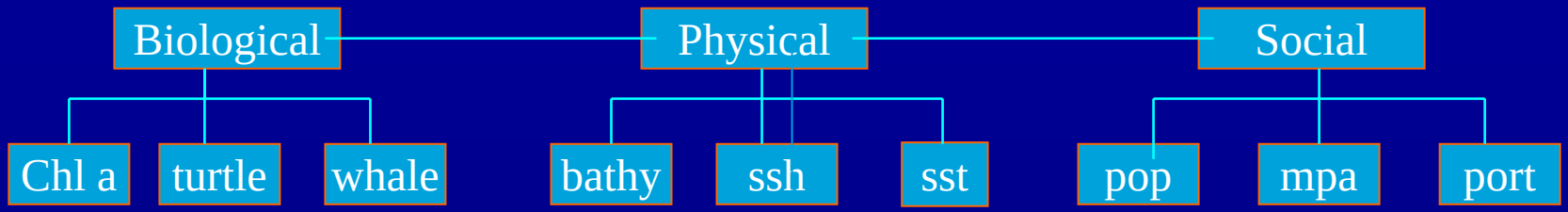
Threats

exploitation, extraction, coastal land-use, pollution, coastline alteration, recreation

Opportunities

previous priority setting, sustainable development and management, opportunity for local or regional engagement, funding vehicles

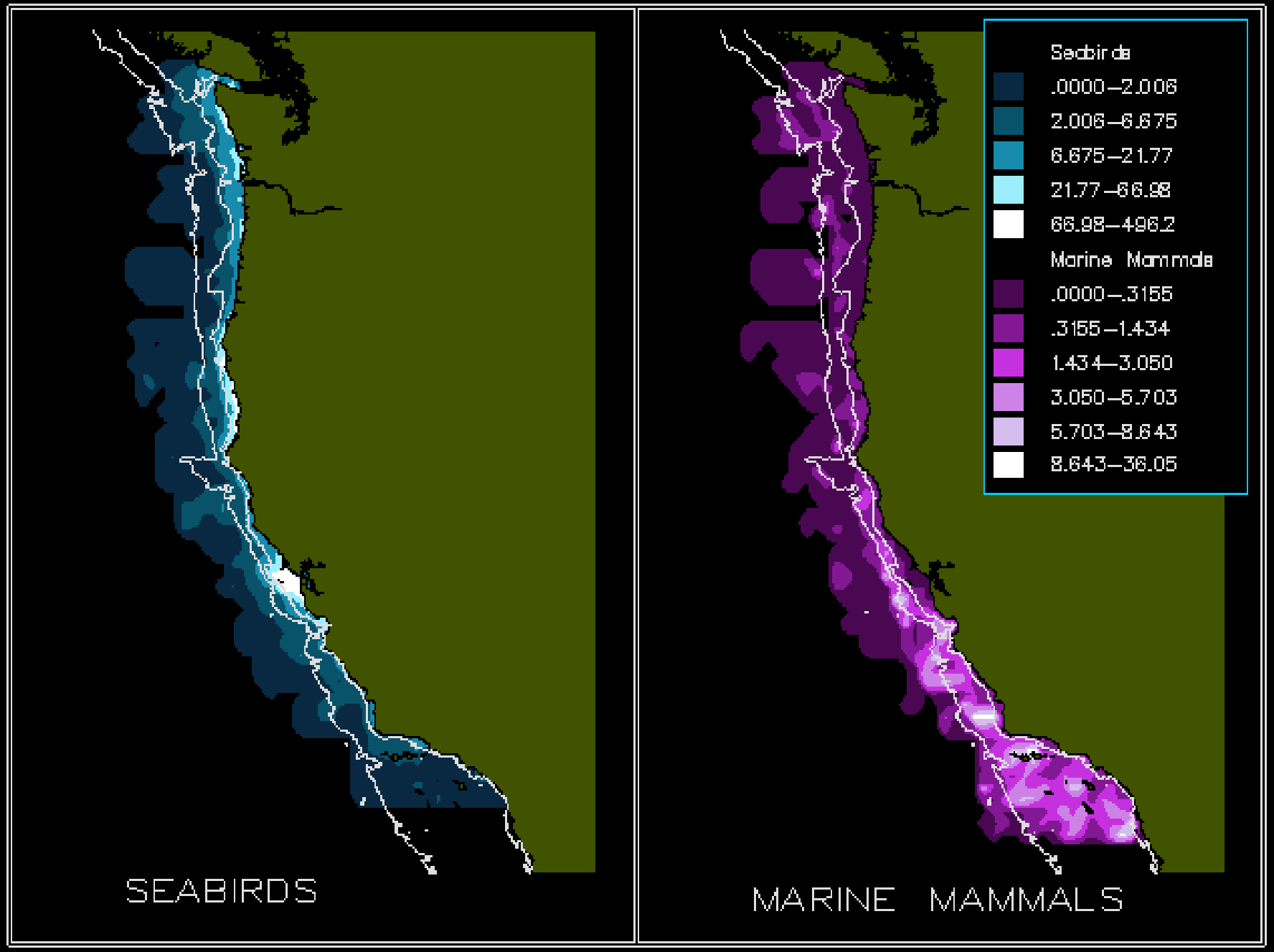
Available data – B2B 1.1



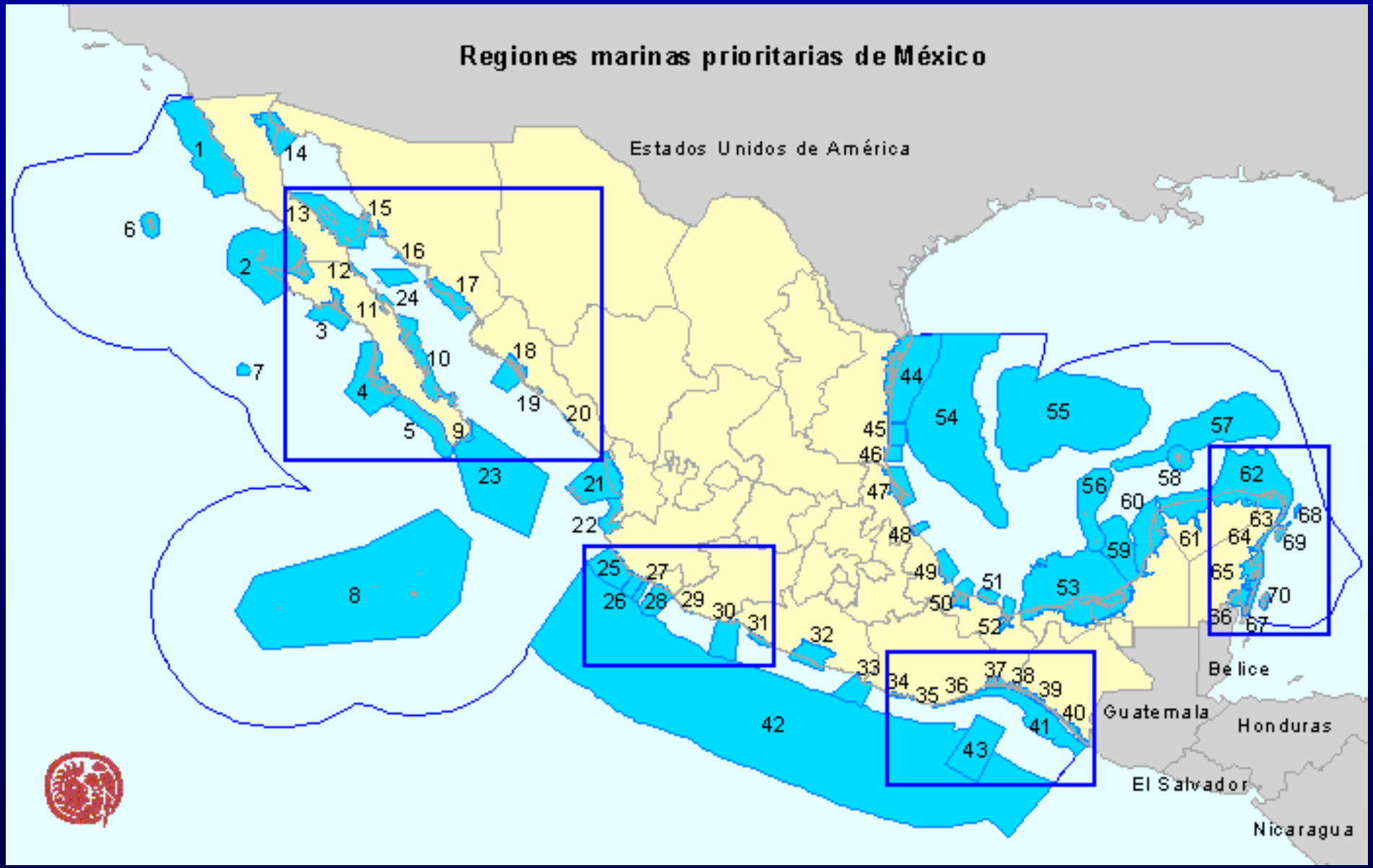
- Biological data
  - chlorophyll A/ cold corals/ whales/ turtles/
- Physical data
  - shoreline/ bathymetry/ currents/ temperature/ seamounts/
- Social data
  - EEZ/ population/ fishing ports/ local priorities/ mpa/

Marine Species of Common Conservation Concern

E. Pacific green turtle	Humpback whale
Hawksbill turtle	Blue whale
Kemp's Ridley turtle	Killer whale
Leatherback turtle	Gray whale
Loggerhead Turtle	Right whale
Pink-footed shearwater	Guadalupe fur seal
Short-tailed albatross	Sea otter
Xantus' murrelet	Vaquita



Courtesy of Glenn Ford, Ecological Consulting, Inc. Portland, Oregon


Regiones marinas prioritarias de México
Estados Unidos de América
Belice
Guatemala
Honduras
El Salvador
Nicaragua
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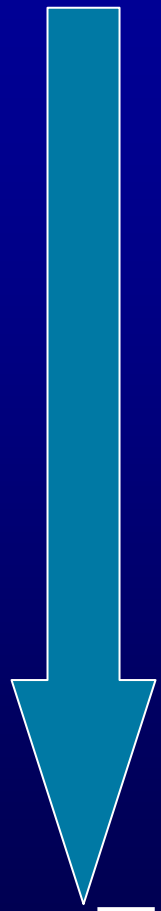
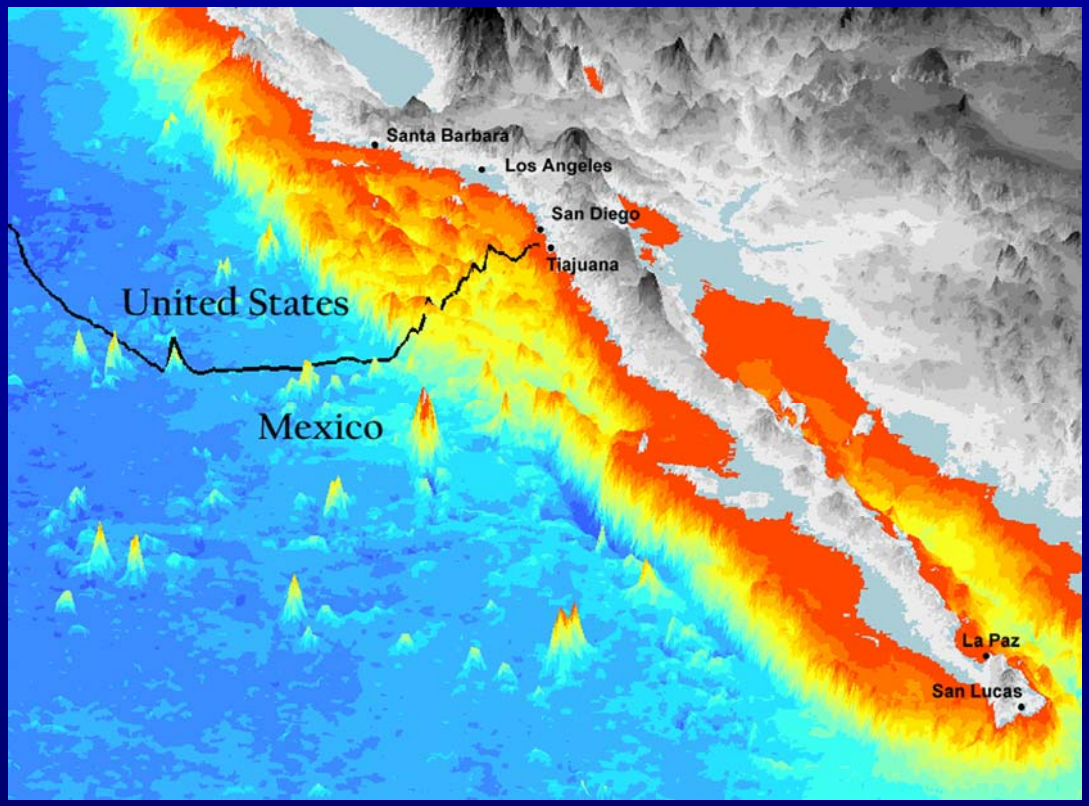
Data Analysis

- Seamount density

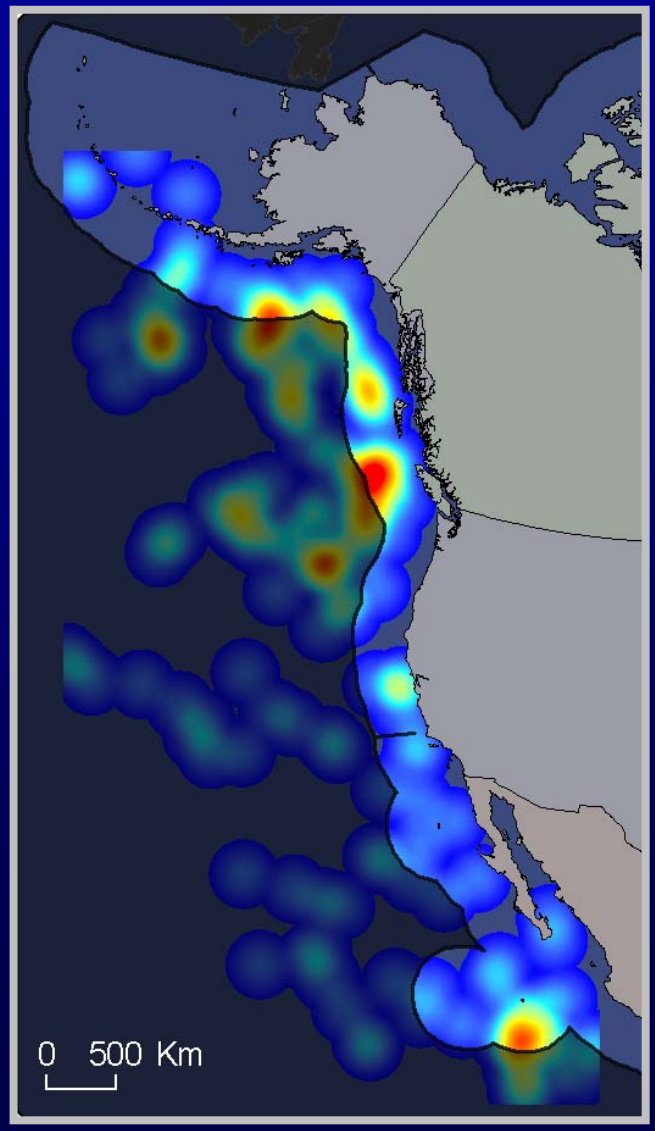


Benthic Features

At the B2B scale…



Bathymetry: ETOPO2, regions of higher resolution



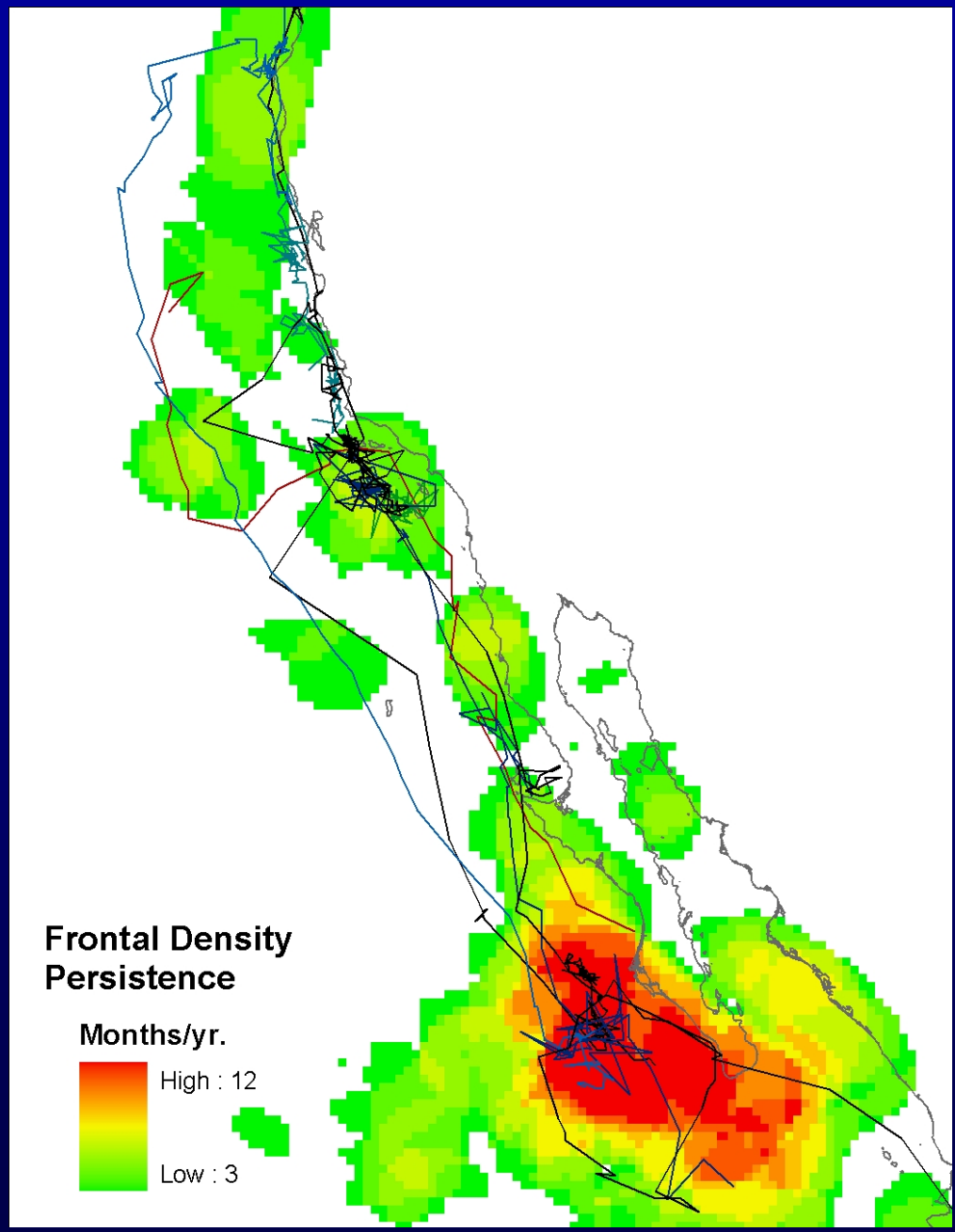
Density of Seamounts: 250 km search radius

Data Analyses

- Sea surface temperature
- Sea surface height (altimetry)
- Primary production

Pelagic Features

Blue Whales Tracks and SST Fronts



Blue whale tracks courtesy of Bruce Mate, OSU

Consensus Mapper – computers networked with GIS

Experts

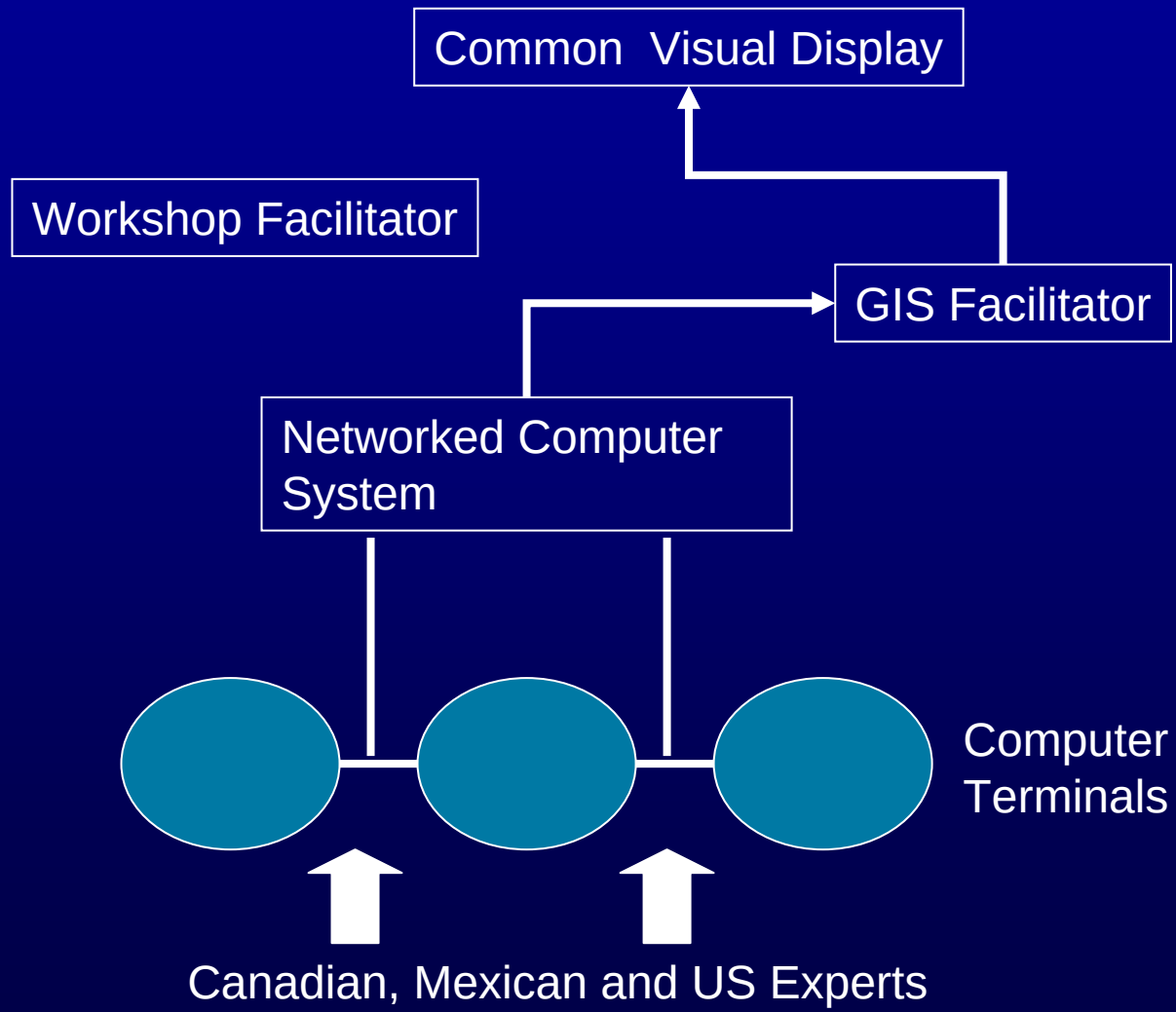
Computer Network

GIS software

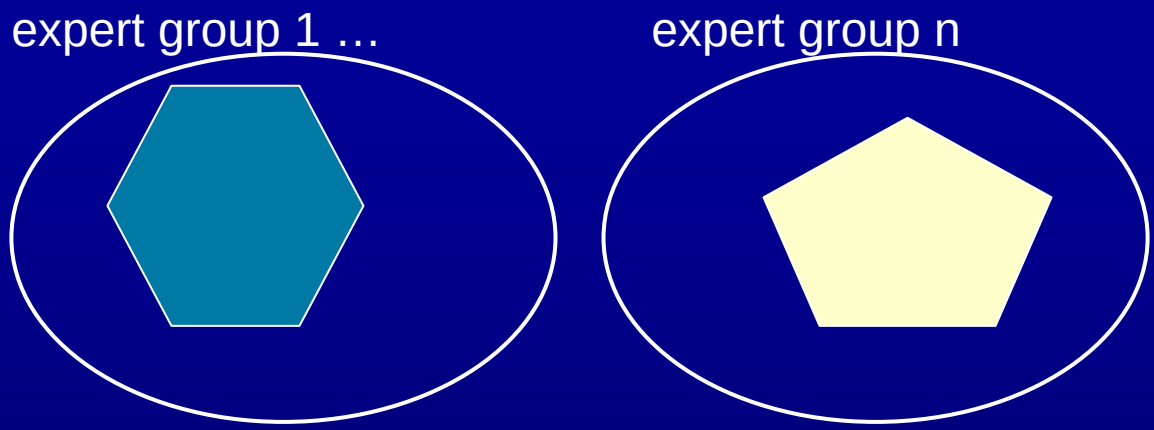
GIS facilitator

Workshop facilitator

Common Display

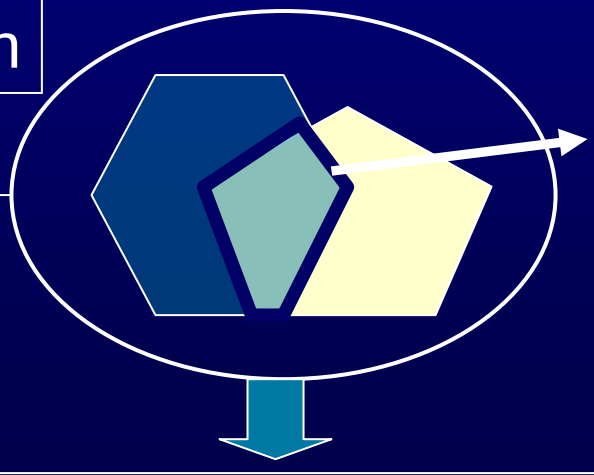


Consensus Mapper Process



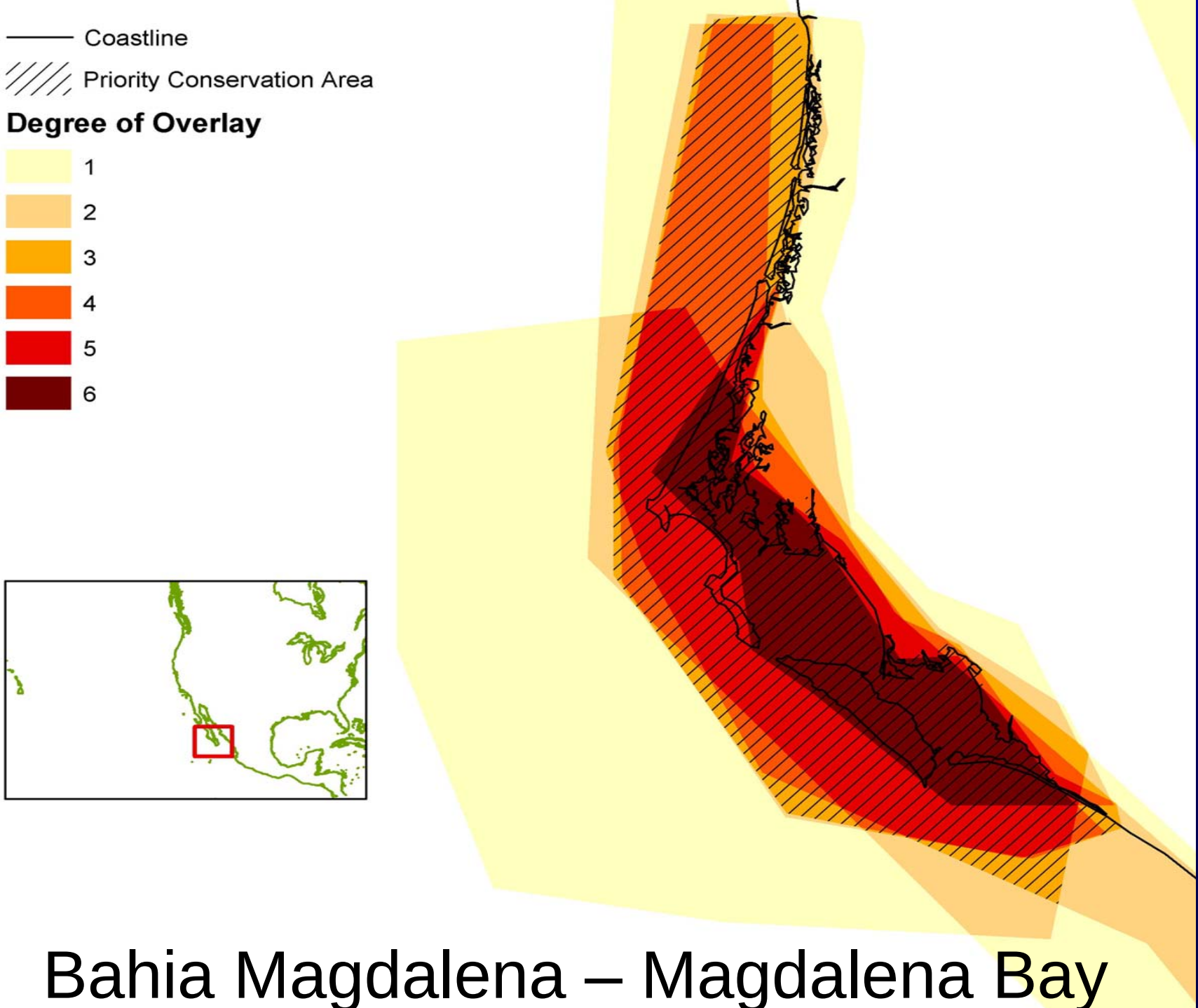
Priority areas chosen by experts

GIS map intersection



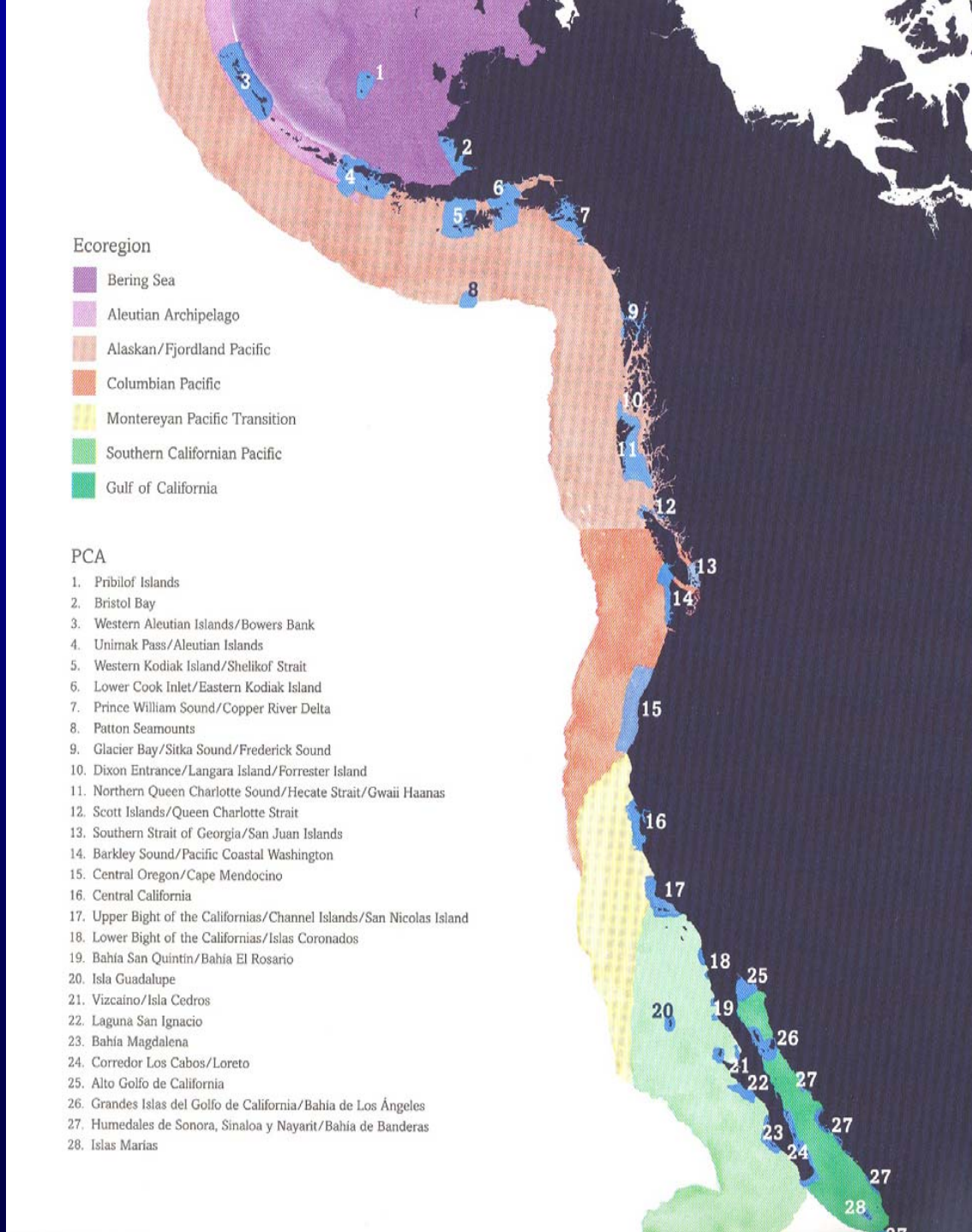
Common area of agreement to initiate discussion

Discussion and verification

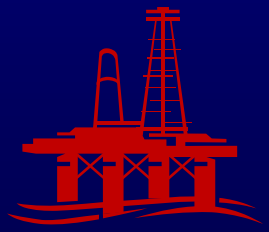


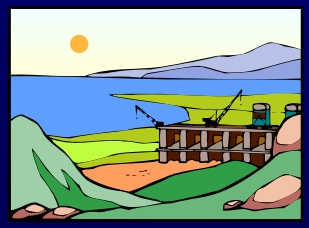
Bahia Magdalena – Magdalena Bay

- High ecological significance (e.g., seamounts, endemic vaquita, seabird concentration)
- Anthropogenic threats (e.g., fishing, marine tourism, habitat loss)
- Conservation opportunities (e.g., grassroots support, marine protected areas)

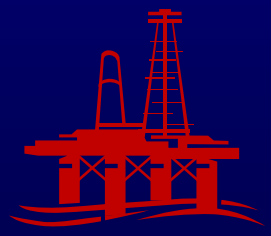


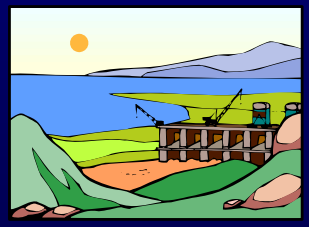
PCA 3. Western Aleutians



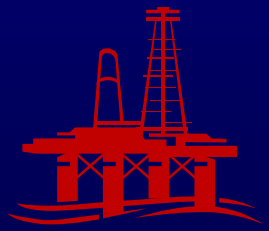


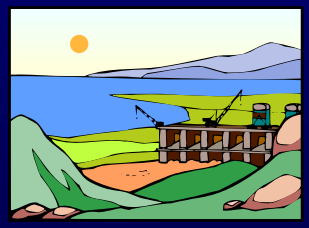
PCA 11. QCI /Hecate St./ Gwaii Hanas

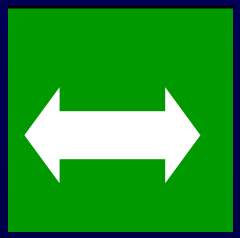


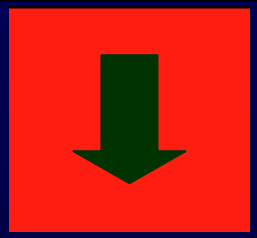


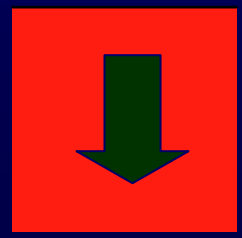
PCA 16. Central California

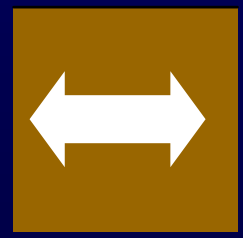


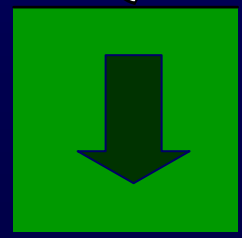


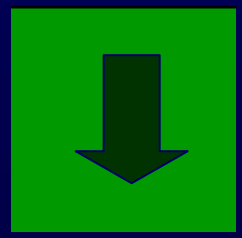




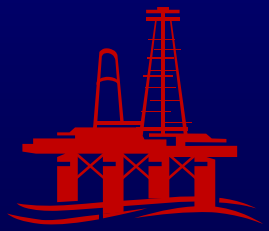


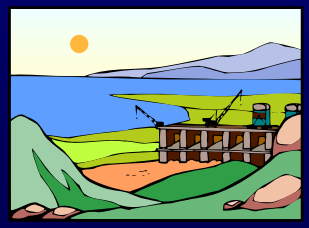


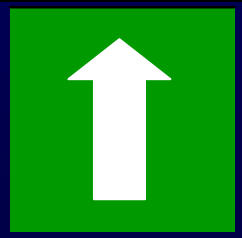


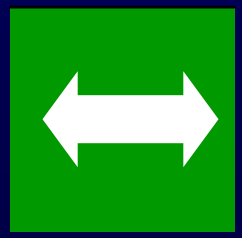


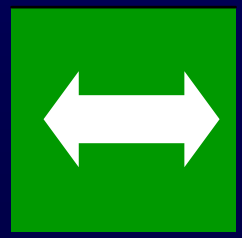
PCA 20. Guadalupe Island

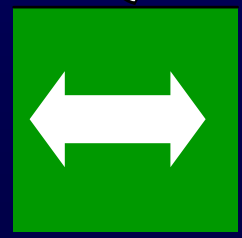


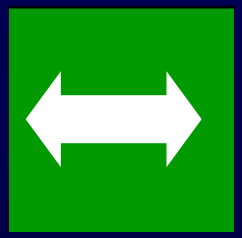










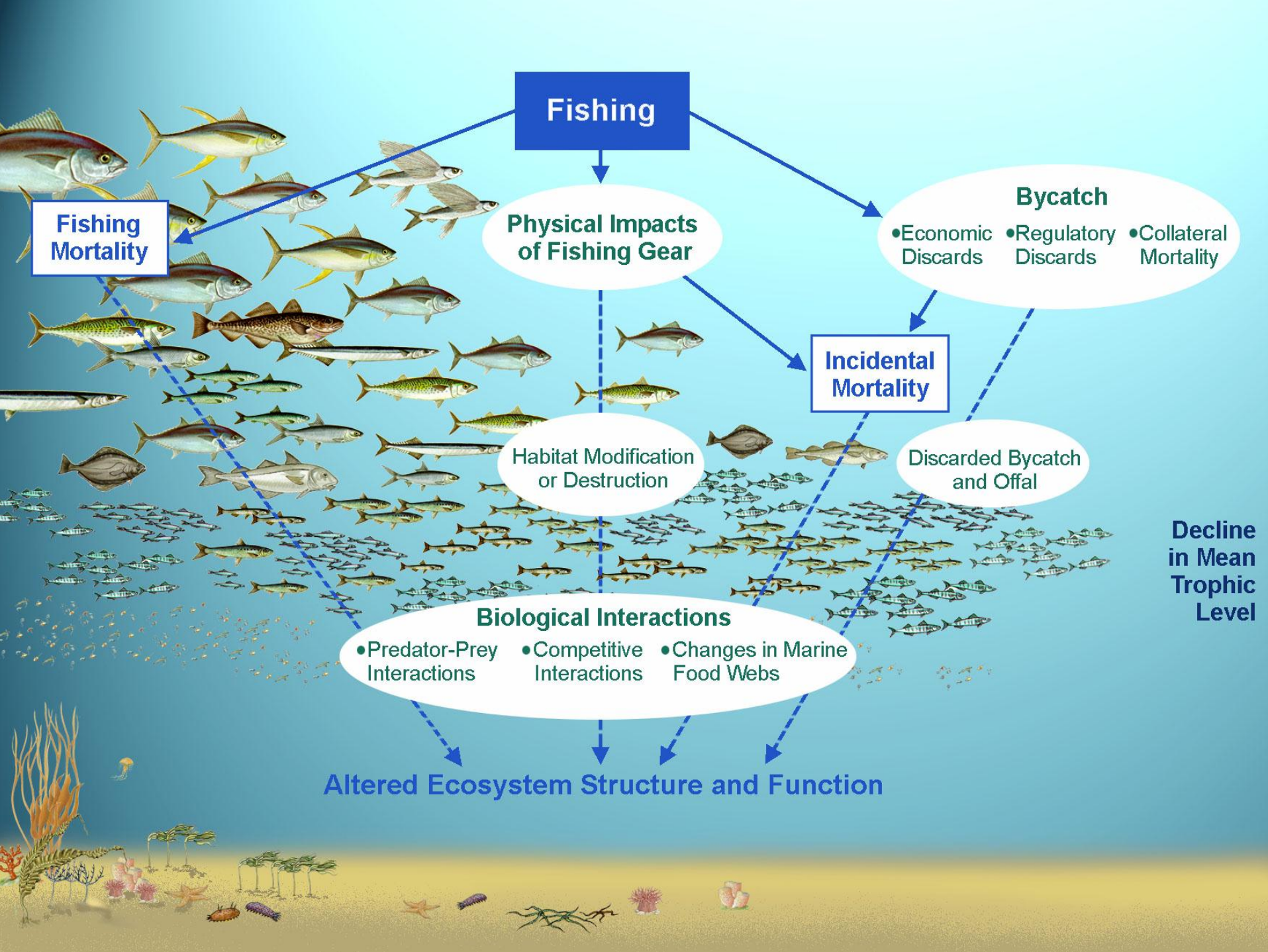


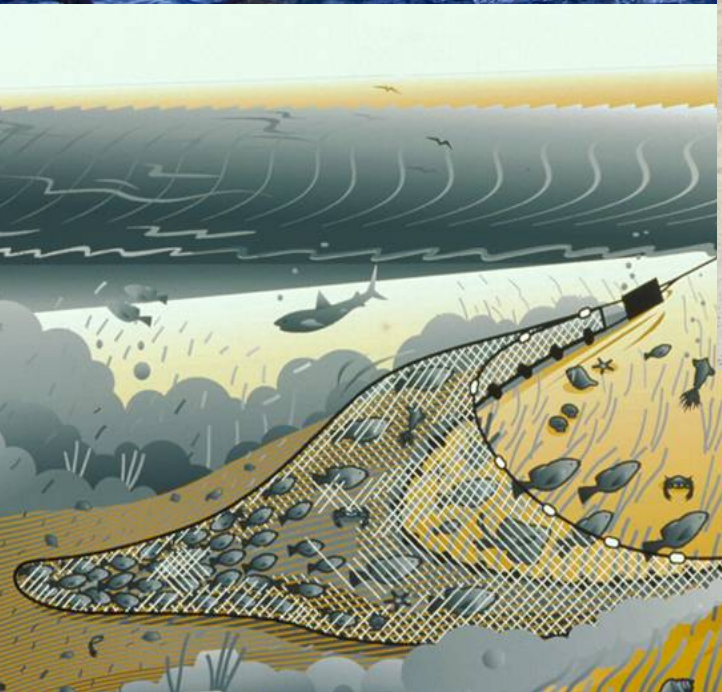
Panel Questions

1. Both MPAs and ecosystem-based management (EBM) represent place- based approaches to achieving marine conservation goals. Given that fundamental overlap in approach, how do MPAs fit within the larger context of ecosystem based management?

2. Are there differences in the science needs (both natural and social) for MPAs vs. EAM/EBM, and if so, which are uniquely required by MPAs?

3. What lessons can we learn from the design and implementation of MPAs and an effective national system of MPAs that will inform our efforts to implement EAM on regional scales?


Fishing
Fishing Mortality
Physical Impacts of Fishing Gear
Bycatch
•Economic Discards
•Regulatory Discards
•Collateral Mortality
Incidental Mortality
Habitat Modification or Destruction
Discarded Bycatch and Offal
Biological Interactions
•Predator-Prey Interactions
•Competitive Interactions
•Changes in Marine Food Webs
Decline in Mean Trophic Level
Altered Ecosystem Structure and Function



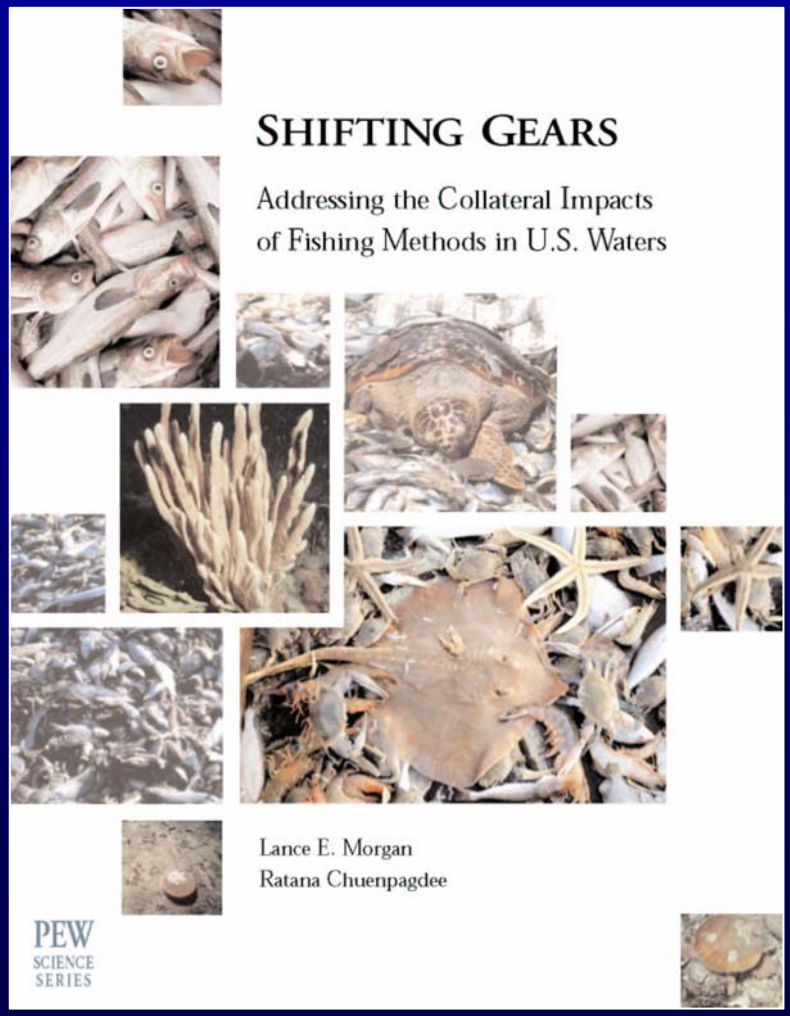
Healthy and Trawled Oculina coral reefs (Florida, USA)

There are solutions:

- Freeze the footprint
- Reduce effort
- Protect areas
- Use less destructive gear

ICES (2000) and NRC (2002) recommendations

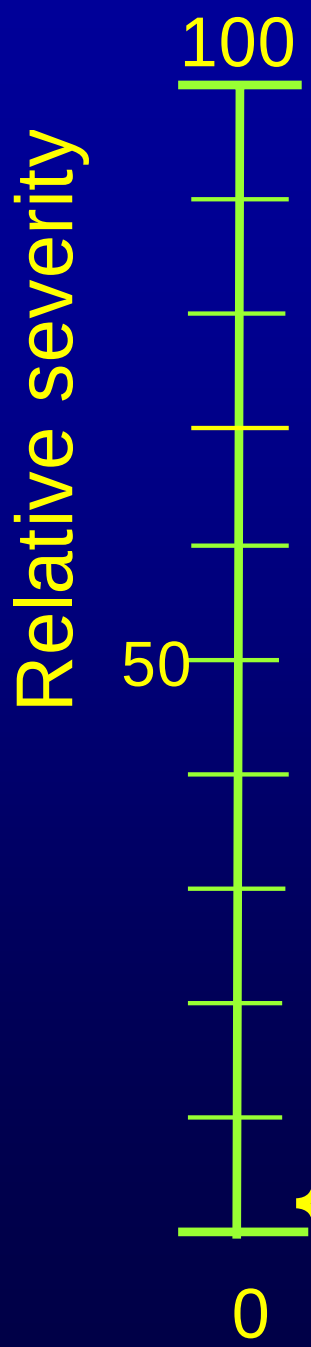
Shifting Gears



Review of different fishing methods found different gears have different environmental impacts – we can manage for these impacts.

Morgan and Chuenpagdee 2003

Relative Gear Rankings



Bottom trawl

Bottom gillnet
Dredge
Midwater gillnet

Pots & Traps
Pelagic longline
Bottom longline

Midwater trawl, Hook & Line. Purse seine

HIGH-IMPACT

MEDIUM-IMPACT

LOW-IMPACT

FEP considerations-EPAP 1999

(1) delineate the geographic extent of ecosystems;

(2) develop a conceptual model of the food web;

(3) describe habitat needs of different food web components;

(4) calculate total removals and relate them to standing biomass, production, optimum yield, natural mortality and trophic structure to ensure that they are not excessive;

(5) assess uncertainty and how buffers are included in conservation and management actions;

(6) develop indices of ecosystem health as targets;

(7) describe long term monitoring and how it is used;

(8) identify external elements to management that affect fisheries and their ecosystems and reduce these impacts.

But fishing is not the only human activity we seek to manage…

- More broadly an ecosystem approach to management should be a holistic view of all human activities with the goal of maintaining functioning ecosystems, healthy populations and extracting resources in a sustainable manner

http://www.worldpoly.com/images/Aquaculture/Fish_Ring_2.jpg

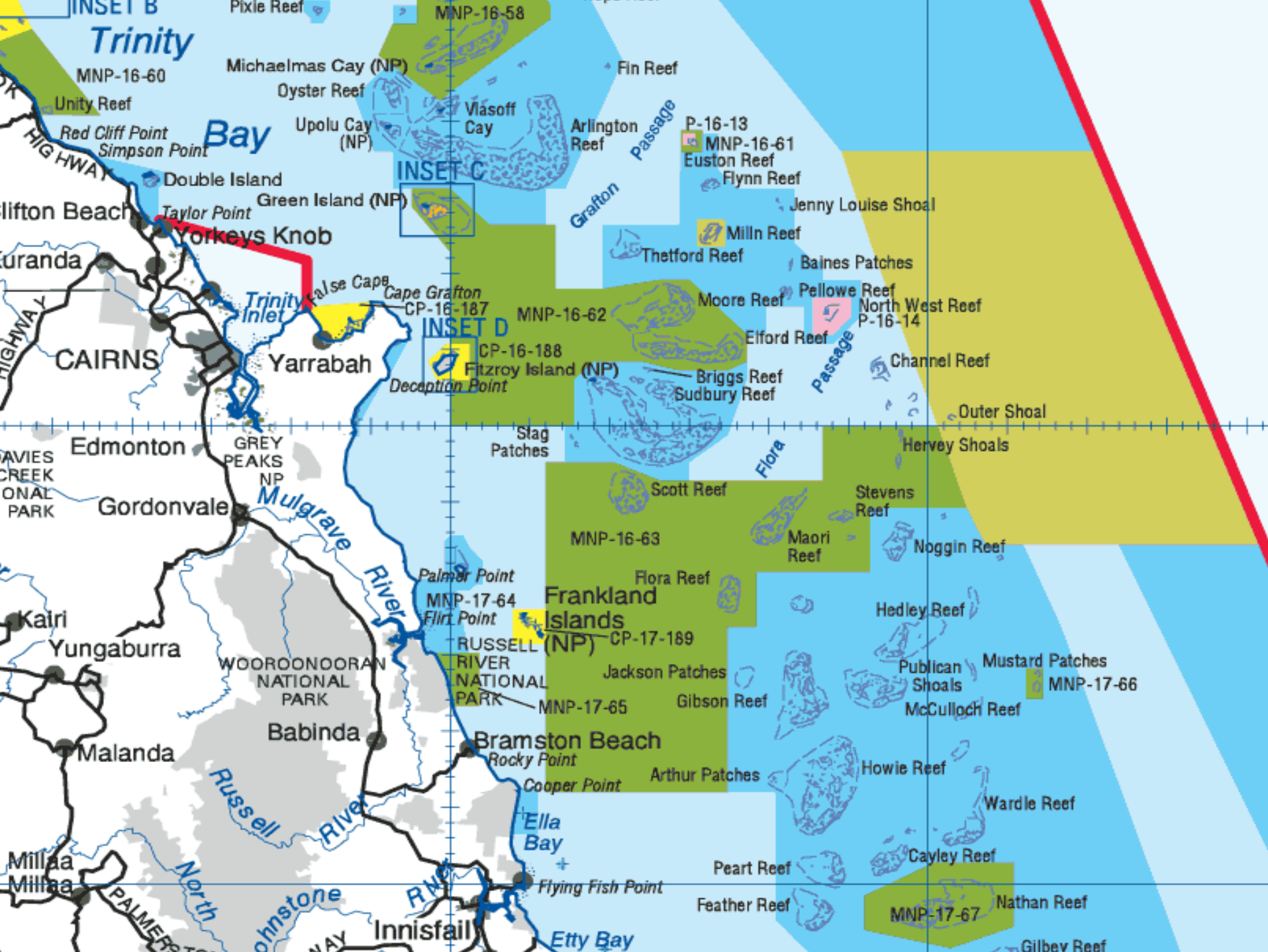
Energy Production

Zoning

A place-based ecosystem management system that reduces conflict, uncertainty and costs by separating incompatible uses and specifying how particular areas may be used

A Simple Zoning System

- *No-go zones* (e.g., seabird nesting colonies) so sensitive that humans (except permitted researchers) are prohibited (very limited)
- *Marine reserves* that protect biodiversity by prohibiting all extractive and other harmful uses
- *Buffer zones* that surround or adjoin no-go and marine reserve zones and allow extractive uses that do not degrade habitats – e.g., no mobile bottom tending fishing gear
- *General use zones* that allow a wide range of activities (probably a plurality of the area)

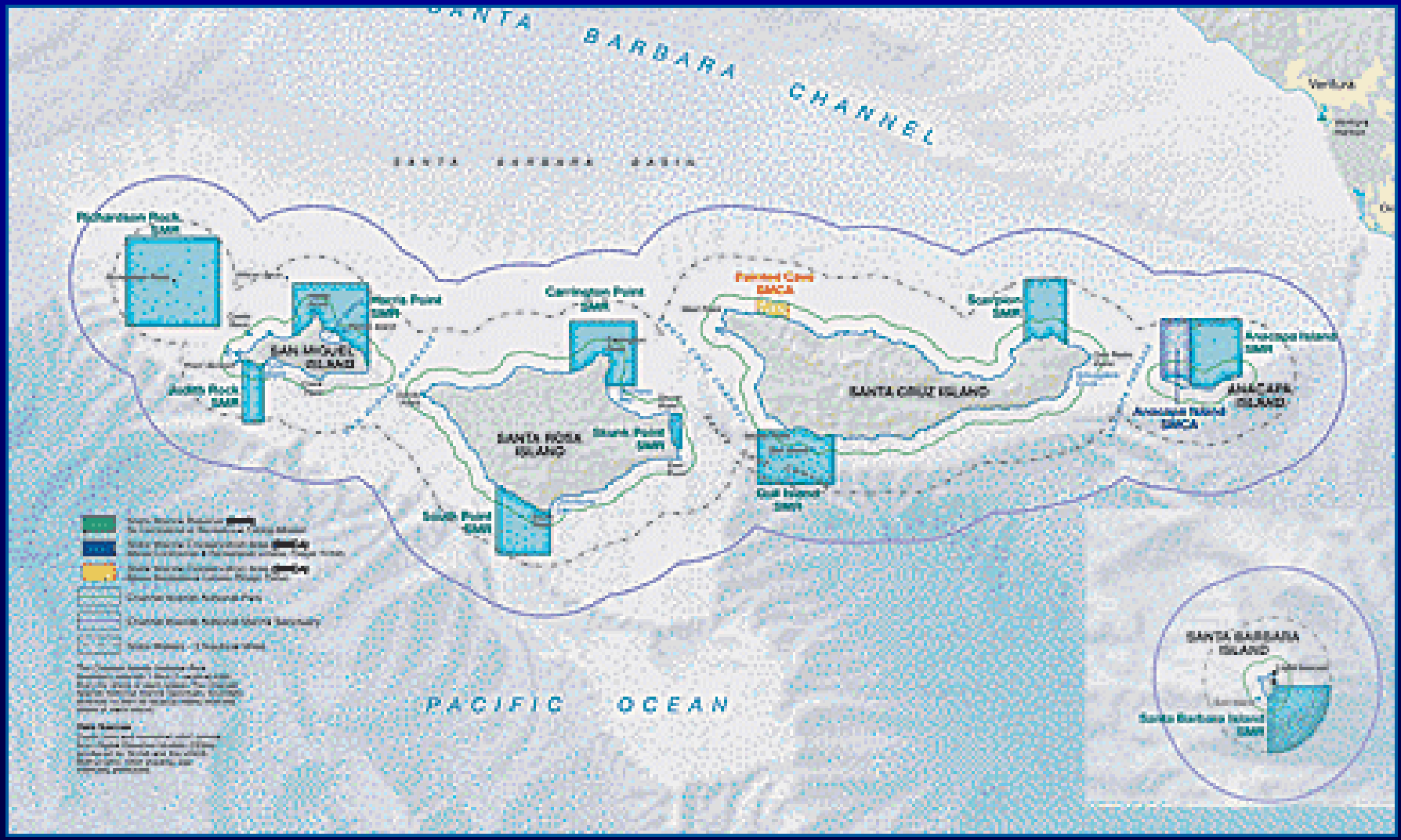

INSET B
Trinity
Pixie Reef
MNP-16-58
MNP-16-60
Michaelmas Cay (NP)
Fin Reef
Oyster Reef
Unity Reef
Vlasoff Cay
Upolu Cay (NP)
Arlington Reef
Passage
P-16-13
MNP-16-61
Euston Reef
Flynn Reef
Red Cliff Point
Simpson Point
Bay
HIGHWAY
Double Island
INSET C
Green Island (NP)
Grafton
Jenny Louise Shoal
Taylor Point
Yorkeys Knob
Milln Reef
Thetford Reef
Baines Patches
Pellowe Reef
Moore Reef
North West Reef
P-16-14
Trinity Inlet
False Cape
Cape Grafton
CP-16-187
MNP-16-62
INSET D
Elford Reef
CP-16-188
Fitzroy Island (NP)
Deception Point
Briggs Reef
Sudbury Reef
Channel Reef
CAIRNS
Yarrabah
Outer Shoal
Edmonton
GREY PEAKS NP
Slag Patches
Hervey Shoals
Flora
Scott Reef
Stevens Reef
Gordonvale
Mulgrave River
MNP-16-63
Maori Reef
Noggin Reef
Palmer Point
Flora Reef
MNP-17-64
Frankland Islands
Flirt Point
CP-17-189
Hedley Reef
Kairi
Yungaburra
RUSSELL RIVER NATIONAL PARK (NP)
WOOROONOORAN NATIONAL PARK
Jackson Patches
Publican Shoals
Mustard Patches
MNP-17-66
Gibson Reef
MNP-17-65
McCulloch Reef
Babinda
Malanda
Bramston Beach
Rocky Point
Arthur Patches
Howie Reef
Cooper Point
Russell River
Ella Bay
Wardle Reef
Cayley Reef
Peart Reef
Millaa Millaa
North Johnstone RNP
Flying Fish Point
Feather Reef
Nathan Reef
MNP-17-67
PALMERSTON HIGHWAY
Innisfail
Etty Bay
Gilbey Reef

ACTIVITIES GUIDE

(see *Zoning Plan* for details)

	General Use Zone	Habitat Protection Zone	Conservation Park Zone	Buffer Zone	Scientific Research Zone	Marine National Park Zone	Preservation Zone
Aquaculture	Permit	Permit	Permit [1]	✗	✗	✗	✗
Bait netting	✓	✓	✓	✗	✗	✗	✗
Boating, diving, photography	✓	✓	✓	✓	✓ [2]	✓	✗
Crabbing	✓	✓	✓ [3]	✗	✗	✗	✗
Harvest fishing for aquarium fish, coral and beachworm	Permit	Permit	Permit [1]	✗	✗	✗	✗
Harvest fishing for sea cucumber, trochus, tropical rock lobster	Permit	Permit	✗	✗	✗	✗	✗
Limited collecting	✓ [4]	✓ [4]	✓ [4]	✗	✗	✗	✗
Limited impact research	✓	✓	✓	✓ [5]	✓	✓ [5]	Permit
Limited spearfishing (snorkel only)	✓	✓	✓ [1]	✗	✗	✗	✗
Line fishing	✓ [6]	✓ [6]	✓ [7]	✗	✗	✗	✗
Netting (other than bait netting)	✓	✓	✗	✗	✗	✗	✗
Research (other than limited impact)	Permit	Permit	Permit	Permit	Permit	Permit	Permit
Shipping (other than in a designated shipping area)	✓	✗	✗	✗	✗	✗	✗
Tourism program	Permit	Permit	Permit	Permit	Permit	Permit	✗
Traditional use of marine resources	✓ [8]	✓ [8]	✓ [8]	✓ [8]	✓ [8]	✓ [8]	✗ [8]
Trawling	✓	✗	✗	✗	✗	✗	✗
Trolling	✓ [6]	✓ [6]	✓ [6]	✓ [6,9]	✗	✗	✗

U.S. Sanctuaries are multiple use zoning opportunities



Acknowledgements

- Commission for Environmental Cooperation
- David and Lucile Packard Foundation and J.M. Kaplan Fund
- NOAA MPA Science Center
- Advisors and workshop participants
- B2B Initiative steering committee members
- John Guinotte, Peter Etnoyer, Dave Canny, Fan Tsao, Sara Maxwell, Elliott Norse, Dan Pauly
- Simon Fraser University, Pat Gallaugher, Suzana Dragicevic, Thom Meredith and the McGill University team.
- B2B cdrom data providers
- Photo Credits: Sabine Jessen, Phillip Colla, Randall Davis, Andrew Lindner, Cordell Expeditions, National Marine Mammal Laboratory, Grupo de Ecologia y Conservacion de Islas, Mike Conti, NOAA