

Marine Protected Areas

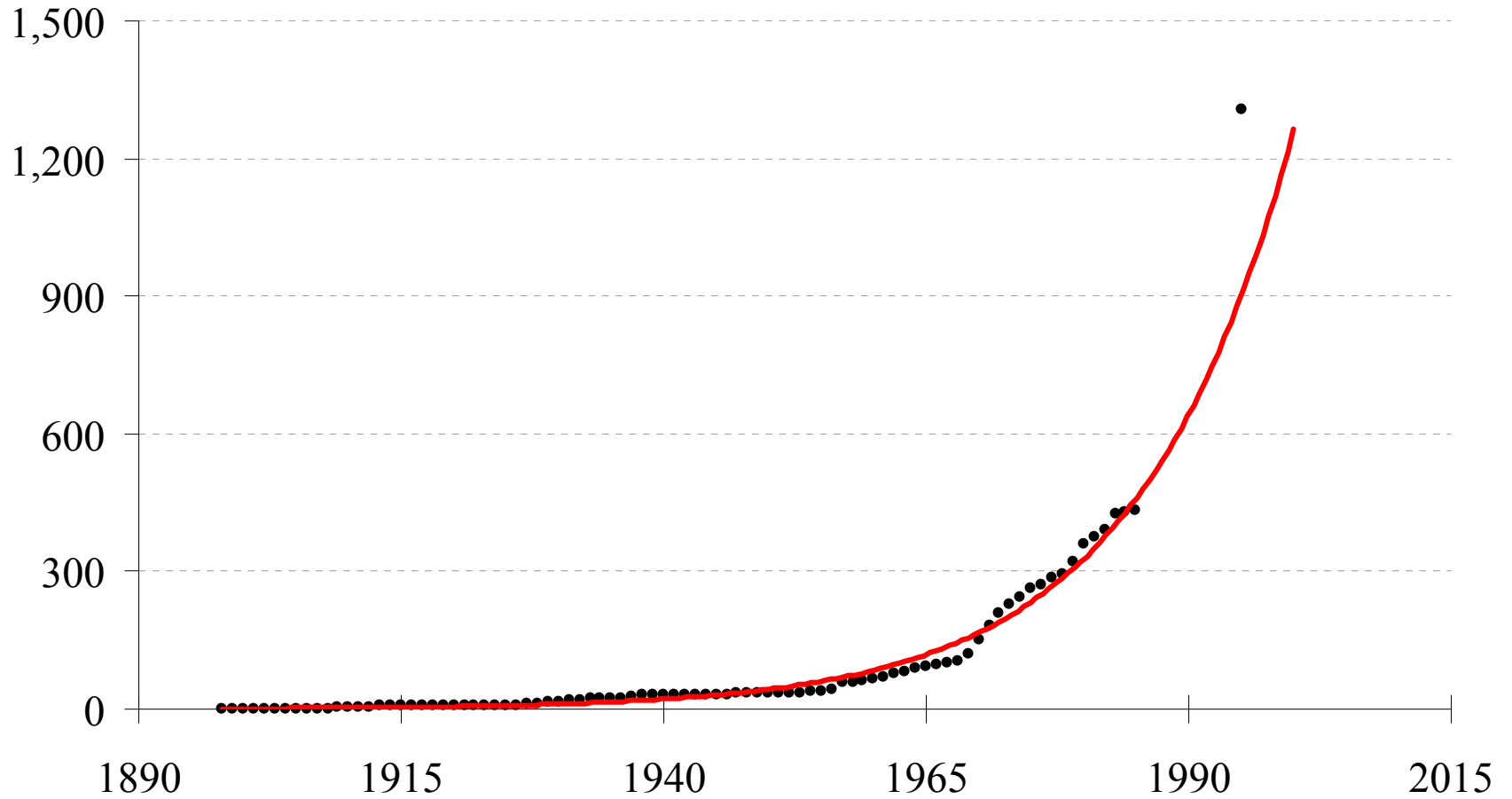
Porter Hoagland

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23 October 2002

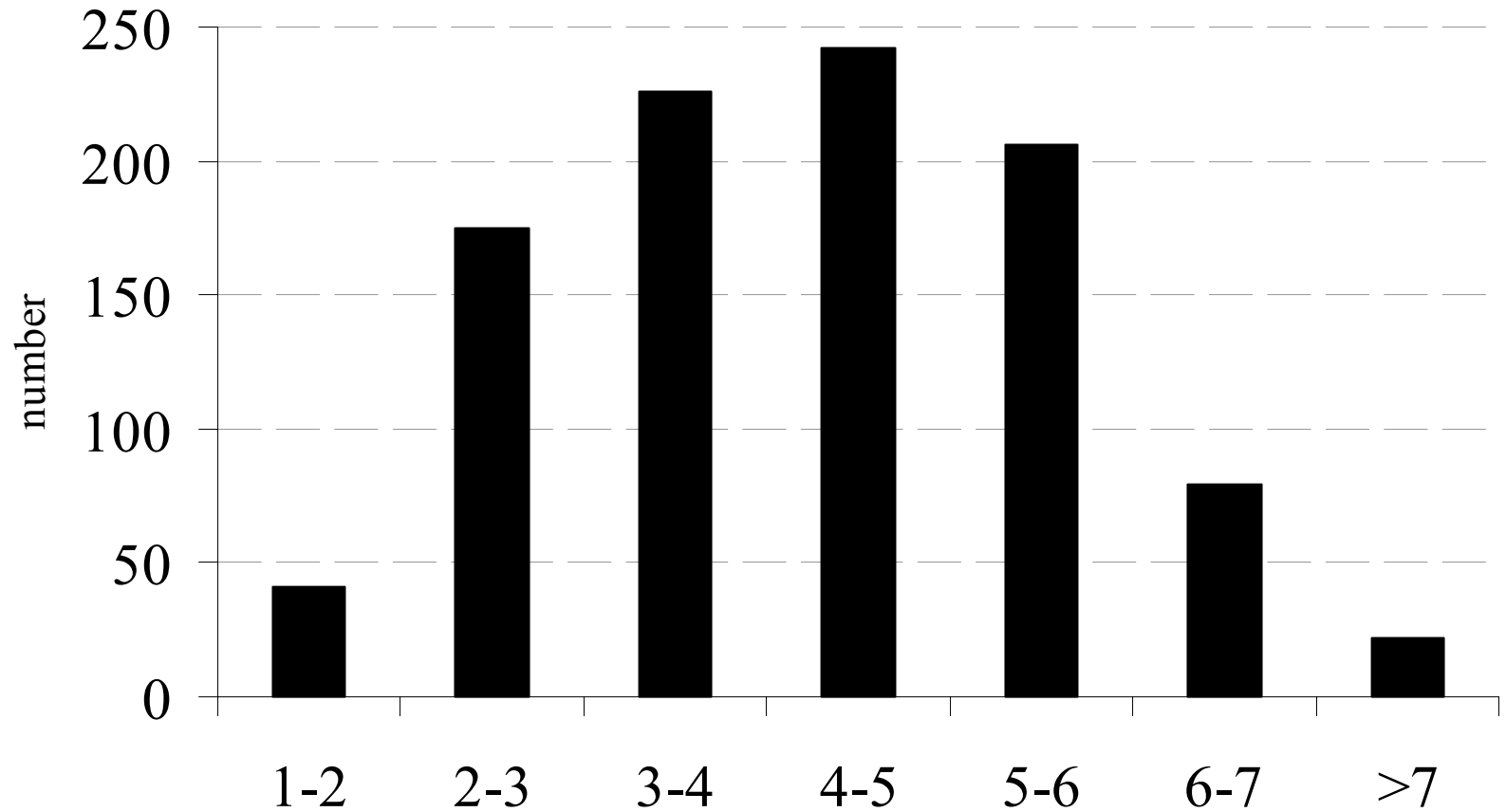
The Henry Luce Foundation Seminar

Cumulative Number of MPAs Worldwide



Worldwide Size Distribution of MPAs

km² (powers of ten); n=991



Definition

- . . .[a]ny area of the intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical, and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment (IUCN 1988)
- . . . [a]ny area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide **lasting** protection for part or all of the natural and cultural resources therein (E.O. 13158, 2000)

Three Things to Remember

- Solution in search of a problem
- Form of zoning
 - spatial/temporal command-and-control regulation
 - uses are excluded or controlled
- Economic valuation can be problematic

WHOI/OLI Symposium

- Precautionary
- Complementary
- Multiple use
- Baseline
- Target %
inappropriate
- Performance?
- Coupled models
- Land-based threats
- Stakeholders
- Cooperative
stewardship

Extant Policies

- Marine Protection, Research, and Sanctuaries Act (1972)
- Coastal Zone Management Act (1972)
- Endangered Species Act (1973)
- Magnuson-Stevens Act (1976)
- Outer Continental Shelf Lands Act (1953, 1978)
- National monuments, parks, seashores, wildlife refuges
- E.O. 13158
- Massachusetts Ocean Sanctuaries Act
- MA Areas of Critical Environmental Concern



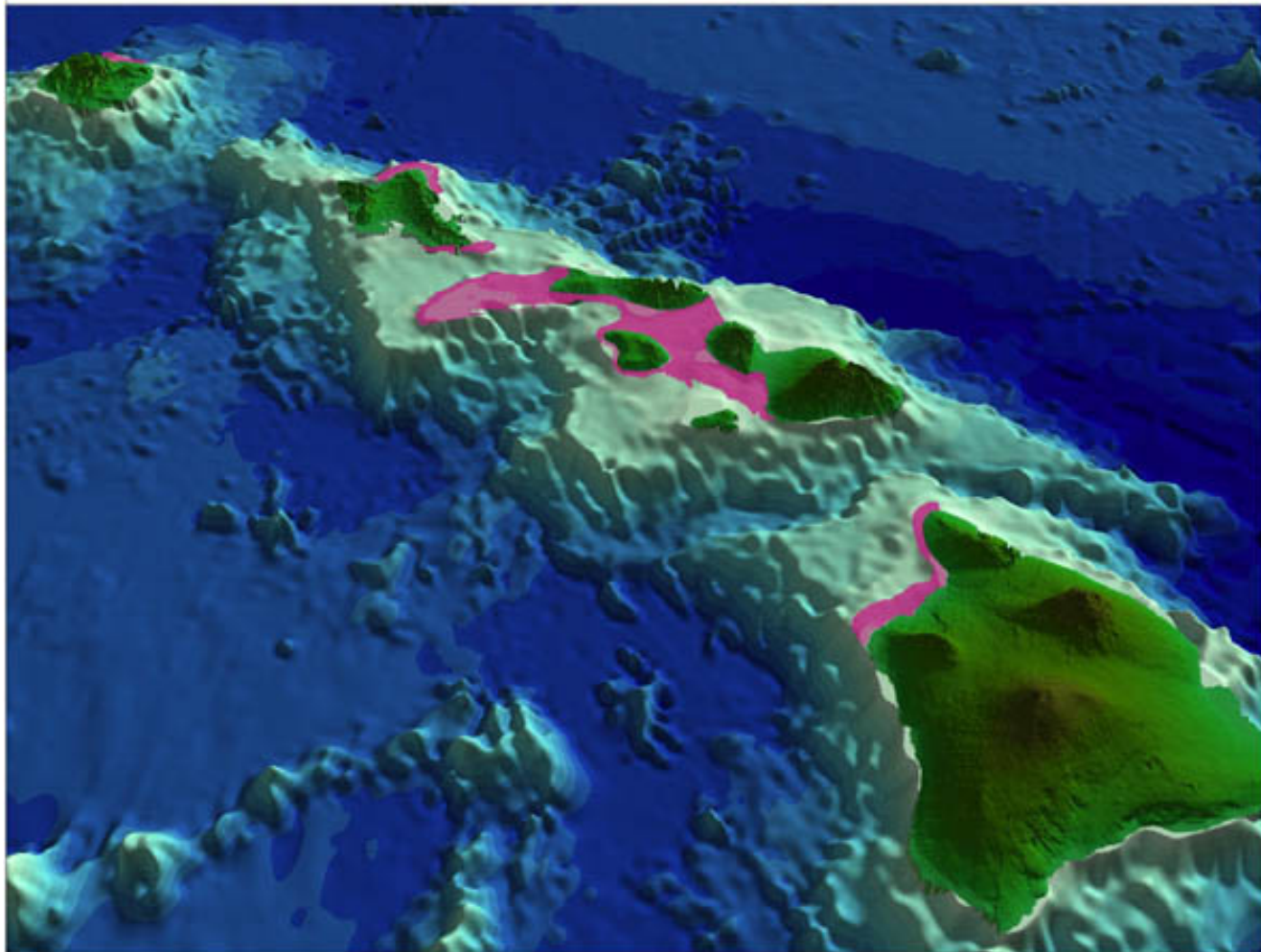
USS Monitor National Marine Sanctuary



Humpback Whales
sanctuaries.nos.noaa.gov

Photo: Dave Matilla
NMFS Permit #807

Hawaiian Islands Humpback Whale National Marine Sanctuary in 3D Perspective

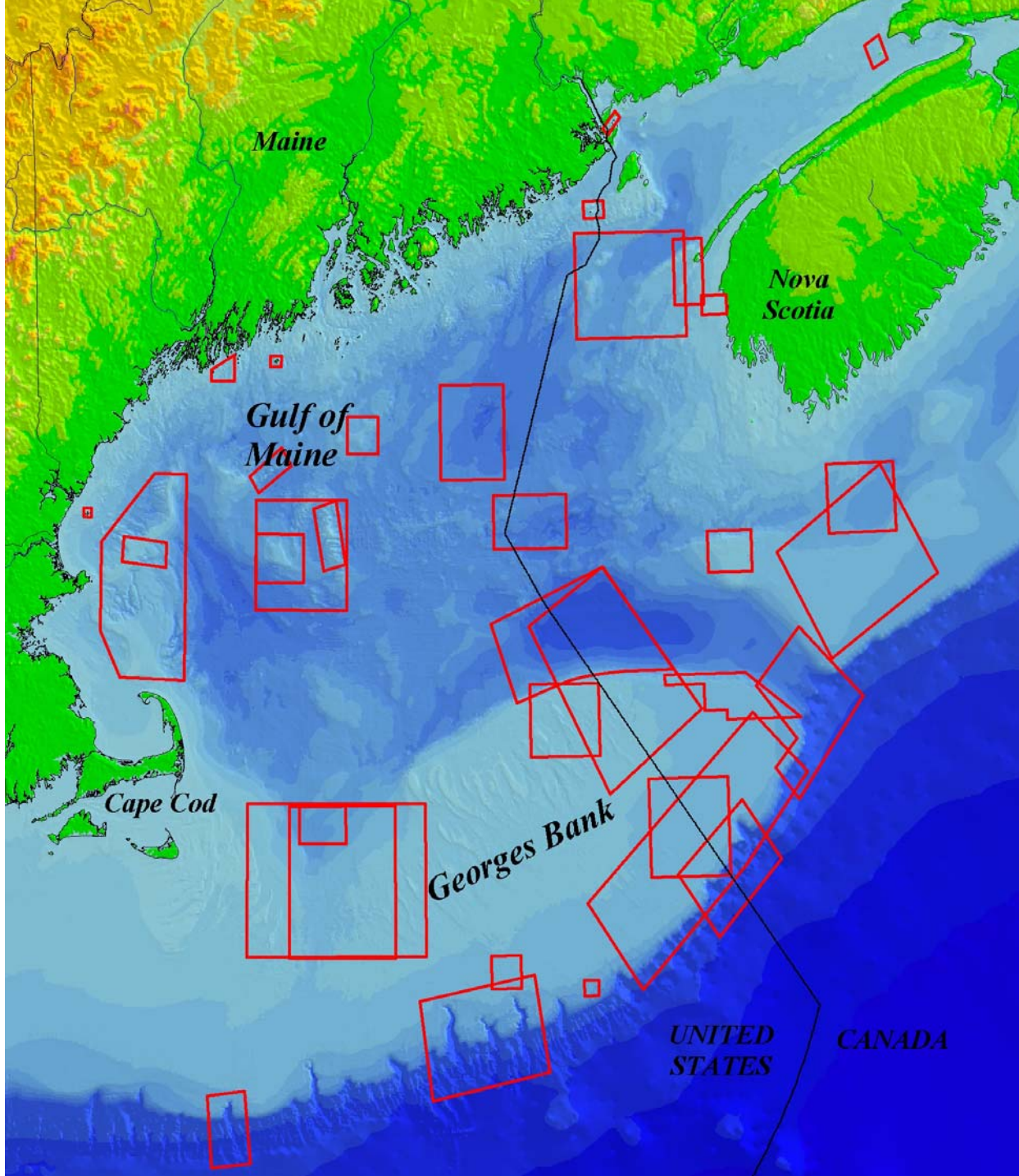


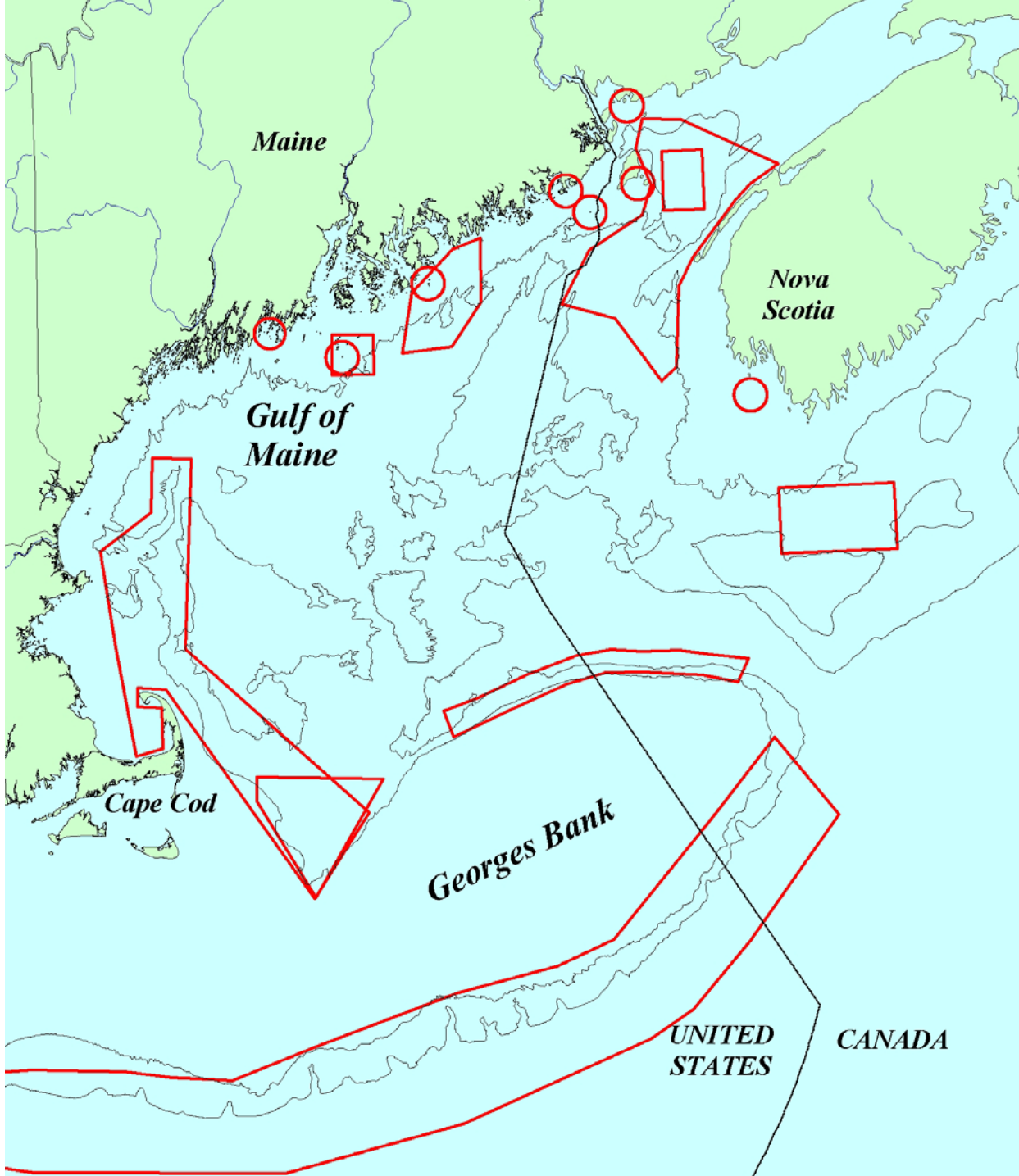
Dimensions

- Physical/Ecological
- Economic
- Distributive [fairness to (non)users]

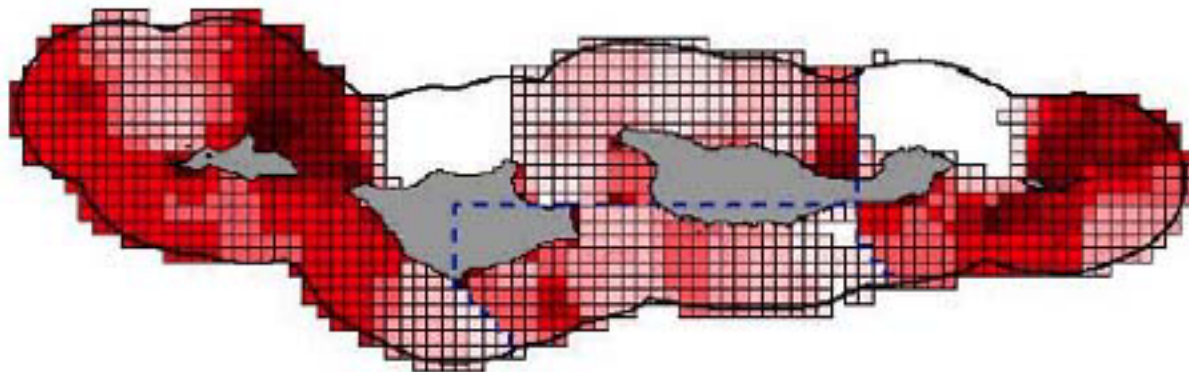
Policy Problem?

- Management alternative
- Response to uncertainty
- Dimensions:
 - Location
 - Size/Shape
 - Number
 - Duration
 - History may matter

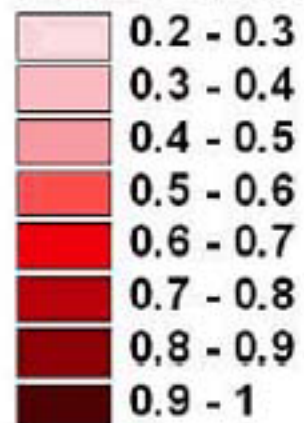




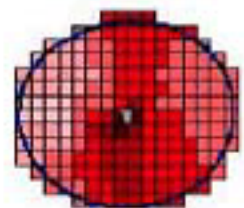
The “Summed” Solution

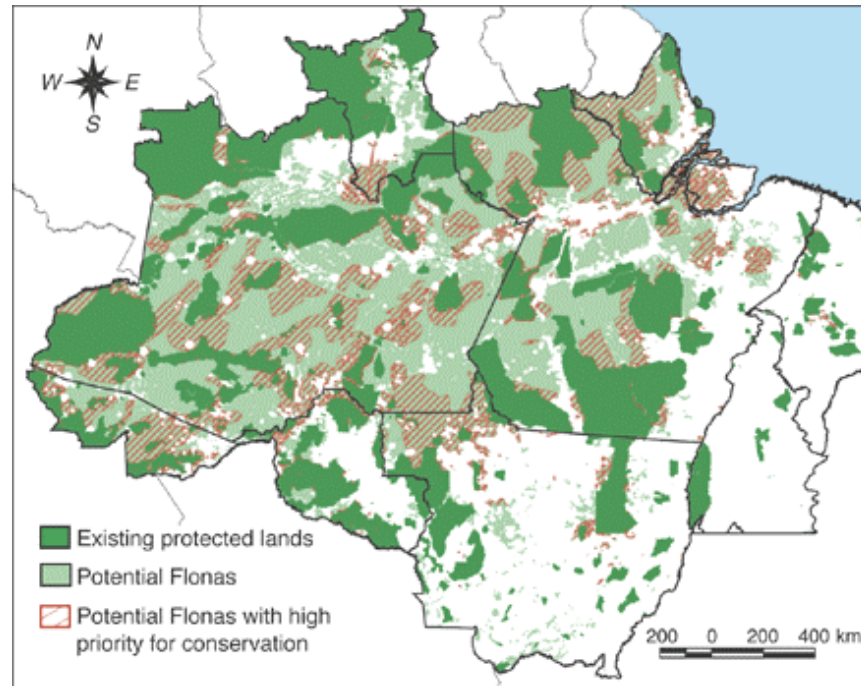


Conservation Value



The number of times each planning unit was included in a final solution.





Forests in the Brazilian Amazon that could be designated as National Forests (“Flonas”) without conflict with existing conservation lands or human inhabitants.

Source: Verissimo *et al.* (2002).

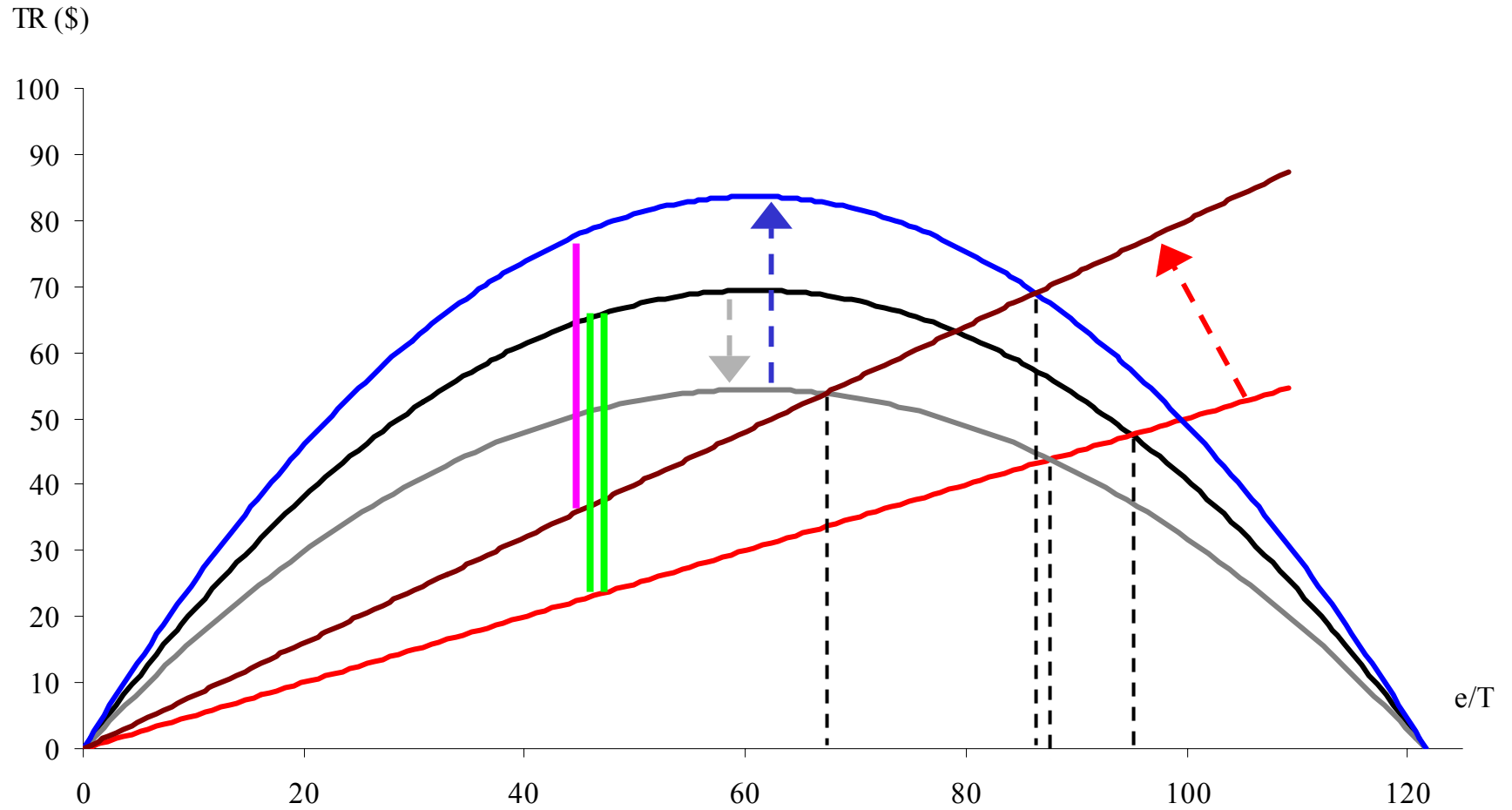
Biology (single species)

- Fishery closure
- Refuge effect
- Stock effect
 - ↑ “effective” stock?
- Multispecies (consider interactions)
- Ecosystem-based management

Economic Theory

- Can't value fish inside reserve
- Stock effect leads to no rents in longrun
- Multiple uses (compatibilities?)
- Non-market valuation
- Empirical applications still crude
 - Dry Tortugas
 - Channel Islands
 - **Stellwagen Bank**

New England Atlantic Cod Fishery

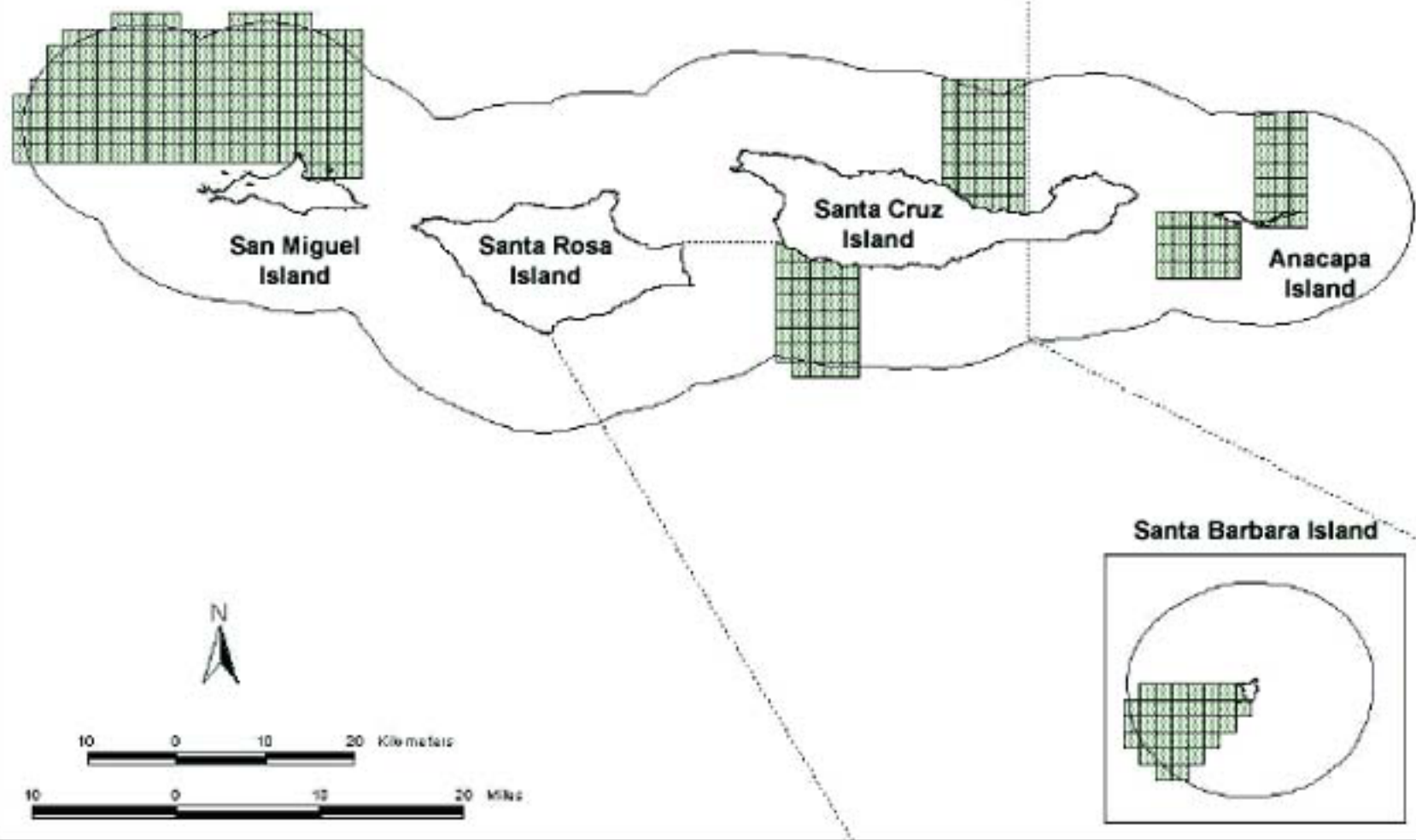


Valuation Issues

- Gross revenues only (landed value)
- No rule for redistribution of fishing effort
 - Increased steaming costs
 - Different (lower?) catch per unit effort
 - Higher costs of congestion
 - Stock vs. refuge effects
- => Distributional analysis

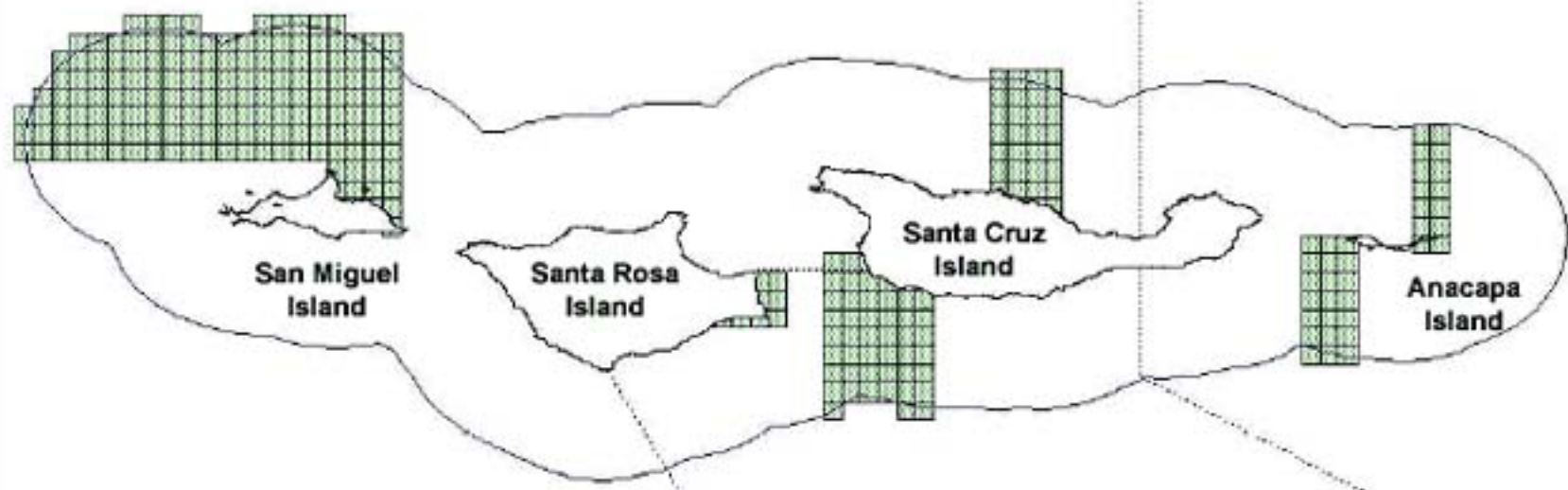
Marine Reserve Concept A1

September 27, 2000

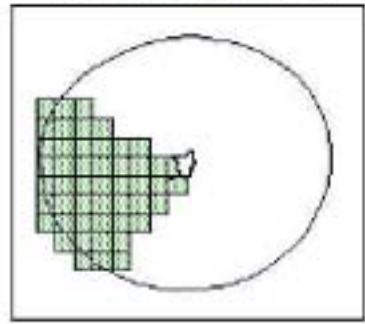


Marine Reserve Concept C

October 18, 2000



Santa Barbara Island



10 0 10 20 Kilometers

10 0 10 20 Miles

Multiple Use MPA:

Types of Benefits

- Commercial fishing
- Recreational fishing
- Non-consumptive uses
 - Boating
 - Bird, fish, wildlife watching
 - Diving
 - Surfing
 - Existence, Bequest
- Scientific research

MPA Valuation Studies

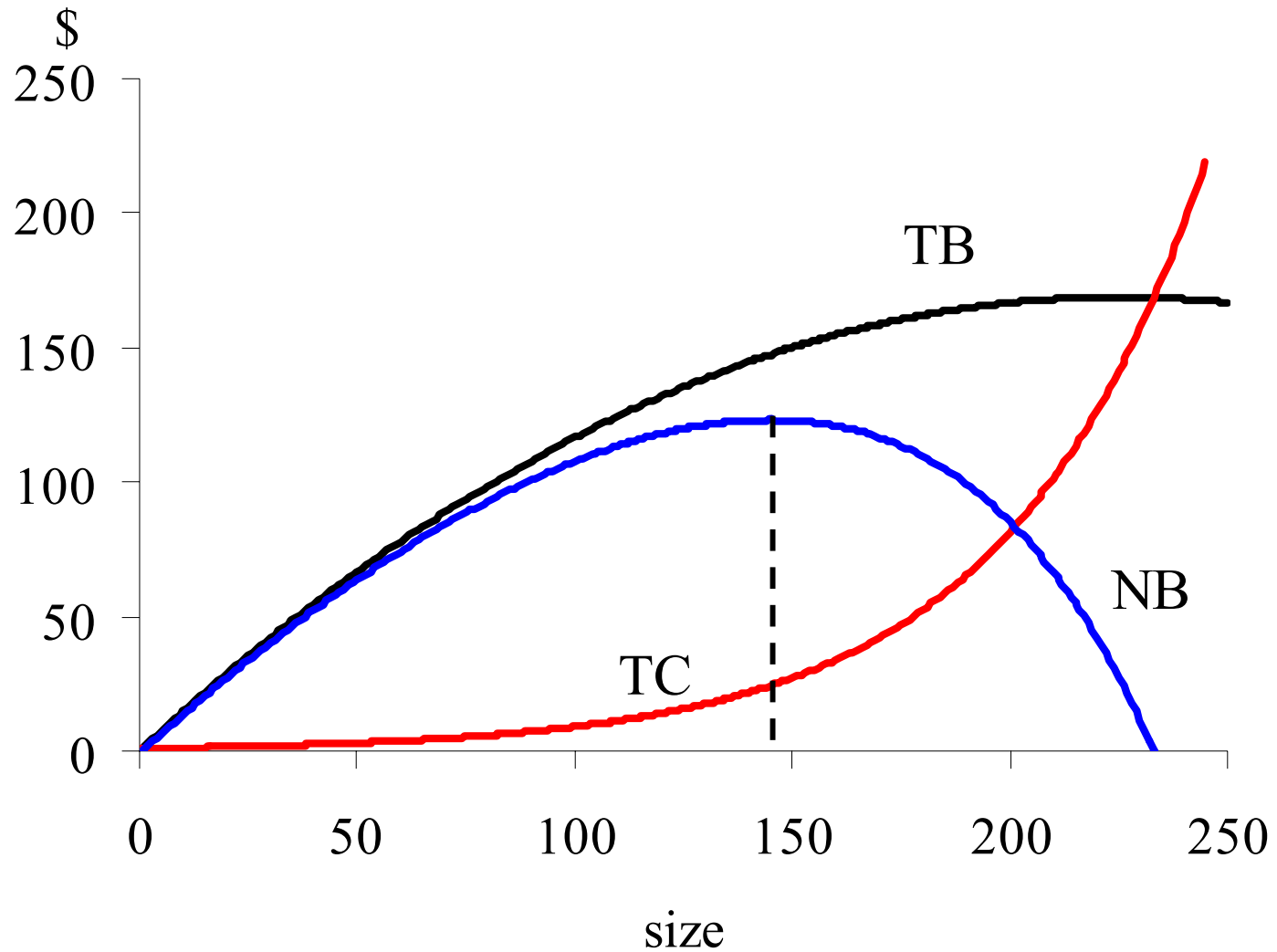
Marine Area	Location	Year	Mean Value (\$)	Model Type	Mean Income (\$000)	Mean Age (yrs)	Multiple Destinations
John Pennekamp/Key Largo	Florida	1988-89	356-533	TCM	59	47	yes
Galápagos National Park	Galápagos	1986	439	HDA	45	53	no
Great Barrier Reef ¹	North Queensland	1985-86	228 ^d 138 ⁱ	TCM	-- --	-- --	no
Martha's Vineyard ²	Massachusetts	1989	164	CVM	109	52	no
Bonaire Marine Park ⁴	Netherlands Antilles	1991	132	--	--	--	no
Wellfleet Harbor ³	Massachusetts	1994	66 ^d 87-111 ⁱ	CVM	46 ^d 70 ⁱ	56 ^d 45 ⁱ	no ^d yes ⁱ
*Monteverde Cloud Forest ³	Costa Rica	1991-92	7 ^d 6 ⁱ	CVM	21 ^d 62 ⁱ	-- --	no
*Nadgee Nature Reserve ^{3,5}	New South Wales	1979	3	CVM	50	36	no

Multiple Use MPA:

Types of Costs

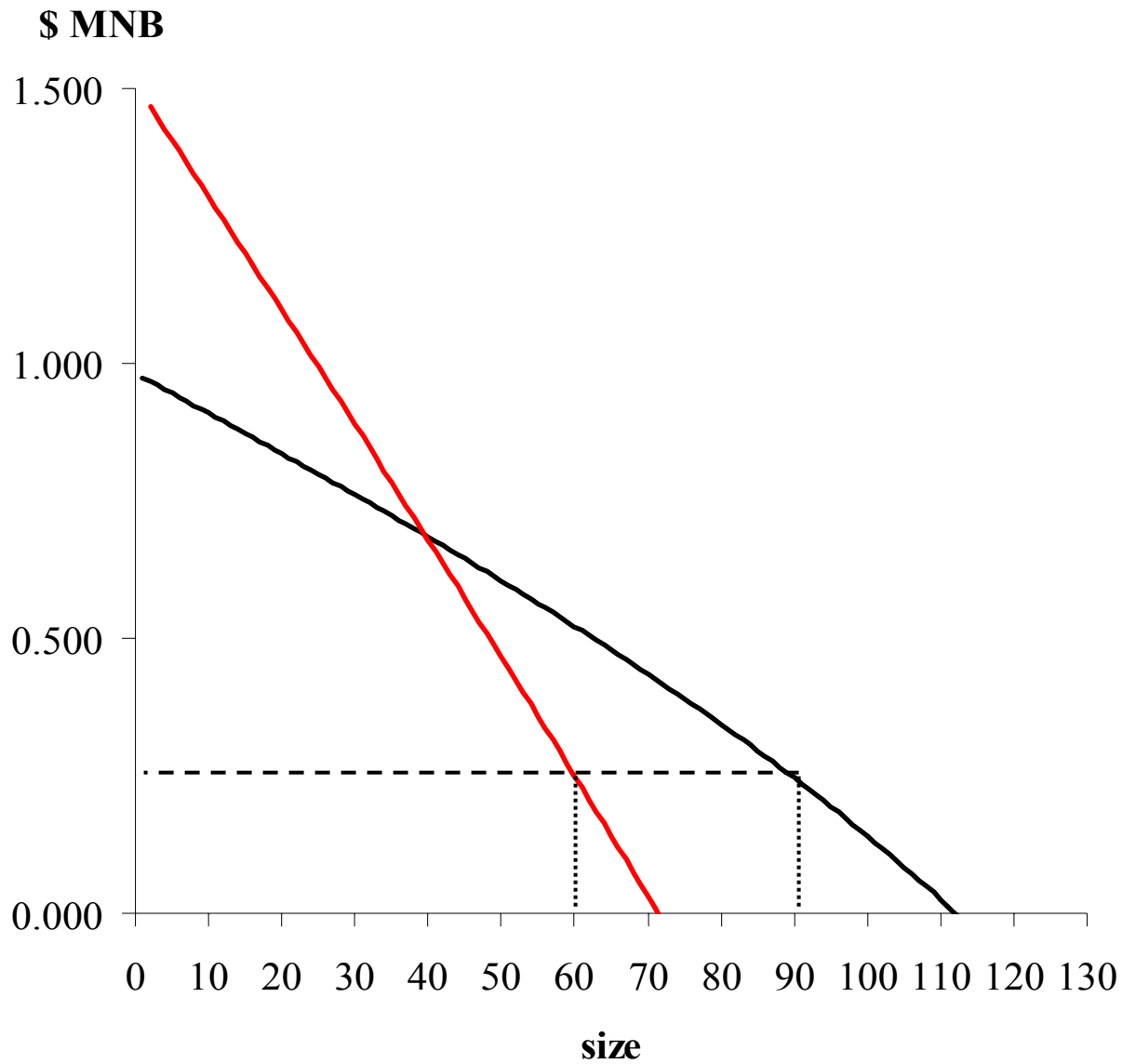
- Capital (land; headquarters)
- Operations (administration; monitoring; enforcement)
- Foregone consumptive uses
 - Mineral development
 - Commercial/recreational fishing
 - Waste disposal
 - Salvage
 - Shipping

Optimal Size of an MPA



Optimal Size of a System of MPAs

(area constraint)



MPAs as Responses to Uncertainty

- Diversify
- Play it safe
- Spread risks
- Procrastinate
- Get more information
- Be flexible