

Environmental Law Institute Brown Bag series

# High Seas Conservation Science & Policy: issues, opportunities and challenges

16 Dec 2010



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# High Seas issues... then & now

# The good old days...



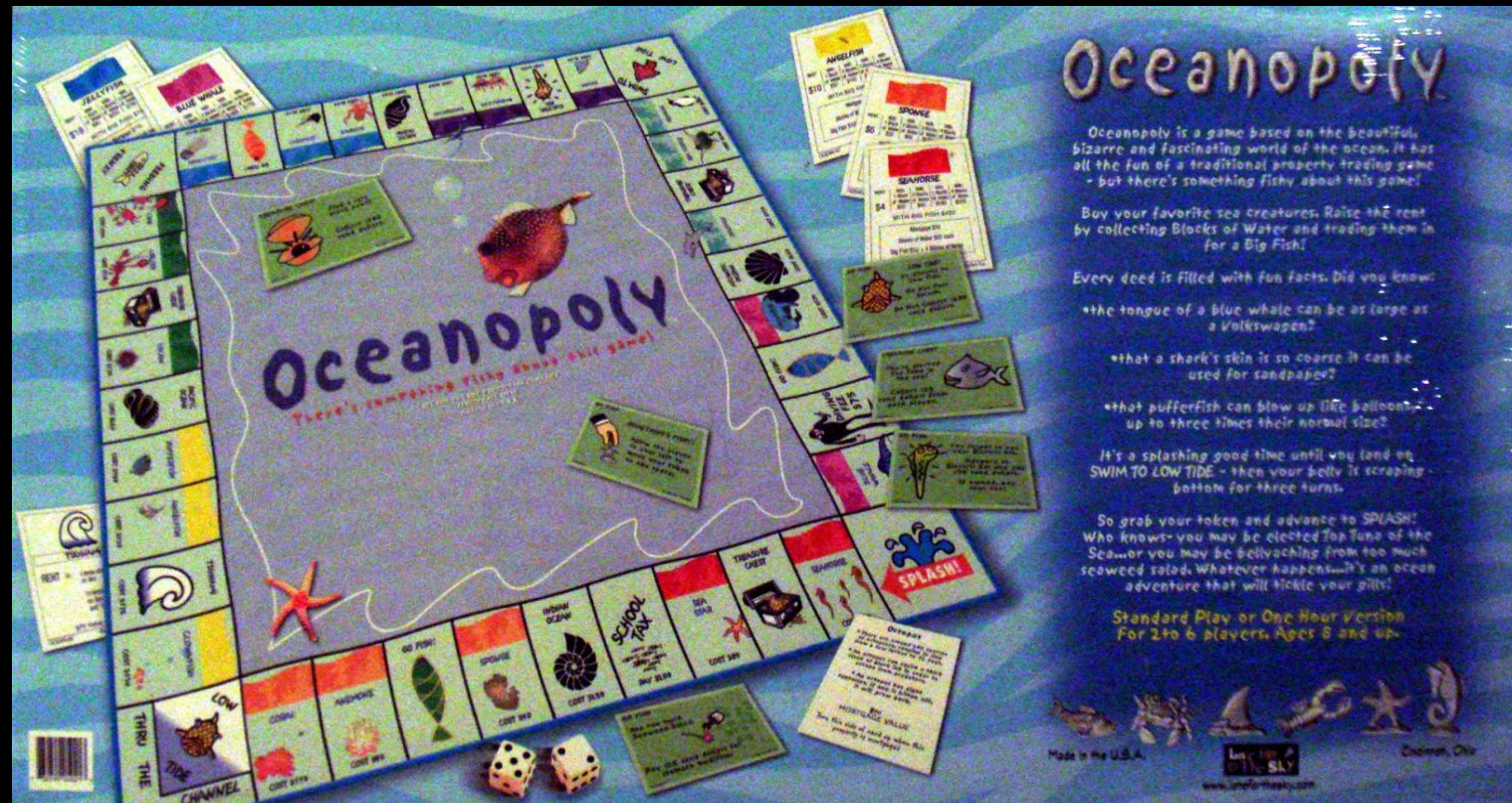
“...for the sea is of so vast an extent that it is sufficient for all the uses that nations can draw thence, either as to water, fishing, or navigation.”

--Huig de Groot (1583-1645)



# Greatest threats to oceans now:

Increasing players with corresponding pressures...



The image shows the Oceanopoly board game box and its components. The board is a large square with a grid of spaces, each containing a different sea creature or ocean-related icon. The title "Oceanopoly" is prominently displayed in the center of the board. Surrounding the board are various game cards, including "Block of Water" cards with different colors and values, and "Fact Cards" with interesting facts about marine life. Two dice are also visible at the bottom of the board.

## Oceanopoly

Oceanopoly is a game based on the beautiful, bizarre and fascinating world of the ocean. It has all the fun of a traditional property trading game - but there's something fishy about this game!

Buy your favorite sea creatures. Raise the rent by collecting Blocks of Water and trading them in for a Big Fish!



Every deed is filled with fun facts. Did you know?

- the tongue of a blue whale can be as large as a Volkswagen?
- that a shark's skin is so coarse it can be used for sandpaper?
- that pufferfish can blow up like balloons up to three times their normal size?

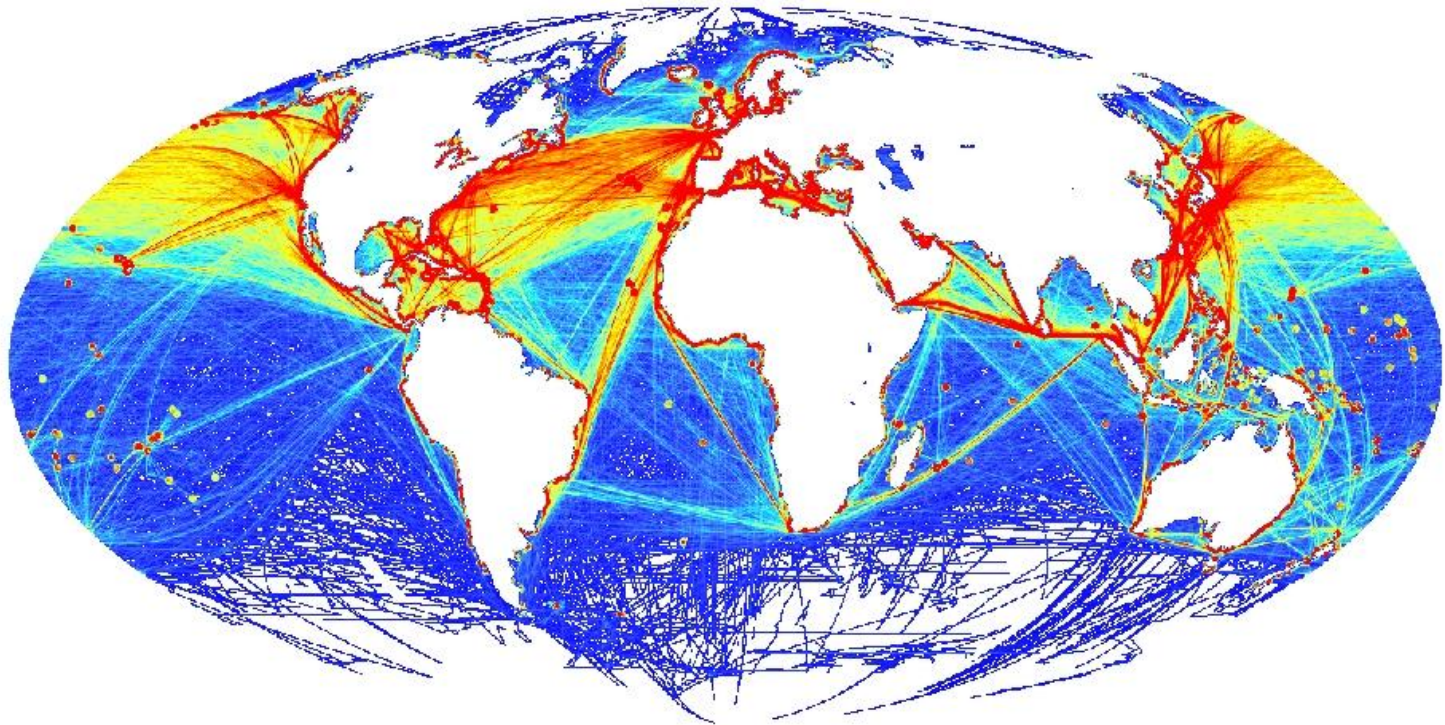
It's a splashing good time until you land on SWIM TO LOW TIDE - then your belly is scraping bottom for three turns.

So grab your token and advance to SPLASH! Who knows - you may be elected Top Tune of the Seaworld or you may be bellyaching from too much seaweed salad. Whatever happens...it's an ocean adventure that will tickle your gills!

Standard Play or One Hour Version  
For 2 to 6 players, Ages 8 and up.

Made in the U.S.A.  

# Global shipping / ocean-based pollution



Source: NCEAS / Halpern et al, Science: 319, 2008



# Persistent pollutants in nine species of deep-sea cephalopods

Michael A. Unger<sup>a,\*</sup>, Ellen Harvey<sup>a</sup>, George G. Vadas<sup>a</sup>, Michael Vecchione<sup>b</sup>

**Table 1**  
Contaminant concentrations (ng g<sup>-1</sup> dry weight) measured in deep-sea squid samples

Squid Species	Station	TBT <sup>+</sup>	ΣPAHs	DPE	ΣPCBs	ΣChlor	ΣDDT				
<i>Gonatus fabricii</i>	19	8	13.3	<0.1	<0.1	<0.1	<0.1				
<i>Haliphron atlanticus</i>	2	15	25.9	21.8	<0.1	0.6	3.9				
<i>Haliphron atlanticus</i>	2	11	15.5	3.1	1.3	<0.1	1.0				
<i>Histioteuthis reversa</i>	6	6	207.2	424.5	18.6	7.3	14.9				
<i>Histioteuthis reversa</i>	6	6	6.7	<0.1	<0.1	<0.1	<0.1				
<i>Illex illecebrosus</i>	1	4	20.1	26.9	7.0	3.2	5.7				
<i>Illex illecebrosus</i>	1	9	18.0	<0.1	8.2	0.8	2.9				
<i>Mastigoteuthis magna</i>	1	2	37.8	32.5	69.4	10.7	29.6				
<i>Mastigoteuthis magna</i>	1	5	96.6	75.3	70.3	9.4	17.9				
<i>Mastigoteuthis magna</i>	5	<1	28.5	3.6	20.5	8.9	16.8				
<i>Mastigoteuthis magna</i>	3	26	71.9	84.5	277.6	45.6	161.3				
<i>Mastigoteuthis magna</i>	6	8	84.0	172.9	43.8	13.8	44.9	1.0	71.0	3.0	0.7
<i>Octopoteuthis sicula</i>	3	10	39.3	30.4	52.4	11.8	30.4	0.4	101.4	10.6	8.5
<i>Octopoteuthis sicula</i>	6	10	86.4	161.5	55.2	12.1	28.4	0.7	46.1	10.1	5.2
<i>Octopoteuthis sicula</i>	12	9	140.2	168.6	<0.1	22.9	44.0	0.6	207.4	13.0	4.1
<i>Octopoteuthis sicula</i>	19	5	10.6	2.8	<0.1	6.8	18.5	0.4	44.5	4.4	1.2
<i>Taonius pavo</i>	5	6	5.3	0.7	0.8	0.6	2.1	<0.1	<0.1	0.6	0.1
<i>Teuthowenia megalops</i>	5	9	70.4	84.0	116.2	19.7	119.6	1.9	37.3	6.8	1.7
<i>Teuthowenia megalops</i>	1	5	7.2	<0.1	<0.1	0.7	2.3	<0.1	<0.1	1.3	<0.1
<i>Vampyroteuthis infernalis</i>	6	<1	13.2	3.5	3.2	1.1	5.2	0.4	<0.1	2.5	0.2

## A forgotten threat to oceans today?

### Persistent pollutants



(Station, lat. (N), long (W), depth): (1, 39.9291, 67.8430, 2349 m), (2, 39.9113, 67.3376, 1120 m), (3, 39.8180, 67.5090, 2739 m), (5, 40.0062, 67.4467, 2204 m), (6, 40.0062, 67.5397, 2252 m), (12, 39.9325, 67.3966, 1164 m), (19, 39.8232, 67.3368, 2980 m).

Σ PAHs = 24 PAH's.

DPE = diphenyl ether.

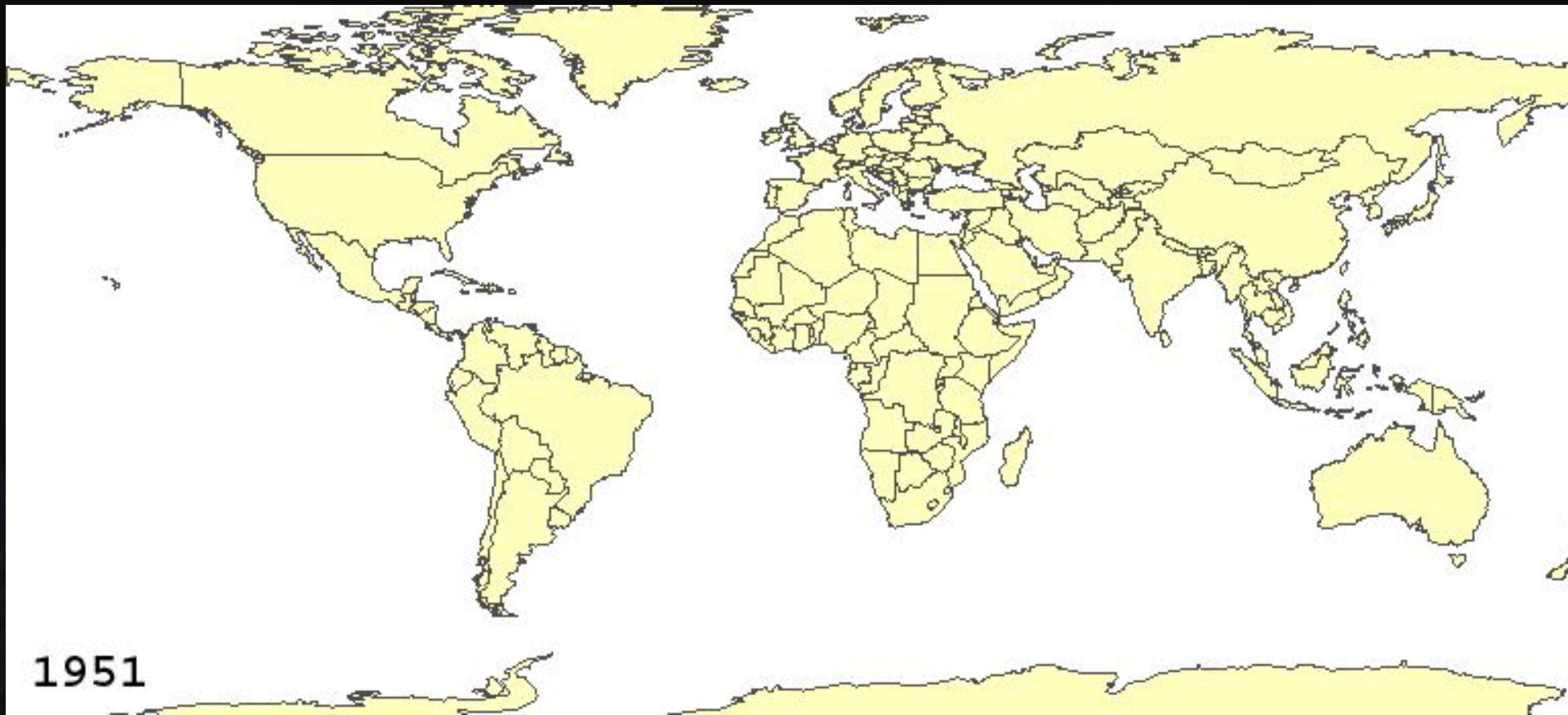
Σ PCBs = 104 congeners.

Σ Chlordanes = *trans* chlordane + *cis* chlordane + *trans* nonachlor + *cis* nonachlor + oxychlordane + MC1 + MC2 + MC3 + MC5 + MC6 + MC7 + MC8 + compound 10 (based on Miyazaki et al., 1985).

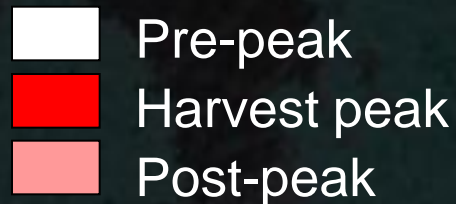
Σ DDT's = *p,p'* dde + *o,p'* dde + *p,p'* ddd + *o,p'* ddd + *p,p'* ddt + *o,p'* ddt + *p,p'* DDMU.

Σ toxaphene = based on technical standard (Ultra Scientific, North Kingstown, RI).

# The Spread of Fishing Activity...



**Calculated Max. Fish  
Harvest**



What people thought was sustainable?

Source: Millennium Ecosystem Assessment and Seas Around Us Project

# According to the Food and Agriculture Organization (FAO)

28% of global marine fish stocks are overfished, depleted or recovering...

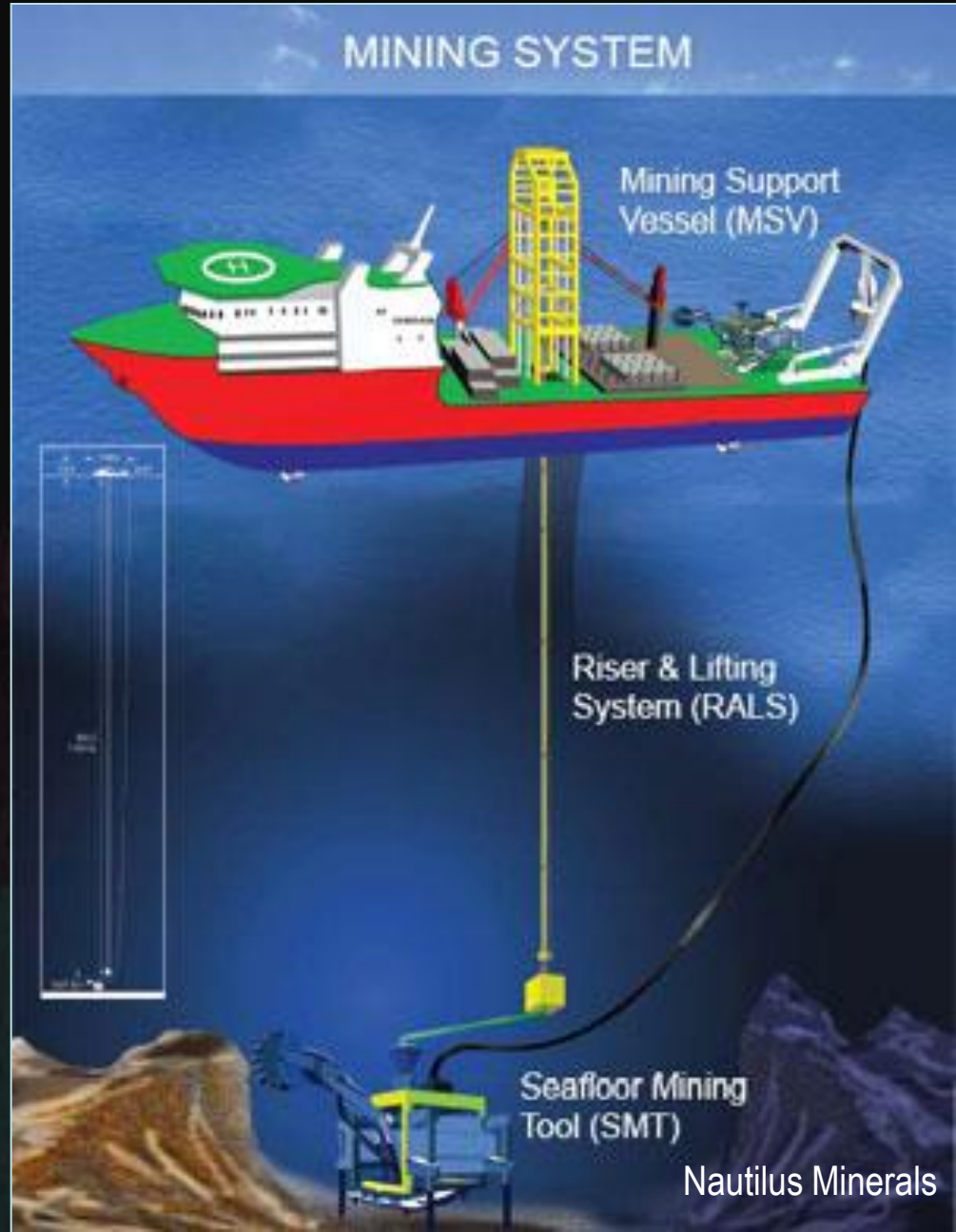
(and another 52% are “fully exploited”, adding up to 80% overall)

But, for straddling stocks and other high seas fish populations, overfished, depleted or recovering stocks exceed 60%; i.e. 2x the global average.

FAO. *The state of world fisheries and aquaculture 2008*. Rome, Italy: Food and Agriculture Organization of the United Nations; 2009.  
<ftp://ftp.fao.org/docrep/fao/011/i0250e/i0250e01.pdf>



# Emerging Issues: deep sea mining

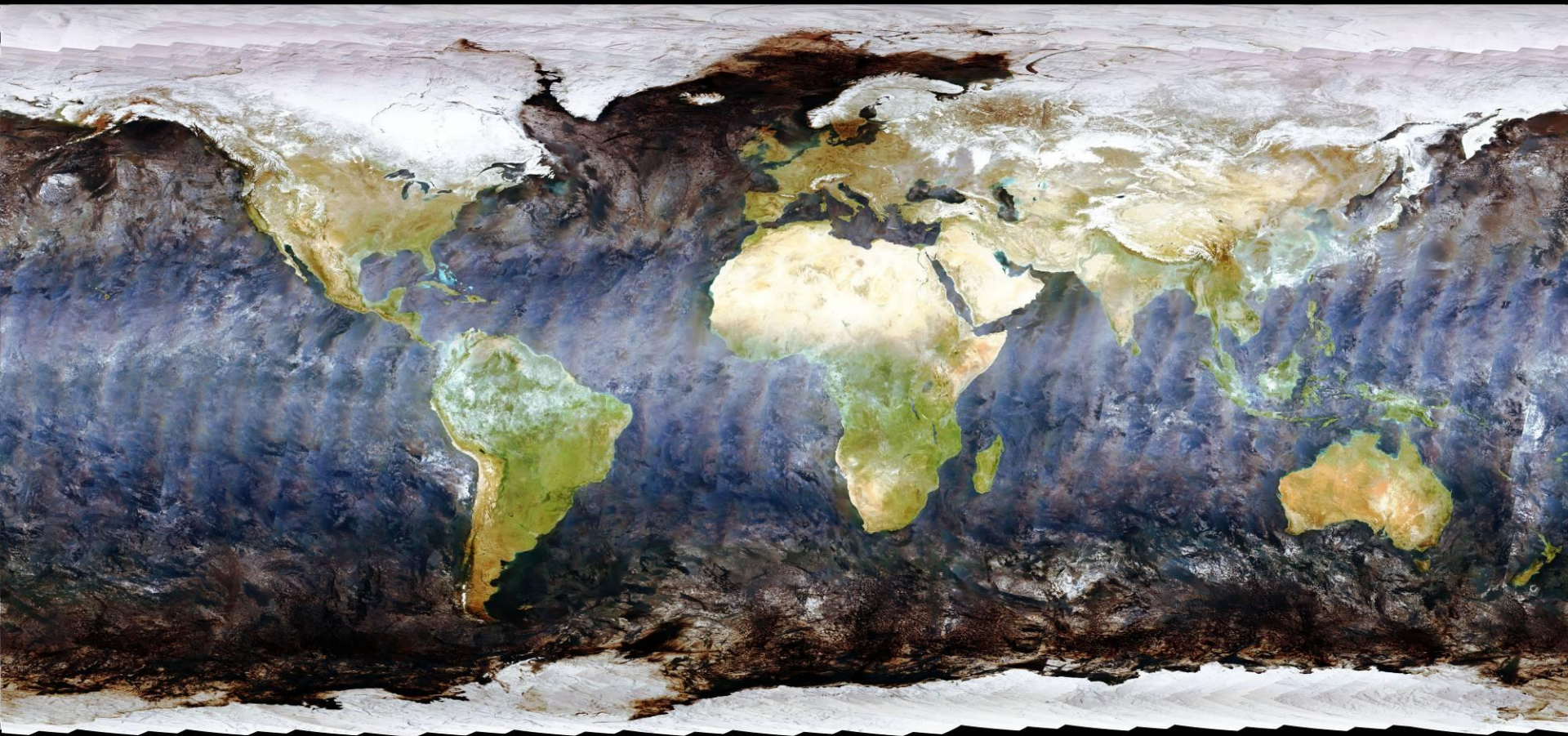


# High Seas policy



The problems of ocean space are closely interrelated  
and need to be considered as a whole

(Preamble to the UN Convention on the Law of the Sea, 1982)





# Two key UN General Assembly Resolutions

- 61/105 (2006): requires bottom trawling to undergo environmental impact assessments and to **identify “Vulnerable Marine Ecosystems” (VMEs)**
- 64/72 (2009): built on the previous resolution and clarified existing fisheries must also undergo an **Environmental Impact Assessment (EIA)**.
- **2011: A full review** of high seas bottom fishing and actions taken by Regional Fisheries Management Orgs

# CBD COP9 Decision 20 (2008)

## Annex I: Site Criteria -adopted

“Ecologically or Biologically Significant Areas” (EBSAs)

1. Uniqueness / rarity
2. Special importance for life history of species
3. Importance for threatened, endangered or declining species / habitats
4. Vulnerability, fragility, sensitivity, or slow recovery
5. Biological productivity
6. Biological diversity
7. Naturalness

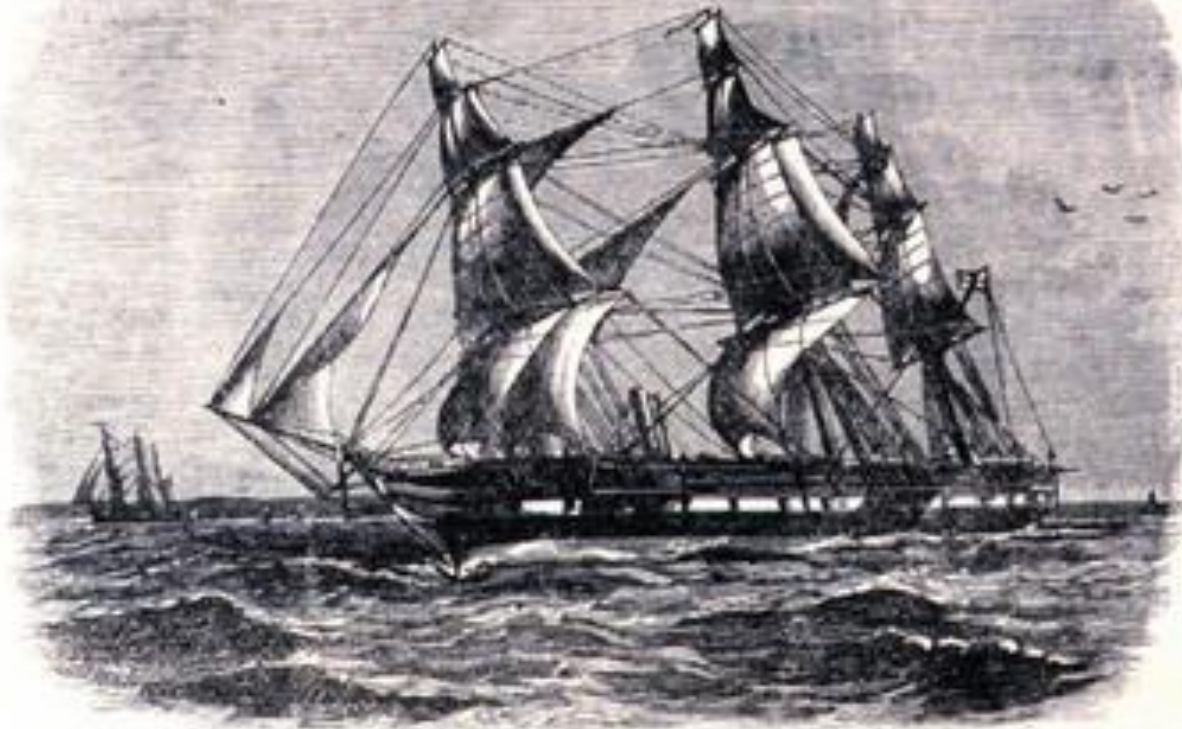
A process to identify EBSAs has been agreed to at CBD COP 10

# High Seas science



# The *Challenger* expedition 1872–76

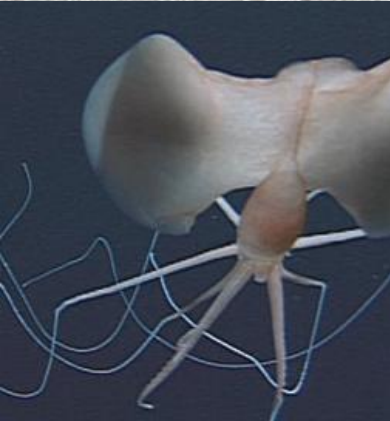
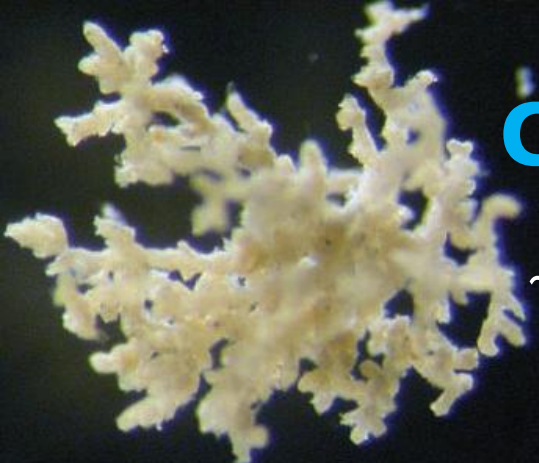
~4700 new species, described over 20+ years



H.M.S. CHALLENGER UNDER SAIL, 1874.

# Census of Marine Life

~20 000 new species, described over 10+ years  
(not counting the microbes!)

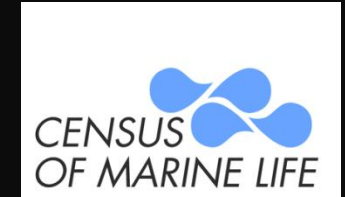


*Aminiconcha* sp. (Hydrothermal vent snail) Suiyo Seamount, Tokyo Hydrotherma Vent. This snail inhabits deep-sea hydrothermal vents and harbors chemoautotrophic symbionts in its gills. This individual is probably a new species, and only a single specimen has been discovered to date. Where are its peers? Credit: Yoshihiro FUJIWARA/JAMSTEC



# Global Ocean Biodiversity Initiative

([www.GOBI.org](http://www.GOBI.org))





# GOBI objectives (abridged)

- **Scientific collaboration process** to assist States and relevant regional and global organisations to **identify ecologically significant areas** (e.g. the CBD “EBSAs”; FAO “VMEs”)
- **To provide guidance** on how scientific criteria can be interpreted and applied
- To assist in developing **regional analyses** with relevant organizations and stakeholders

# High Seas Marine Protected Areas (MPAs) to date

(excluding fisheries closures and IWC areas protected from whaling)

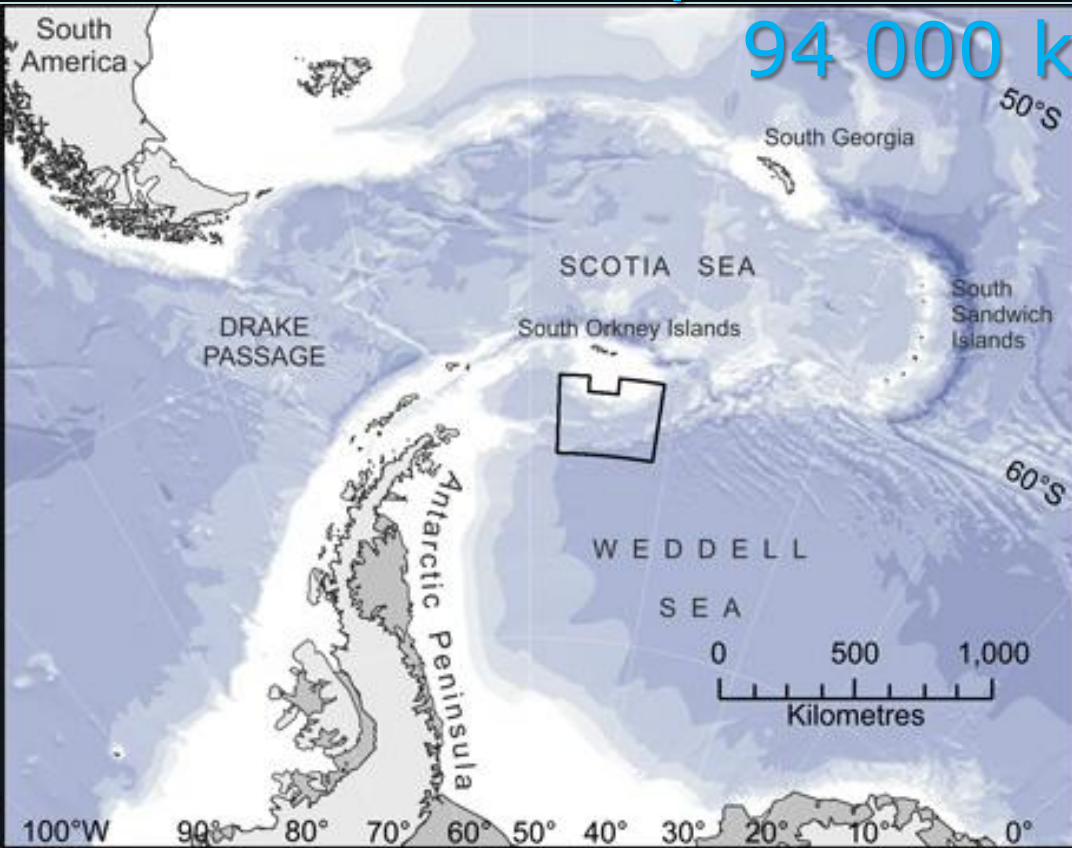
# 1999/2002: Pelagos Sanctuary (Mediterranean) 87 500 km<sup>2</sup>





# Nov. 2009: South Orkney Islands (Antarctica) marine protected area (MPA)

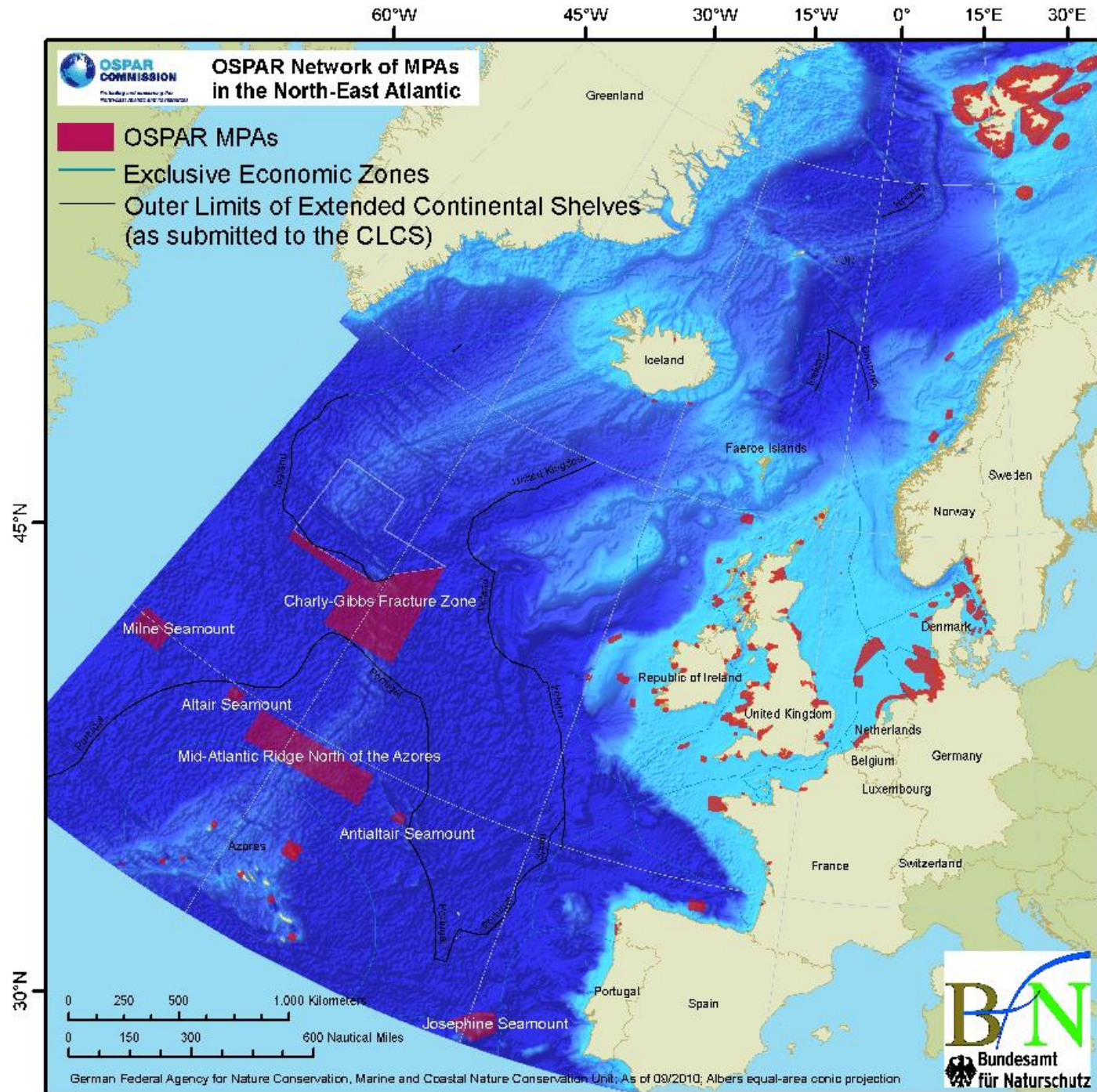
94 000 km<sup>2</sup>



Sept. 2010

# OSPAR High Seas Marine Protected Areas

285 000 km<sup>2</sup>

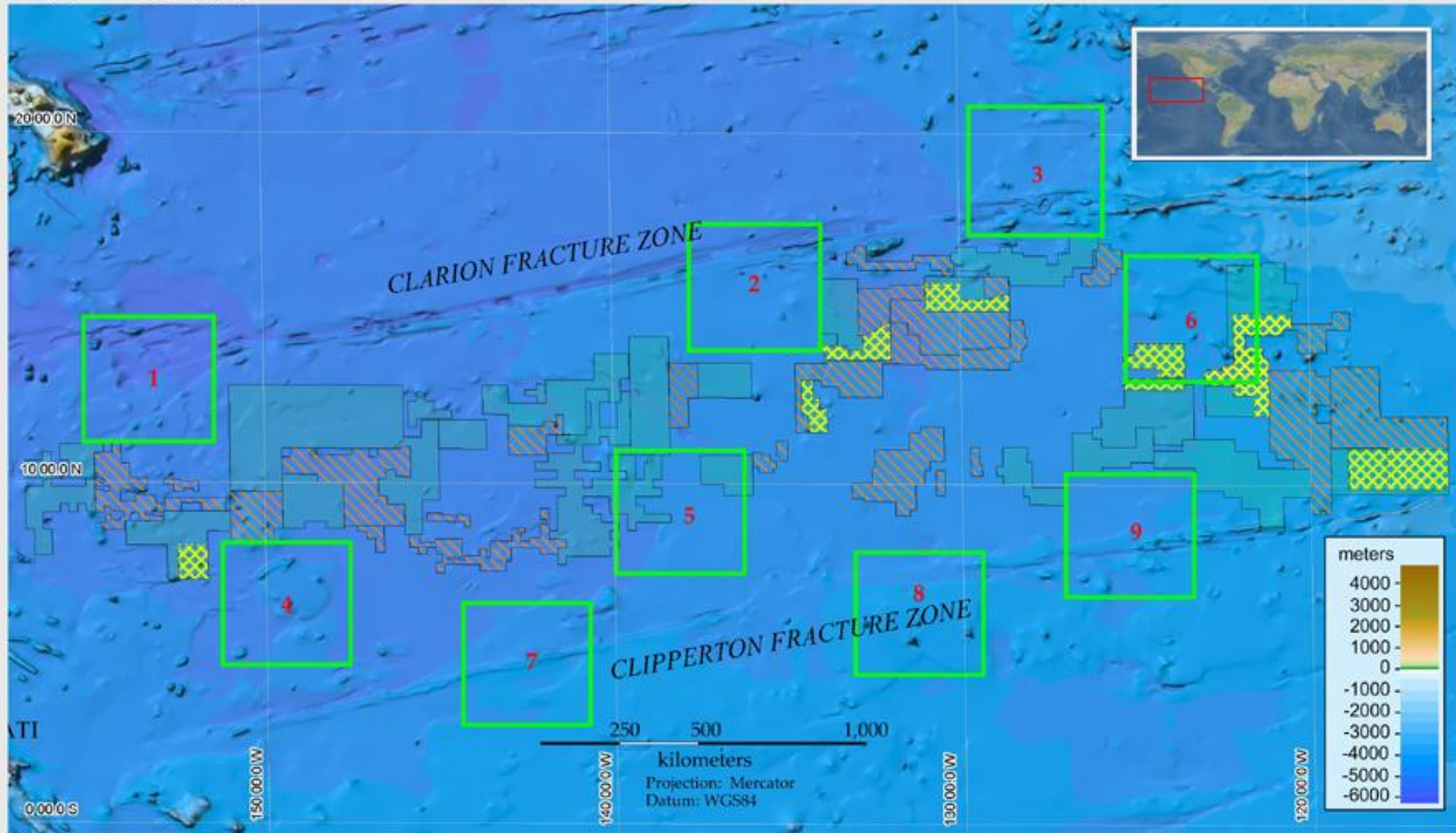




# In discussion: International Seabed Authority "Preservation Reference Areas"



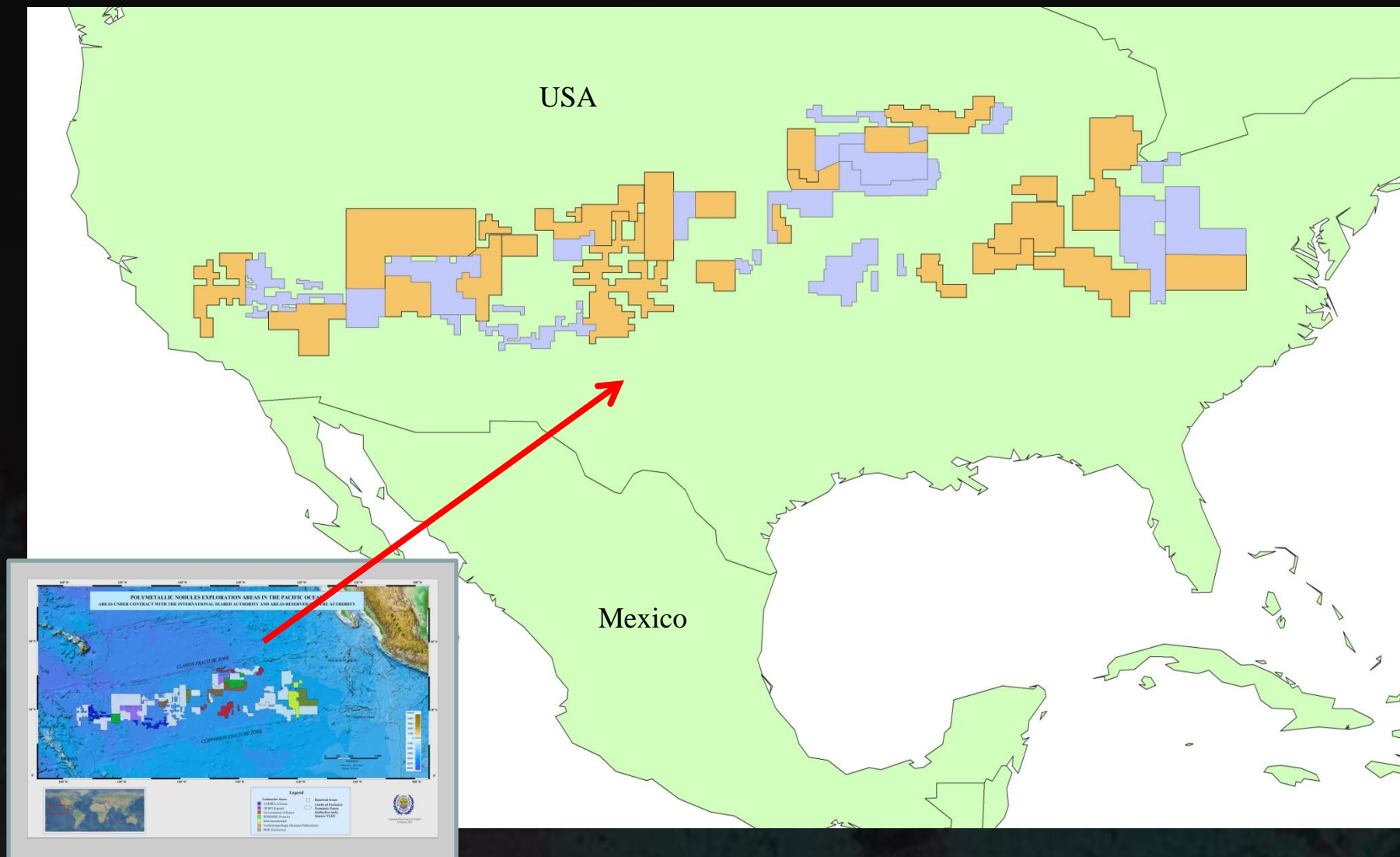
INTERNATIONAL SEABED AUTHORITY  
POTENTIAL PRESERVATION REFERENCE ZONES IN THE CLARION-CLIPPERTON FRACTURE ZONE  
MAP 3: PROPOSED PRZs ROTATED AND SHIFTED (EXCEPT ZONE 5 AND 6)  
27 June, 2008



- Contractor Area
- Reserved Area
- Area under Application for Exploration
- Proposed Reference Impact Zone



Indicative area comparison I: Polymetallic nodules exploration areas under contract with the Authority (blue) and areas reserved for the Authority (orange) in the Pacific Ocean shifted over North America

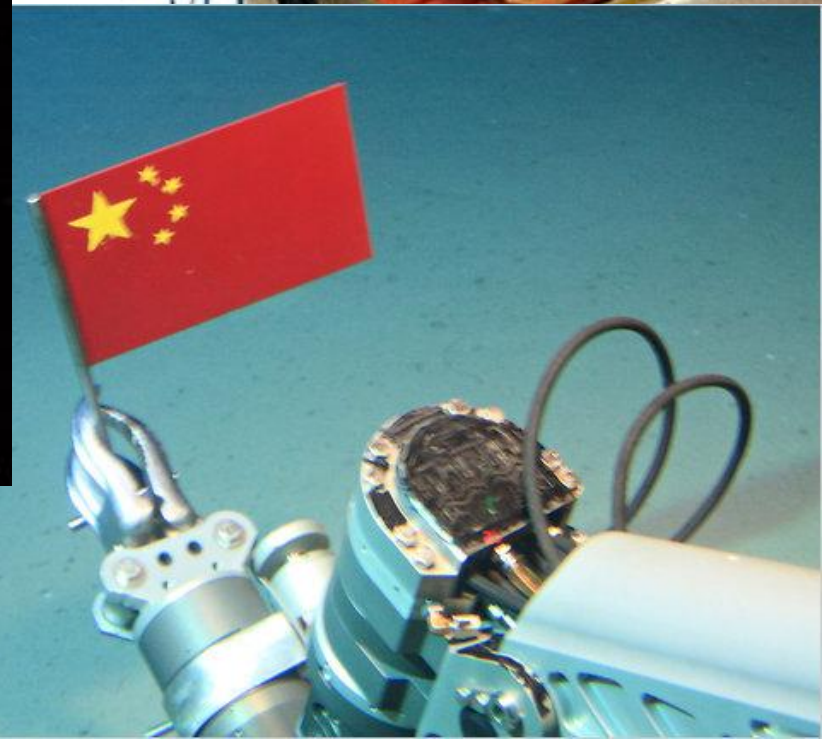
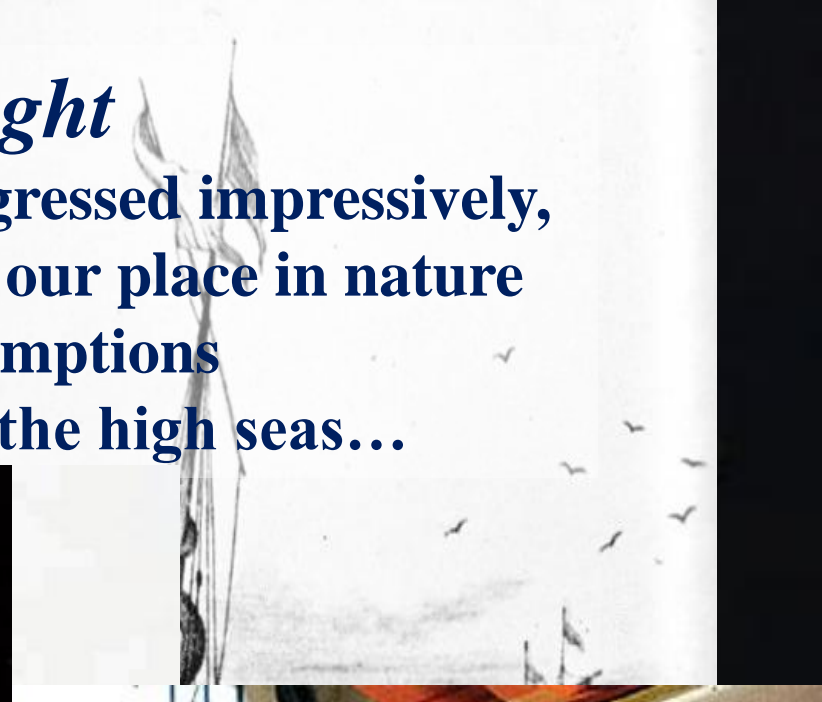


# Summary

- **High seas areas account for 64% of the oceans**, almost half the surface of the planet, 95% of the biosphere...
- **Human uses have intensified** in offshore / high seas areas;
- UN General Assembly and the Convention on Biological Diversity have both passed **international resolutions to protect significant & vulnerable high seas areas**;
- Some **high seas MPAs** are now being designated;
- **GOBI** (Global Ocean Biodiversity Initiative) is one international scientific response to support further protection.

## *Final thought*

**Although our science has progressed impressively,  
the time has come to rethink our place in nature  
and the legal assumptions  
that shaped our laws on the high seas...**





**Thank you to the many colleagues who have shared ideas and slides. Thank you also to ELI for hosting this event and inviting me to speak.**

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