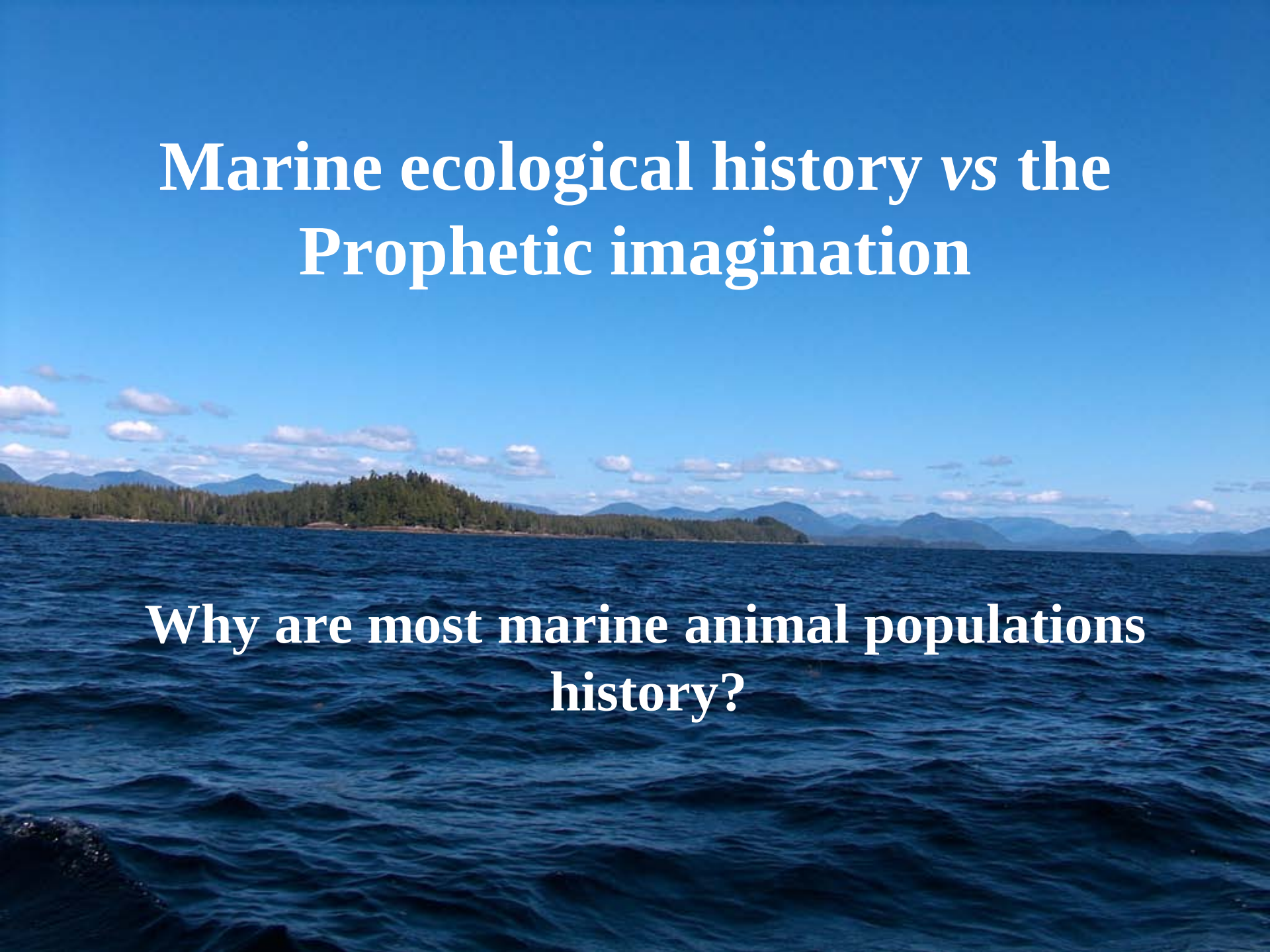


Marine ecological history *vs* the Prophetic imagination

Why are most marine animal populations history?

Ancestral relationships

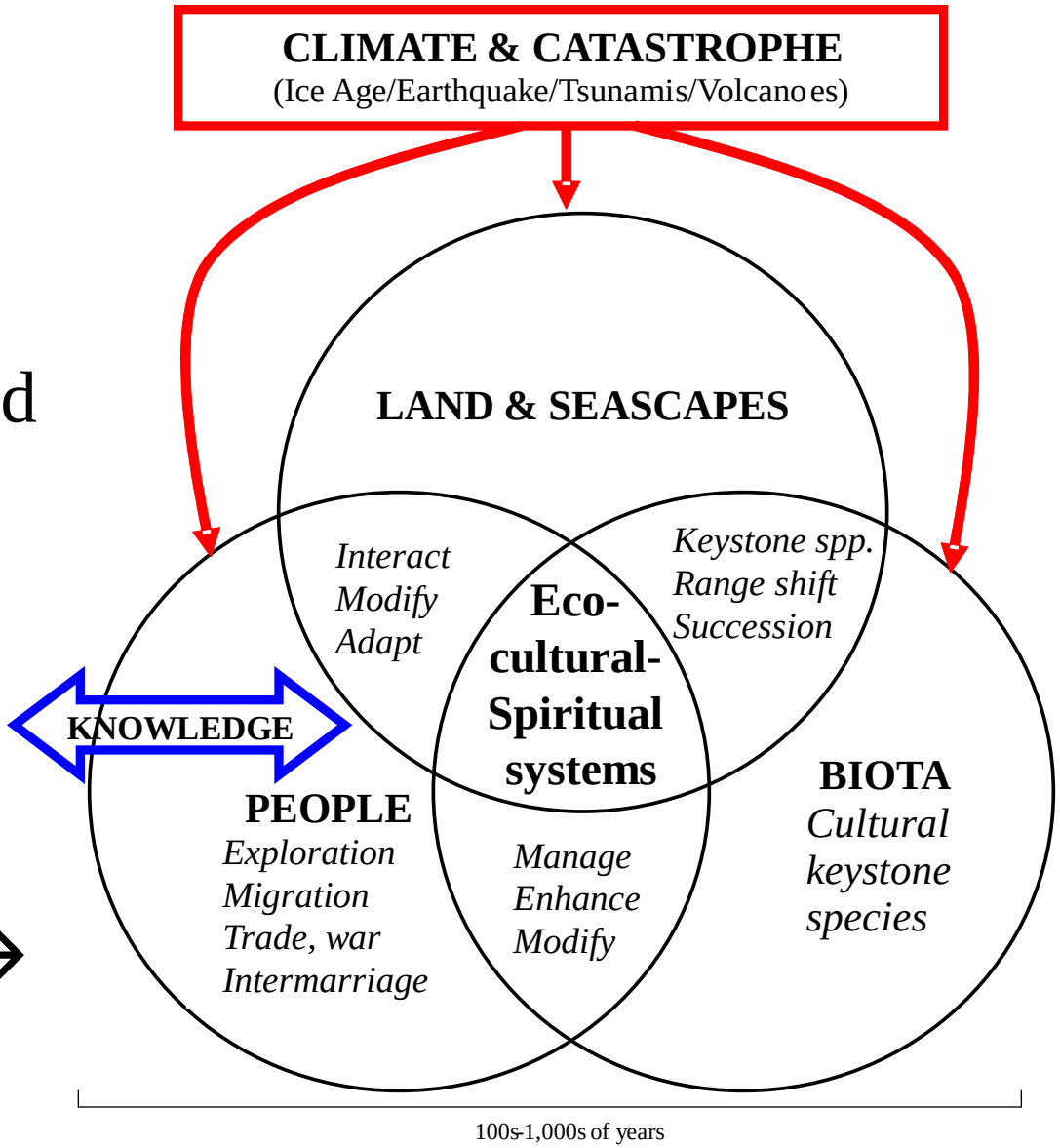
- Our distant ancestors harvested fish and shellfish between 2.5 and 1.7 million years ago (Erlandson 2001; Broadhurst *et al.* 2007);
- Their fish diet is reflected in our brain chemistry—may have made us human (Eaton & Eaton 2000—*aspiring scholars take note*);
- Lands, waters and their creatures have nurtured and sustained human cultures since the dawn of (human) time;
- Relationships older than human memory persist in origin stories, ceremonies, names and crests.

"Wildlife aren't just animals. They are our medicine, our clothes and our relatives. Wildlife are sacred." Salish Elder P. Pierre cited in Senos *et al. (*2006).

A really long conversation

People, environment and biota shape each other (Mann 2005).

7,000 languages x diversity of species, lands, waters, climate → 'eco-social-spiritual' diversity.



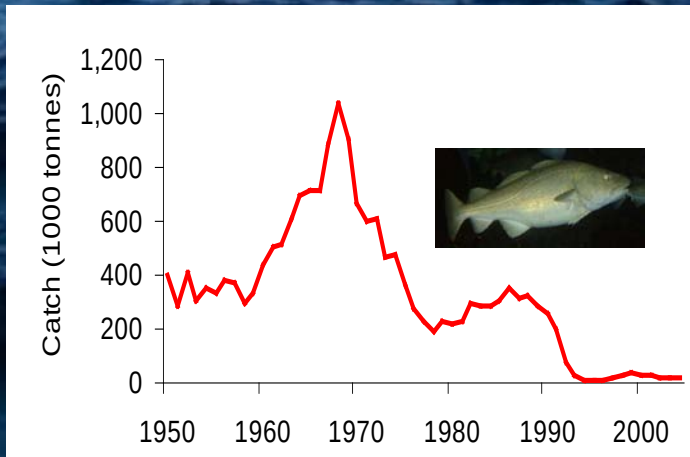
Interaction between people, territory, biota and 'surprise' (Hollings 1996).

From relationship to ratio

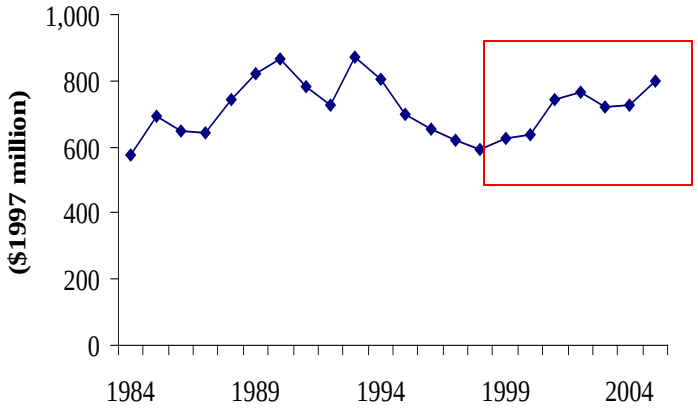
- Our relationship with the ocean is intellectual, physical, emotional and spiritual (4D);
- Privileging the intellectual and physical (economic) dimension underlies separation & depletion.

$$\delta > 2f'(0)$$

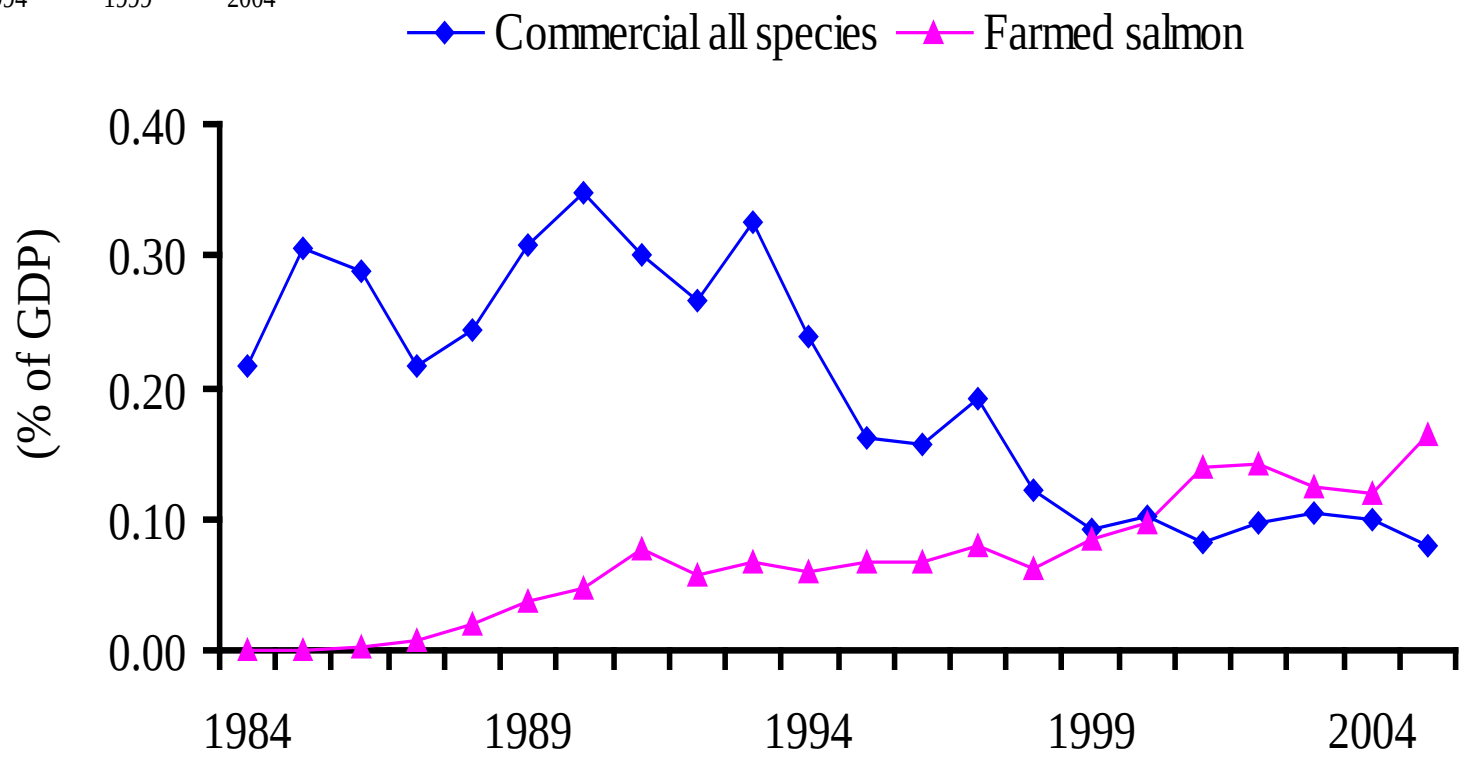
Clark 1973



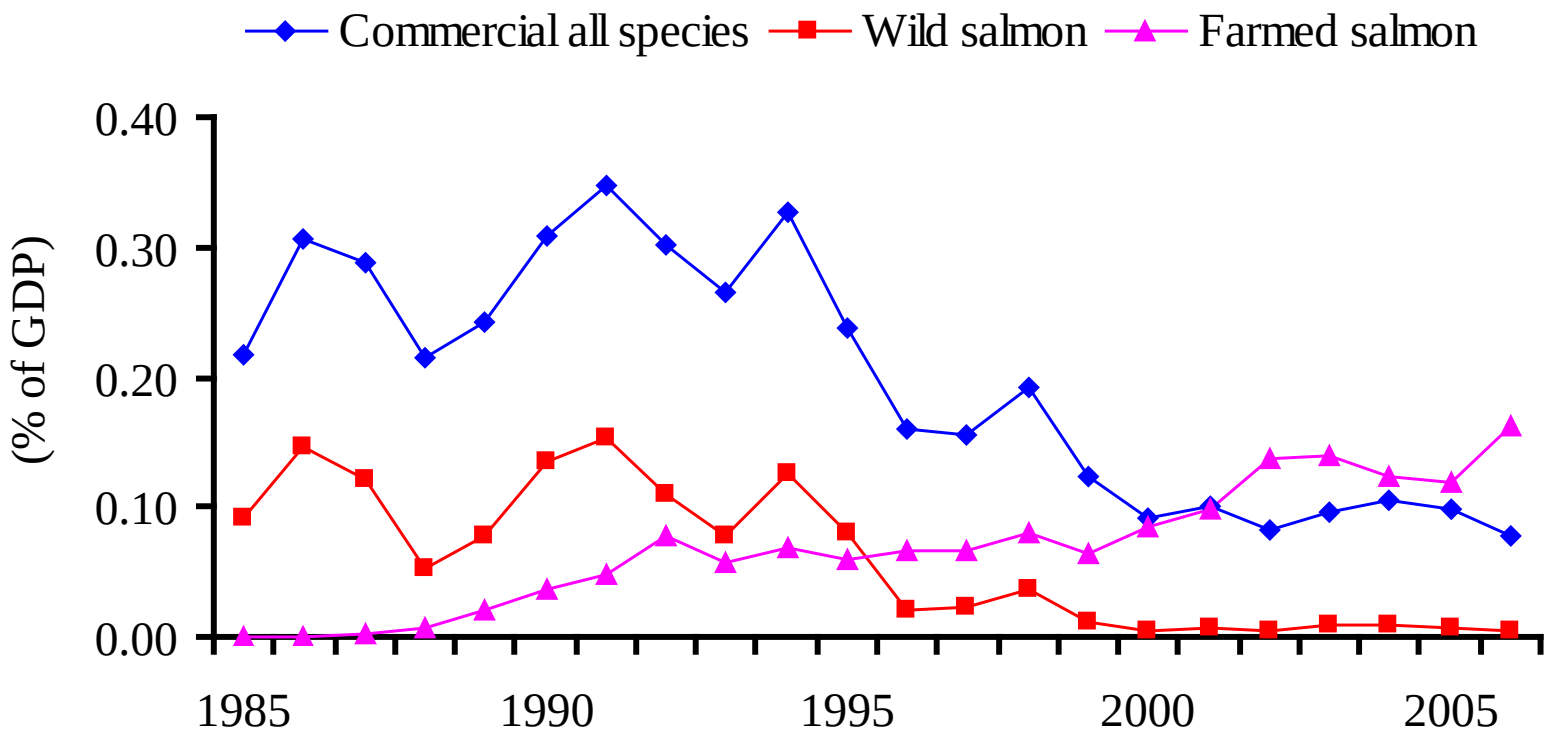
A “comeback” in the BC ‘Fisheries and Aquaculture sector’



- Farmed salmon is the only ‘growth’ sector;
- Commercial fisheries *for all species* are now ~ 1/1000th part of GDP.



Wild salmon barely register



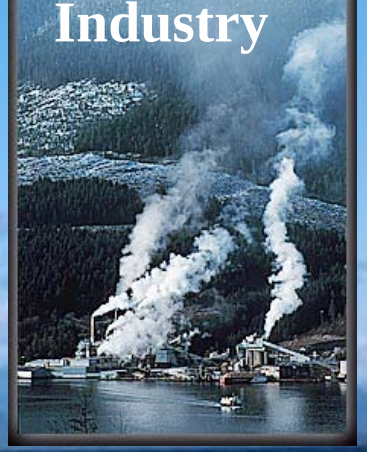
A few of the 35 million 2010 Fraser River Sockeye salmon

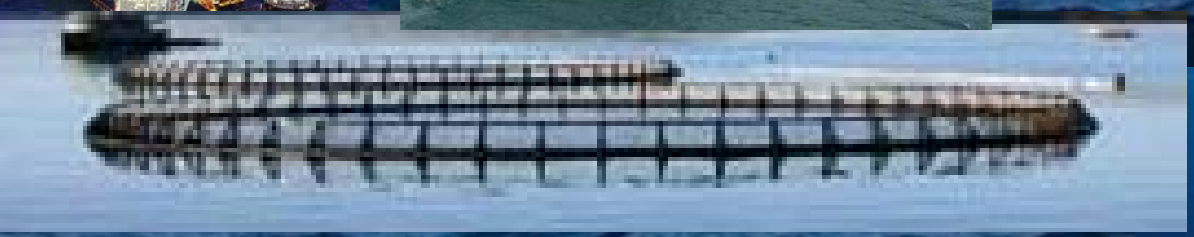
- http://picasaweb.google.com/s.klain/SockeyeAdamSRiver#slideshow/5531825645666298594

Fisheries as percentage of GDP

Country	Year	% GDP	Source (and remarks)
Iceland	2002	12.00	(FAO n.d.)
Indonesia	2004	2.40	(FAO n.d.)
Norway	2002	0.70	(FAO n.d.) (Fishing, sealing, whaling and aquaculture)
USA	2005	0.30	(FAO n.d.) (Incl. forestry and hunting)
Canada	2006	0.26	(Gardner Pinfold 2009 Table 5.3) (Excluding recreational fisheries)
Japan	2006	0.29	(FAO n.d.; Japan n.d.)
UK		0.21	(FAO n.d.)

Undervaluing ecosystems is now the greatest threat to sustainability



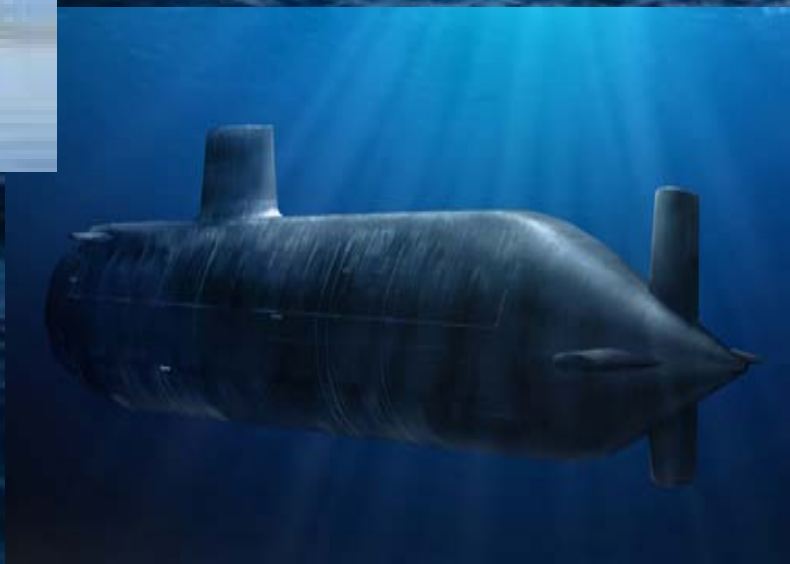


Gas hydrates;

Gravel mining;

CO_2

Wild fish sanctuary



‘Penalty metric’

- Fisheries violation used to incur penalties from banishment to death (Kittinger this meeting);
- Current penalties seem derisory, but are probably ‘in scale’ with GDP contribution;
- EU fisheries ~ carrot industry;
- But what about ‘ecosystem services’? Doesn’t that revalue nature?
- Aren’t cultural and spiritual values included?

"Ecosystem services"

Functions, goods and services of natural and semi-natural ecosystems

	Functions	Ecosystem processes and components	Goods and services (examples)
	Regulation Functions	*Maintenance of essential ecological processes and life support systems*	
1	Gas regulation	Role of ecosystems in bio-geochemical cycles (e.g. CO_2/O_2 balance, ozone layer, etc.)	1.1 UVb-protection by O_3 (preventing disease). 1.2 Maintenance of (good) air quality. 1.3 Influence on climate (see also function 2.)
2	Climate regulation	Influence of land cover and biol. mediated processes (e.g. DMS-production) on climate	Maintenance of a favorable climate (temp., precipitation, etc) for, for example, human habitation, health, cultivation
3	Disturbance prevention	Influence of ecosystem structure on dampening env. disturbances	3.1 Storm protection (e.g. by coral reefs). 3.2 Flood prevention (e.g. by wetlands and forests)
4	Water regulation	Role of land cover in regulating runoff & river discharge	4.1 Drainage and natural irrigation. 4.2 Medium for transport
5	Water supply	Filtering, retention and storage of fresh water (e.g. in aquifers)	Provision of water for consumptive use (e.g.drinking, irrigation and industrial use)
6	Soil retention	Role of vegetation root matrix and soil biota in soil retention	6.1 Maintenance of arable land. 6.2 Prevention of damage from erosion/siltation
7	Soil formation	Weathering of rock, accumulation of organic matter	7.1 Maintenance of productivity on arable land. 7.2 Maintenance of natural productive soils
8	Nutrient regulation	Role of biota in storage and re-cycling of nutrients (eg. N,P&S)	Maintenance of healthy soils and productive ecosystems
9	Waste treatment	Role of vegetation & biota in removal or breakdown of xenic nutrients and compounds	9.1 Pollution control/detoxification. 9.2 Filtering of dust particles. 9.3 Abatement of noise pollution
10	Pollination	Role of biota in movement of floral gametes	10.1 Pollination of wild plant species. 10.2 Pollination of crops
11	Biological control	Population control through trophic-dynamic relations	11.1 Control of pests and diseases. 11.2 Reduction of herbivory (crop damage)
	Habitat Functions	*Providing habitat (suitable living space) for wild plant and animal species*	Maintenance of biological & genetic diversity (and thus the basis for most other functions)
12	Refugium function	Suitable living space for wild plants and animals	Maintenance of commercially harvested species
13	Nursery function	Suitable reproduction habitat	13.1 Hunting, gathering of fish, game, fruits, etc. 13.2 Small-scale subsistence farming & aquaculture
	Production Functions	*Provision of natural resources*	

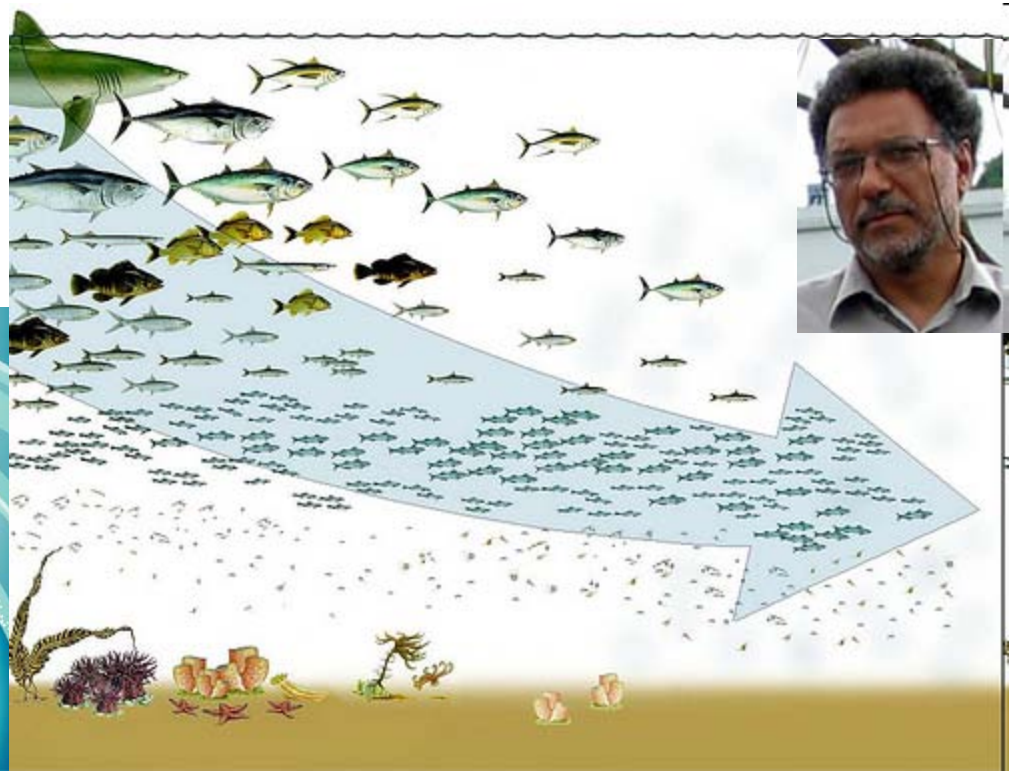
Ecosystem services II

14	Food	Conversion of solar energy into edible plants and animals	14.1 Building & Manufacturing (e.g. lumber, skins). 14.2 Fuel and energy (e.g. fuel wood, organic matter). 14.3 Fodder and fertilizer (e.g. krill, leaves, litter).
15	Raw materials	Conversion of solar energy into biomass for human construction and other uses	15.1 Improve crop resistance to pathogens & pests. 15.2 Other applications (e.g. health care)
16	Genetic resources	Genetic material and evolution in wild plants and animals	16.1 Drugs and pharmaceuticals. 16.2 Chemical models & tools. 16.3 Test- and essay organisms
17	Medicinal resources	Variety in (bio)chemical substances in, and other medicinal uses of, natural biota	Resources for fashion, handicraft, jewelry, pets, worship, decoration & souvenirs (e.g. furs, feathers, ivory, orchids, butterflies, aquarium fish, shells, etc.)
18	Ornamental resources	Variety of biota in natural ecosystems with (potential) ornamental use	
	Information Functions	*Providing opportunities for cognitive development*	
19	Aesthetic information	Attractive landscape features	Enjoyment of scenery (scenic roads, housing, etc.)
20	Recreation	Variety in landscapes with (potential) recreational uses	Travel to natural ecosystems for eco-tourism, outdoor sports, etc.
21	Cultural and artistic information	Variety in natural features with cultural and artistic value	Use of nature as motive in books, film, painting, folklore, national symbols, architect., advertising, etc.
22	Spiritual and historic information	Variety in natural features with spiritual and historic value	Use of nature for religious or historic purposes (i.e. heritage value of natural ecosystems and features)
23	Science and education	Variety in nature with scientific and educational value	Use of natural systems for school excursions, etc. Use of nature for scientific research

Adapted from Costanza et al. (1997), De Groot (1992), De Groot et al. (2000).

Is doom the only business of prophets? (A Worm's eye view of the future)

- "…global collapse of all taxa currently fished by the mid–21st century" (Worm *et al.* (2006).



The Prophetic Imagination

- Human and ecological poverty go hand in hand—nature as the new poor (McFague 2009; HMAP/Sea Around Us);
- The *Prophetic Imagination* combines a radical critique of grief, agony, oppression and despair;
- Hope of renewal when there is no grounds for hope (Brueggemann 2001);
- And a vision of justice beyond what can be contemplated under the present system;
- A lot of history, reconstruction and deconstruction!

The CSI of it all

- Today's fisheries are the result of 100s of years of perverse evolutionary pressures (Haggan *et al.* 07);
- Cheap oil a major driver of depletion;
- Depletion spawns restrictive licensing and quota systems;
- Which erode ecosystem knowledge;
- Create allocation conflicts;
- Spawn excess capital investments;
- 'Collateral damage' of fishers forced to behaviours they know to be wrong;
- Entire wit and wisdom goes to maintain *status quo*.

Subsidies

- Global subsidies (industry, agriculture, etc.) = , $US 1 trillion, 1/3 to production and consumption of fossil fuel (TEEB 2010);
- Global fishing subsidies ~30 billion or 25% of operating cost of fleet 2x necessary to catch remaining 1-10%;
- $2billion in licenses, quota and vessels in BC.

Who cares?

- Fisheries values don't justify cost of EBM. 160m Ocean Tracking Network *vs* $US 2billion in annual ocean tech, Foundation funding critical, (Sloan, Pew, Moore and others; but programs sunset. Communities of prophets disperse. 2 options:

1. Inducing ocean industry to tweak their $2billion annual investment to generate ecological data—their incentive faster EIA, good corporate cits, green tech to sell (Haggan *et al*, 2007);
2. Mobilize public support for the 'subjective' emotional/spiritual relationships at risk.

Snakebit by science and economics

- *"…when economic well-being and the passion for scientific discovery] are abstracted from (and set above) the complex of intangible values in which they are embedded then the sense of connectedness is shredded. It leaves **many people** confused and dispirited, unable to justify their deepest feelings. That in turn can lead to a kind of moral paralysis in which people do not act to protect what they care about because, faced with the perceived invincibility of scientific and economic argument, they think they cannot legitimately explain why they care…"*
  Harmon Putney (2003) [my emphasis].

Who are these “many”

- Words like “many”, “others’ and “one” in scientific and valuation studies indicate constituencies who exist outside the authors’ realm:
  - “…**many persons**…value wilderness…[**others**]…place a value on the mere existence of biological and/or geomorphological variety and its widespread distribution (Krutilla 1967);
  - “**Many people** believe that ecosystems have value quite apart from any human interest in explicit goods or services…comprehending this intrinsic value does not trouble most individuals, assessing it is problematic.” (NRC 2005 p.87),
  - **many people** ascribe ecological, sociocultural, or intrinsic values to the existence of ecosystems and species and, sometimes, to inanimate objects such as ‘‘sacred’’ mountains.” (DeFries *et al.* 2005).

Coastal values/Eco-tourism

- Eco-tourism fastest growing sector, 25% of global market 2010, valued at US473 billion;

> ½ US population in coastal states—17% of landmass;

- Marine eco-tourism $US 46 billion (Cisneros-Montemayor *et al*. 2010);
- $10billion in CA *vs* 6 in port traffic and 550 m in fisheries and aquaculture;
- How much of this value is attributable to emotional and spiritual connection?
- Why did *Pirates of the Caribbean* outgross all other movies? Sure Depp is cute, but you'd have to give some credit to the fascination of the sea.

Ecological and Darwinian Debt

- Global fish trade moves 40% of protein from S to N;
- The World Council of Churches (2009) Statement on ecological debt acknowledged complicity in depletion of resources and called for restoration and forgiveness of "illegitimate" developing world debt;
- Add "Darwinian Debt" (Allendorf 2008), where fisheries-driven size reduction may take 100s to 1000s of years to reverse (Therkildsen *et al*. this meeting; N. Sea ling—Poulsen 2007);
- WCC represents 560 million Christians—ones with the big cars;
- 11 faiths in Alliance of Religions and Conservation own 7% of earth's surface, role in 54% of all schools, 6-8% share of investment market (Wolfensen 2003);
- Adherents control a vast amount of planetary wealth—if mobilized by state of ocean could liberate amounts to dwarf the recent bank bailout;
- Some signs of hope from Achim Steiner/UNEP.

The Huxley/Asubel axis

- Julian was wrong about fish; but Jesse's HMAP snapshot showed the ocean is more diverse than we can imagine;
- Trophic levels may not be the answer, but nor is returning to single-species management;
- Indigenous and local systems were rejected as 'primitive superstition' (idolatry) and inefficient economic practices;
- "Idolatry'-the perception of worship of salmon or other species' as taking part for the whole;
- Applies equally to single species or ecosystem models as *descriptions* of reality, *vs* ways to build collective understanding of the system and the effect of cumulative actions. As a way to ask questions, a model becomes an act of worship of the impossible abundance of God/Allah/The Creator, or of a universe whose goal is 'eco-social-spiritual' diversity.

The sacred as flourishing

- *Emergent* from relationships built over the lifetime of individuals, communities and cultures;
- *Productive* of bio-cultural diversity as different ways of being in the world (not failed attempts at modernity);
- *Recognized*, not 'assigned' by an external valuer;
- *Expressed* as relationship and 'belonging' (ubiquity of golden rule);
- *Consistent* with respectful, generous and grateful use, i.e., no 'use' / 'non-use' distinction; but,
- *Resistant* to depletion, extinction and damage;
- *Resistant* to monetary equivalents (although possibly *measurable locally* in strength of attachment/depth of grief and despair);
- *Evident* in acts of "eco-justice" e.g., salmonid enhancement in BC;
- *Necessary* for conservation, restoration and flourishing.

The Sea Ahead

- The sacred matters to all of us;
- It will not do to wait for Aboriginal people to put the spiritual value of nature on the table;
- Scientists of all stripes need to repossess the language or grief, oppression, loss and, above all, that we do what we do because these are things we love and will miss desperately if they cease to be.
- We cannot ask scientists to become theologians.
- We can incorporate spiritual leaders, artists, poets and painters to engage ‘these many’ in support of our renewal projects

Finally, a word from our sponsors…

’Erring on the side of caution

Thank You

Acknowledgements

- HMAP for funding support for this trip;
- The creatures of the sea, particularly those of Belfast Lough and the Pacific Northwest;
- Friends, colleagues and mentors too numerous to mention.