

Harvest Strategies for Data-Poor Fisheries

Jeremy Prince

**Exploring Tools for Improving Management of
Data Poor Stocks Workshop**

23-44 February 2011

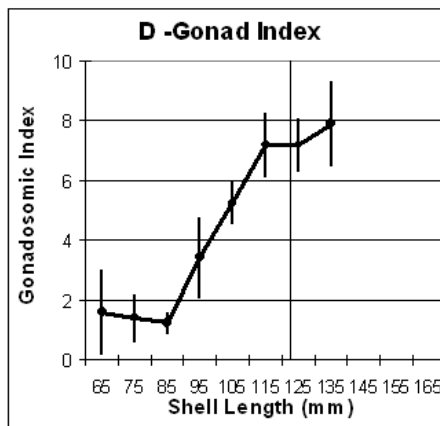
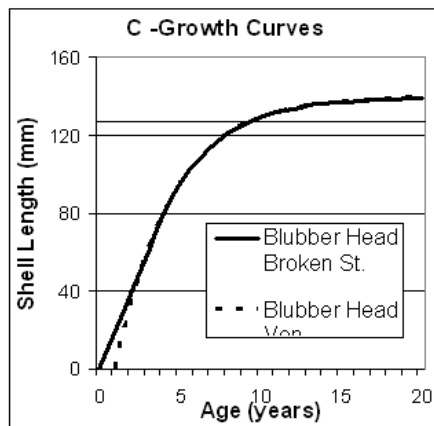
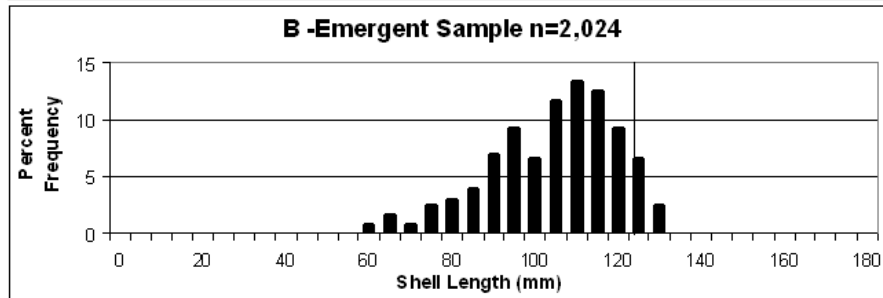
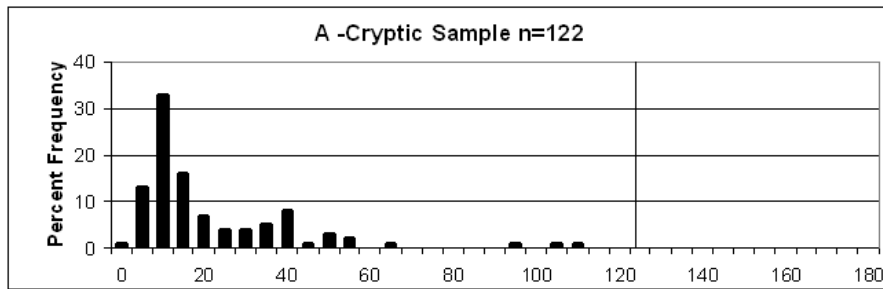


Outline

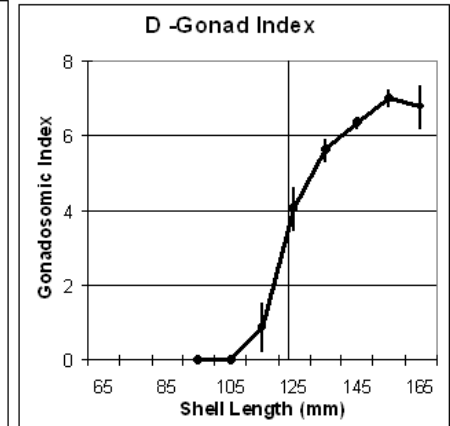
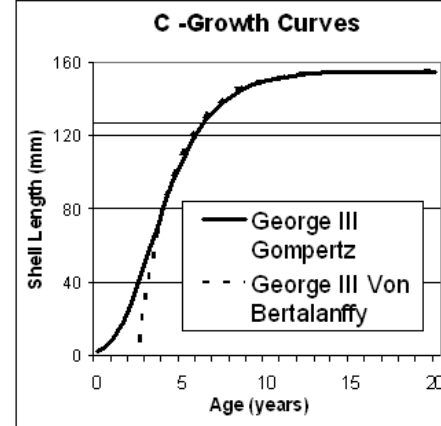
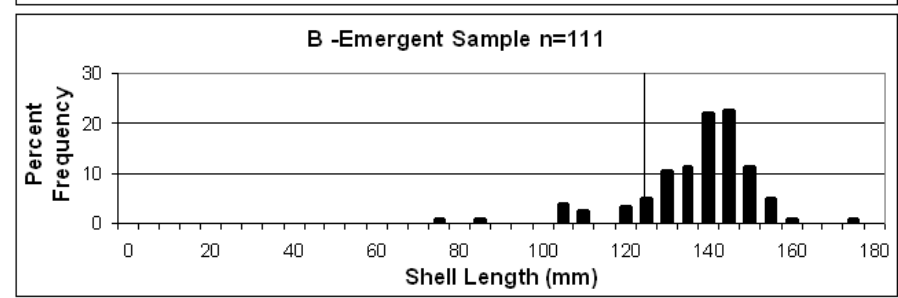
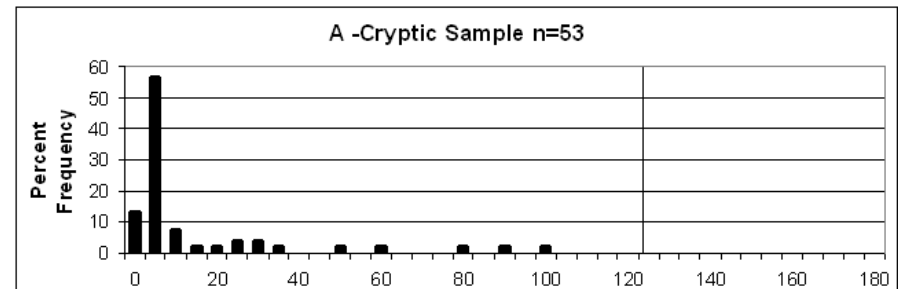
- **Spatial Complexity & Data Paucity**
- **International Overview**
 - Japan
 - Chile
 - Oceania
 - Southeast Asia
- **Developing Solutions**
- **Case Study**

Two Populations of Blacklip Abalone *Haliotis rubra*

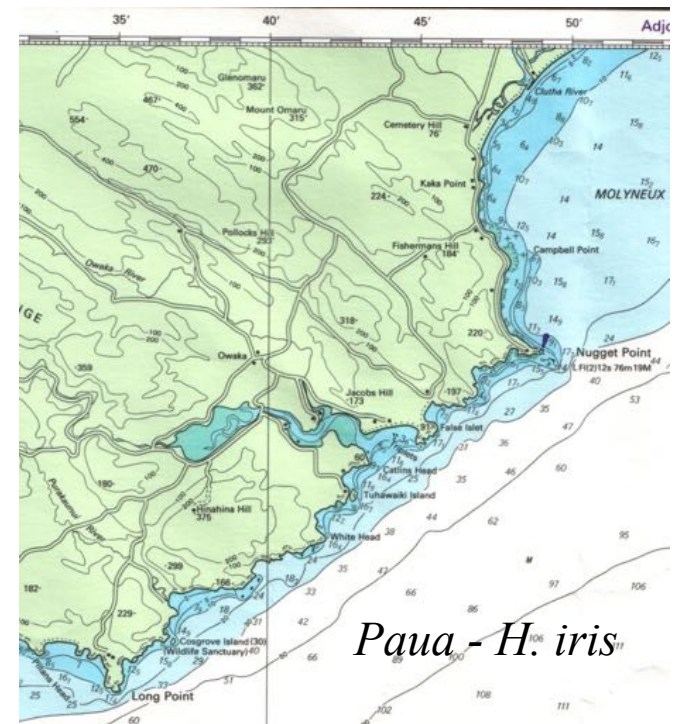
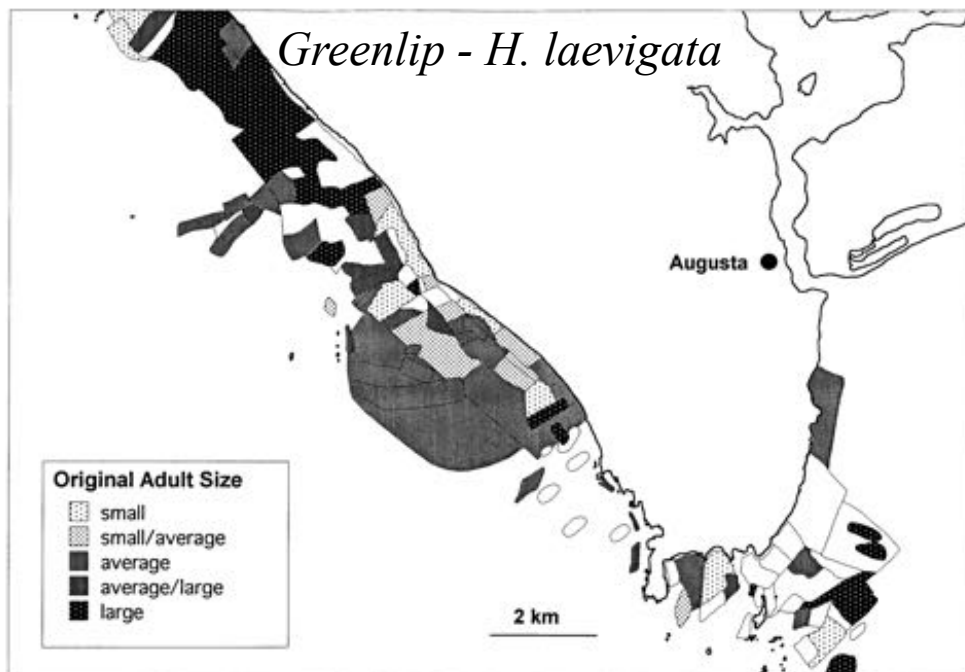
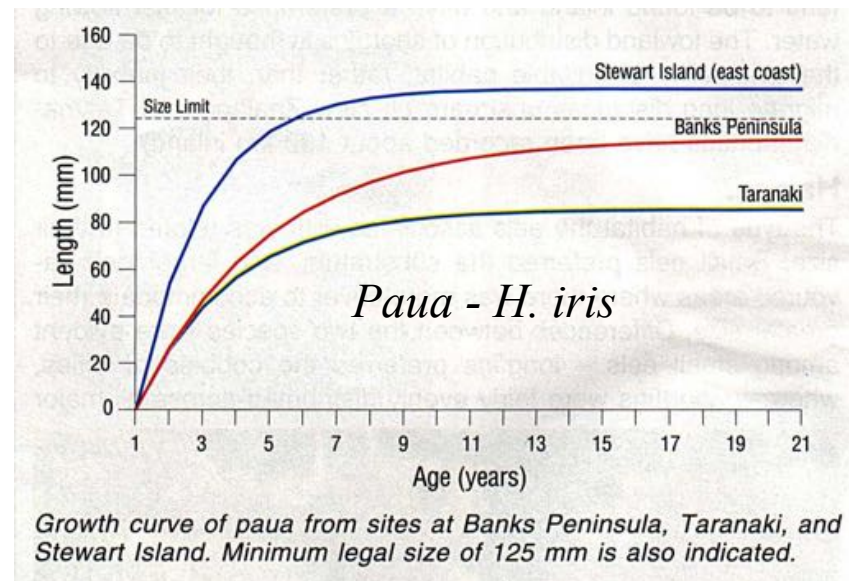
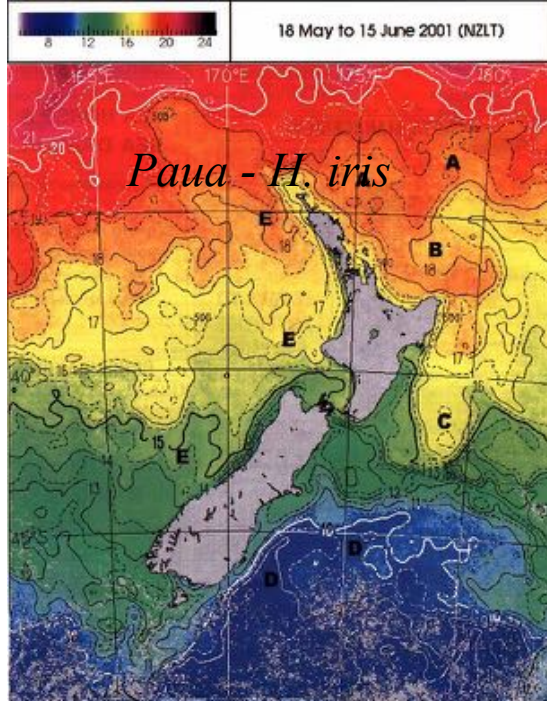
Blubber Head



George III Rock

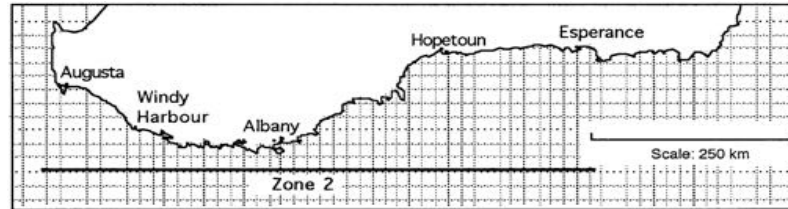


Prince, J.D. (2005) Combating the tyranny of scale for haliotids: Micro-management for micro-stocks. *Bulletin of Marine Science* 72:557-577.

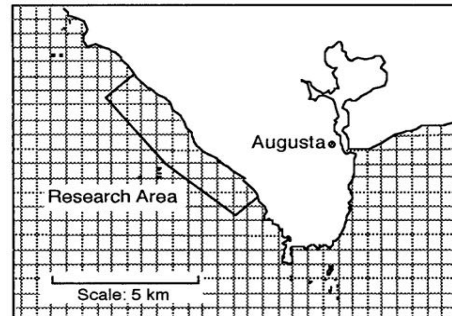


The Tyranny of Scale

**Regional Scale of
Management and
Enforcement**

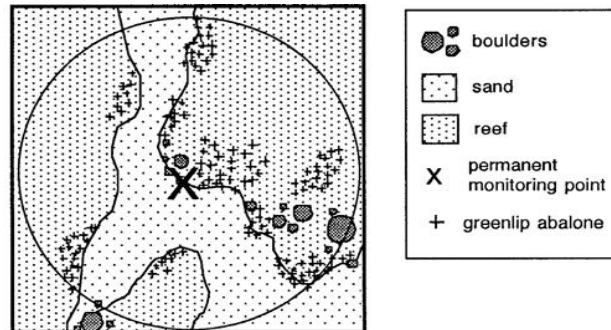


**Local Scale of
Data Collection
and
Stock Assessment**

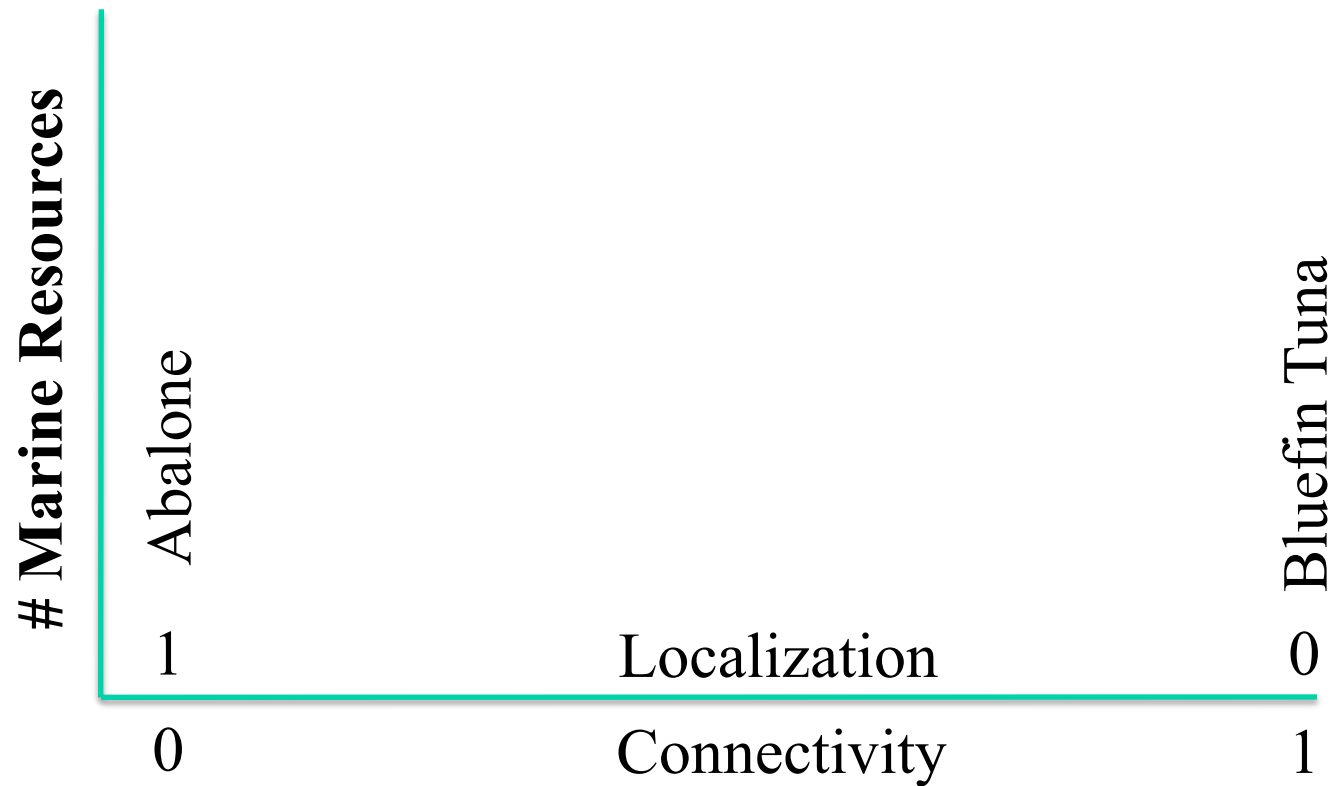


**The Challenge:
Managing at the
Scale of Functional
Stocks requires
Motivated Diver
Behaviour**

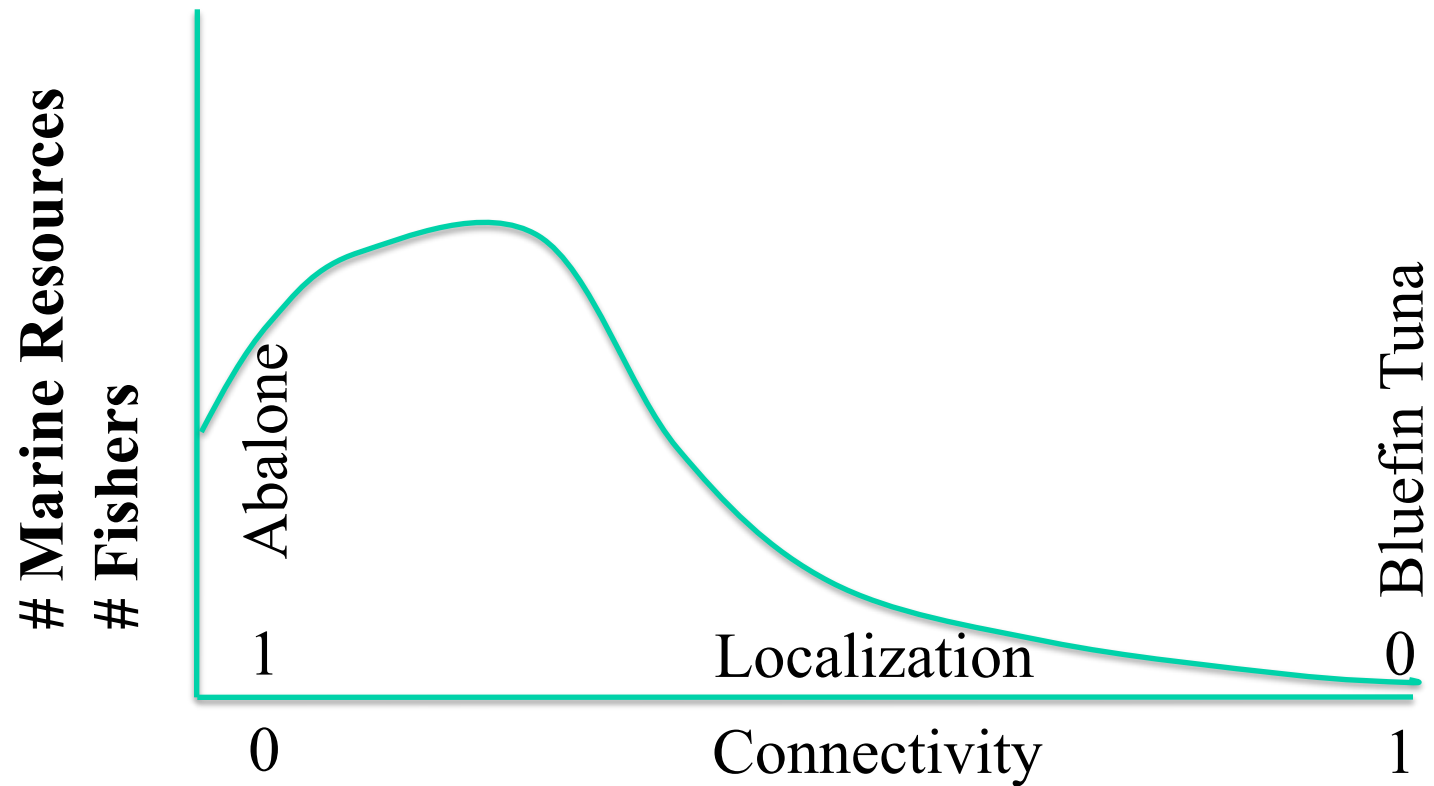
10m Radius Survey Circle



Localization Index (1-Connectivity)

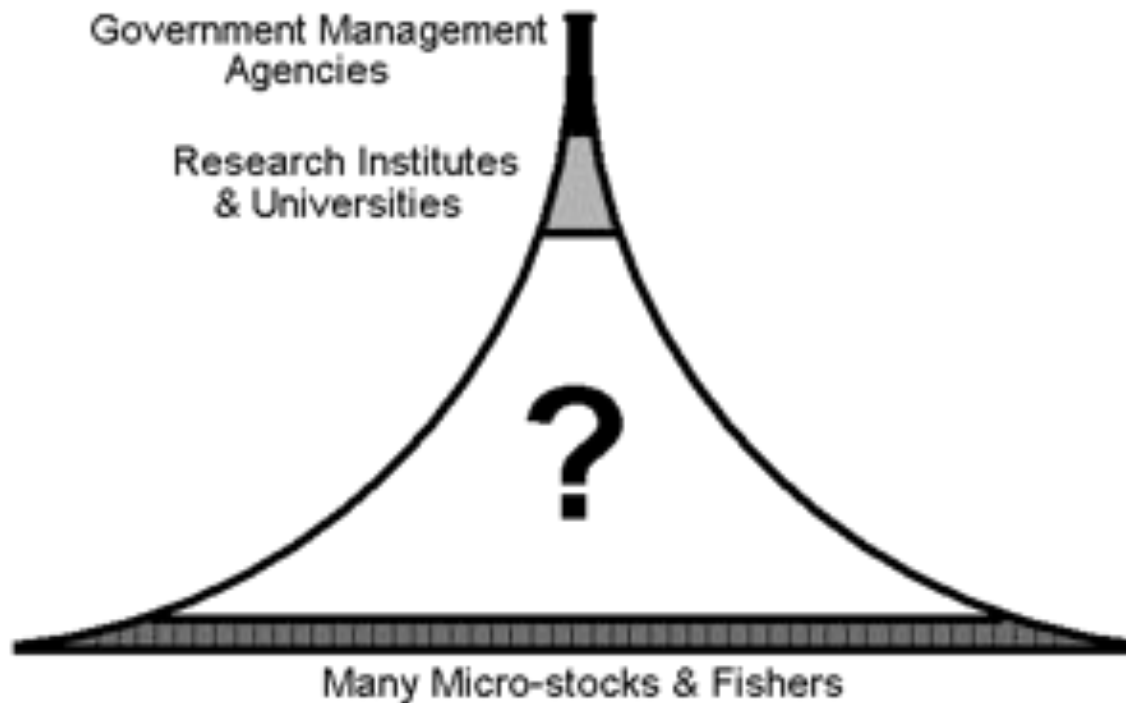


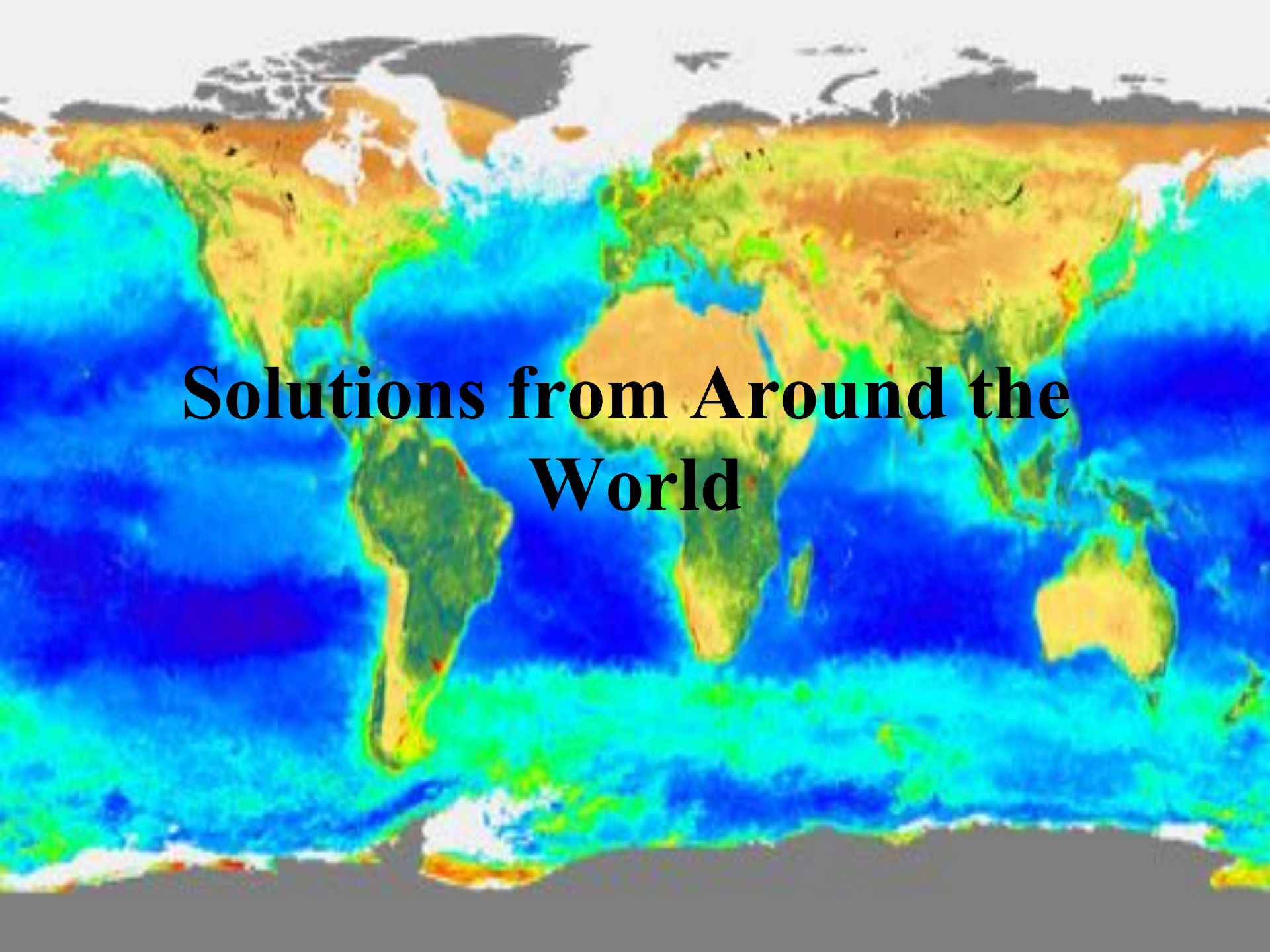
Localization Index (1-Connectivity)



The Problem

“Too much environment and not enough taxpayers to pay for it all.”





Solutions from Around the World

Japan

- Yamamoto, T. 1995. Development of a community-based fishery management system in Japan. *Marine Resource Economics* 10: 21-34.
 - Uchida, H. and J.E. Wilen. 2004. Japanese coastal fisheries management and institutional designs: a descriptive analysis. Pages 1-11 *in* Y. Matsuda & T. Yamamoto, editors. *Proceedings of the Twelfth Biennial Conference of the International Institute for Fishery Economics and Trade*. Corvallis: International Institute for Fishery Economics and Trade.
 - Makino, M. and H. Matsuda. 2005. Co-management in Japanese coastal fisheries: institutional features and transaction costs. *Mar. Policy* 29: 441–450.
-
- Local fishing rights recognized by law; TURFs
 - Local fishers identifying management issues and addressing them through species- or gear-focused groups
 - Local extension scientists work with local fishers
 - Governmental structures that harmonize management strategies of local and regional scales

The Renaissance of Community-Based Marine Resource Management in Oceania

- Johannes, R.E. (1998) Government-supported, village based management of marine resources in Vanuatu. *Ocean and Coastal Management* 40, 165-186.
- Johannes R.E. (2002) The renaissance of Community-based Marine Resource Management in Oceania. *Ann. Rev. Ecol. Syst.* 33: 317-40.
- Organically growing movements towards village based management of coastal marine resources began in 1990s in Vanuatu, Fiji, Samoa, Cook Islands, Palau, Hawaii, Tuvalu.
- In PNG Community Based Fisheries Management (CBFM) recognized in policy and legislation as the future for coastal artisanal fisheries

Village Based Rule-of-Thumb Coral Reef Management

Fiji

- Gillnetting closures
- Mangrove protection
- Beche-de-mer closures
- Restrictions on spearfishing with SCUBA
- Banning night spearfishing
- Fishing area closures
- Total fishing bans
- Prohibition of Destructive fishing (Dynamite)
- Closures for Reef Invertebrates
- Rotational Fishing

Vanuatu

- Fishing ground closures (18)
- Trochus closures (11)
- Ban on taking turtles & eggs (11)
- Beche-de-mer closures (10)
- Spearfishing controls (8)
- Controls on using fishing nets (7)
- National ban on dugong hunting

Samoa

- 100%- Ban use of chemicals and dynamite to kill fish
- 96%- Ban use of traditional plant-derived fish poisons
- 86%- Establish small protected areas in which fishing is banned
- 82%- Ban other destructive fishing methods (e.g. coral smashing)
- 73% - Enforce (national) mesh size limits on nets
- 75%- Ban dumping of rubbish in lagoon
- 39%- Set minimum size limit for fish
- 39% - Ban coral collection for export
- 30%- Ban removal of mangroves
- 16%- Restrict of ban flashlights for night spearfishing

Lessons from Around the World

Oceania

- Johannes, R.E. (1984) Marine conservation in relation to traditional life-styles of tropical artisanal fishermen. *Environmentalist* 4(suppl. 7): 30–35.
 - Johannes R.E. (1994) Design of tropical nearshore fisheries extension work beyond the 1990s. Pages 162–174 *in* R. South, D. Goulet, S. Tuquiri, and M. Church, eds. *Traditional marine tenure and sustainable management of marine resources in Asia and the Pacific*. International Ocean Institute—University of the South Pacific, Suva, Fiji.
 - Johannes, R.E. (1998) The case for data-less marine resource management: examples from tropical nearshore finfisheries. *Trends Ecol. Evol.* 13: 243–246.
-
- Exclusive access rights; customary marine tenure; territorial use rights (TURFs)
 - Extension workers trained to collect and use fisher knowledge and to facilitate development of local management strategies by villages
 - Data-less management: local fisher knowledge and generalized expert knowledge combined to develop simple management strategies for conserving local spawning biomass

South East Asia

- Pomeroy, R.S., B.M. Katon and I. Harkes. 2001. Conditions Affecting the Success of Fisheries Co-management: Lessons from Asia. *Marine Policy*. 25: (3): 197-208

Community level

- Appropriately scaled and defined boundaries
- Clearly defined membership
- Group homogeneity
- Participation by those affected
- Leadership
- Empowerment, capacity building, and social preparation

Community organizations

- Long-term local government support
- Property rights
- Adequate financial resources
- Partnerships and partner sense of ownership of process

Accountability

- Conflict-management mechanisms
- Clear objectives and defined issues
- Enforcement of management rules

Supracommunity level

- Enabling policy and legislation
- External change agents

Individual and household level

- Individual incentive structure

South East Asia & Oceania

- Macfadyen, G., P. Cacaud, B. Kuemlangan. 2005. Policy and legislative frameworks for com-management. APFIC Regional Workshop on “Mainstreaming” Fisheries Co-management in Asia Pacific. Siem Reap, Cambodia. 9–12 August 2005
- User rights that provide strong incentives for stakeholders to engage
- Recognized local communities of stakeholders
- Leadership and strengthening of community-based institutions to engage with co-management.
- Local political support.
- Formal legislative backing that codifies and helps to enforce community rules and to resolve disputes

Latin America - Chile

- Castilla J.C. et al. (1998) Artisanal “caletas” as units of production and comanagers of benthic invertebrates in Chile. Can. Spec. Publ. Fish. Aquat. Sci. 125:407-423.
- Orensanz J.M., A.M. Parma, G. Jerez, N. Barahona, M. Montecinos, I. Elias. 2005. What are the key elements for the sustainability of "S-fisheries"? Insights from South America. Bulletin of Marine Science 76:527-556
- Gonzalez, J., W. Stotz, J. Garrido, J. M. Orensanz, A. M. Parma, and A. Zuleta. 2006 The Chilean TURF system: how is it performing in the case of the loco fishery. Bull. Mar. Sci. 78: 499–527.
- Systems that provide the right incentives
- Important role of scientific consultants but requires more participation by fishers and other stakeholders
- Broader definition of data
- Spatially explicit qualitative data more useful than inexplicit quantitative data. Spatially explicit data needs engaged fishers.
- Spatially explicit and experimental management
- Need for simple data driven feedback decision rules to adjust harvest regulations

1. Governance and the Right Incentives

- **Incentive motivates human behavior**
- **Align self interest with resource management.**
- **Dedicated Access Privileges - guaranteed rewards for long term behavior.**
i.e. Stackable Permits, pot licenses, gear-time units, TURF, ITQ or IFQ etc etc.
- The governance system must set appropriate incentives for all parties involved in the fishery.” Hilborn et al. (2004)
- The challenge for the next century lies more in the crafting of local and regional institutions, than in the filling of scientific gaps or on the implementation of novel management measures. Castilla (1997)
- “It would be difficult to overemphasize the importance of some form of limited entry ... to sound fisheries management.” Johannes (1984)

2. A Simple Assessment Toolbox

- **Data-less or Rule-of-Thumb Management:**
 - Simple robust management prescriptions based on local and expert knowledge
 - Precautionary conservation of spawning biomass (SPR) & Habitat
 - Johannes, R.E. (1998) The case for data-less marine resource management: examples from tropical nearshore finfisheries. *Trends in Ecology and Evolution* 13, 243-246.
- **Rapid Assessment:**
 - The Use of Simple Expert Opinion based on Qualitative Indicators of Exploitation / Impact: e.g. Shell shapes and size structure, green reefs
 - Empirical Estimation of Reproductive Potential (SPR)
- **Simple data driven feedback decision rules**
 - SPR Decision Trees

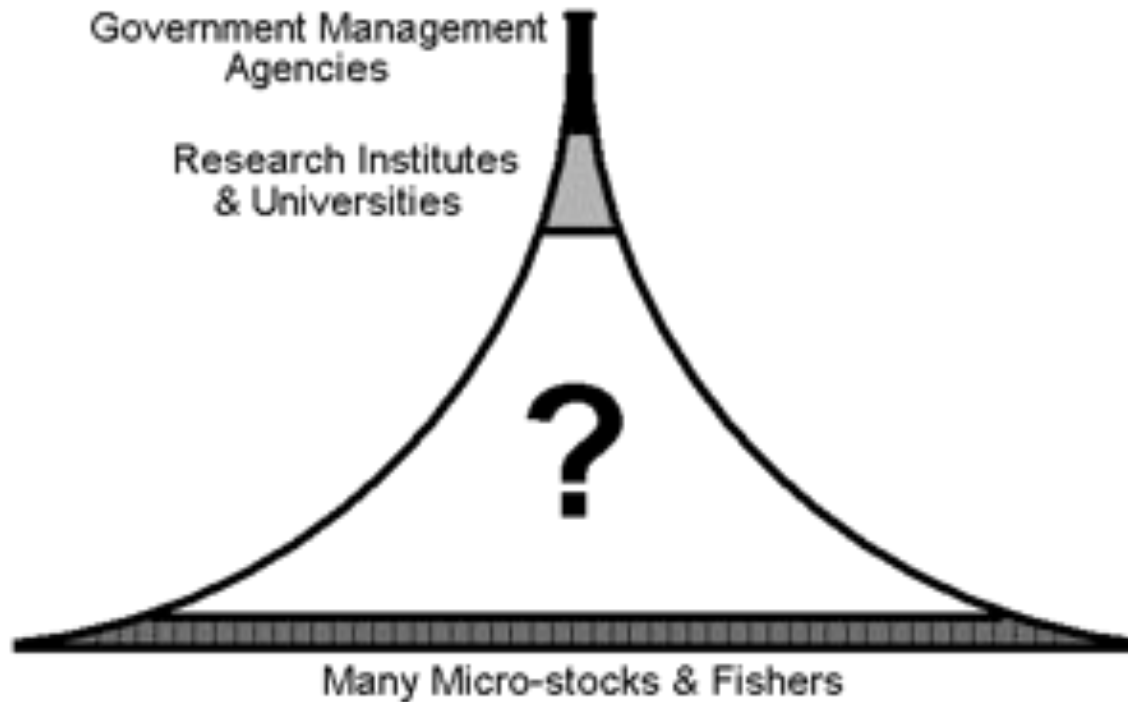
3. Fishing for Knowledge

- **Fishing for profit & knowledge**
- **Responsibility in Return for Access Privilege**
- **Small cost effective changes or additions to normal fishing practice**
- **Large amounts of less precise spatially explicit data are better than small amounts of precise data**

4. Extension Officers

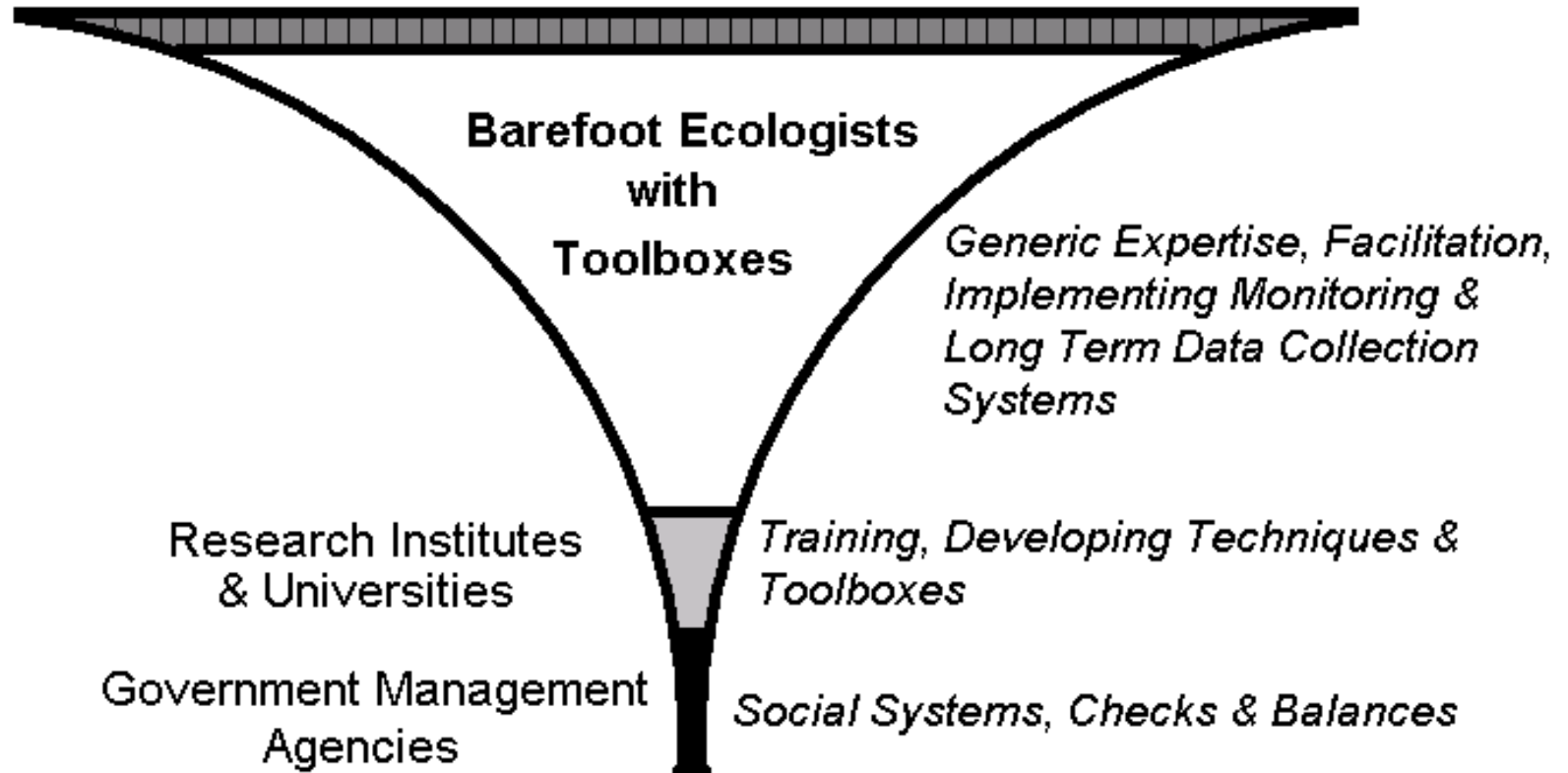
- **Barefoot Ecologist; practical integrated generalists**
- **Agents of Change - Building Social Capital**
- **Empowering Fishing Communities, Families & Individuals to monitor & manage themselves**
- **Skilful Use of Fisher knowledge**
- **Establishing fisher based data collection systems: appropriate technology & social systems rather than “Big Science”**

The Problem



The Solution ?

Many Micro-stocks & Fishers - *Local Experts Fishing for Knowledge & Profit*

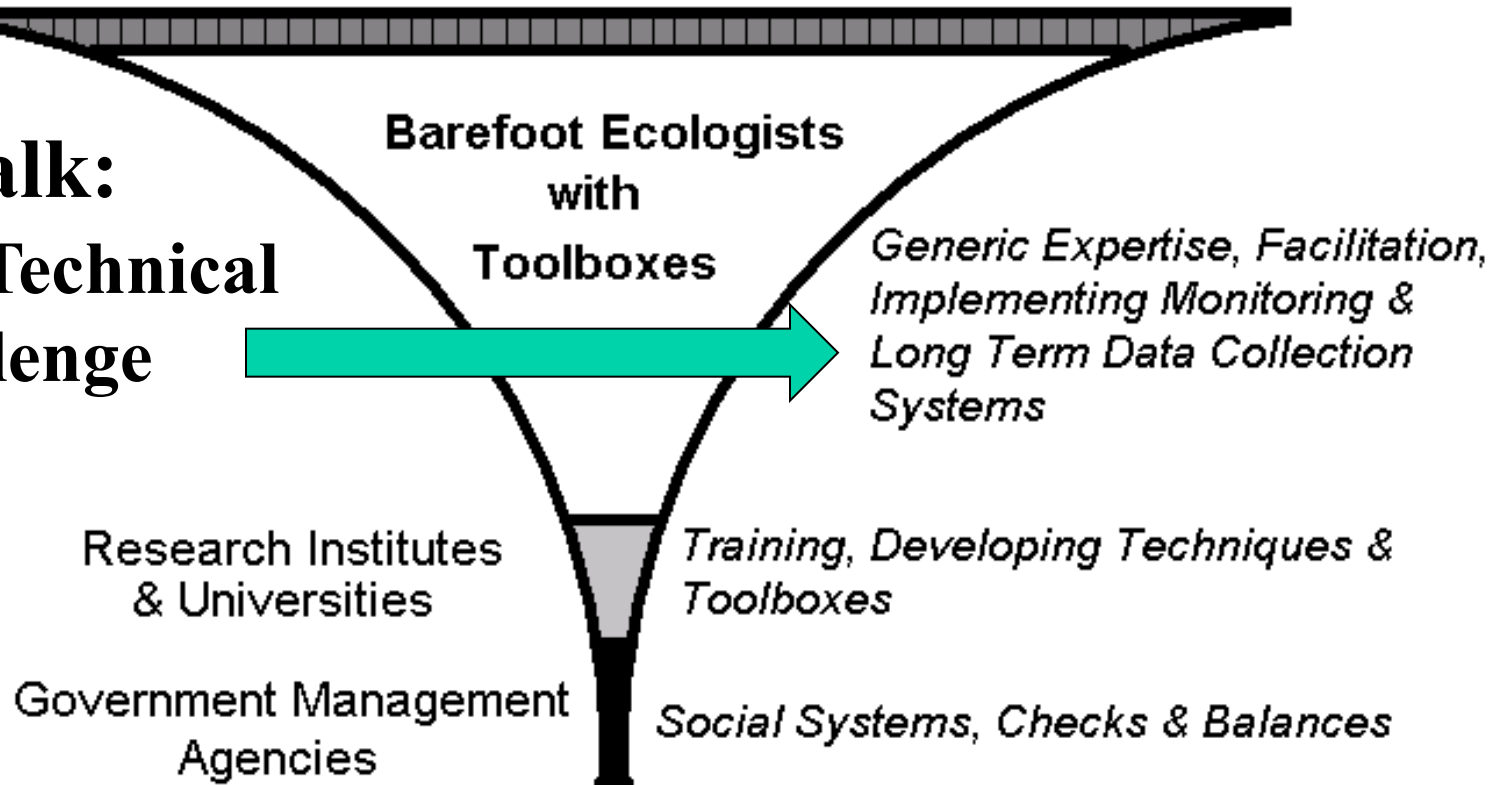


The Solution ?

Many Micro-stocks & Fishers - *Local Experts Fishing for Knowledge & Profit*

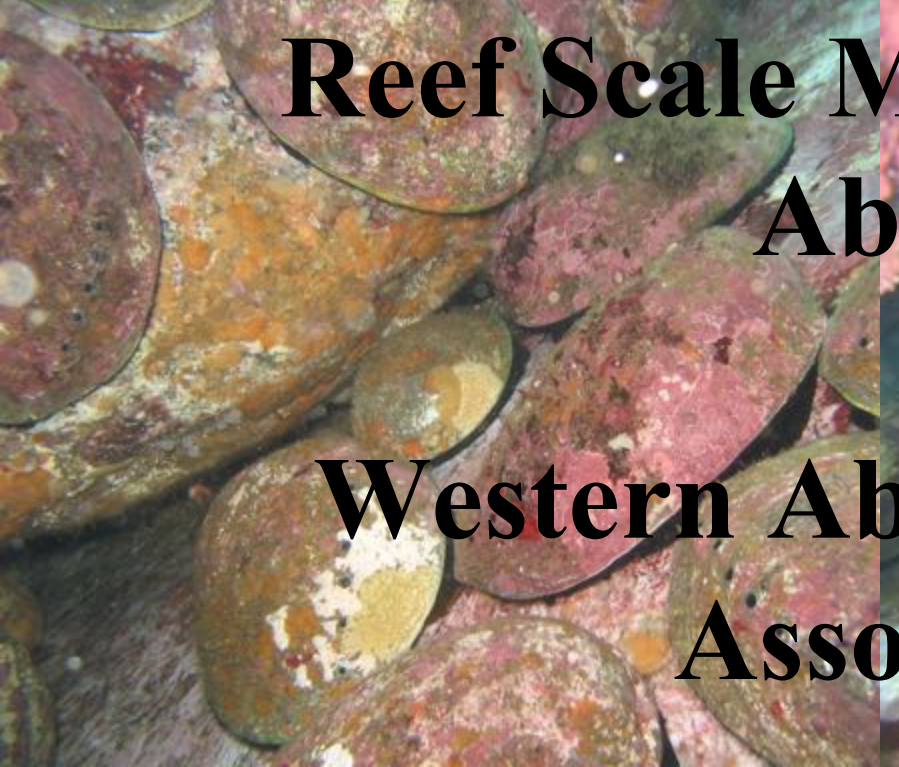
Next Talk:

**The Technical
Challenge**





Reading Abalone Shells



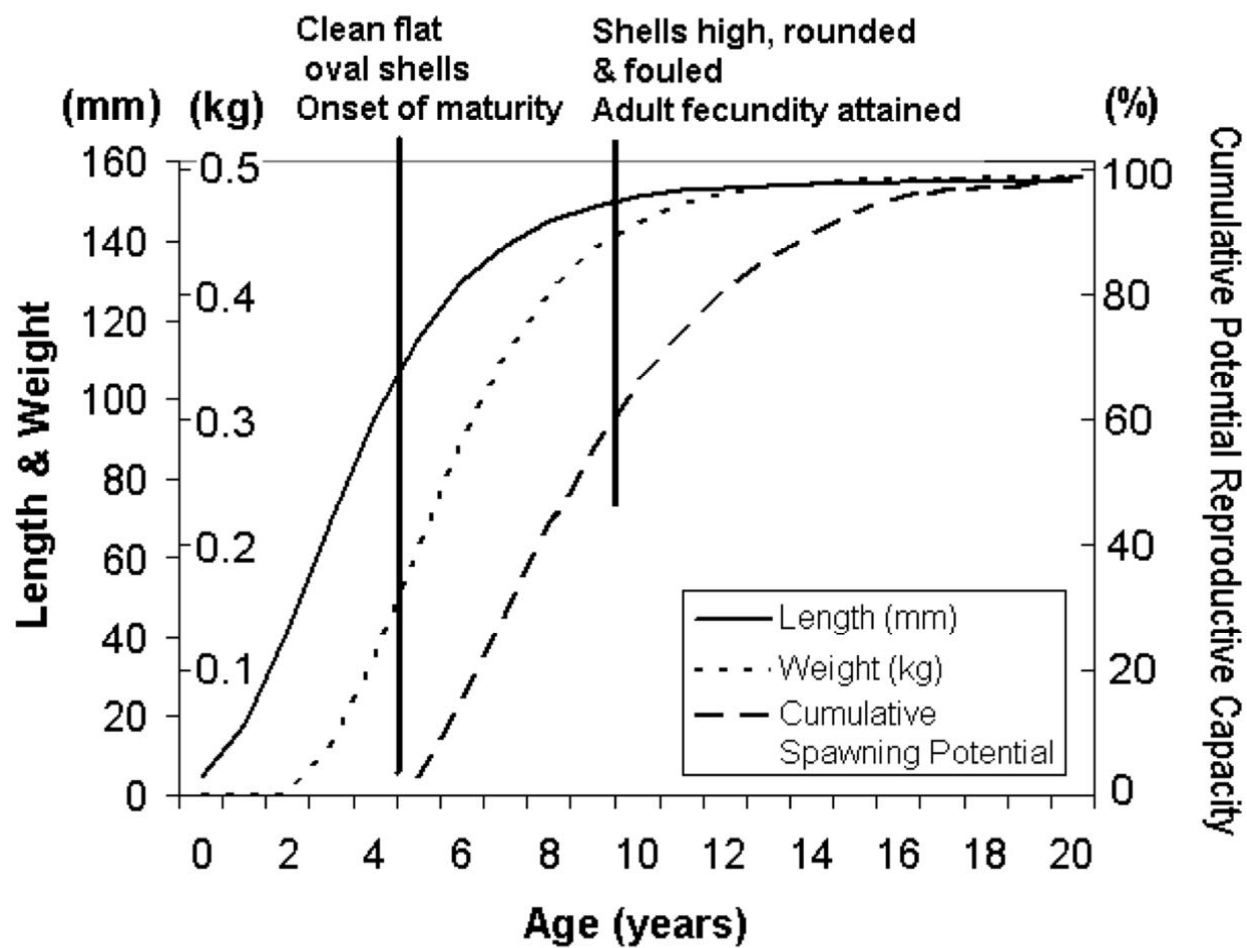
Reef Scale Management of Abalone

Western Abalone Diver's Association



Emergence & Maturity

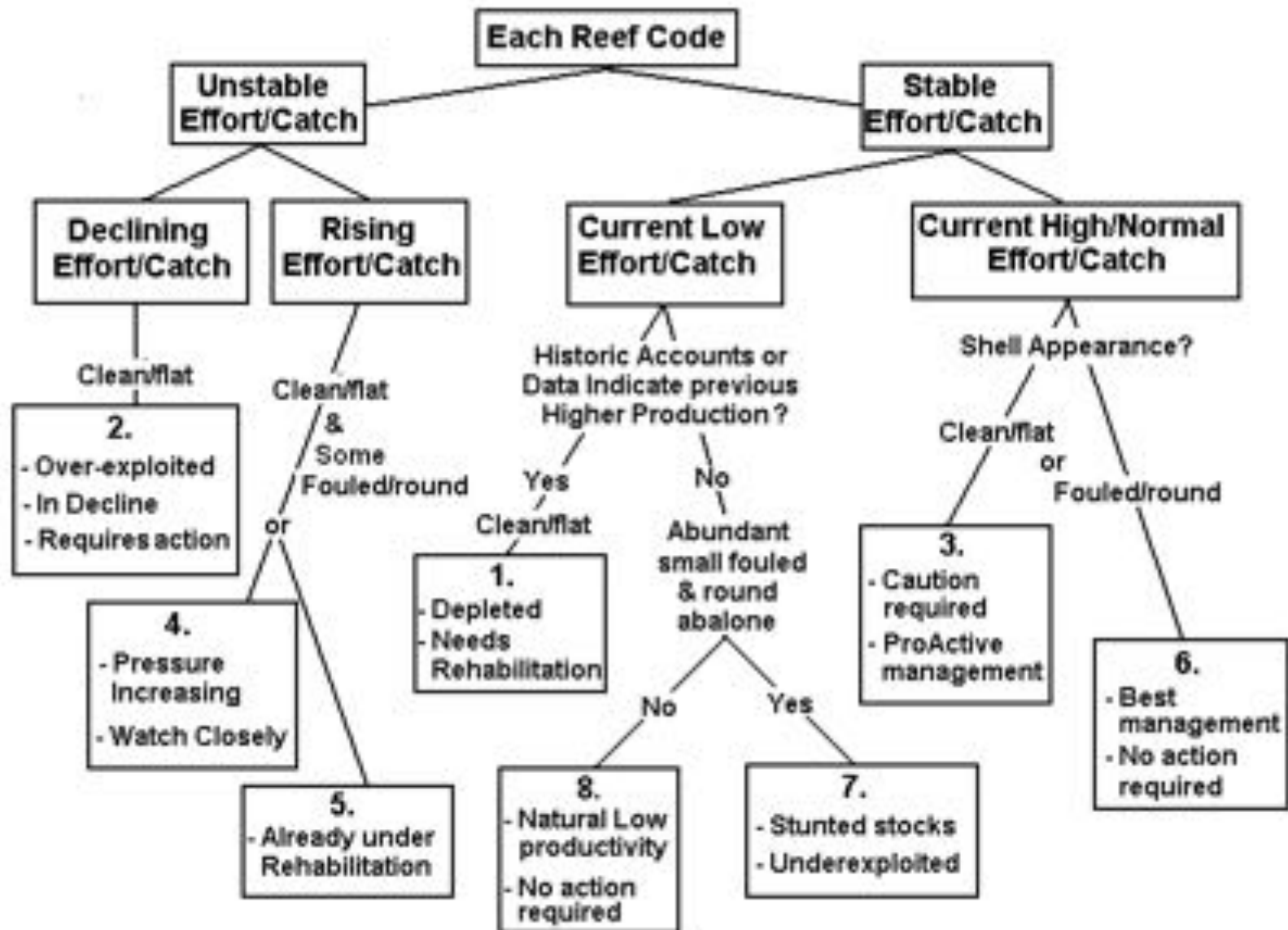




Reading Abalone Shells

- **Juvenile abalone remain hidden in reef. Sub-adult shells grow in length remain thin and flat. Living wedged in dark crevices shells free of fouling growth.**
- **Maturing abalone move out of cryptic habitat to join adult aggregations. Shells thicken growth increasingly in volume rather than length. Shells higher and rounder as adult fecundity achieved. Exposed to the light shells become fouled by epiphytic growth and take on appearance of reef.**
- **Maturing abalone take several years to attain full adult fecundity (egg production capacity of 1-2 million). Should be allowed several years of breeding with adult potential before harvest. Shells being harvested should be high, rounded and covered with fouling growth regardless of size.**
- **When a catch is comprised predominantly of clean flat shells the reef is being recruitment over fished. Individual abalone are not being left to attain full adult fecundity, and there will be insufficient breeding to sustain future production.**

Reef Assessment Decision Tree





Reef Assessment Workshops



The End

