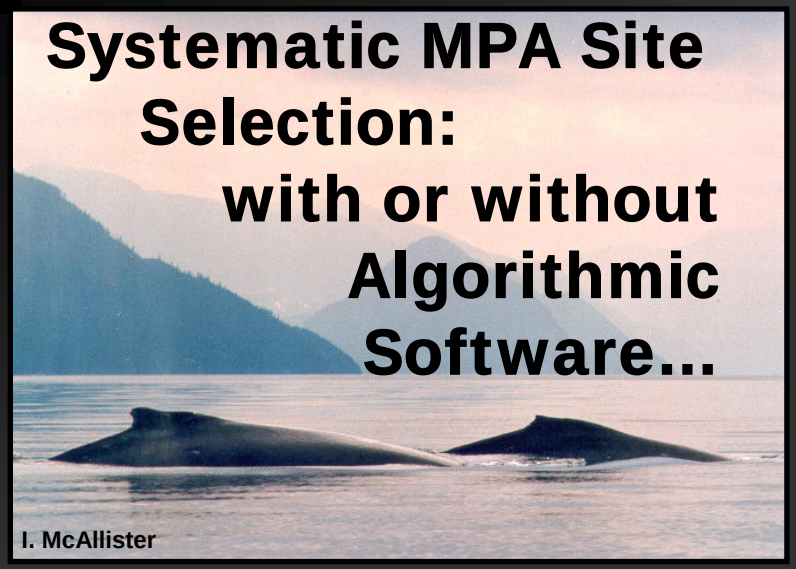
Systematic MPA Site Selection: with or without Algorithmic Software...



Scientific Advisor on MPAs,
German Fed. Agency for Nature Cons.

Vice-President PacMARA

Secretary OSPAR Intersessional
Correspondence Group on MPAs

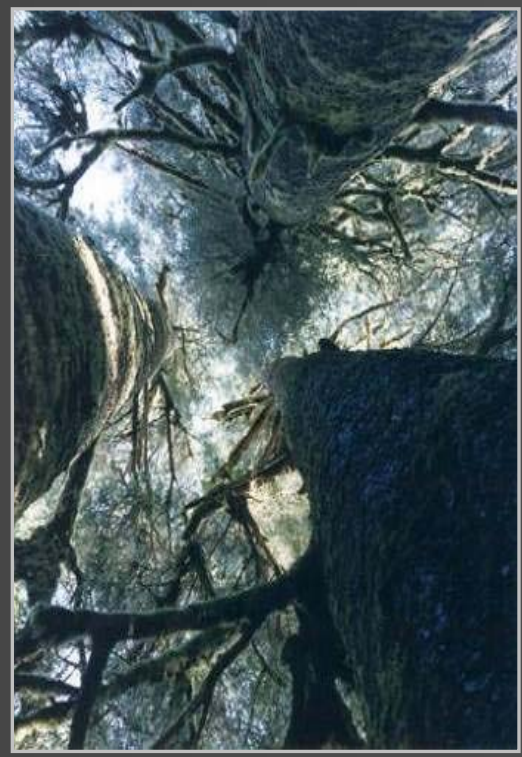
World Commission
on Protected Areas
Regional Coordinator, NE Atlantic

Lest we forget
Terrestrial Conservation

Rock & Ice: Land nobody wanted

Freaks of nature

Playgrounds in the wilderness



Carmanah Valley
British Columbia

History
The plea for a *Systematic Approach*…

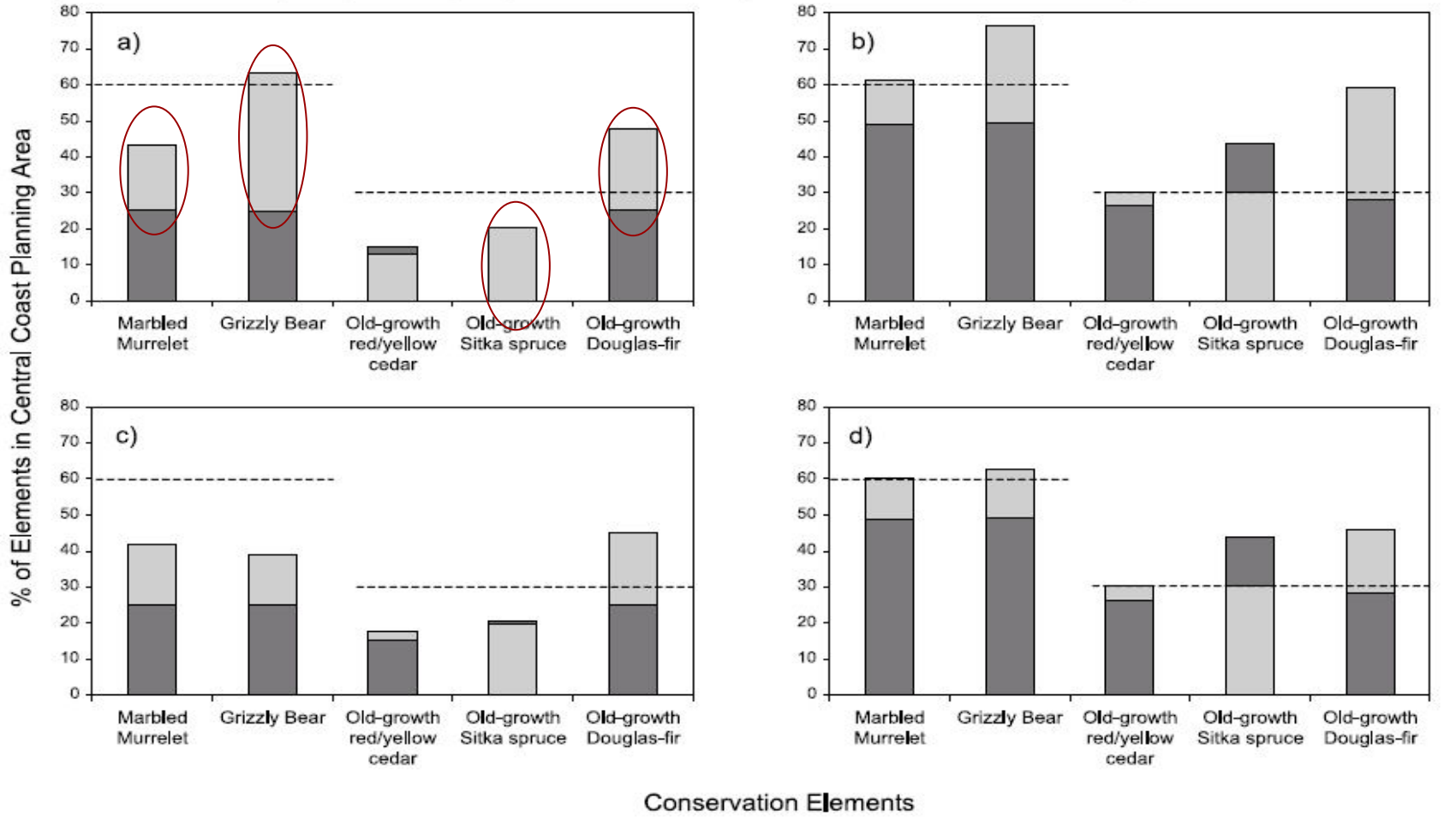
Margules, C.R., and Pressey, R.L. (2000). Systematic conservation planning. *Nature*, 405: 243-253.

"A more systematic approach to locating and designing reserves has been evolving and this approach will need to be implemented if a large proportion of today's biodiversity is to exist in a future of increasing numbers of people and their demands on natural resources."

More history
Regrettable Decisions in the past?

Gonzales, E.K., Arcese, P., Schultz, R., & Bunnel, F. (2003). Strategic reserve design in the Central Coast of British Columbia: Integrating ecological and industrial goals. *Canadian Journal of Forest Research*. 33, 2129-2140.

Fig. 5. Percentage of wildlife habitat, old-growth stands, and ecosystem types reserved by SITES versus the Preliminary Plan under (*a*) 20.3% and (*b*) 31.4% area limits and (*c*) 16.5% and (*d*) 27.4% timber volume limits. Light grey bars indicate percentages reserved in the SITES scenarios. Dark grey bars indicate the percentages reserved in the (*a* and *c*) Protection Areas or the (*b* and *d*) Protection plus Option Areas of the Preliminary Plan. Broken lines indicate conservation targets.



Yet more history

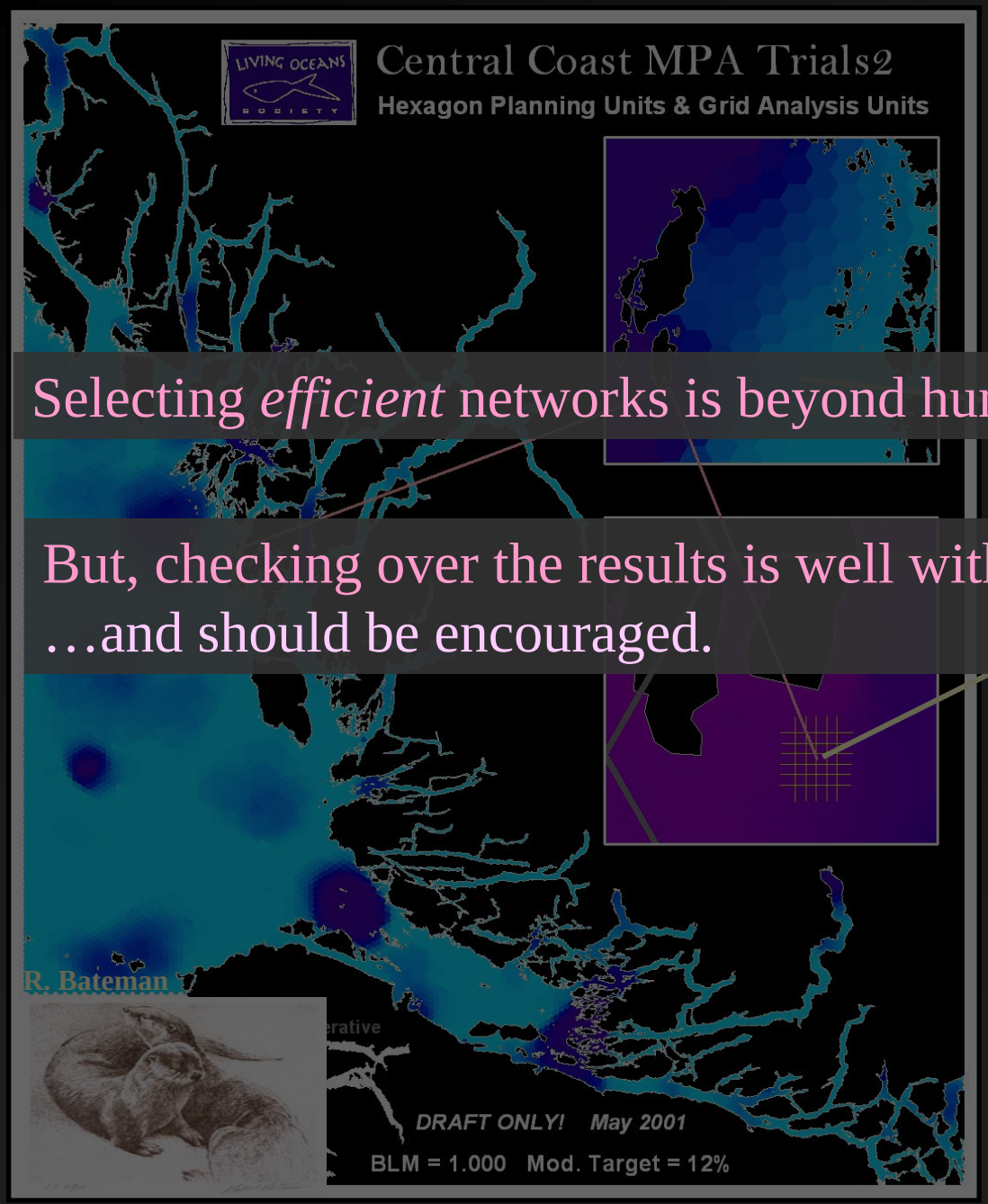
Could our existing parks have been false friends?

Stewart, R.R., Noyce, T., Possingham, H.P. (2003). Opportunity cost of ad hoc marine reserve design decisions: An example from South Australia. *Marine Ecology Progress Series*, 253, 25-38.

"We found that despite spanning less than 4% of South Australian state waters, locking in the existing ad hoc marine reserves presented considerable opportunity costs.

Even with representation targets set at 50%, more than half of South Australia's existing marine reserves were selected randomly or less in efficient marine reserve systems.

Hence, ad hoc marine reserve systems are likely to be inefficient and may compromise effective conservation of marine biodiversity."



Anatomy of two BC affairs: 1999-01

Central Coast, expanded in 2002-03 to include most of BC

Selecting *efficient* networks is beyond human intuition…

But, checking over the results is well within human intuition…
…and should be encouraged.

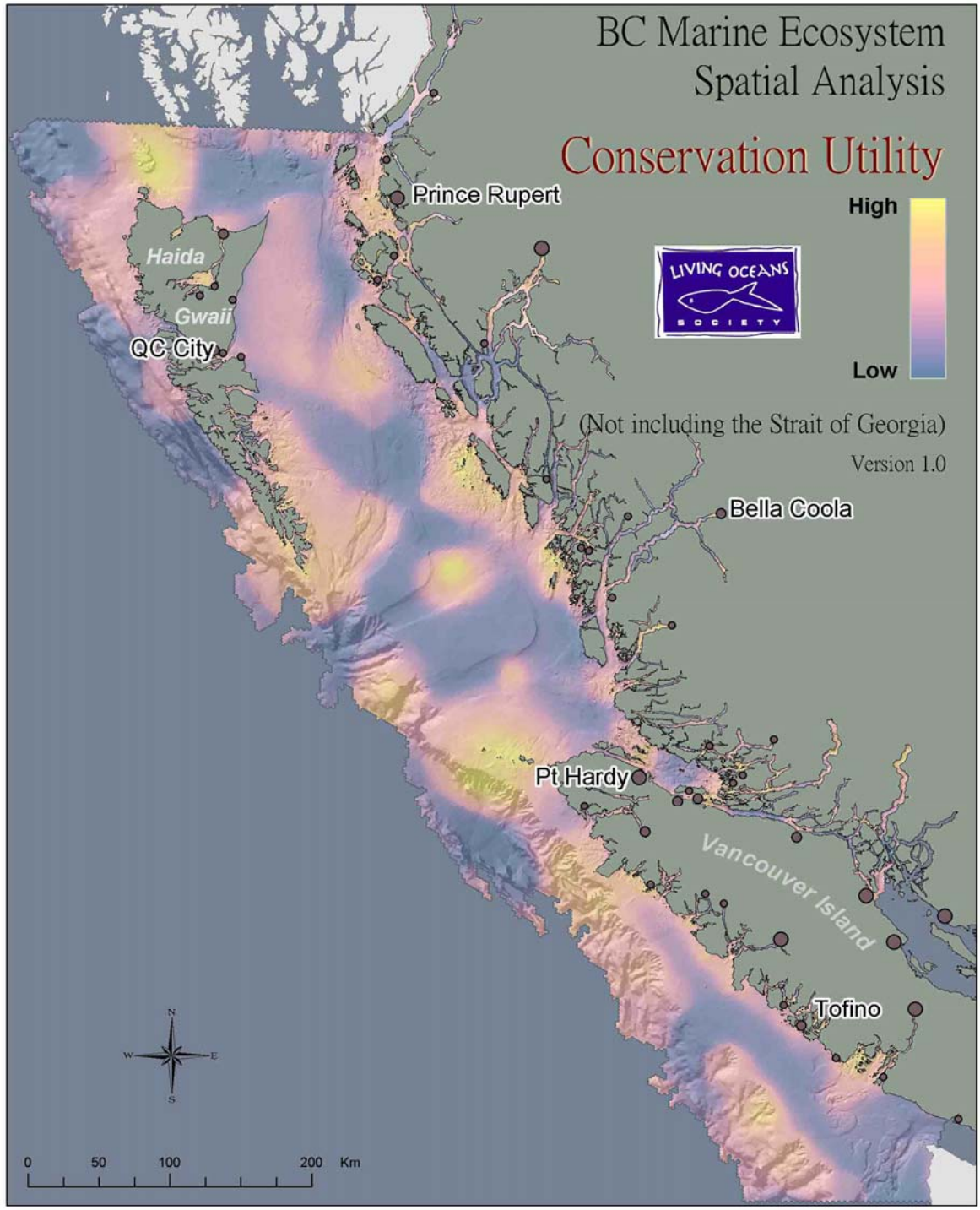
- Planning Units: Hexagons (**250** / 500 hectares each – 12,000 / 23,000)
- Analysis Units: Square grids (**0.5** / 1.0 hectares – **11.4** / 12.8 million)
- Features: Physical and Biological –**61** / 93

Memories
BC, 2003...
Pretty Maps

Conservation Utility

- **Yellow:** Places almost always chosen.
- **Pink:** Areas chosen about ½ the time.
- **Blue:** Areas can be considered useful in only some reserve networks.
- 93 data layers

Marxan
6 different size targets
x 4 levels clumping
x 100 runs each
= 2,400 solutions



The Middle Years

Marxan, you were getting quite the reputation...

But now, 2007...

three **years** after that publication...

four years after our BC Conservation Utility analysis...

seven years after we first danced in the Central Coast...

Well, nothing much has happened, has it?

Still no real commitments or MPA bambinos on the way...

A fizzle of hope, effort, dreams?

its mandate and MPA objectives under the Oceans Act.”

A changing tide of opinion?

One Marxan *Grande Damme* may not be as effective as several simpler consorts…

Meir, E., Andelman, S., Possingham, H.P. (2004). Does conservation planning matter in a dynamic an uncertain world? *Ecology Letters*, 7: 615-622.

- "Simple decision rules, such as protecting the available site with the highest irreplaceability or with the highest species richness, may be more effective when implementation occurs over many years."

More problems

The Existential Poetry of D.H. Rumsfeld

The Unknown

As we know,
There are known knowns.
There are things we know we know.
We also know
There are known unknowns.
That is to say
We know there are some things
We do not know.
But there are also unknown unknowns,
The ones we don't know
We don't know.

—Feb. 12, 2002, Department of Defense news briefing

Recent works by the [former] secretary of defense.
Transcribed by Hart Seely
http://slate.msn.com/id/2081042/#ContinueArticle

Looking back

A little knowledge can be a dangerous thing

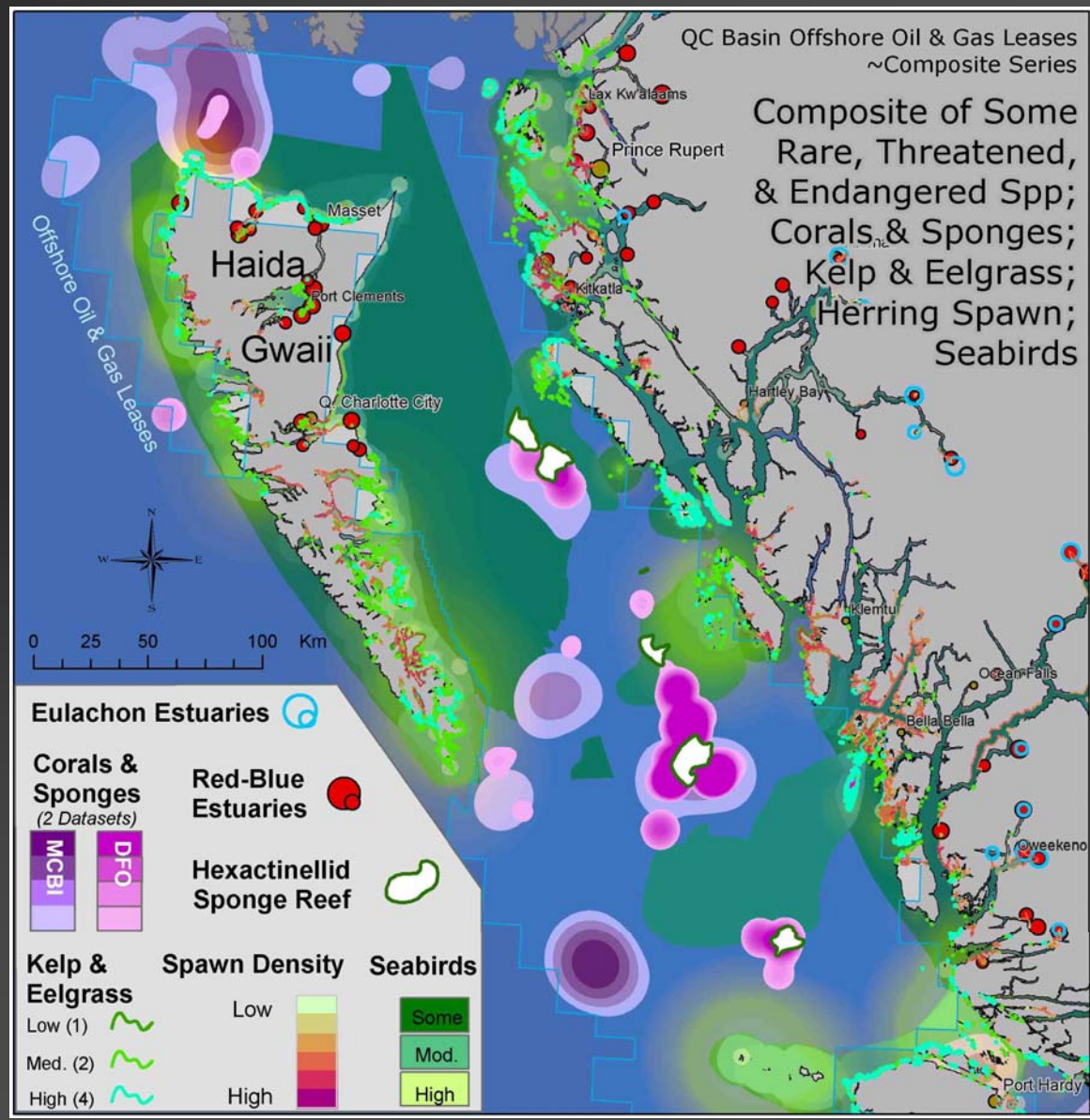
There are over 6,500 known spp of invertebrates, 400 spp of fish, 161 spp of birds, & 29 spp of marine mammals in BC…

Total: 7,087

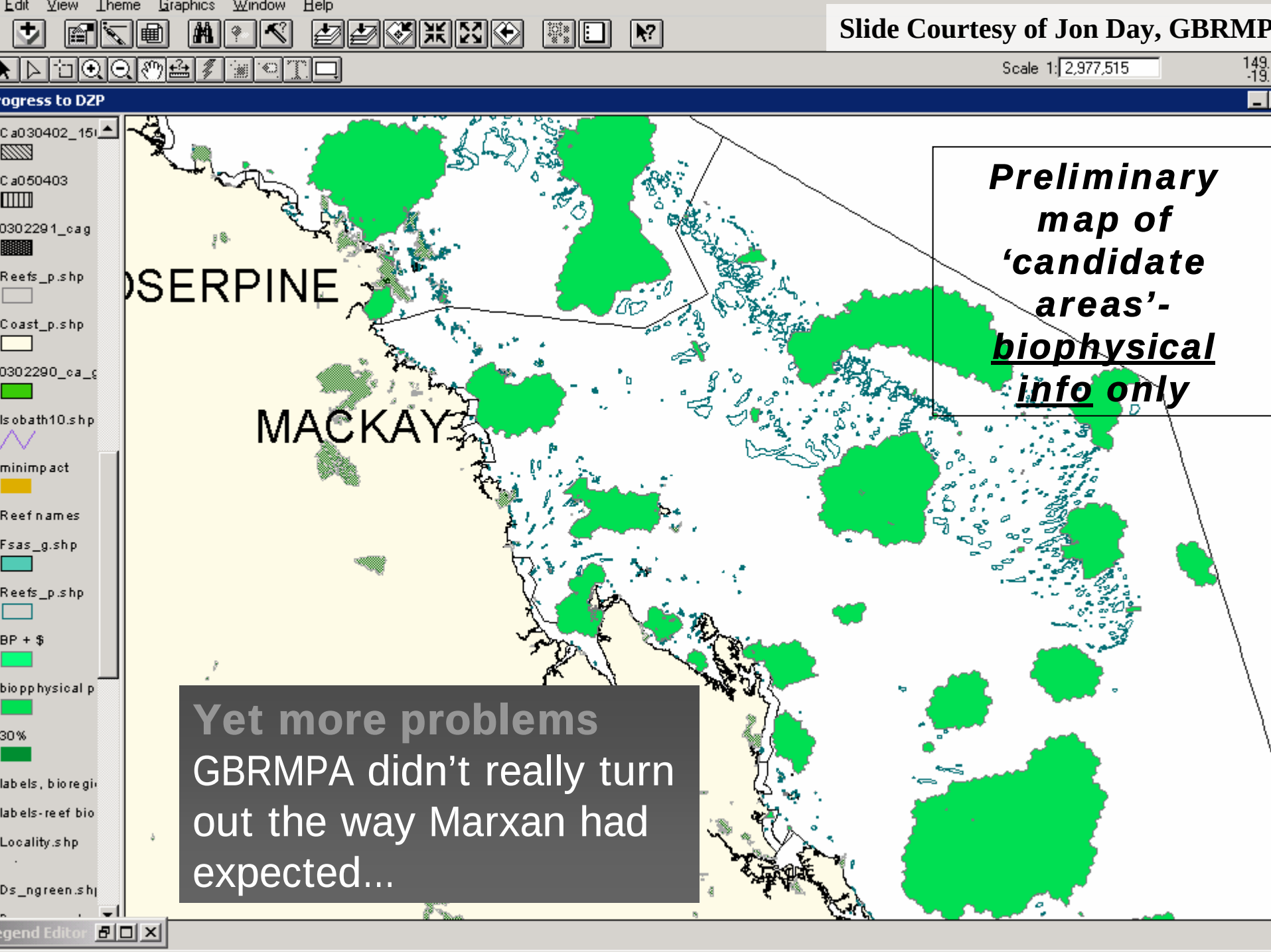
Less what we (sort of) know, say three or four dozen…

7,087 – **48** = **7039**

0.07%



Governments of Canada and BC, 1998.
Marine Protected Areas: A Strategy for Canada's Pacific Coast. Discussion Paper.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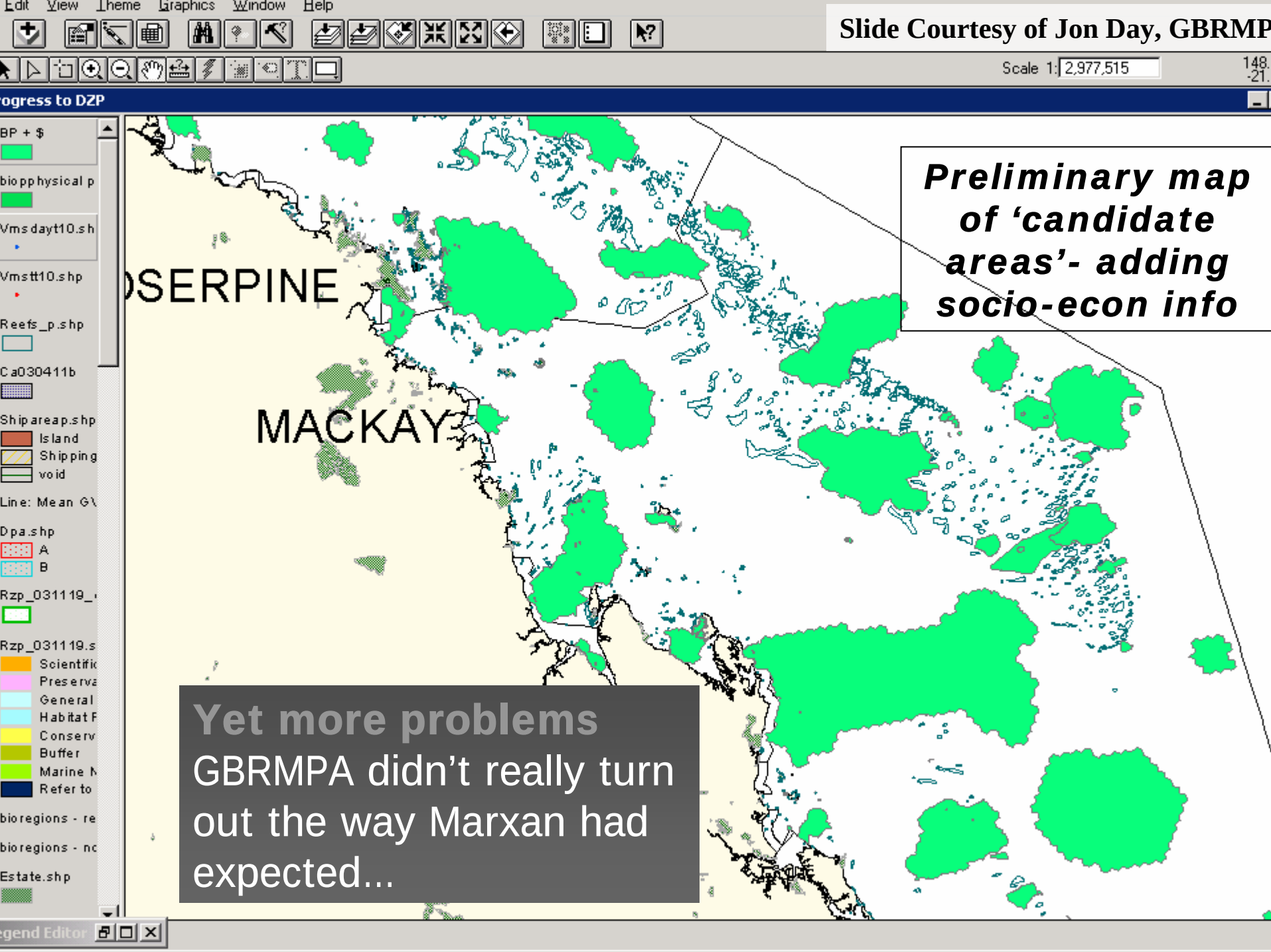
Preliminary map of 'candidate areas'- biophysical info only
Yet more problems
GBRMPA didn't really turn out the way Marxan had expected...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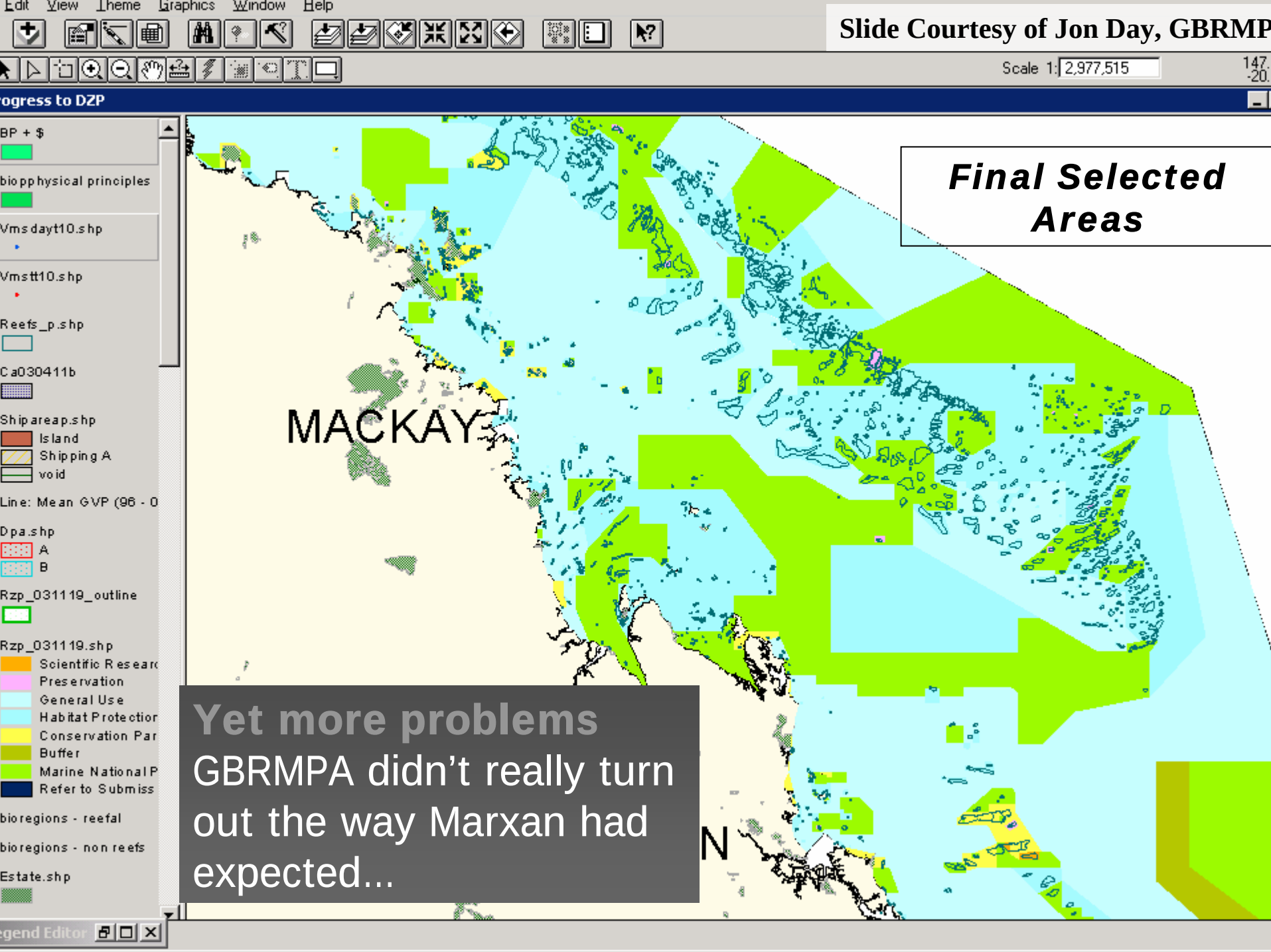
MACKAY
Preliminary map of 'candidate areas'- adding socio-econ info
Yet more problems
GBRMPA didn't really turn out the way Marxan had expected...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Final Selected Areas
Yet more problems
GBRMPA didn't really turn out the way Marxan had expected...

Summing up so far
Systematic Approach vs. Ad Hoc?

- Systematic was supposed to be “good”
- Ad hoc was supposed to be “bad”

1. Except that we didn’t always know enough to be systematic...
2. Meanwhile time marches on...
3. And all our pretty solutions get messed up by moody stakeholders, anyway...

4. So maybe ad hoc is good enough? For now? While we still can?

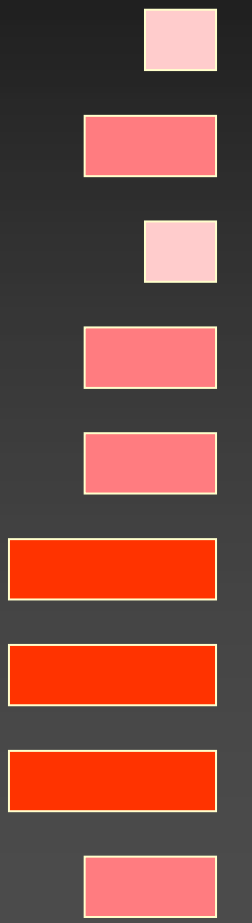
What I really want to talk about...
Systematic Approach vs. Ad Hoc? (cont'd)

Three Issues and one Observation

1. Lack of progress: Not necessarily the fault of the tools
2. Time to learn and use tools like Marxan: "Cutting edge" is a rotten place to be, and we should hurry out of there...
3. Pay now or pay later: the issues behind good conservation design will not go away => assessing ecological coherence post hoc is (usually) not easier...

4. All that we didn't know: We need to ask the (other) experts & locals to help us

Software & conservation planning



1. **Scope and cost**
2. **Identify and involve stakeholders**
3. **Identify goals**
4. **Compile data**
5. **Set conservation targets**
6. **Assess existing conservation areas**
7. **Select new conservation areas**
8. **Implement conservation action**
9. **Maintain and monitor**

Slide Courtesy Bob Pressey

Point 1: **Lack of Progress**
It's about more than just research…

Slide Courtesy of John Tanzer, GBRMPA

Reasons for effective management of the GBRMP?

- **a sound legislative and regulatory framework (*GBRMP Act 1975 & EPBC Act 1999*)**
- **ecosystem-level management … and management influence over a wider context than just the MPA/WHA**
- **national consensus and international recognition that the GBR is 'iconic' and worth conserving**
- **well developed institutional arrangements with the adjacent jurisdiction (Queensland) including complementary legislation**
- **ongoing research and monitoring programs, prioritised to provide information for management**

Point 1: **Lack of Progress**
It's about getting out of old ruts...

Slide Courtesy of John Tanzer, GBRMPA

Lessons learnt [GBRMP]

- Must integrate fisheries into ecosystem management
- Align research, monitoring and management
- Avoid 'scientific holding patterns
- Effective compliance
- Transparency and public debate
- Effective communication – *tell the story*
- Management requires public support
- Community participation and ownership
- Knowledge of Park has to include social , economic as well as ecological dimensions

Point 2: **Bleeding edge woes**

Distinguishing the cutting edge from the state of the art...

Cutting edge

April 3, 1973:

using a "brick"-like

ounce phone, Martin

Cooper started the

year proce

market.

But now...

It is accepted as normal

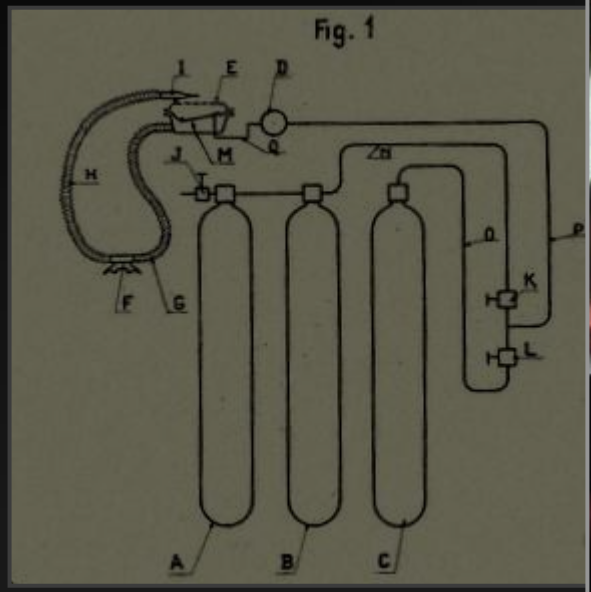
neither cutting edge nor state of the art...

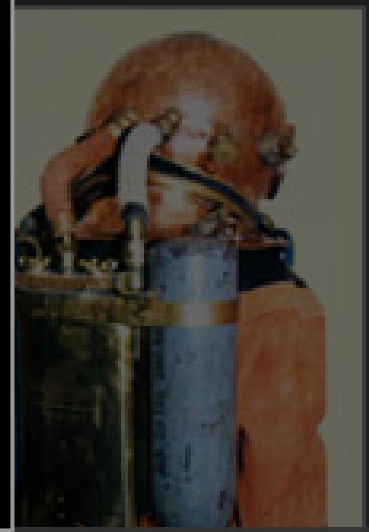
Because it is more affordable, flexible, convenient, and reliable

than the old “state of the art”

Point 2: **Bleeding edge woes**

Even in marine science, things to change…



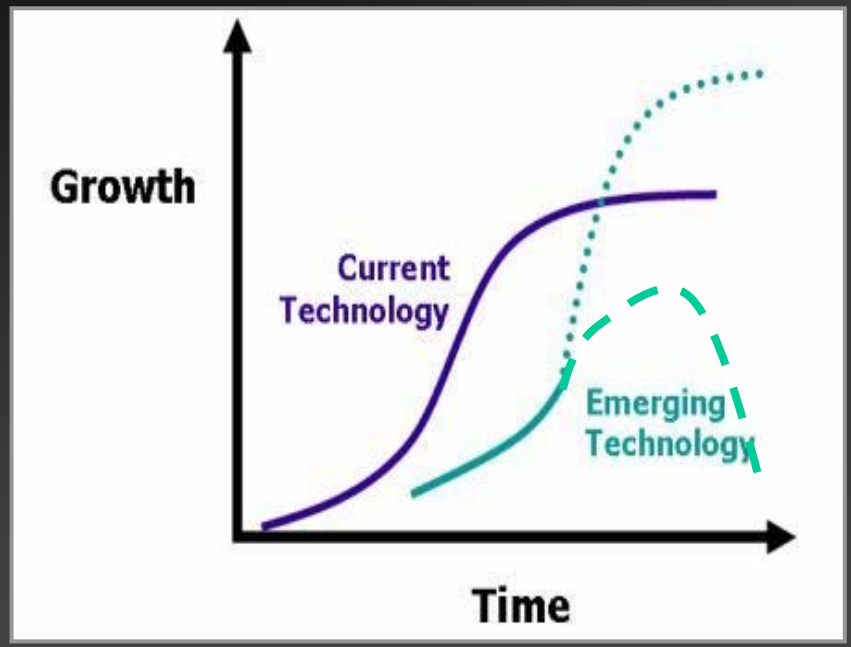


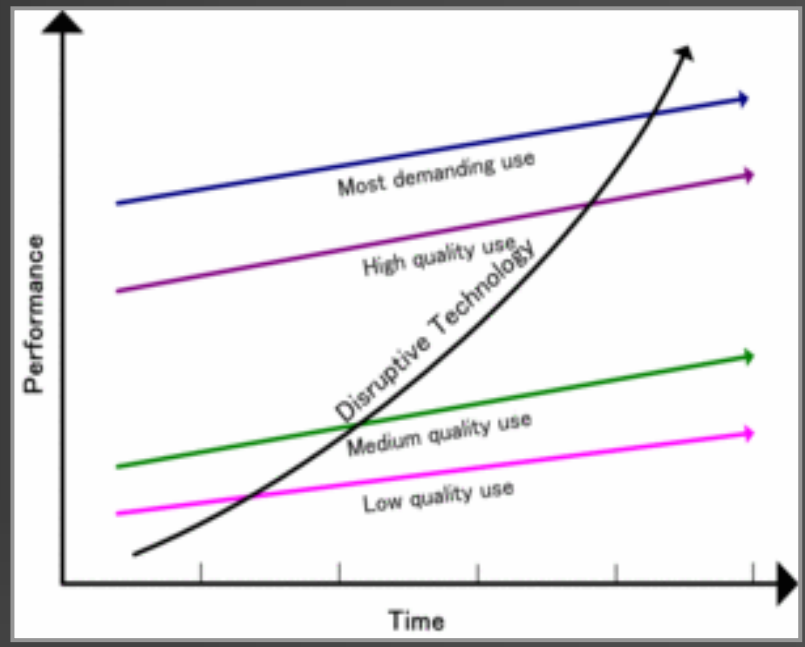
It was not until the 1960s (Jacques Cousteau's Undersea World) and the 1970s that SCUBA diving caught on with the public, and began to gain acceptance in commercial applications (where state of the art had ruled).

Jacques Cousteau and Emile Gagnon.

design was still the state of the art in re-breather technologies...

Point 2: **Bleeding edge woes**
The gap between the dream and reality...





Things going according to plan...

...is not a given.

State of the art is often better than a new innovation for several years... And thus clear-headed decision-making is required.

OSPAR: Oslo-Paris Convention

- Regional Seas Org. of the NE Atlantic;
- Ecosystem Approach including MPAs;
- 87 MPAs up to 2006, and 14 more (at least) in 2007...
- To date, no site selection tools have been used, beyond at-sea surveying and basic GIS.

Point 3: **Pay now or pay later**

Good old top-down commitments, without those fancy tools...

Joint Ministerial Meeting in Bremen, 2003

OSPAR / HELCOM Ministerial Declaration

"We reaffirm our commitments to establish a network of well-managed marine protected areas.

.....we shall have identified the first set of such areas by 2006, and shall then establish what gaps remain and complete by 2010 a joint network of well-managed marine protected areas that, ***together with the NATURA 2000 network***, is ecologically coherent."

NATURA 2000: Legally Driven MPAs

Habitats Directive (92/43/EWG)

- Creation of protected areas for species and habitats of Annex I and II
- Designed to maintain or restore natural habitats and species of wild fauna and flora of Community interest at a favourable conservation status

Critical Species (rarity, uniqueness, aggregation, life history)

Birds Directive (79/409/EWG)

- Conservation of all naturally occurring birds, taking measures to maintain their populations at an level which corresponds in particular to their ecological requirements
- Creation of protected areas for species of Annex I and similar measures for migratory birds with regards for their breeding, moulting and wintering areas

BN BUNDESAMT FÜR NATURSCHUTZ

Slide Courtesy of Jochin Krause, BfN, Germany

An Overview of the Designation Process in the NATURA 2000 Network

Habitats – Directive (92/43/EWG)

Stage 1
- FFH - Site Selection and Delineation
- Transmission

Stage 1
Member States propose a list of pSCIs

Transmission to the Commission

Stage 2
- Biogeographic Regions
- Biogeographic Seminars
- Reference Lists
- Assessment of pSCIs

Stage 2
Establishment of a list of Sites of Community Importance (SCI) by the Commission

Designation of Special Areas of Conservation (SAC) by the Member States

Network NAUTRA 2000

Selection of SPAs

Birds – Directive SPAs (79/409/EWG)

- Federal States
- Ministry of Environment
- Federal Agency of Nature Conservation

- European Commission DG XI Environment
- Member States
- European Topic Centre on Biological Diversity ETC/BD
- Habitat Committee
- Scientific Working Group
- NGOs
- Independent Experts of the Commission

- Habitat Committee
- European Commission

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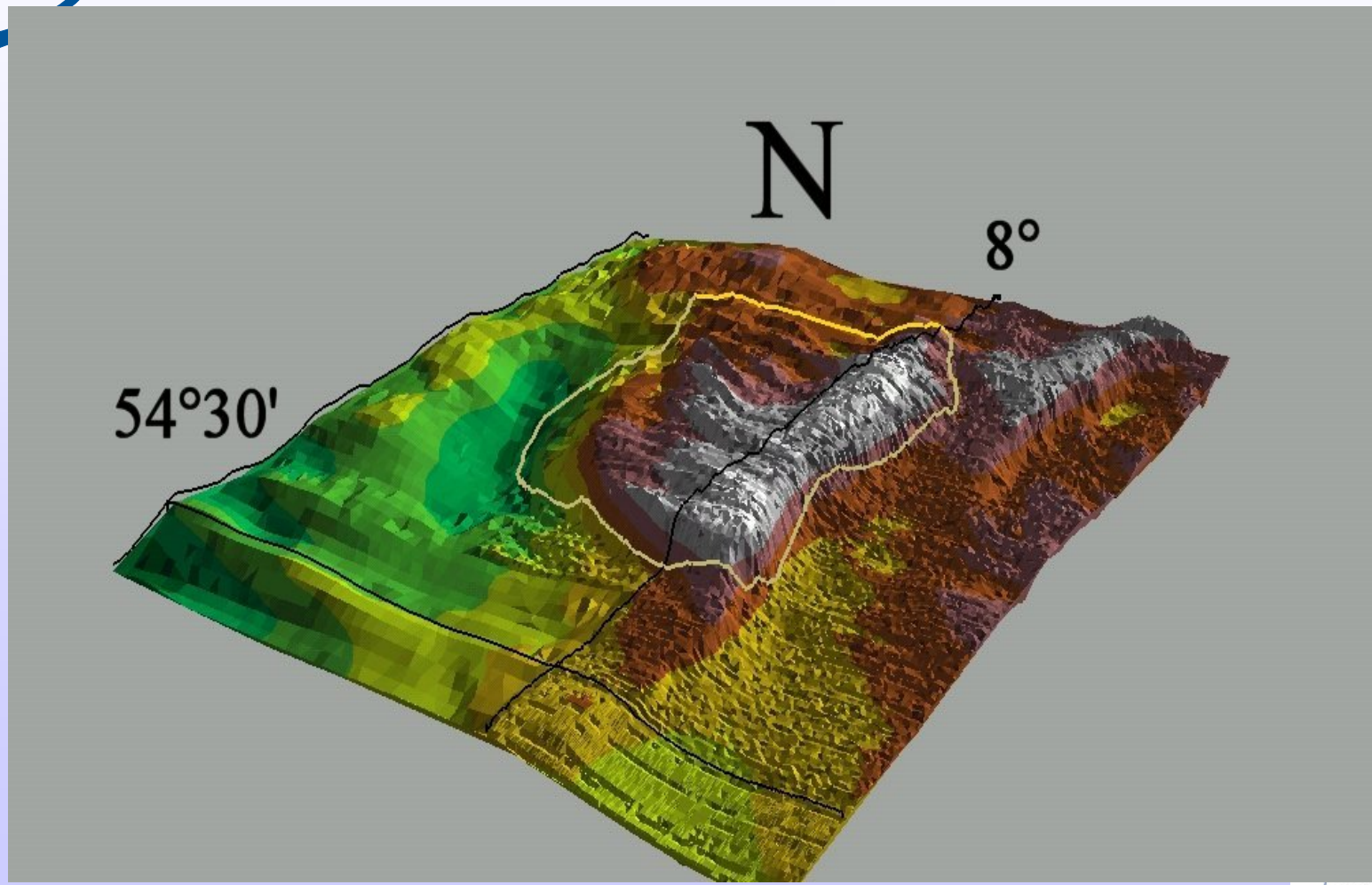
Slide Courtesy of Jochin Krause, BfN, Germany

Reefs

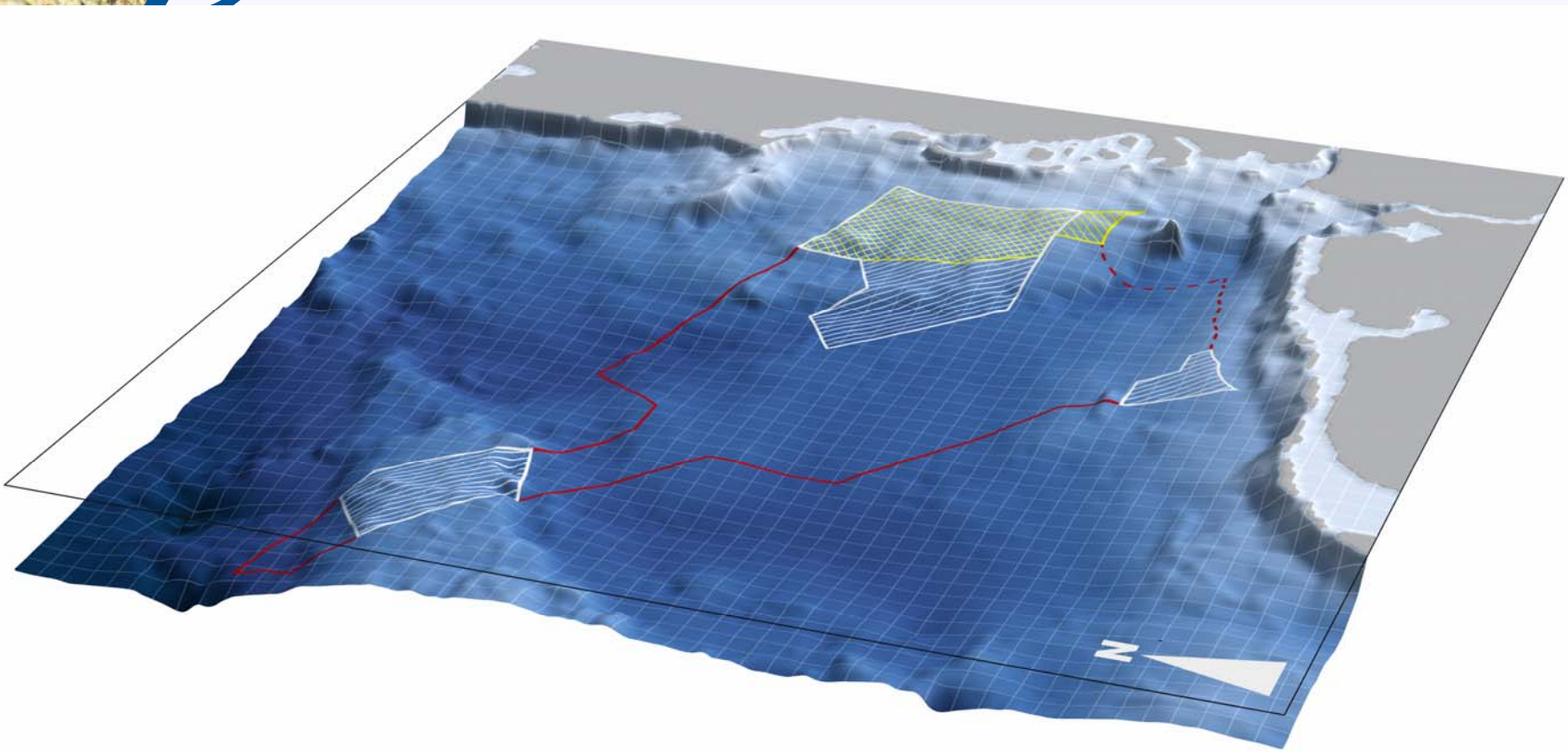
Amrum Bank German North Sea



Slide Courtesy of Jochin Krause, BfN, Germany

NATURA 2000 in the German EEZ

North Sea sites

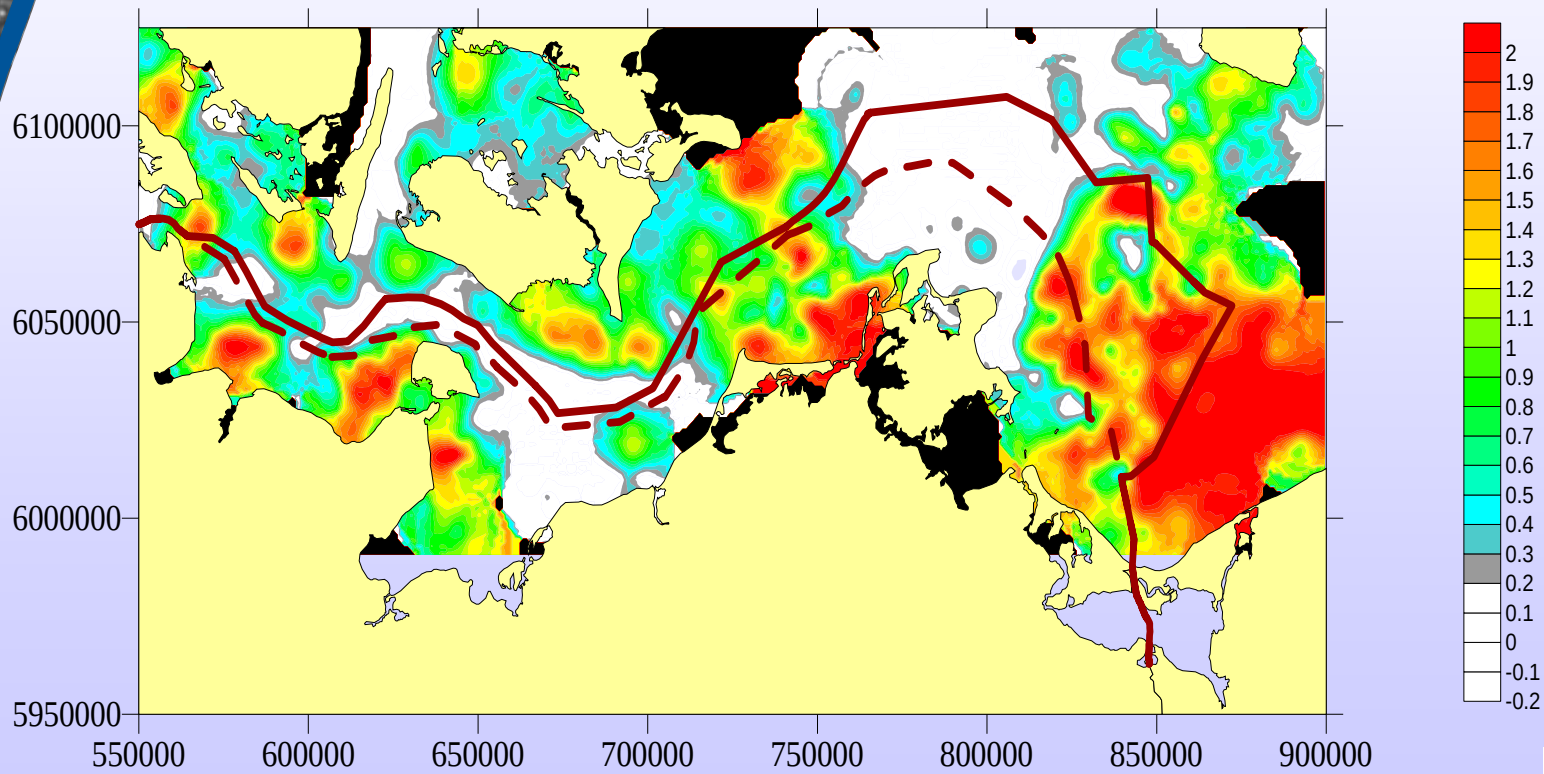


About 40% of all German marine waters
have been / are being protected...

BfN BUNDESAMT FÜR NATURSCHUTZ

Seabird Areas

Long-tailed Duck *(Clangula hyemalis)*



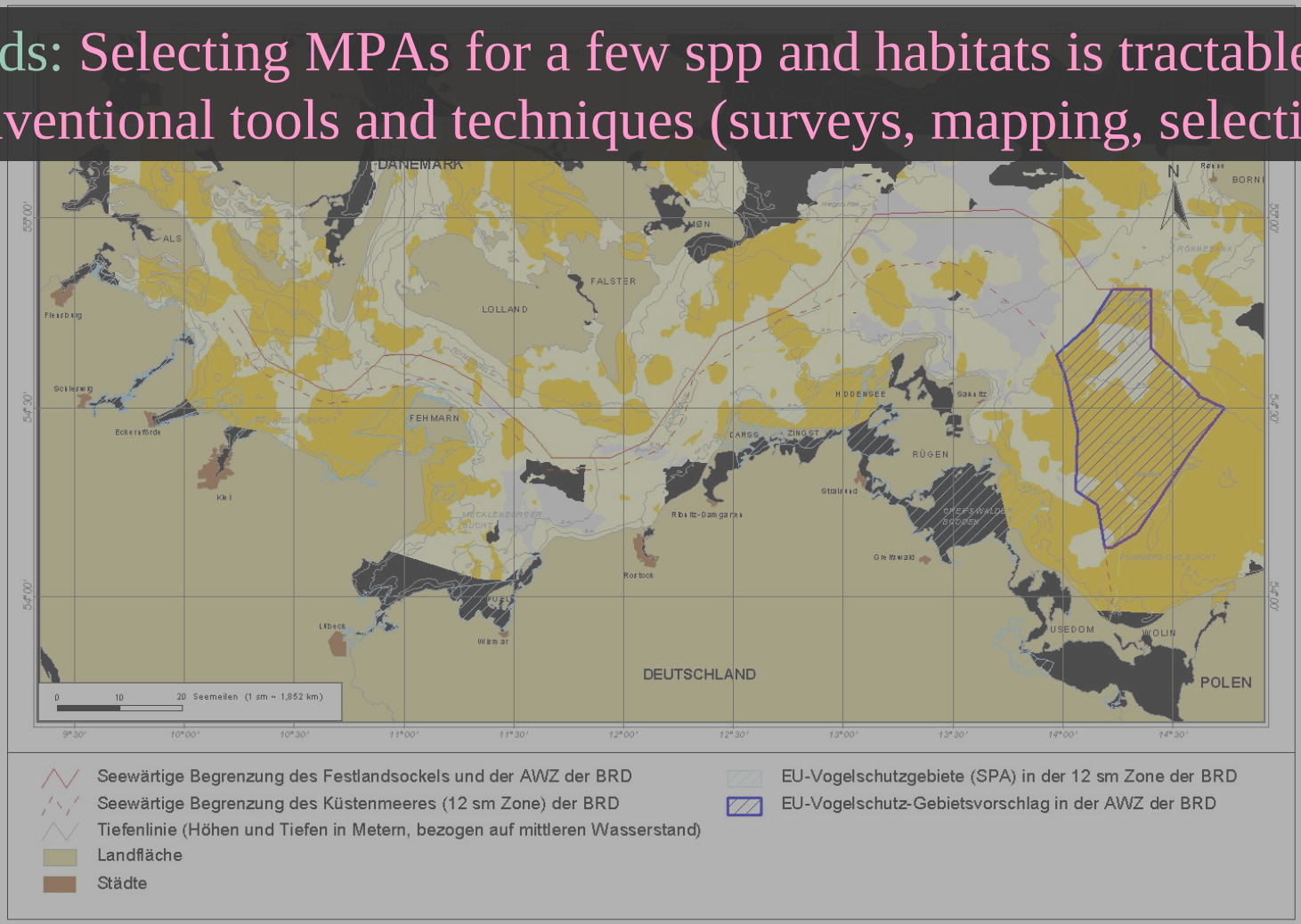
BfN BUNDESAMT FÜR NATURSCHUTZ

Slide Courtesy of Jochin Krause, BfN, Germany

Seabird Areas

Identification of sites

Methods: Selecting MPAs for a few spp and habitats is tractable using conventional tools and techniques (surveys, mapping, selection)



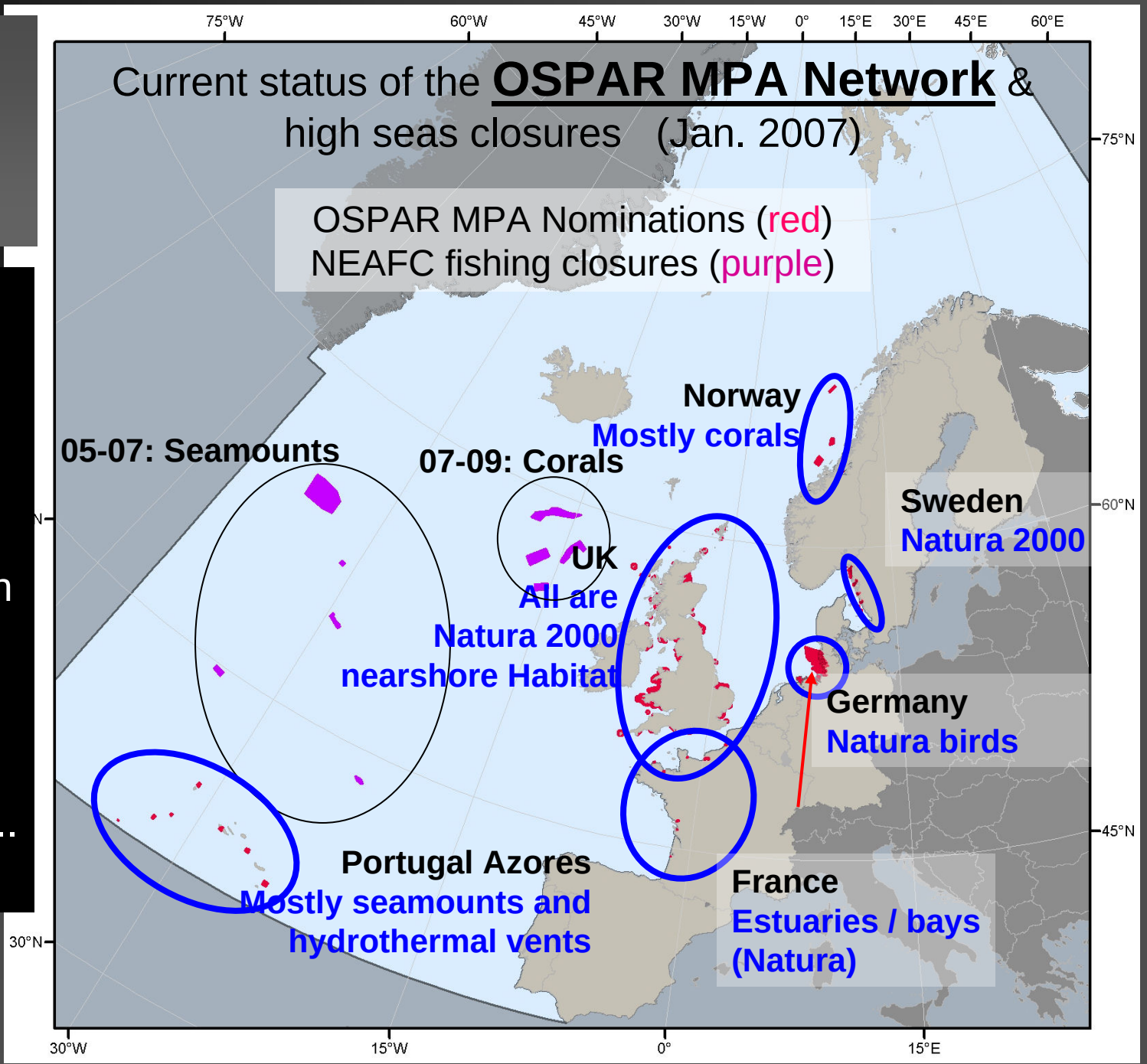
BfN BUNDESAMT FÜR NATURSCHUTZ

Pay now or pay later

...without those fancy tools

Everyone has their own methods / reasoning for choosing sites...

And the question of an ecologically coherent network remains unanswered...



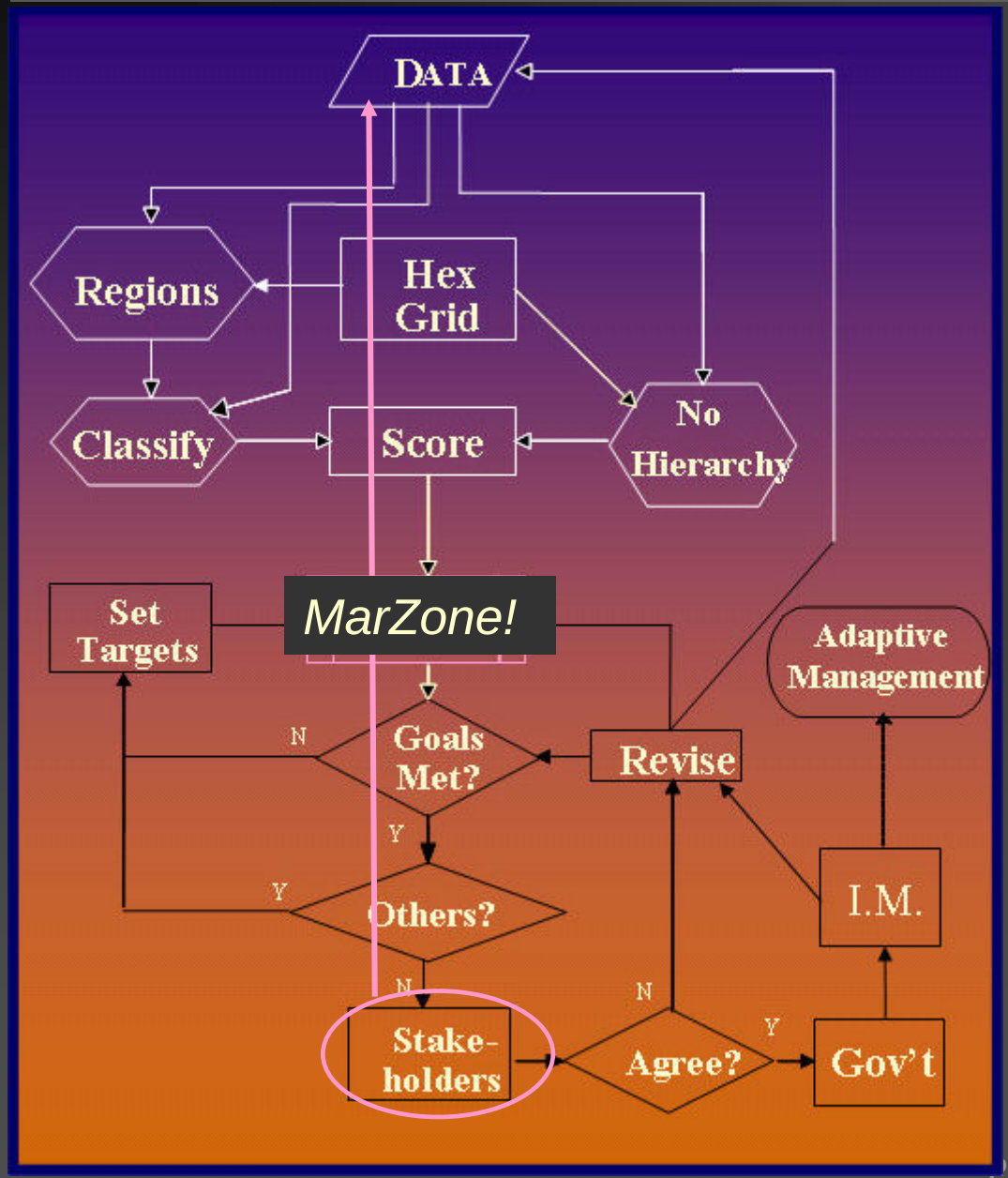
Point 3: **Pay now or pay later**
Site Selection vs Post hoc Assessment

- Post hoc Assessment: Many of the same criteria as in MPA site selection, and many of the same data required...
- Additionally, monitoring data is (ideally) required to check on the health of the sites.

- Ecological Coherence
- Assessment Criteria
  1. **Adequacy**
  2. **Representativity**
  3. **Replication**
  4. **Connectivity**

Point 4: **All that we don't know...**

Our tools need to include (other) experts & locals from the outset



The Old Approach...

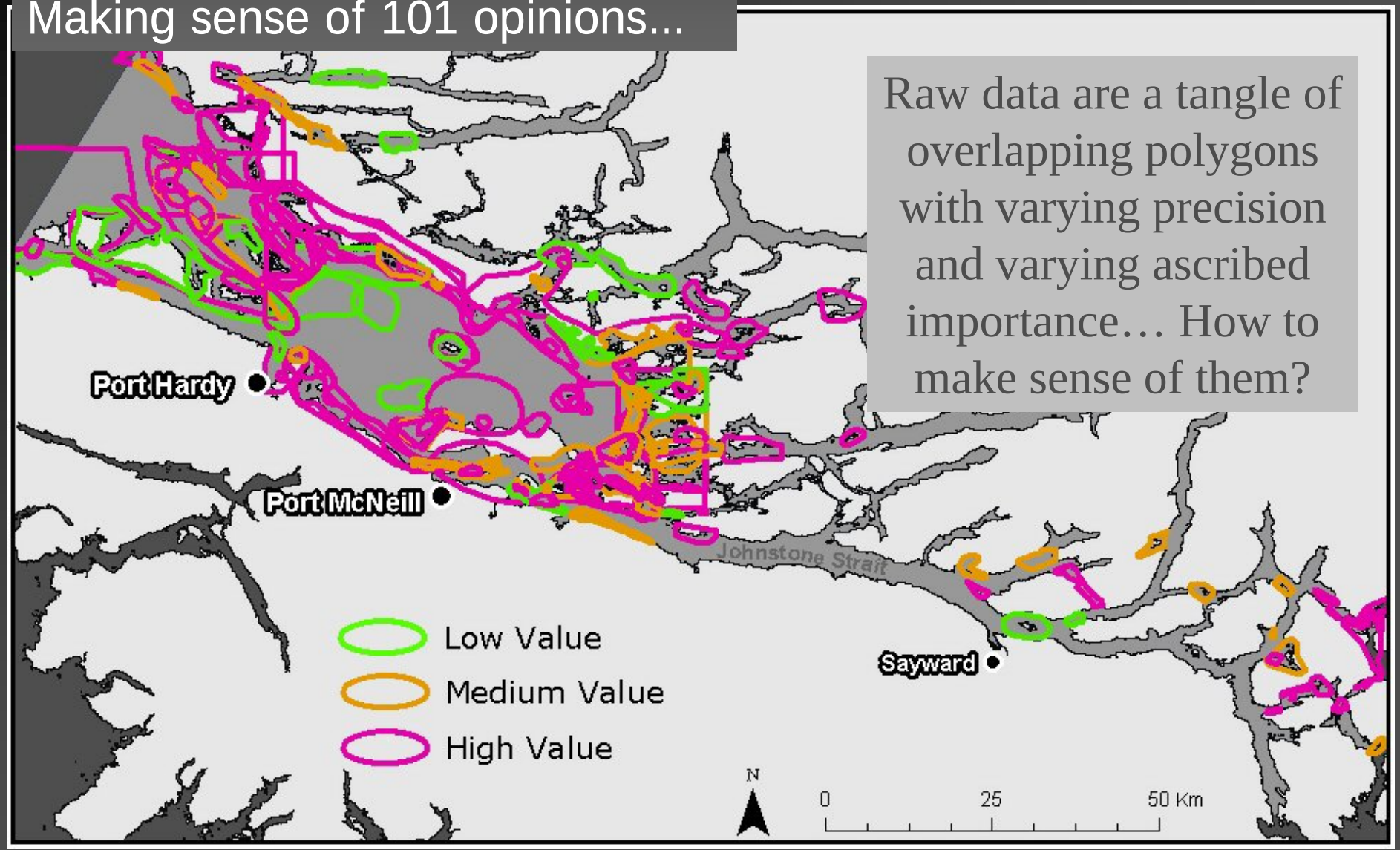
- **Human use** treated as a relative-cost in the models.
- **Stakeholders (and often experts too)** consulted after the model has been run.

Integrated Approach

- **Human uses** as types of zoning
- **Stakeholders / experts** to be interviewed *before* the model has been finalized.

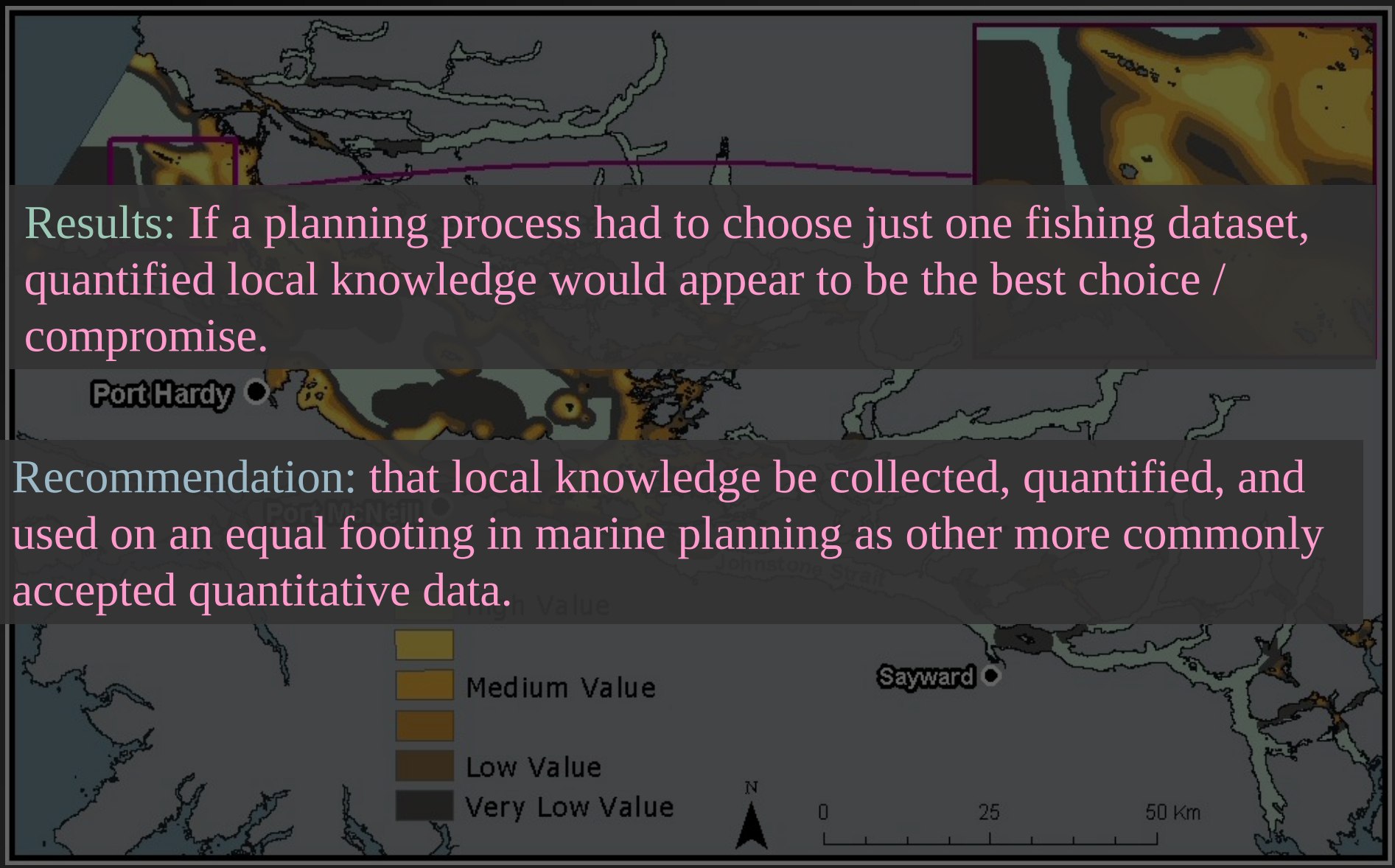
Point 4: **Talkin' to the locals**

Making sense of 101 opinions...



Raw data are a tangle of overlapping polygons with varying precision and varying ascribed importance… How to make sense of them?

Point 4: **Doing what we do best** Quantifying Knowledge



Results: If a planning process had to choose just one fishing dataset, quantified local knowledge would appear to be the best choice / compromise.

Recommendation: that local knowledge be collected, quantified, and used on an equal footing in marine planning as other more commonly accepted quantitative data.

Life beyond the cutting edge
Developing Best Practices

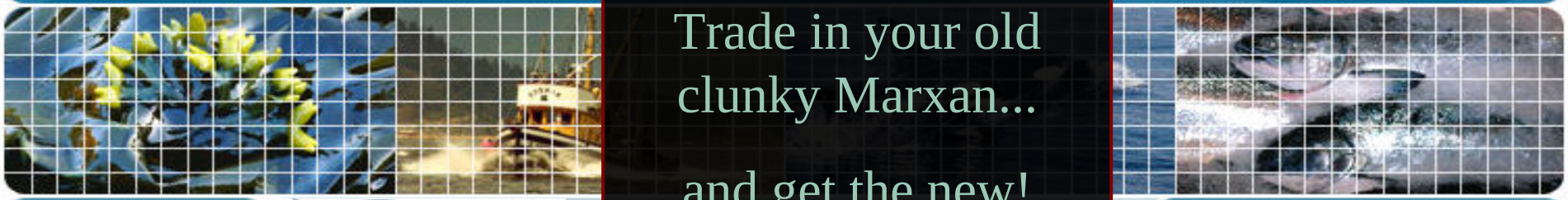
alysis & Research Association (PacMARA) - Mozilla Firefox

o Bookmarks Tools Help

http://www.pacmara.org/

www.pacmara.org

Pacific Marine Analysis & Research Association



Trade in your old clunky Marxan...

and get the new! improved! ***MarZone***

Allowing for multiple zoning... Late 2007.

PacMARA
Pacific Marine Analysis & Research Association

Welcome

- Who We Are
- Our Mission
- Projects
- Resources
- Join Us
- Links
- Home

The Pacific Marin ciation
Building Best Practi aps
for Marine Planning

Latest News

- ***Marxan Best Practices Workshop, April 2-5 2007, University of British Columbia, Vancouver, Canada***. *Two back-to-back 2-day workshops clarifying the relationship of planning tools to decision-making (workshop 1) and drafting text for a Marxan best practices handbook (workshop 2). Download here either a Word or a pdf file with more information and registration forms.*

- ***Marxan Users Everywhere! Fill out the on-line users' survey***, *and tell us about your experiences and problems. It will only take ten minutes of your time, but could save new users hours of grief... Results from this survey will feed into our workshops and best practices handbook (see above).* Click Here.

Conclusions

Systematic Conservation Planning is still okay by me.
The love affair is, um, maturing…

- Getting action is never easy, and really it is a bigger issue than just our tools. It takes all facets to make it work.
- Moving from the cutting edge to the mainstream will still take some time, but we are well on our way... The relationship is finally coming of age.
- Lack of data is not going away. So, we should develop better techniques of making do with what we have. Expert & local knowledge layers is one obvious gap that can be filled without too much expense. We are learning to give space to each other (zones)...
- Systematic Conservation Design, either before or after site designations, is the only way towards a meaningful network. Previous experience has already shown us that we can make it work together, if we try. (It can only get better –trust me.)

Info...

Jeff.Ardron@bfn-vilm.de

www.PacMARA.org

www.OSPAR.org

www.bfn.de

www.livingoceans.org

WCPA-marine (easier to google it!):
www.iucn.org/themes/wcpa/biome/marine/marineprogramme.html