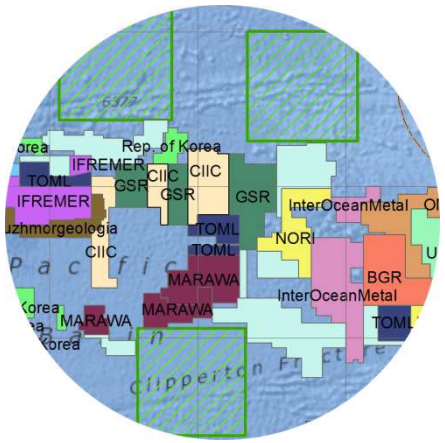
Spatial Management Approaches



Daniel Jones
National Oceanography Centre

Phil Weaver
Seascape Consultants

MIDAS

Benefits of spatial management

Environmental Benefits	**Identification of** biological and ecological **important areas**
	Biodiversity objectives incorporated into planned decision-making
	Identification and **reduction of conflicts** between human use and nature
	Allocation of space for biodiversity and nature **conservation** e.g. through Marine Protected Areas
	Identification and **reduction of the cumulative effects** of human activities on marine ecosystems
Economic Benefits	Greater certainty of access to desirable areas for new private sector investments, particularly for long-term plans
	Identification of compatible uses within the same area of development
	Reduction of conflicts between incompatible uses
	Improved capacity to plan for new and changing human activities, including emerging technologies and their associated effects
	Better safety during operation of human activities
	Promotion of the efficient use of resources and space
	Streamlining and transparency in permit and licensing procedures
Social Benefits	Improved opportunities for community and citizen participation
	Identification of impacts of decisions on the allocation of ocean space (e.g., closure areas for certain uses, protected areas) for communities and economies onshore (e.g., employment, distribution of income)”
	Identification and improved protection of cultural heritage
	Identification and preservation of social and spiritual values related to ocean use (e.g., the ocean as an open space)

UNESCO IOC 2009

Characteristics of good spatial management

Ecosystem-based, balancing ecological, economic, and social goals and objectives toward sustainable development

Integrated, across sectors and agencies, and among levels of government

Place-based or **area-based**

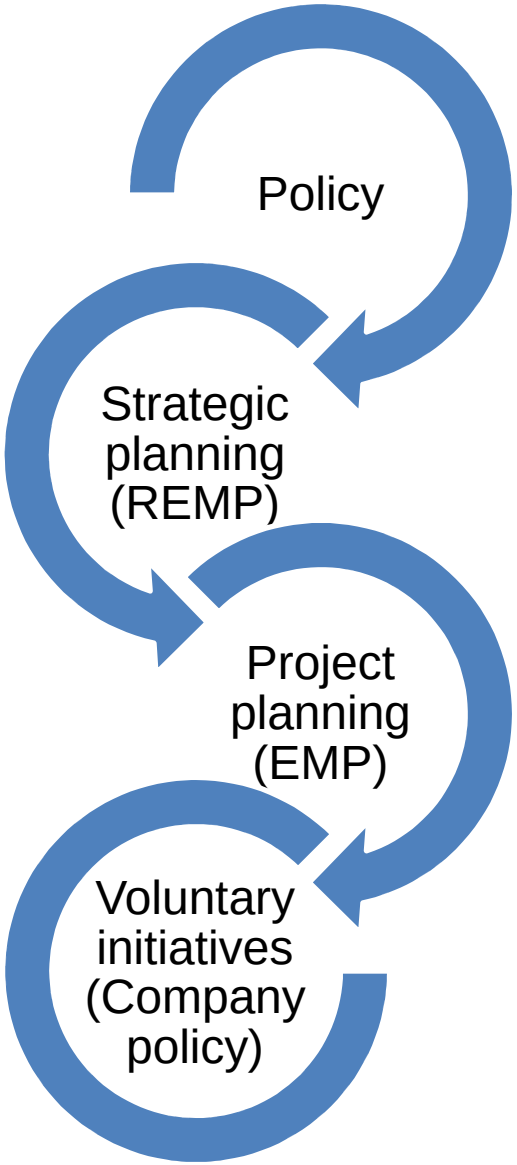
Adaptive, capable of learning from experience

Strategic and anticipatory, focused on the long-term

Participatory, stakeholders actively involved in the process

UNESCO IOC 2009

Mechanisms


Policy
Strategic planning (REMP)
Project planning (EMP)
Voluntary initiatives (Company policy)

Potential conservation benefits of protecting spatial areas

- May protect a variety of habitats and species
  - Helps maintain healthy and sustainable populations / communities
  - May reduce chance of population / community extinction
  - May reduce chance of species extinction
- May help re-colonisation / recovery of impacted areas (supply of larvae / adults)

- Can be more effective than other methods
  - Precautionary
  - Simpler
  - Is more effective with high uncertainty
  - Can be adaptive (many caveats)

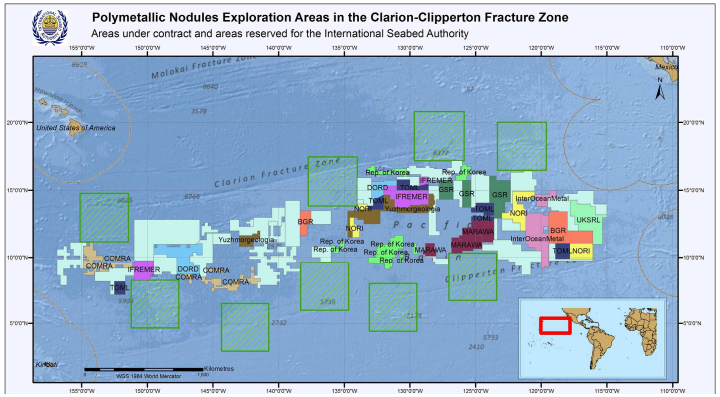
Conservation benefits depend on areas being:

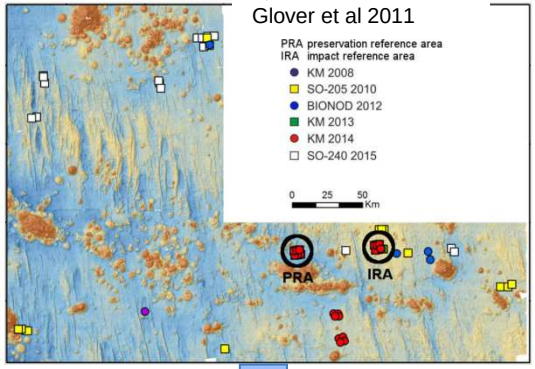
- Unimpacted
- Well enforced
- Old
- Large
- Ecologically isolated from other activities

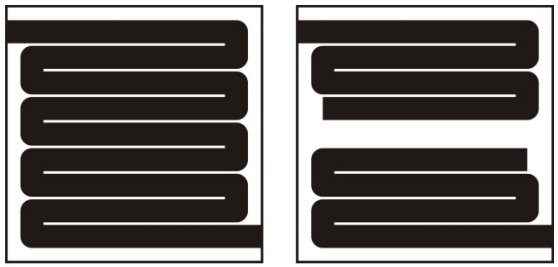
Edgar et al., 2014. Nature 506 (7487), 216-220.

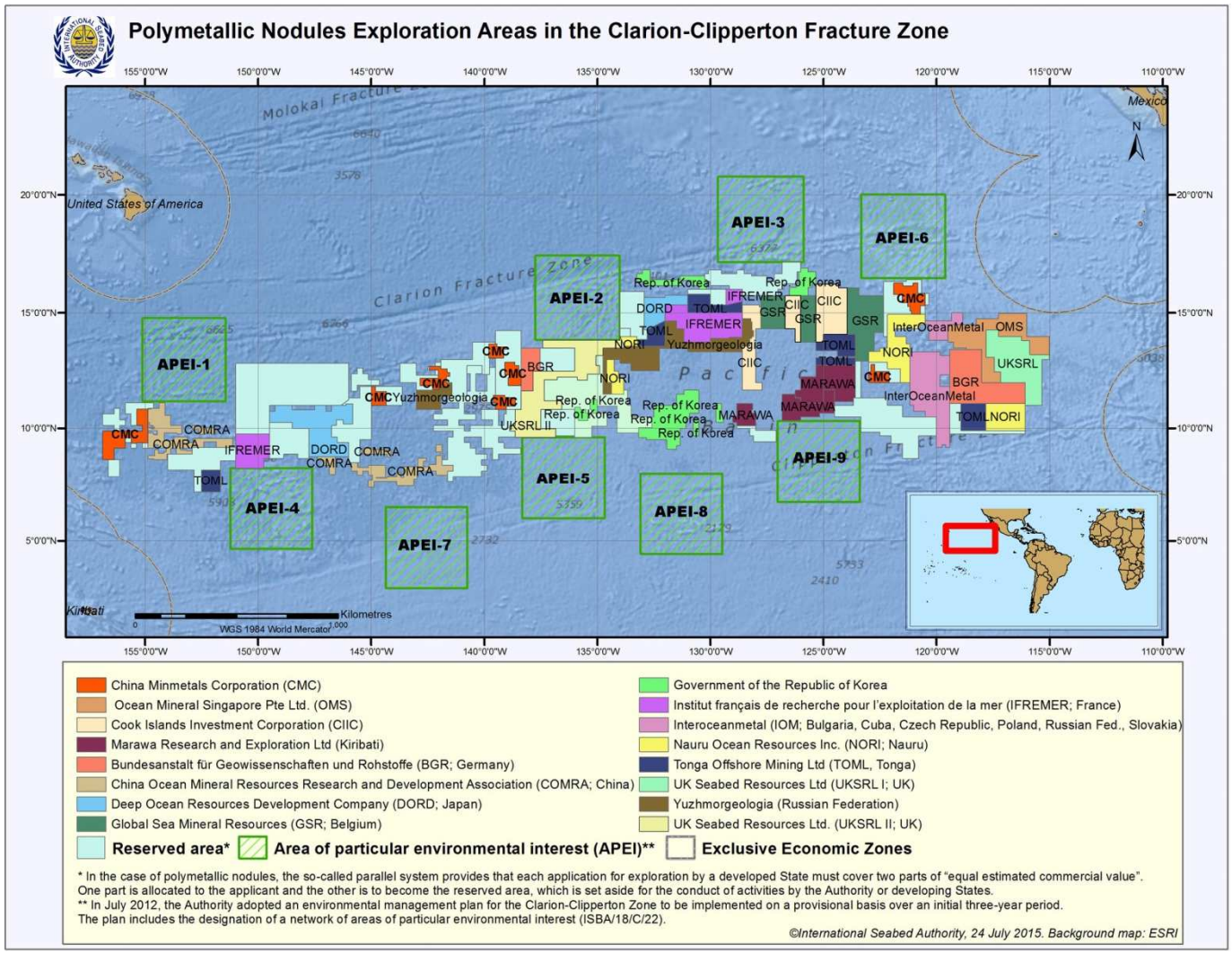
(CBD) Network Design principles

- EBSAs (i.e. ecologically important / special / unique places)
- Representativity
  - Of habitats / communities / species
- Adequacy
  - Size: Proportional to population sizes, species numbers, habitat types
- Replication
  - Number of areas
- Connectivity / Spacing
  - All kinds of connectivity (e.g. trophic, life history, genetic, etc.)
  - Isolation from impact


Polymetallic Nodules Exploration Areas in the Clarion-Clipperton Fracture Zone
Areas under contract and areas reserved for the International Seabed Authority
Molokai Fracture Zone
Clarion Fracture Zone
Clipperton Fracture Zone
Pacific
United States of America
Mexico
Kiribati
Rep. of Korea
IFREMER
BGR
GSR
InterOceanMetal
NORI
UKSRL
MARAWA
TOML
COMRA
DORD
Yuzhmorgeologiya
WGS 1984 World Mercator
Kilometros


Glover et al 2011
PRA preservation reference area
IRA impact reference area
KM 2008
SO-205 2010
BIONOD 2012
KM 2013
KM 2014
SO-240 2015
0 25 50
Km
PRA
IRA

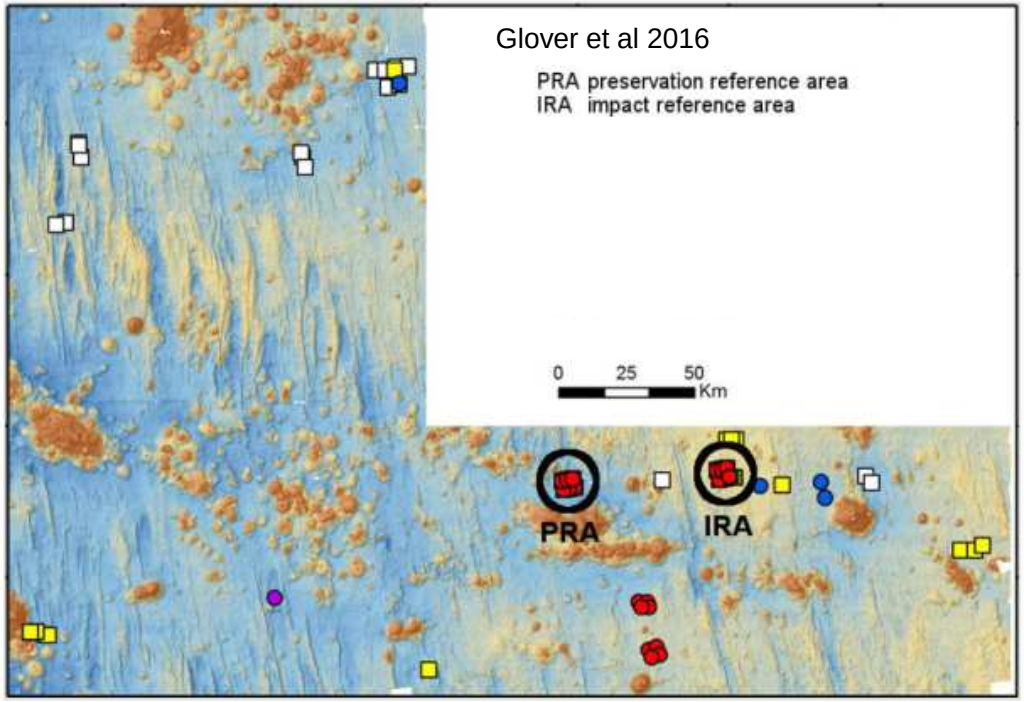




Regional scale APEI network

- Can help protect biodiversity
- Likely primary conservation strategy
  - Protects large areas
  - Likely to be unimpacted
  - Can be long term
- But
  - May not be fully representative
  - Widely spaced (little connectivity / ability to colonise impacted areas?)
  - May not be long term
- Needs to be complemented by finer-scale measures

Claim-scale spatial management



Claim-Scale Spatial management

Report of the LTC 2016 session

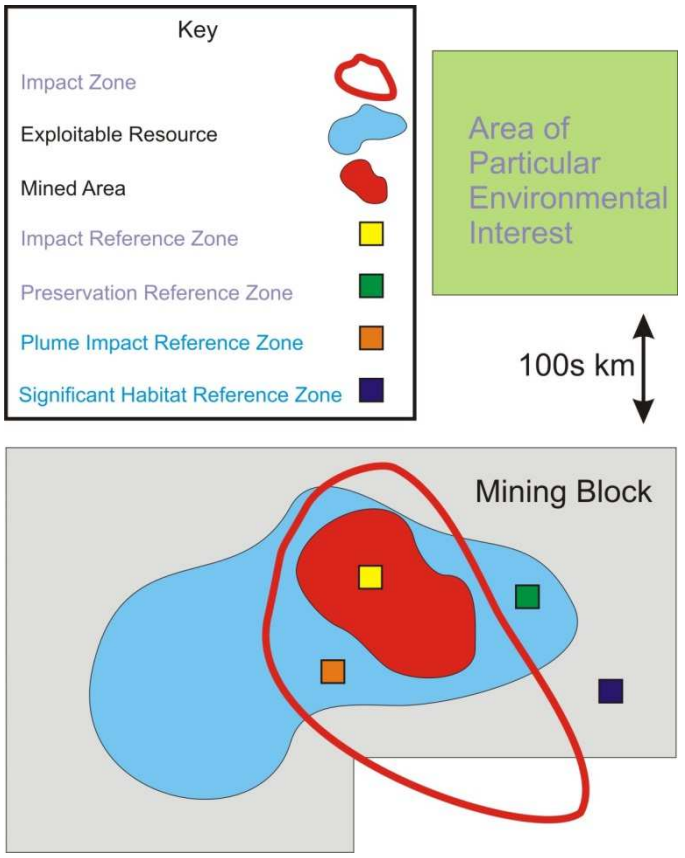
- Guidelines needed for establishment of IRZ and PRZ

Current system is IRZ and PRZ

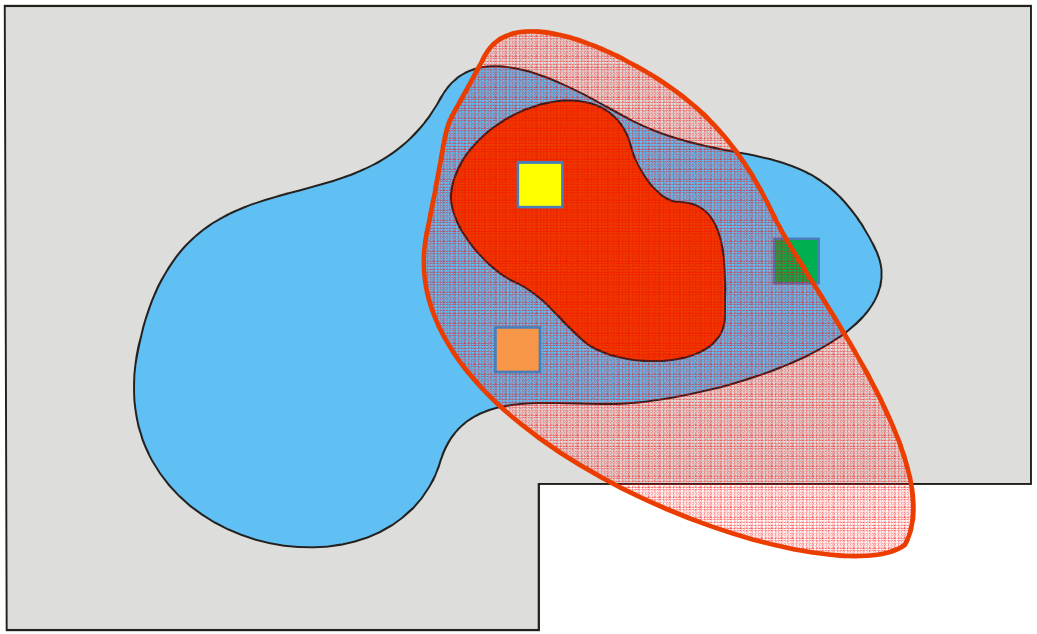
Defined in mining code

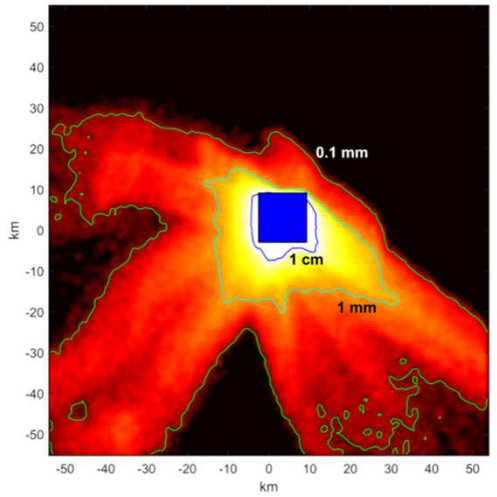
"**Impact reference zones**" are areas to be used for assessing the effect of each contractor's activities in the Area on the marine environment and which are representative of the environmental characteristics of the Area.

"**Preservation reference zones**" means areas in which no mining shall occur to ensure representative and stable biota of the seabed in order to assess any changes in the flora and fauna of the marine environment.



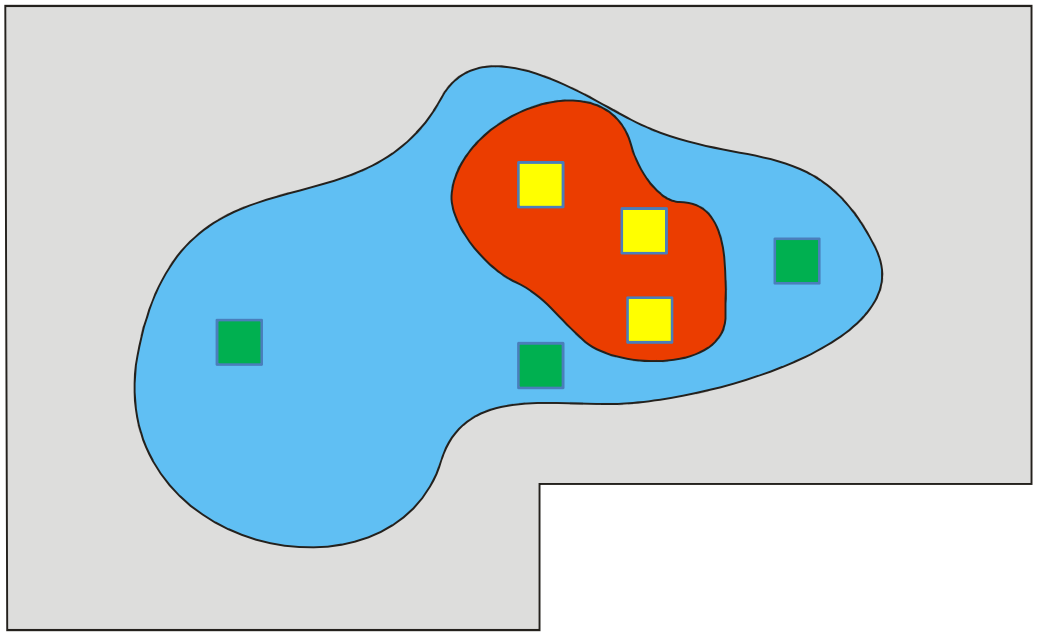
Science-based recommendations for this





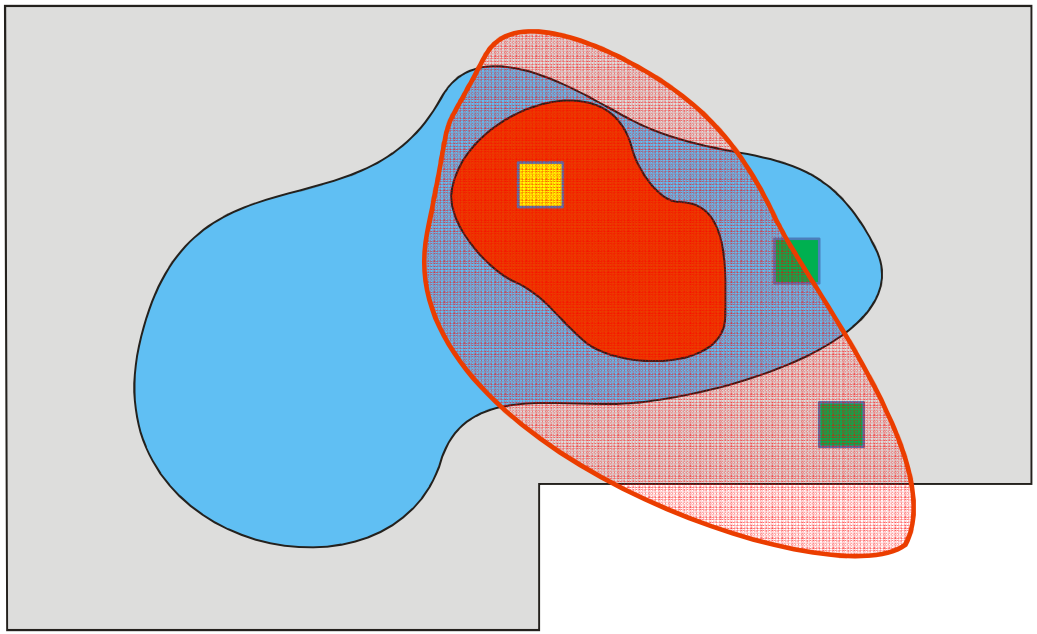
Needs:
Consider the likely distribution of the mining plume in determining zones

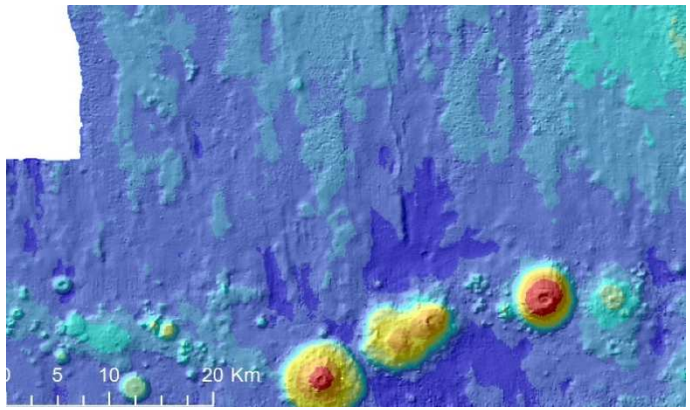
- The plume may enter a PRZ
- A sub-class of impact reference zone will be needed to assess plume impacts



Recommendation
Multiple PRZs and IRZs will likely be required

- To deal with uncertainty in the mining and plume
- To deal with uncertainty in natural biological processes
- To improve the statistical power of subsequent environmental investigations



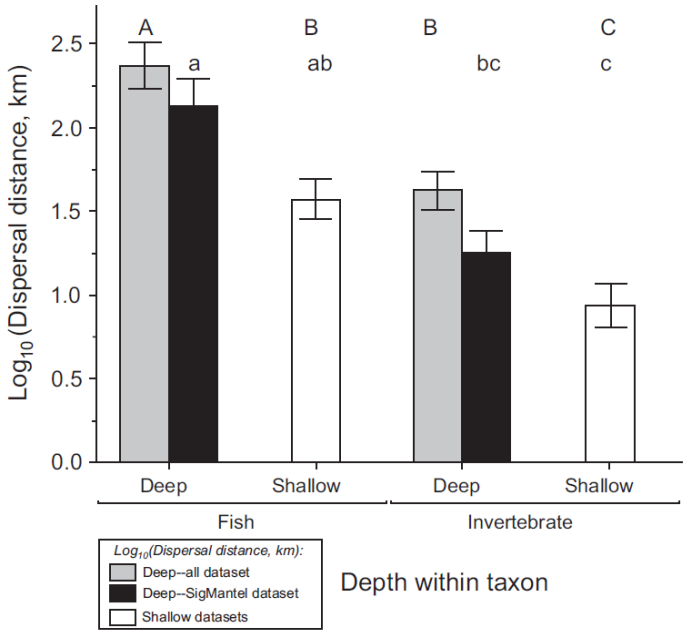


Representativity suggests that all major habitats will need to be represented, including those directly and indirectly impacted by mining

- Areas may contain vulnerable or important marine ecosystems
- A range of ecosystems may be impacted by plumes

Other considerations

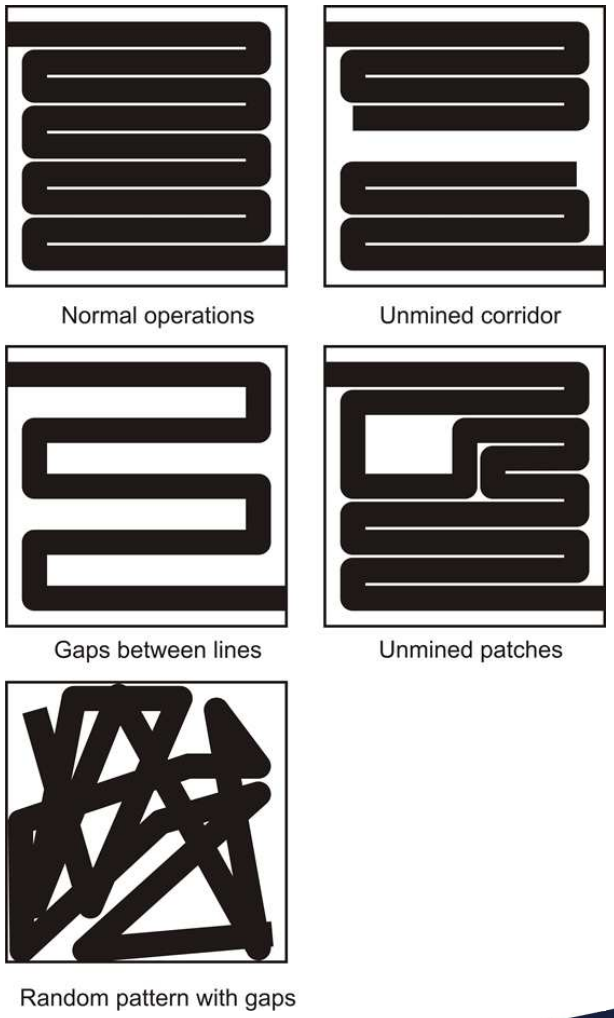
- Phased approach or all established at the beginning?
- Size and spacing (scientific challenge)
- How long they last (perpetuity, decommissioning)
- How long monitored for
- What can be done in PRZ (limit MSR?, other industries)
- Monitoring reliant on long-term network of sites – what happens when mine plan changes



From R. Etter

Finer-scale spatial management?

- Possible to reduce impact by fine-scale spatial management?
- Limited information to determine best approach
- Terrestrial examples for corridors and patches
- May occur as a result of operations e.g. deposit locations
- Plume size critical
- Part of contractors strategy (mine plan)



Conclusions

- Spatial management important and represented in planning for DSM
- Two main mechanisms SEMP/REMP (ISA) and EMP (Contractor)
- Lots of potential approaches
- Appears that although provision for spatial management through EMP will be in exploitation regulations, there may be gaps
  - Strategic / Regional approaches
  - Objectives leading to “rules” for spatial management – covered in technical studies?
- Opportunities for enhancing spatial management
  - SEA (need formalised process)
  - SEMP/REMP
  - Set best practice approaches for EMP
  - Improve underpinning science for design