



Western Washington University
Western CEDAR

Salish Sea Ecosystem Conference

2014 Salish Sea Ecosystem Conference
(Seattle, Wash.)

May 2nd, 8:30 AM - 10:00 AM

Marine Protected Area Design for the North Pacific Coast, Canada

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and John Bones

JG Bones Consulting

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Smith, Joanna; Diggon, Steve; and John Bones, and, "Marine Protected Area Design for the North Pacific Coast, Canada" (2014). *Salish Sea Ecosystem Conference*. 27.

<https://cedar.wvu.edu/ssec/2014ssec/Day3/27>

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MARINE PROTECTED AREA DESIGN

Jo Smith

Charlie Short, Steve Diggon, John Bones, Matthew Justice and Jo Smith
Marine Planning Partnership for the North Pacific Coast (MaPP)

MAPP STUDY AREA

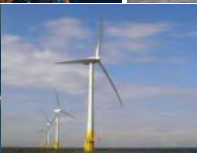
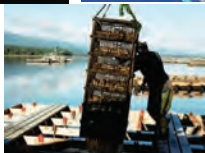
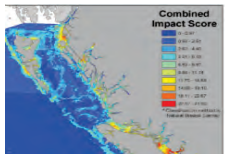


MaPP
102,000 sq. km
North Pacific Coast
British Columbia, Canada

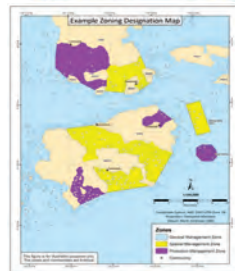
MARINE PLANNING PARTNERSHIP



- Co-led Provincial and 18 First Nations governments
- Nov 2011 – Jun 2014
- EBM framework



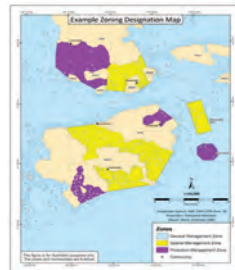
- Sub-regional Marine Plans
- Regional Priority Plan
- Zoning
- Recommendations to a marine protected area network in the Northern Shelf Bioregion



- Sub-regional Marine Plans
- Regional Priority Plan
- Zoning
- Recommendations to a marine protected area network in the Northern Shelf Bioregion

→ Identify high priority conservation areas

→ Marine protected area network design



IDENTIFY HIGH PRIORITY CONSERVATION AREAS IN MAPP STUDY AREA



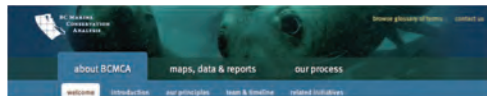
- Marxan
- Used globally to inform planning and protected area networks
- Optimisation algorithm
- Data intensive
- Requires expertise
- Requires a decision on “targets”
- Generate multiple scenarios
- Output = solution sets to inform planning



IDENTIFY HIGH PRIORITY CONSERVATION AREAS IN MAPP STUDY AREA



- BC Marine Conservation Analysis (BCMCA) 2006 – 2013
 - **Karin Bodter, Carrie Robb, Chris McDougall and others**
- Rigorous analysis with > 200 features
- Expert workshops
- Thorough government and stakeholder review and input



→ Meet targets in minimum area

IDENTIFY HIGH PRIORITY CONSERVATION AREAS IN MAPP STUDY AREA



- MaPP used BCMCA Project Team recommendations*:

Regional Scenarios	Project Team Target	Representative species & habitats	Special or Rare	BLM* (clumping)
1	High	30%	60%	3
2	High	30%	60%	8
3	High	30%	60%	12
4	Low	10%	20%	5
5	Low	10%	20%	12

*Input from MaPP Science Advisory Committee

IDENTIFY HIGH PRIORITY CONSERVATION AREAS IN MAPP STUDY AREA



5 Regional scenarios

- 588 planning units (1x1 km)
 - 1,022 features
 - Cost layers not used (e.g., human uses)
 - Sum Solutions 100 runs and “Best” Solution
 - Calculate # clumps, average size, and area
- 20 Sub-regional scenarios



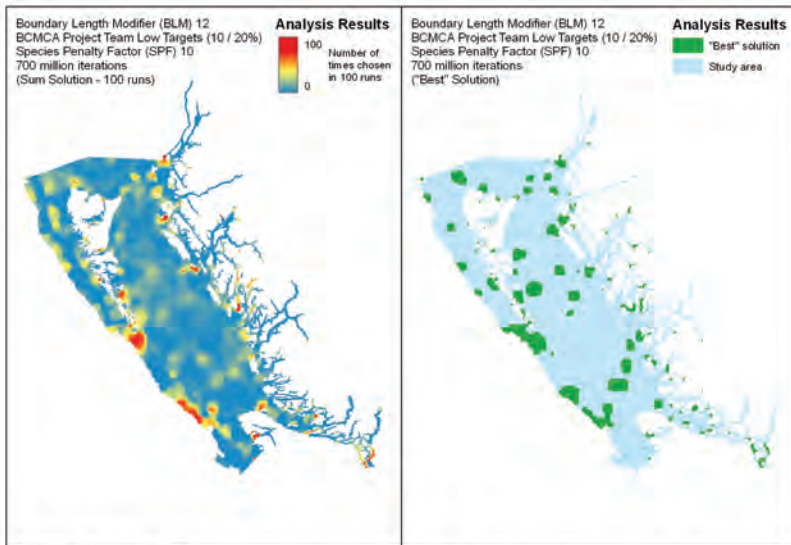
IDENTIFY HIGH PRIORITY CONSERVATION AREAS IN MAPP STUDY AREA



Scenario	Project Team Target*	# Clumps	Average \pm SD Size (km ²)	Total area (km ²) in "best" solution
1	High (30/60; 3)	240	167 \pm 866	40,163
2	High (30/60; 8)	130	325 \pm 1,176	42,246
3	High (30/60; 12)	119	360 \pm 1,090	42,899
4	Low (10/20; 5)	191	70 \pm 139	13,294
5	Low (10/20; 12)	160	87 \pm 212	13,970

* (% representative/% special; boundary length modifier)

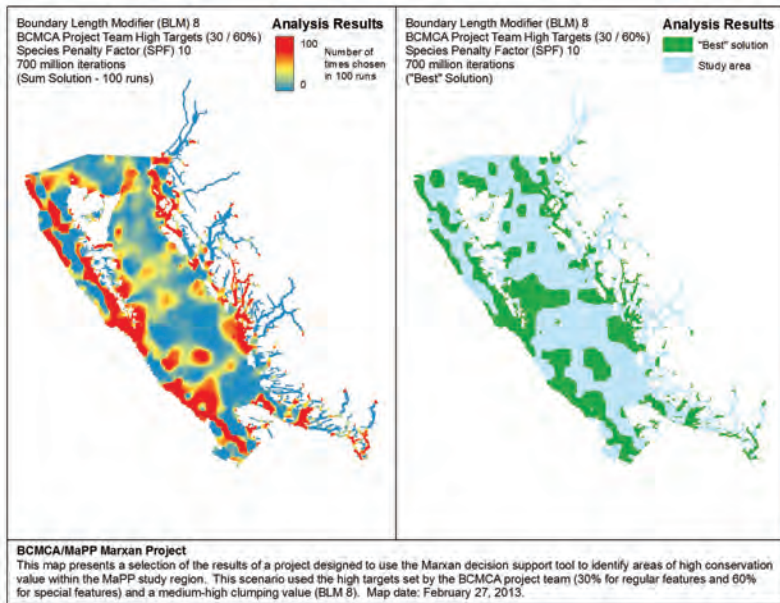
Low Target (10/20%) with medium clumping (BLM 12)



BCMCA/MaPP Marxan Project

This map presents a selection of the results of a project designed to use the Marxan decision support tool to identify areas of high conservation value within the MaPP study region. This scenario used the low targets set by the BCMCA project team (10% for regular features and 20% for special features) and a high clumping value (BLM 12). Map date: February 25, 2013.

High Target (30/60%) with medium clumping (BLM 8)

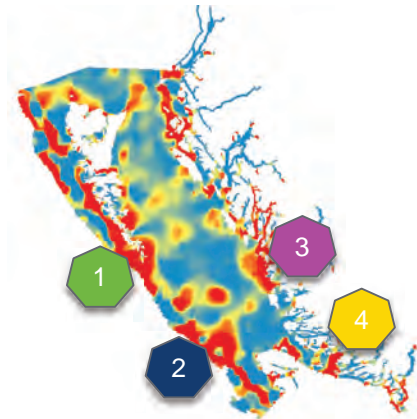


IDENTIFY HIGH PRIORITY CONSERVATION AREAS IN MAPP STUDY AREA



- All scenarios met designated targets for species & habitats
 - Plants, birds, invertebrates, fish, indices, mammals, abiotic
- Consistent high value areas:

1. Cape St. James
2. Scott Islands
3. Hakai Pass
4. Broughton Archipelago



- Analyse existing protected areas
- Overlap with Marxan scenarios
- Inform Sub-regional Protection Management Zones
- Inform Regional network

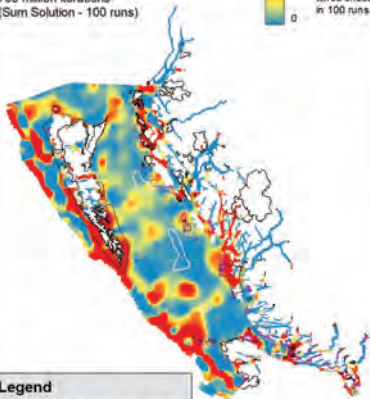
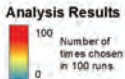


Existing marine protection	# Clumps	Average Size \pm SD (km ²)	Total area (km ²)
Prov & Fed protected areas	112	47 \pm 330	5,262
Rockfish Conservation Areas	71	49 \pm 84	3,494
Sponge Reef Closures	3	612	1,837
All Existing	186	57 \pm 274	10,593

High Target (30/60%) with Existing Protected Areas



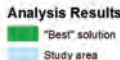
Boundary Length Modifier (BLM) 8
BCMCA Project Team High Targets (30 / 60%)
Species Penalty Factor (SPF) 10
700 million iterations
(Sum Solution - 100 runs)



Legend

- Sponge Reef Fishing Closures
- Marine Protected Areas
- Rockfish Conservation Areas

Boundary Length Modifier (BLM) 8
BCMCA Project Team High Targets (30 / 60%)
Species Penalty Factor (SPF) 10
700 million iterations
("Best" Solution)



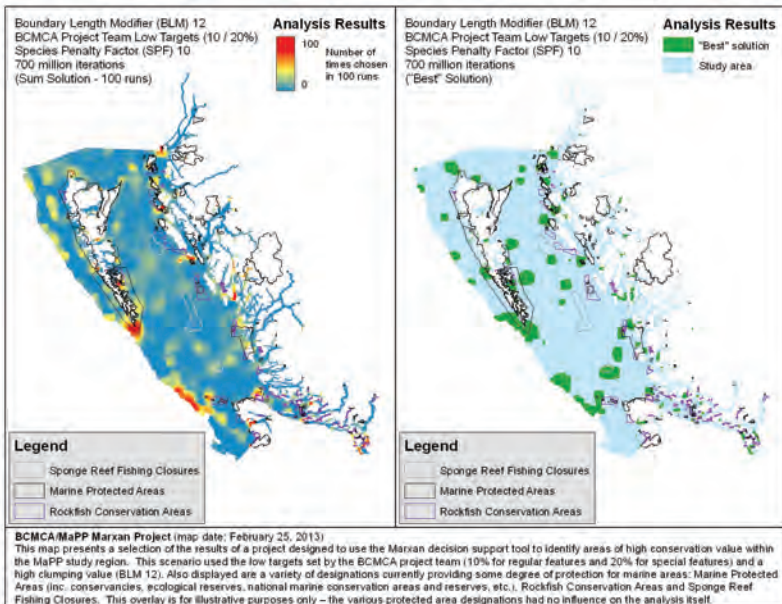
Legend

- Sponge Reef Fishing Closures
- Marine Protected Areas
- Rockfish Conservation Areas

BCMCA/MaPP Marxan Project (map date: February 27, 2013)

This map presents a selection of the results of a project designed to use the Marxan decision support tool to identify areas of high conservation value within the MaPP study region. This scenario used the high targets set by the BCMCA project team (30% for regular features and 60% for special features) and a med-high clumping value (BLM 8). Also displayed are a variety of designations currently providing some degree of protection for marine areas: Marine Protected Areas (inc. conservancies, ecological reserves, national marine conservation areas and reserves, etc.), Rockfish Conservation Areas and Sponge Reef Fishing Closures. This overlay is for illustrative purposes only – the various protected area designations had no influence on the analysis itself.

Low Target (10/20%) with Existing Protected Areas

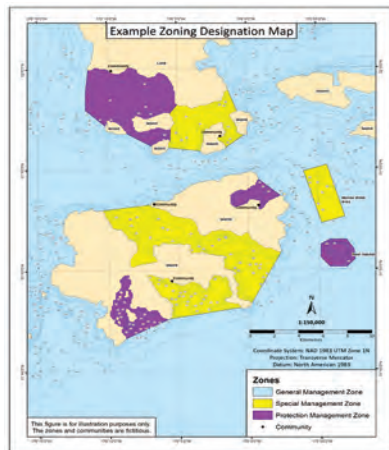


- Representation - biodiversity
- Replicate protection
- Special, distinct, unique, vulnerable sites or species
- Critical habitat for breeding, spawning, feeding, rearing
- Minimum and variable sizes 1-20 km²
- Connectivity – ensure linkages



MPAIT 2012, Green et al, 2013; Gombos et al. 2013, Burt et al. in preparation

- Apply best practices for designing protected areas:
 - straight lines
 - square, rectangular, hexagonal shapes
- Ecological effectiveness



- Social, Economic & Cultural
- *For example:*
 - Recognise range of uses, activities
 - Enhance management effectiveness
 - Mitigate human disturbances



SeaSketch

www.seasketch.org

317 Data Layers:

- 111 marine environment
- 120 human uses
- 29 Marxan
- + others



THANK YOU!



For more information:

Marine Planning Partnership for the North Pacific Coast

www.mappocean.org

Email: info@mappocean.org

