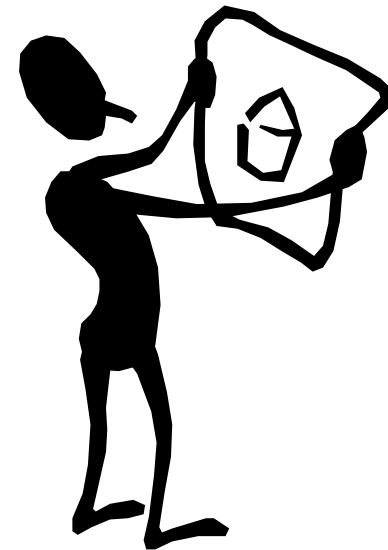


ERP Planning Framework

Selecting conservation areas

Combination of 3 Methods:

- ❖ Marxan modeling software
- ❖ Non-Marxan ‘Common Sense’ method
- ❖ Relative Biodiversity Index



Selecting conservation areas

Marxan

Marxan is a DOS-based optimisation computer software model developed to facilitate the design of marine protected areas (Ball & Possingham 2000)

MARXAN - The Ecology Centre at The University of Queensland - Microsoft Internet Explorer

Address: <http://www.ecology.uq.edu.au/index.html?page=27710>

The Ecology Centre

Home > MARXAN

MARXAN

MARXAN - A Reserve System Selection Tool

Ian R. Ball and Hugh P. Possingham

About MARXAN
Getting MARXAN

MARXAN at Work
MARXAN - Contacts

MARXAN - Further Info
MARXAN - Key References

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How to cite MARXAN
CLUZ Software
P.A.N.D.A Software

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What does MARXAN do?

MARXAN is software that delivers decision support for reserve system design. MARXAN finds reasonably efficient solutions to the problem of selecting a system of spatially cohesive sites that meet a suite of biodiversity targets. Given reasonably uniform data on species, habitats and/or other relevant biodiversity features and surrogates for a number of planning units (as many as 20,000) MARXAN minimizes the cost (a weighted sum of area and boundary length, Possingham, Ball and Andelman 2001) while meeting user-defined biodiversity targets.

The optimisation algorithm that attempts to find good systems of sites is 'simulated annealing' (Kirkpatrick et al. 1983, Otten et al. 1989). The number of possible solutions is vast (for 200 planning units there are over 1.6×10^{60} solutions) and because the problem is NP-complete there is no possible method for extracting an optimal solution in reasonable time for large problems. Because of this there is no real hope (or indeed incentive) to find an optimal solution: MARXAN will find good solutions using simulated annealing. The user can also invoke a variety of less sophisticated, but often faster, heuristic algorithms. We have found that one of the most useful outputs from the decision support software is the 'summed irreplaceability' output (Fig. 1) (Leslie et al. 2003, McDonnell et al. 2002). This output shows how often each planning unit is in one of the good systems. Planning units that are chosen more than 50% of the time can be thought of as being essential for efficiently meeting biodiversity goals. Sites that are rarely selected can be ignored. This concept is inspired by, but different from, Bob Pressey's notion of irreplaceability (Pressey et al. 1994).

0
1 - 49
50 - 99
100

start

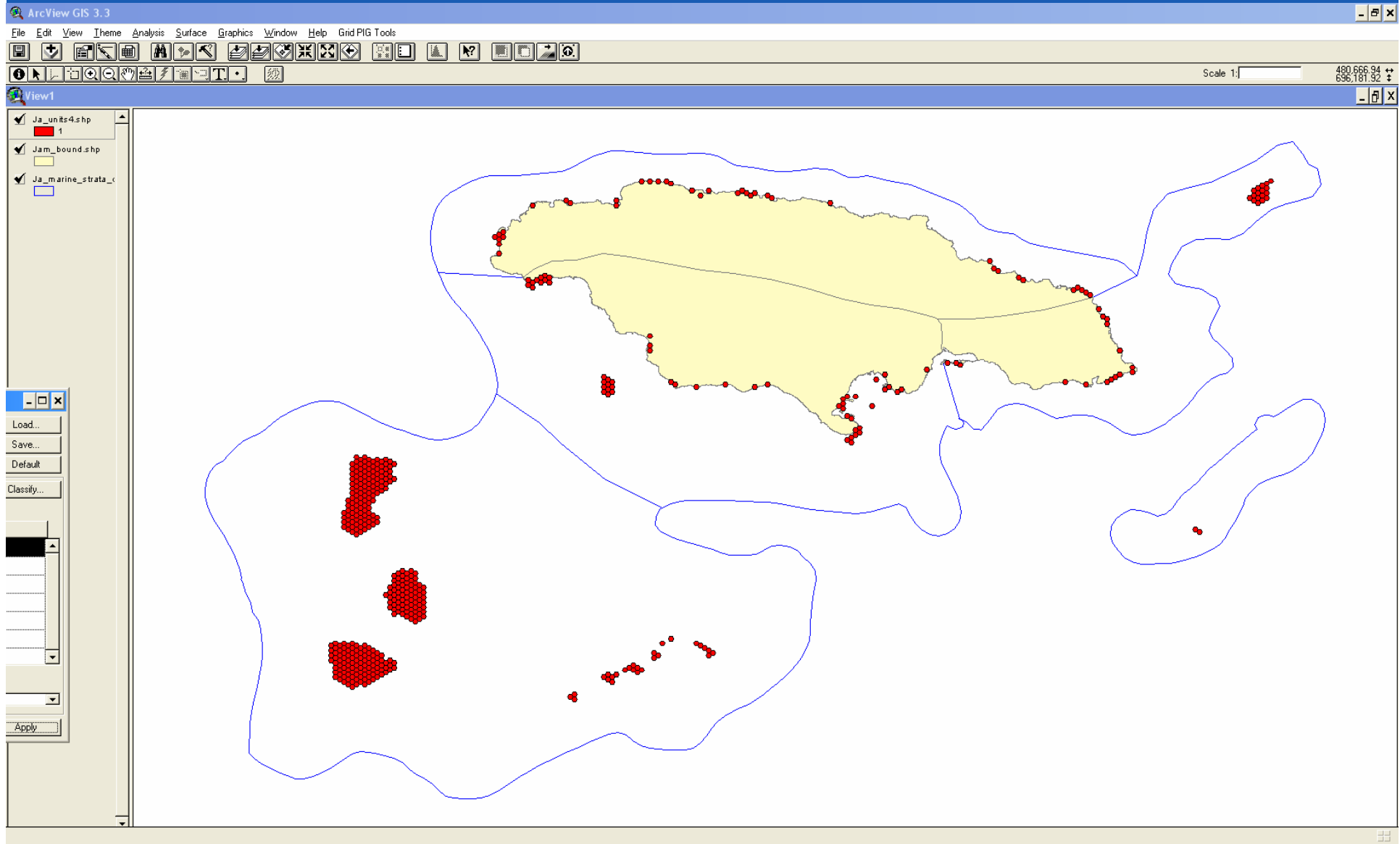
Internet

JERP MA... ArcView... Jerp_mari... PRESENT... 2 Micro... 100% 8:36 PM

<http://www.ecology.uq.edu.au/index.html?page=27710>

Runs – 100
Iterations – 10,000,000
BLM – 0.05
Cost – Surface mean
(260-1300)

SPF – fixed at 1
Status of Planning Units – none locked in
Goal – **Independent goals**



Non-Marxan 'Common sense' model

- ❖ Pre-selected areas prioritised based on explicit criteria: biological significance, threat intensity and conservation feasibility



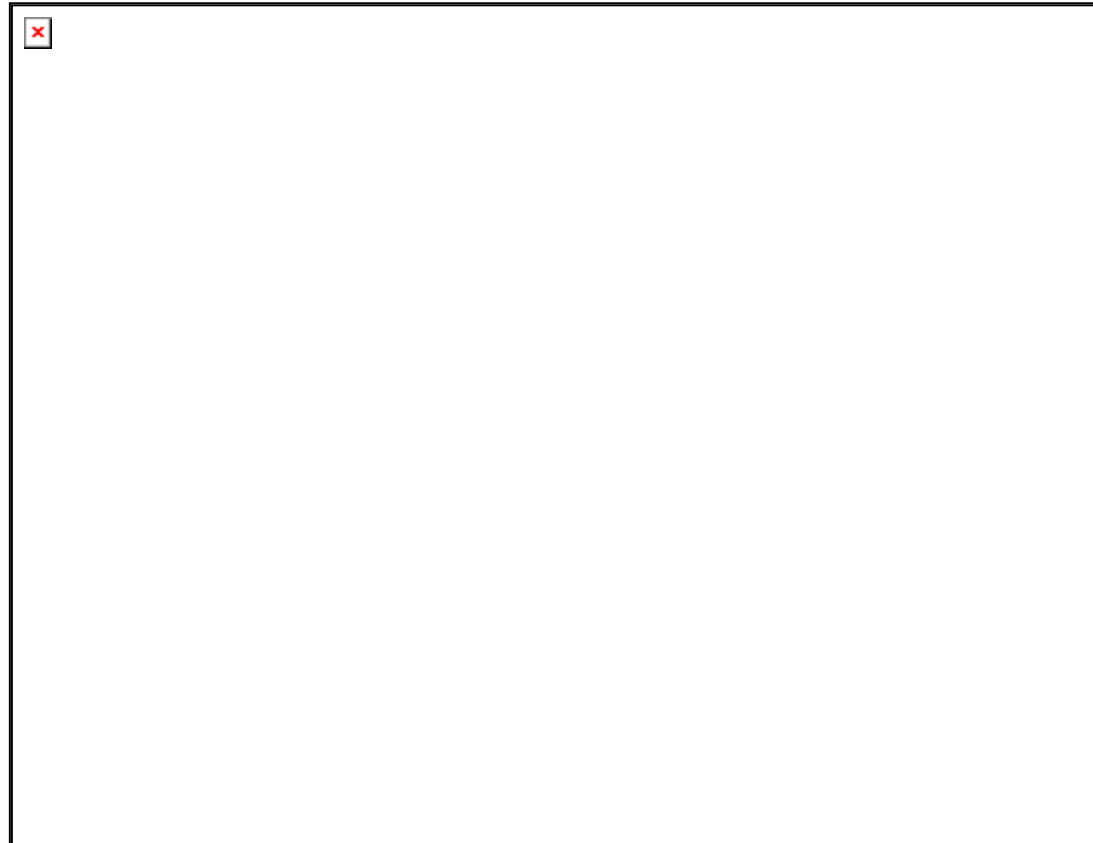
Criteria for Conservation Priority

CRITERIA	MEASURES		
Relative Biological Significance (High, Medium)	targets relative to total target # in Marine Stratification Unit), Endangered Species (P/A of Manatees), Source Area (P/A of Seabird Nesting & Roosting Areas & Turtle Nesting Beaches)	} OVERALL BIODIVERSITY VALUE	
Relative Threat Intensity (High, Medium, Low)	P/A of mapped threats (by Threat Category) within Areas of Biodiversity Significance (ABSs) 3 - ABS is contained within or intersects a		
Conservation Feasibility (3,2,1,0)	Protected Area; 2 - ABS is contained within or intersects a Game Reserve; 1 - ABS is contained within or intersects a Proposed Protected Area or has some protective legislation ; 0 - no PA status		

Areas of Biodiversity Significance (ABSs)

❖ 16 areas (mainland Jamaica and 2 offshore banks – Pedro & Morant)

- ❖ Areas determined based on marine biodiversity ‘hot spots’ (concentrations of multiple target occurrences)
- ❖ Areas were reviewed and accepted by local experts at JERP workshop, October 2004 – Areas of Significant Biodiversity (ABS)




Draft Prioritisation Results

Handout # 5

ABS #	Area of Biodiversity Significance (ABS)	Marine Stratification Unit (MSU)	Relative Biological Significance	Relative Threat Intensity	Overall Biodiversity Value	Conservation Feasibility	Conservation Priority
1	Negril	Northern	High	Medium	High	3	High
2	Falmouth/Duncans (including Lili's Rock, Stewart Bay)	Northern	High	Medium	High	2	Medium
3	Montego Bay/Reading area	Northern	Medium	High	Medium to Low	3	Medium
4	Ironshore/Rose Hall area	Northern	Medium	Medium	Medium	0	Low
5	Discovery Bay/Pear Tree	Northern	High	Medium	High	1	Medium
6	West of Port Maria and Pagee to Robin's Bay	Northern	Medium	Low	Medium	0	Low
7	Trident Wall to Boston Bay	Northern	High	Medium	High	1	High
8	Western Kingston Harbour and Port Royal Cays	Southern	High	High	Medium	3	High
9	Portland Bight coastal area (including Canoe Valley, Hellshire Bay and Manatee Bay)	Southern	High	High	Medium	3	High
10	Coastal Black River (to Scotts Cove) and Treasure Beach	Southern	High	Medium	High	2	High
11	Alligator Pond Area	Southern	High	High	Medium	2	Medium
12	Sav la Mar area (including Cabarita)	Southern	Medium	Medium	Medium	0	Low






-  HIGH
-  MEDIUM
-  MEDIUM-LOW

Conservation Feasibility

CONSERVATION FEASIBILITY OF AREAS OF BIODIVERSITY SIGNIFICANCE (ABS).

ID #	Area of Biodiversity Significance (ABS)	Marine Stratification Unit (MSU)	Conservation Feasibility
1	Negril	Northern	3
2	Falmouth/Duncans (including Lili's Rock, Stewart Bay)	Northern	2
3	Montego Bay/Reading area	Northern	3
4	Ironshore/Rose Hall area	Northern	0
5	Discovery Bay/Pear Tree	Northern	1
6	West of Port Maria and Pagee to Robin's Bay	Northern	0
7	Trident Wall to Boston Bay	Northern	1
8	Western Kingston Harbour and Port Royal Cays	Southern/Eastern	3
	Portland Bight coastal area		



-  HIGH
-  MEDIUM
-  LOW