

DRAFT
How large should marine reserves be?

Table 1. Reproduced from Table 6.3 in NRC 2001. Summary of studies estimating marine reserve area relative to the conservation of management objective.

Goal	Citation	Criteria (Species)	Area
Ethics	Ballantine 1997	Typical terrestrial target.	10%
Risk Risk management	Lauck et al. 1998	Uncertainty in stock assessment	31-70%
	Roughgarden 1998	Recruitment overfishing	75%
	Guenette et al. 2000	Spatial model, with and without additional regulations (cod).	20%
	Mangel 2000	Maintain stock at target levels	20-30%
	Goodyear 1993	Prevent recruitment overfishing	+20%
	Mace 1994	Precautionary approach	+40%
	Mace and Sissenwine 1993	Prevent recruitment overfishing	+35%
	Sumaila 1998	Bioeconomic model, cost-benefit (cod)	30-50%
DeMartini 1993	Yield-per-recruit model, adult mobility (coral reef fishes)	20-50%	

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Risk	Risk minimization and bycatch avoidance	Man et al. 1995	Metapopulation model	20-40%
	Risk minimization and yield maximization	Soh et al. 1998	Target high biomass areas (rockfish)	4-16%
		Foran and Fujita 1999	Fecundity and recruitment (Pacific ocean perch)	25%
Yield Maximization	Guenette and Pitcher 1999	Fecundity and recruitment (cod)	+30%	
	Pezzy et al. 2000	Bioeconomic model (coral reef fish)	21-40%	
	Sladek Nowlis and Roberts 1997, 1999	Fishing intensity (reef fish)	40%	
	Sladek Nowlis 2000	Fishing intensity (Caribbean white grunt)	30%	
	Sladek Nowlis and Yoklavich 1998	Catch enhancement (Pacific rockfish)	20-27%	
	Holland and Brazee 1996	Bioeconomic model (red snapper)	15-29%	
	Hannesson 1999	Bioeconomic model (cod)	50-80%	
	Polacheck 1990	Yield/recruit model, adult dispersal (cod)	10-40%	
Hastings and Botsford 1999	Reproductive output (sea urchin)	35%		
Botsford et al. 1999	Vulnerability to recruitment overfishing (sea urchin)	8-33%		

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Yield Maximization	Attwood and Bennett 1995	Increase spawning stocks (recreational surf zone fishing)	33%	
	Quinn et al. 1993	Allee effects and dispersal (sea urchin)	50%	
	Daan 1993	Reduce fishing mortality by 10-14% (cod)	25%	
Biodiversity				
	Representation	Turpie et al. in press	Species representation, complementarity (fish)	10-36%
		Bustamente et al. 1999	Representative habitats	36%
		Ward et al. 1999	Habitats and species assemblages	40%
	Maintenance of genetic variation	Halfpenny and Roberts (in review)	Habitat representation or replication	10%
	Trexler and Travis 2000	Selective pressure from fishing	10-20%	
Increase Connectivity Among Reserves	Roberts in review	Dispersal distance	30%	