APPENDIX O8

Sensitivity of marine biota to changes in salinity

O8 SENSITIVITY OF MARINE BIOTA TO CHANGES IN SALINITY

The tolerance of marine biota to high salinities from studies in Australia and elsewhere in the world has been reviewed and the results summarised in Table O8.1. Note that in many cases the tested brine contained other possible contaminants, including anti-scalants or sewage.

Table O8.1 Summary of the response of marine biota to low and high salinities

Common name	Scientific name	Salinity g/L	Response	Reference
Seagrass	*Halophila johnsonii*	30	Optimum growth	Torquemada et al. (2005)
		>40	Reduced growth	
		>50	Reduced photosynthetic activity	
		>60	Increased mortality	
Hermit crab (larvae)	*Pagurus criticornus*	25 and 35	Normal growth and metamorphosis	Blaszkoski and Moreira (1986)
		45	Development inhibited at Stage II	
Mole Crab	*Emerita analoga*	>52	Lethal within two hours	Gross (1957)
Amphipod	*Rhepoxynius abronius*	43	No measurable effect to survival	Bay and Greenstein (1992)
Giant Kelp	*Macrocystis pyrifera*		No measurable effect to growth	
Purple sea urchin	*Stronglyocentrotus purpuratus*	36.5	Inhibition of embryo development	
Purple sea urchin	*Stronglyocentrotus purpuratus*	40	No measurable effect on survival or fertilisation	Le Page (2005)
Red Abalone	*Haliotis rufescens*			
Sand Dollar	*Dendraster excentricus*			
Sand Dollar	*Dendraster excentricus*	43–48	No measurable effect	ABA Consultants, 1992 (cited in Kinnetic Laboratories 2005)
Olive Snail	*Olivella pycna*		Lethal to juveniles (10–15 mm diameter)	
Littleneck Clams	*Venerupis (Ruditapes) philippinarum*	<50	No measurable effect	Iso et al. (1994)
		60–70	Impaired behaviour observed Lethal within 48 hours at 60 ppt Lethal within 24 hours at 70 ppt	
Sea Bream (juvenile)	*Pagrus major*	<45	No measurable effect	
		50	Colour darkening observed after 30 minutes 25% fatality within 24 hours	
		70	Lethal within 1 hour	
Marbled Flounder (eggs)	*Pseudopleuronectes yokohamae*	31–60	Hatchability successful but delayed with increasing salinity	
		70	Hatchability 0%	
Marbled Flounder (larvae)		<50	No observable effect	
		>50	Lethal after six days	
		60–100	Number of dead larvae increased in shorter periods of time	
Microalga	*Nitzschia closterium*	36.8	Reduced growth	Geotechnical Services (2006)
Common kelp	*Ecklonia radiata*	36.5	Reduced germination	
Blue Mussel (larvae)	*Mytilus edulis*	40	Impaired development	
Copepod	*Gladioferens imparipes*	36.8	Impaired reproduction	
Snapper (larvae)	*Pagrus auratus*	40	Reduced growth	

Table O8.1 Summary of the response of marine biota to low and high salinities (cont'd)

Common name	Scientific name	Salinity g/L	Response	Reference
California Grunion (larvae)	*Leuresthes tenuis*	41	50% fatality within 24 hours	Reynolds et al. 1976
Sheepshead Minnow	*Cyprinodon variegatus*	70	50% fatality within 48 hours	Pillard et al. 1999
Inland Silverside Minnow	*Menidia beryllina*	44	50% fatality within 48 hours	
Mysid shrimp	*Mysidopsis bahia*	43	50% fatality within 48 hours	
Western King Prawn	*Melicertus latisulcatus*	<10	100% mortality	Sang and Fotedar 2004
		>52	Adult mortality	Wu 1990
		>63	Juvenile mortality	
		>40	Larval mortality	
		>50	Reduced juvenile growth	
Chokka squid	*Loligo vulgaris*	34	60% hatching rate, 56% hatching success	Sen 2005
		37	88.5% hatching rate, 82% hatching success	
		>47	Prohibits development	D'Aniello et al. 1989
Patagonian squid	*Loligo gahi*	▲34.3	Zero survival, malformed embryos, ink ejection	Cinti et al. 2004
Golden cuttlefish	*Sepia esculenta*	>25.4	58–66% hatching success	Choe 1966 (cited in Paulij et al. 1990)
Japanese cuttlefish	*Sepiella maindroni (Sepiella japonica)*	>25.4	50–63% hatching success	
Kisslip cuttlefish, Bigfin reef squid, Double-ear Bobtail	*Sepia subaculeata (Sepia (Acanthosepion) lycidas), Sepioteuthis lessoniana, Eupryma berry*	27.1	>80% hatching success	
Australian Giant Cuttlefish	*Sepia apama*	45	Reduced embryo growth and survival	B Gillanders, University of Adelaide, pers. comm., 3 December 2008
		50	Zero survival of embryos	

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