

Supplementary material

Quantifying shark and ray discards in Western Australia's shark fisheries

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Table S1. Post-release mortality (PRM) of discarded species and length-weight parameters (a, b) for discarded and retained species

Common name	Scientific name	PRM	a	b	Source
Angel sharks	Squatinae	0.405	6.67×10^{-6}	3.16	Bridge <i>et al.</i> (1998)
Banded wobbegong	<i>Orectolobus ornatus</i>		4.83×10^{-6}	3.20	Huveneers <i>et al.</i> (2007)
Big-eye sixgill shark	<i>Hexanchus nakamurai</i>		2.18×10^{-6}	3.47	R. Froese and D. Pauly, FishBase, see www.fishbase.org
Bignose shark	<i>Carcharhinus altimus</i>		1.02×10^{-6}	3.46	Kohler <i>et al.</i> (1996)
Blacktip sharks	<i>Carcharhinus limbatus</i> – <i>C. tilstoni</i>		7.81×10^{-6}	3.06	Stevens and Wiley (1986)
Blue shark	<i>Prionace glauca</i>		3.18×10^{-6}	3.13	Kohler <i>et al.</i> (1996)
Bull shark	<i>Carcharhinus leucas</i>		1.78×10^{-5}	2.92	FishBase, see www.fishbase.org
Catsharks	Scyliorhinidae	0.271	3.52×10^{-6}	3.1	Pattarapongpan (2017)
Cobbler wobbegong	<i>Sutorectus tentaculatus</i>	0.057	4.83×10^{-6}	3.2	Huveneers <i>et al.</i> (2007)
Common blacktip	<i>Carcharhinus limbatus</i>		1.71×10^{-5}	2.9	FishBase, see www.fishbase.org
Common sawshark	<i>Pristiophorus cirratus</i>		6.07×10^{-5}	2.32	FishBase, see www.fishbase.org
Copper shark	<i>Carcharhinus brachyurus</i>		1.67×10^{-5}	2.9	FishBase, see www.fishbase.org
Crocodile shark	<i>Pseudocarcharias kamoharui</i>	0.758	3.35×10^{-4}	2.12	Ariz <i>et al.</i> (2007)
Dusky shark	<i>Carcharhinus obscurus</i>		1.96×10^{-5}	2.86	Simpfendorfer and Unsworth (1998)
Dwarf spotted wobbegong	<i>Orectolobus parvimaculatus</i>	0.057	4.83×10^{-6}	3.2	Huveneers <i>et al.</i> (2007)
Floral banded wobbegong	<i>Orectolobus floridus</i>	0.057	1.14×10^{-5}	3.01	Set at a average of <i>O. ornatus</i> and <i>O. maculatus</i>
Great hammerhead	<i>Sphyrna mokarran</i>		1.75×10^{-6}	3.44	Pleizier <i>et al.</i> (2015)
Grey gummy shark	<i>Mustelus ravidus</i>		2.52×10^{-6}	3.22	Stevens and McLoughlin (1991)
Grey reef shark	<i>Carcharhinus amblyrhynchos</i>		1.21×10^{-5}	2.98	Stevens and McLoughlin (1991)
Guitarfish & shovelnose rays	Rhinobatidae & Rhynchobatidae	0.363	1.88×10^{-6}	3.28	FishBase, see www.fishbase.org
Gummy shark	<i>Mustelus antarcticus</i>		2.51×10^{-6}	3.21	Walker (2010)
Hammerheads	<i>Sphyrna</i> spp.		2.44×10^{-6}	3.22	Set at a average of <i>S. lewini</i> , <i>S. mokarran</i> and <i>S. zygaena</i>
Milk shark	<i>Rhizoprionodon acutus</i>		3.54×10^{-6}	3.01	Stevens and McLoughlin (1991)
Pelagic thresher shark	<i>Alopias pelagicus</i>		4.46×10^{-5}	2.79	Kohler <i>et al.</i> (1996)
Pencil shark	<i>Hypogaleus hyugaensis</i>		3.54×10^{-6}	3.01	Set equal to <i>R. acutus</i>
Port Jackson shark	<i>Heterodontus portusjacksoni</i>	0.054 ^A	2.20×10^{-6}	3.47	Tovar-Ávila <i>et al.</i> (2007)
Sandbar shark	<i>Carcharhinus plumbeus</i>		1.09×10^{-5}	3.01	Kohler <i>et al.</i> (1996)
Sawsharks	<i>Pristiophorus</i> spp.		6.07×10^{-5}	2.32	Set equal to <i>P. cirratus</i>
Scalloped hammerhead	<i>Sphyrna lewini</i>		7.78×10^{-6}	3.07	Kohler <i>et al.</i> (1996)
School shark	<i>Galeorhinus galeus</i>		8.30×10^{-6}	2.99	FishBase, see www.fishbase.org
Sevengill shark	<i>Notorynchus cepedianus</i>		1.09×10^{-5}	3	FishBase, see www.fishbase.org
Shortfin mako	<i>Isurus oxyrinchus</i>		5.24×10^{-6}	3.14	Kohler <i>et al.</i> (1996)
Silky shark	<i>Carcharhinus falciformis</i>		1.54×10^{-5}	2.92	Kohler <i>et al.</i> (1996)
Sliteye shark	<i>Loxodon macrorhinus</i>	1	8.36×10^{-7}	3.44	Stevens and McLoughlin (1991)
Smooth hammerhead	<i>Sphyrna zygaena</i>		9.19×10^{-7}	3.42	Stevens (1984)
Snaggletooth	<i>Hemipristis elongata</i>		2.73×10^{-6}	3.21	Stevens and McLoughlin (1991)
Southern eagle ray	<i>Myliobatis tenuicaudatus</i>	0.146	7.41×10^{-6}	3.19	Jones <i>et al.</i> (2010)
Southern fiddler ray	<i>Trygonorrhina dumerilii</i>	0.1	1.09×10^{-5}	3	FishBase, see www.fishbase.org
Spinner shark	<i>Carcharhinus brevipinna</i>		6.19×10^{-6}	3.04	Stevens (1984)
Spotted wobbegong	<i>Orectolobus maculatus</i>		3.00×10^{-5}	2.78	Huveneers <i>et al.</i> (2007)
Spurdogs	<i>Squalus</i> spp.	0.173	1.36×10^{-6}	3.48	Braccini <i>et al.</i> (2006)

Common name	Scientific name	PRM	a	b	Source
Stingrays	Dasyatidae	0.173	7.41×10^{-6}	3.19	Jones <i>et al.</i> (2010)
Thresher sharks	Alopiidae		1.88×10^{-4}	2.52	Kohler <i>et al.</i> (1996)
Tiger shark	<i>Galeocerdocuvier</i>		2.53×10^{-6}	3.26	Kohler <i>et al.</i> (1996)
Weasel sharks	Hemigaleidae		5.67×10^{-6}	3	Stevens and McLoughlin (1991)
Western shovelnose ray	<i>Aptychotrema vincentiana</i>	0.363	4.59×10^{-6}	3	FishBase, see www.fishbase.org
Western spotted gummy	<i>Mustelus stevensi</i>		2.52×10^{-6}	3.22	Stevens and McLoughlin (1991)
Western wobbegong	<i>Orectolobus hutchinsi</i>	0.057	1.14×10^{-5}	3.01	Set at a average of <i>O. ornatus</i> and <i>O. maculatus</i>
Whiskery shark	<i>Furgaleus macki</i>		2.54×10^{-5}	2.73	Simpfendorfer <i>et al.</i> (2000)
Whitespot shovelnose	<i>Rhynchobatus australiae</i>	0.363	4.59×10^{-6}	3	FishBase, see www.fishbase.org
Wobbegongs	Orectolobidae		1.14×10^{-5}	3	Set at a average of <i>O. ornatus</i> and <i>O. maculatus</i>

^AThis amount is based on our assumption of a doubling of the reported PCM for the species (i.e. 2×0.027).

Table S2. Stock status for non-target discarded elasmobranchs based on the International Union for the Conservation of Nature (IUCN) Australia Red List assessment and Simpfendorfer *et al.* (2019)

NB: for stingrays, guitarfish and shovelnose rays, and catsharks no information is presented as these taxa potentially include a range of species

Common name	IUCN (Australia Red List)	Simpfendorfer <i>et al.</i> (2019)
Port Jackson shark	Least Concern	Sustainable
Southern eagle ray	Least Concern	Not assessed
Spurdogs ^A	Least Concern	Sustainable
Western wobbegong	Least Concern	Sustainable
Angel sharks ^{B,C}	Least Concern	Sustainable
Stingrays	–	–
Guitarfish & shovelnose rays	–	–
Cobbler wobbegong	Least Concern	Sustainable
Grey nurse shark ^D	Near Threatened	Sustainable
Sliteye shark	Least Concern	Sustainable
Southern fiddler ray	Least Concern	Sustainable
Dwarf spotted wobbegong	Least Concern	Sustainable
White shark	Vulnerable	Overfished
Whitespot guitarfish	Near Threatened	Sustainable
Western shovelnose ray	Least Concern	Sustainable
Floral banded wobbegong	Least Concern	Sustainable
Catsharks	–	–
Crocodile shark	Near Threatened	Sustainable

^A*Squalus megalops* is the most common spurdog in the study area so this species is used to represent the group.

^B*Squatina australis*.

^C*Squatina tergocellata*.

^DWest coast population.

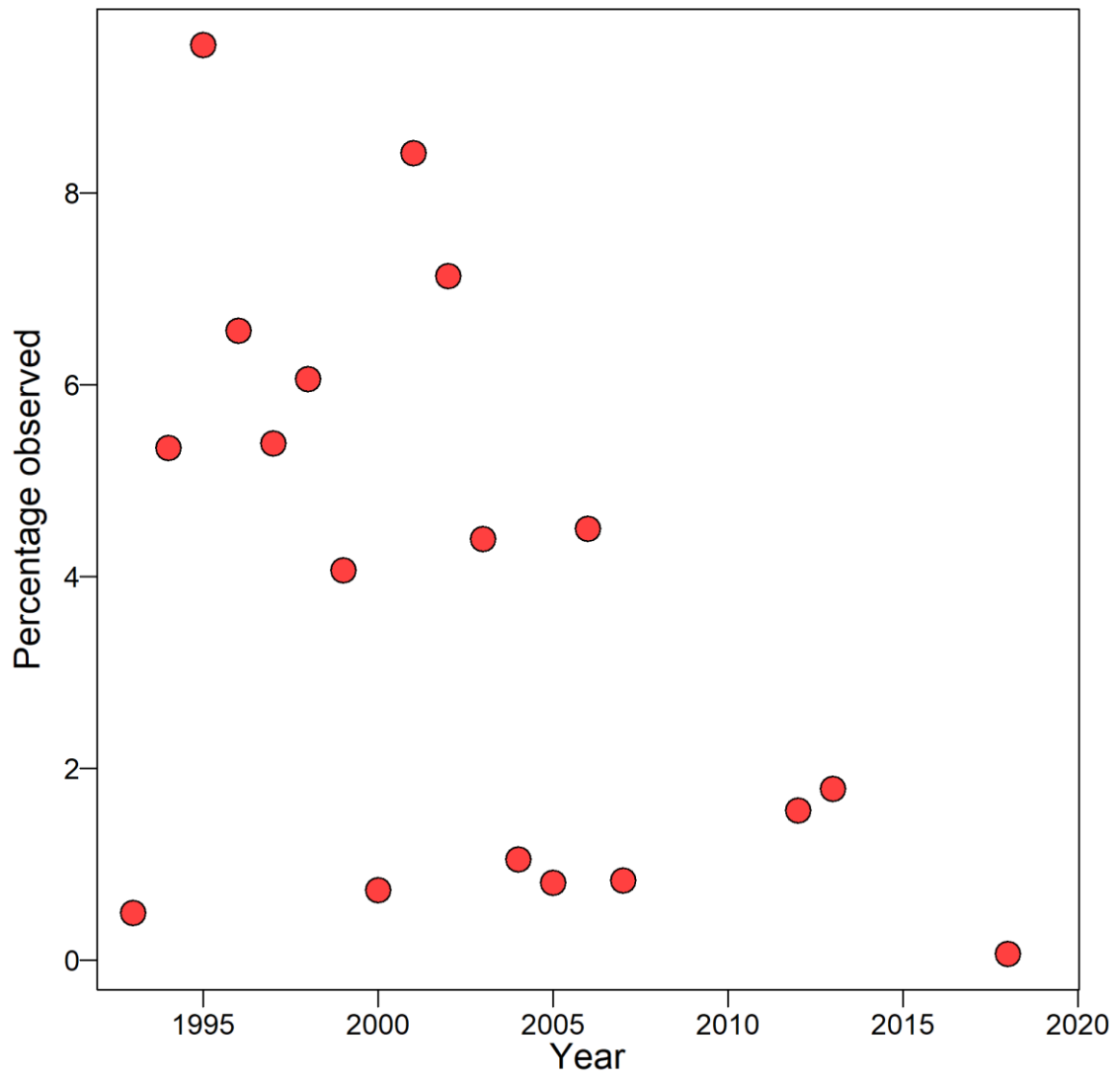


Fig. S1. Percentage of observed effort.

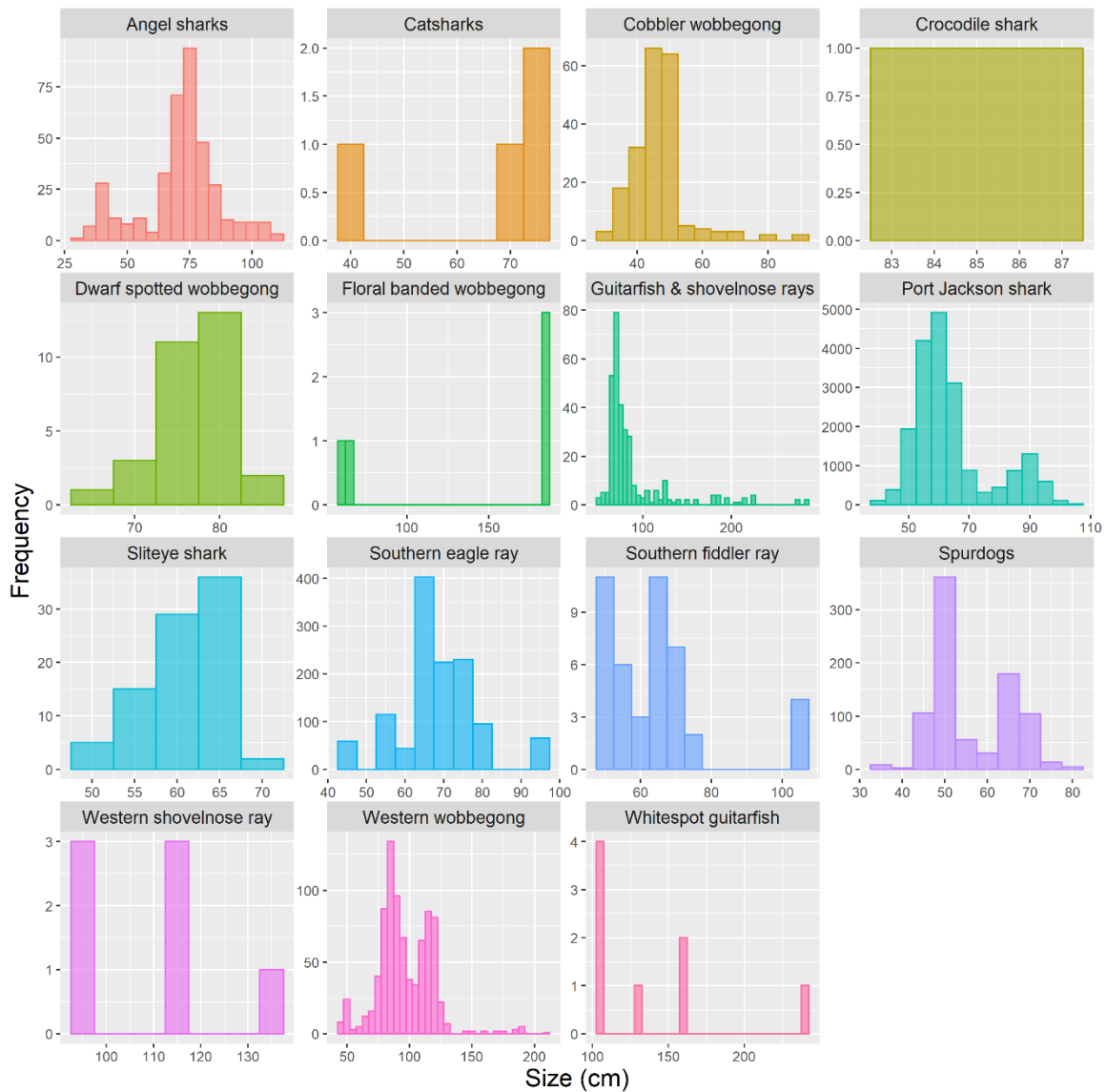


Fig. S2. Size (disc width for southern eagle ray, fork length for the other species) frequency distribution of discarded species.

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