

¹ The utility of spatial model-based estimators of

² unobserved bycatch: future or folly?

³ *Brian C. Stock¹, Eric J. Ward², James T. Thorson³, Jason E. Jannot³, Brice X. Semmens¹*

Table 1: Fisheries for which the ratio estimator is used to calculate total bycatch from partial observer coverage. This list is far from comprehensive and included simply to illustrate broad use of the ratio estimator across fisheries regions, management organizations, and gear types.

FAO Region	Country/ Organization	Fisheries	Bycatch Species	Observer Coverage	Reference
Global	FAO	All	Total bycatch (all species combined)		Alverson et al. 1994, Kelleher 2005
Mediterranean Sea	Spain, Italy, Greece, Turkey	Trawl, trap, purse seine, longline, dredge, gillnet	Total bycatch (all species combined)		Tsagarakis et al. 2014
Mediterranean Sea	European Union	All	All		ICES 2007
Atlantic, Northeast	Scotland	Seine, trawl	Haddock, cod, whiting	0.1-0.2%	Stratoudakis et al. 1999
Atlantic, Northeast	Ireland	Gillnet (albacore tuna)	25 species of fish, seabirds, turtles, and cetaceans	2.2-47.8%	Rogan and Mackey 2007
Atlantic, Northwest	USA	Longline, trawl, seine, pot/trap, handline, dredge, gillnet	60 species of groundfish, invertebrates, pelagic fish, elasmobranchs, seabirds, marine mammals, and turtles	3%	Wigley et al. 2007, GARFO 2016
Atlantic, Northwest	Canada	Longline, trawl, gillnet	Porbeagle, shortfin mako shark, blue shark	5%	Compana et al. 2011
Atlantic, Western	USA	Shrimp trawl	Marine mammals	0.8%	Soldevilla et al. 2016
Atlantic, Southeast	South Africa	Groundfish trawl	19 species of finfish, elasmobranchs, and cephalopods	0.3%	Walmsley et al. 2007
Atlantic, all	Spain, France, ICCAT	Tuna purse seine	Dozens of species of other finfish, sharks, marine mammals, and turtles	1.5-32.7%	Amande et al. 2010b, Hall and Roman 2013
Indian, all	Taiwan	Longline	40 species of tuna, fish, sharks, seabirds, marine mammals, and turtles	2.2-20.8%	Huang and Liu 2010
Indian, all	IOTC	Tuna purse seine	Dozens of species of tuna, other finfish, sharks, marine mammals, and turtles	1.4-8.1%	Hall and Roman 2013
Indian, Western	Kuwait	Shrimp trawl	23 species of finfish and elasmobranchs	35-54%	Ye et al. 2000
Pacific, Southwest	New Zealand, Australia	Deepwater trawl	48 species of finfish, elasmobranchs, and invertebrates	10.5-22.1%	Anderson and Clark 2003
Pacific, Eastern	IATTC	Tuna purse seine	Dozens of species of tuna, other finfish, sharks, marine mammals, and turtles	>99%	Hall and Roman 2013
Pacific, Western	WCPFC	Tuna purse seine	Dozens of species of tuna, other finfish, sharks, marine mammals, and turtles	1.5-11%	Hall and Roman 2013
Pacific, Eastern	USA	Groundfish trawl	Dozens of species of finfish, elasmobranchs, invertebrates, marine mammals, and seabirds	>99%	Somers et al. 2018
Pacific, Eastern	USA	Sablefish longline	Dozens of species of finfish, elasmobranchs, invertebrates, marine mammals, and seabirds	7-41%	Somers et al. 2018
Pacific, Eastern	USA	Groundfish pot	Dozens of species of finfish, elasmobranchs, invertebrates, marine mammals, and seabirds	2-12%	Somers et al. 2018

Year	Group	Observations	Median			SD		
		N	V1	V2	V3	V1	V2	V3
2012	Control	2	0.052	0.294	0.115	0.304	0.619	0.611
	Treat	2	0.511	0.083	0.123	0.573	0.541	0.734
2016	Control	3	0.320	0.344	0.382	0.382	0.494	0.477
	Treat	3	0.378	0.296	0.123	0.386	0.668	0.732

Table 2: Mean by Year and Group