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# Appendix 1

## COMPARISON OF VARIABLES FROM OBSERVER PROGRAMMES

TABLE A1.1  
Trip data

	IATTC	FFA	Spain	France		IATTC	FFA	Spain	France
Trip Number	●	●	●	●	Power Block Size	●			
Vessel Number	●	●		●	Raft present	●			
Vessel Name	●	●	●	●	High Intensity Floodlight present	●			
Observer Name	●	●		●	Blind Radar present	●	●		
Flag	●	●			Diver Equipment present	●			
Depart Date	●	●			Quality Codes	●			
Arrive Date	●	●			Captain Information	●	●		
Capacity	●	●			Observer Information	●	●		
Depart Port	●	●			Vessel registration number		●		
Arrive Port	●	●			Fishing permits license number		●		
Net Length	●	●			Radio Call sign		●		
Net Depth	●	●			Vessel Owner		●		
Net Mesh Size	●	●			Work with tender vessel		●	●	●
Safety Panel Type	●				Skiff date		●		
Safety Panel Length	●				Helicopter information		●		
Safety Panel Depth	●				power Block Details		●		
Safety Panel Mesh Size	●				Winch details		●		
Number Speedboais	●	●			Brall Capacity		●		
Bow Thruster present	●				Electronics details		●		
Aircraft present	●	●			Crew details		●		
Sonar present	●	●	●	●	Well configuration details		●		
Ring Stripper present	●				Safety equipments details		●		
Number of Screws	●				Communication equipment details		●		



TABLE A1.2  
Sets data

	IATTC	WCPFC	ICCAT/IOTC			IATTC	WCPFC	ICCAT/IOTC	
	IATTC/Nat. Programs	SPC/FFA	Spain	France		IATTC/Nat. Programs	SPC/FFA	Spain	France
All types of sets:					Marine Mammal sets:	Yes	Yes		
Set Number	Yes	Yes	Yes	Yes	Dolphin school composition estimations	Yes	Yes		
Set Type	Yes	Yes			Dolphin school size estimations	Yes	Yes		
Set Date	Yes	Yes	Yes	Yes	Explosives use (seal bombs)	Yes			
LetGo time	Yes	Yes	Yes	Yes	Dolphin behavior (during chase, set, backdown)	Yes			
RingsUp time	Yes	Yes	Yes	Yes	Dolphin rescue effort by the crew	Yes			
Endset time	Yes	Yes	Yes	Yes	Backdown times	Yes			
Strong Currents present	Yes				Fish lost during backdown	Yes			
Malfunction information	Yes	Yes			Dolphin mortality by spp. and cause	Yes	Yes		
Well loading data	Yes	Yes	Yes	Yes	Dolphin injury	Yes	Yes		
Begin/end pursing		Yes			Number of bow bunches pulled	Yes			
Begin/end brailing		Yes			Presence of net canopies and/or collapses	Yes			
Tuna catch of set	Yes	Yes	Yes	Yes	Use of High Intensity Floodlights after sundown	Yes			
Tuna discards of set	Yes	Yes	Yes	Yes	Use of speedboats to tow the net during backdown	Yes			
Cumulative tuna catch		Yes			Net configuration sketches	Yes			
Tuna estimation before the set			Yes	Yes	Dolphins in net during malfunctions				
Sonar tuna readings			Yes	Yes	Marine Mammal sightings:	Yes	Yes		
Net depth at rings up			Yes	Yes	Dolphin school composition estimations	Yes	Yes		
Reason a set is not made		Yes	Yes	Yes	Dolphin school size estimations	Yes	Yes		

TABLE A1.3  
Effort data

	IATTC	FFA	Spain	France
Vessel mode (in port, search, run, drift)	●	●	●	●
Observer on duty	●	?		
Position during the day	●	●	●	●
Marine mammal sighting information	●	●		
Crew search activity	●	●	●	●
Vessel speed	●	●	●	●
Environmental (SST, Wind speed)	●	●	●	●
Environmental (Cloud cover, Visibility)	●			
Helicopter/plane assistance	●	●		
Cue to set	●	●		
Distance to cue	●	?	●	●
UTC time		●		
Helicopter take-off/landing times		●		
Transshipment activities		●	●	●
Code group fishing activity			●	●

TABLE A1.4  
Capture and bycatch

	IATTC	FFA	Spain	France
Tuna tonnage caught and loaded by spp. and size	•	•	•	•
Reason for tuna discard	•	•	•	•
Bycatch by spp. And number	•	•	•	•
Billfish, shark, turtles: identification characteristic	•	•		
Non-tuna spp. Size measurements	•	•	•	•
Utilization of bycatch (discarded, treated as catch, etc)	•	•		
Tag information (turtles, tuna, fish)	•	•		
Specimen collection	•	•		
Tuna size measurements		•	•	•
Other fauna size measurements (fish, turtles, cetaceans)		•	•	•

TABLE A1.5  
Floating objects

	IATTC	FFA	Spain	France
Object number	•	•	•	•
Object Count	•	•		
Set Number	•	•		
Date and Time	•	•	•	•
Position	•	•		
Object origin	•	•	•	•
Object type	•	•	•	•
Object disposition (eg. Left in water, removed)	•	•	•	•
Locate method	•	•	•	•
Object soak time			•	•
Hanging net information	•	•		
Bait information	•			
Turtle presence	•		•	•
Turtle Entanglement	•		•	•
Other spp. Presence	•		•	•
Size and depth of the object	•	•		
Water clarity	•			
Percent of object covered in flora	•			
Components making up the object	•	•		
Location equipment attached	•	•	•	•
Transmission capabilities of location equipment	•			

This report provides a review of our knowledge of the bycatches, defined as discarded dead, from the tropical tuna purse seine fisheries of the world. The major fishing grounds involved (eastern and western Pacific, eastern Atlantic, and western Indian Oceans) share the gear, the ways of fishing, and the structure of the pelagic communities. Because of that, the species taken in association with tuna schools tend to be the same in all regions. After describing the gear and fishing operations, it discusses the reasons why bycatches happen, and explores the options to mitigate them.

The types of sets used to capture tunas and the detection methods used to locate the schools are a major factor to determine which are the catches and the bycatches. The main bycatches are tunas, sharks and rays, pelagic bony fishes, billfishes, and sea turtles. The total discards amount to one to five percent of the total tonnage captured, and tunas of the species targeted amount to over 90–95 percent of those bycatches. The silky shark is the most common shark species by far, followed by the oceanic whitetip sharks. Marlins and sailfishes are also taken but in reduced numbers. Olive ridley sea turtles are the most common turtle captured, but the majority of them are released alive and unharmed. Rainbow runners, mahi-mahis, wahoos and amberjack yellowtail are the major pelagic bony fishes taken with the tunas. They are being retained in increasing numbers for utilization.

Besides discussing problems of estimation, the report presents most of the ideas proposed or in different stages of testing, to mitigate those bycatches, including ways to avoid the captures, or to release the individuals from the net or from the deck.

Finally, the known or potential ecological impacts of the rapidly increasing fishery on fish aggregating devices (FADs) are reviewed, emphasizing some of the uncertainties that still prevail.