



Bycatch and Discards of the French Tuna Purse Seine Fishery during the 2003-2010 Period estimated from Observer data

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Terms

- **Total Catch:** the overall biomass that is encircled and retained by the net once closed
- **Production:** targeted major tuna species, such as yellowfin (*Thunnus albacares*), skipjack (*Katsuwonus pelamis*), bigeye (*Thunnus obesus*), and albacore (*Thunnus alalunga*), which are landed and marketed through canneries
- **Bycatch:** all non-targeted species plus small or damaged target tuna species that are not marketed through canneries



Terms

- The bycatch may be divided into two components:
 - by-products that are kept for a particular use, i.e. to be consumed on board or sold later on the local African market
 - discards that are rejected at sea, dead or alive
- Total Catch = Production + Bycatch
- Bycatch = By-products + Discards



Table 1: Observer program coverage (% of trips) on french tuna purse seiners (2003-2010)

Year	Observed trips	Total trips	Coverage (%)
2005	1	183	0.55
2006	5	191	2.62
2007	14	159	8.81
2008	14	174	8.05
2009	6	130	4.62
2010	1	111	0.90

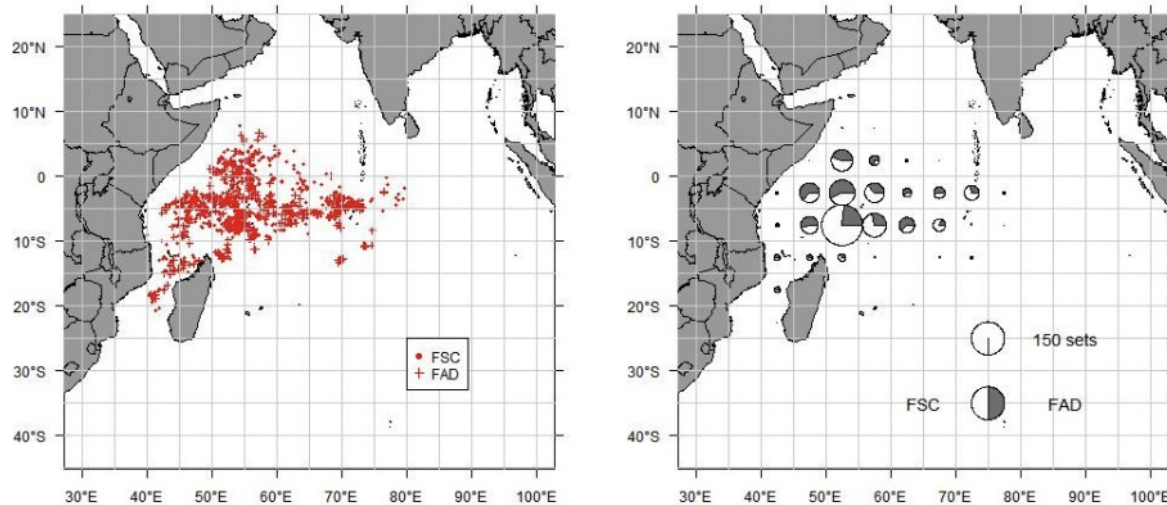


Figure 1: Geographical distribution (left) of observed sets on free swimming schools (FSC) and log-associated schools (FAD) and number of sets (right) observed by 5° statistical square through the French observer program (2005-2010)

Table 2: Bycatch ratios (t/1 000 t of tuna production) by species groups and fishing modes for the European tuna purse seiners estimated by Amandè et al, (2008). FSC = free swimming school, FAD = fish-aggregating device

Species Groups	FSC	FAD	All
Tunas	9.3	26.5	19.2
Bony Fishes	1.5	19.7	12.0
Billfishes	0.4	0.7	0.5
Sharks	0.3	6.0	3.6
Rays	0.2	0.2	0.2
Total	11.7	53.1	35.5

Table 3: Fate of total bycatch to by-product or discards by species group for the French tuna purse seiners (2003-2010)

Species Groups	By-product	Discards
Tunas	12%	88%
Bony Fishes	24%	76%
Billfishes	60%	40%
Sharks and Rays	33%	67%

Table 4 : Estimated total bycatch, by-product and discards of the French purse seine fishery in 2003-2010 when fishing on free swimming schools (FSC)

Total bycatch (FSC)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	566.0	91.3	24.3	30.4	712.0
2004	614.1	99.0	26.4	33.0	772.5
2005	535.6	86.4	23.0	28.8	673.8
2006	493.3	79.6	21.2	26.5	620.6
2007	313.6	50.6	13.5	16.9	394.5
2008	389.1	62.8	16.7	20.9	489.5
2009	199.5	32.2	8.6	10.7	251.0
2010	166.3	26.8	7.2	8.9	209.2

Total by-products (FSC)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	65.5	21.6	14.6	10.2	111.8
2004	71.0	23.4	15.8	11.1	121.3
2005	62.0	20.4	13.8	9.6	105.8
2006	57.1	18.8	12.7	8.9	97.5
2007	36.3	12.0	8.1	5.6	62.0
2008	45.0	14.8	10.0	7.0	76.9
2009	23.1	7.6	5.1	3.6	39.4
2010	19.2	6.3	4.3	3.0	32.9

Total discards (FSC)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	500.5	69.7	9.8	20.2	600.2
2004	543.0	75.6	10.6	22.0	651.2
2005	473.6	66.0	9.3	19.2	568.0
2006	436.2	60.8	8.5	17.6	523.2
2007	277.3	38.6	5.4	11.2	332.6
2008	344.1	47.9	6.7	13.9	412.6
2009	176.4	24.6	3.4	7.1	211.5
2010	147.1	20.5	2.9	5.9	176.4

Table 5: Estimated total bycatch, by-product and discards of french purse seine fishery in 2003-2010 when fishing on fish-aggregating device associated schools

Total bycatch (FAD)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	1567.0	1164.9	41.4	366.6	3139.9
2004	1490.6	1108.1	39.4	348.7	2986.9
2005	1452.5	1079.8	38.4	339.8	2910.5
2006	1570.2	1167.3	41.5	367.4	3146.4
2007	1294.7	962.5	34.2	302.9	2594.4
2008	1373.9	1021.3	36.3	321.4	2753.0
2009	1490.8	1108.3	39.4	348.8	2987.3
2010	1236.8	919.4	32.7	289.4	2478.3

Total by-products (FAD)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	181.3	275.4	24.8	122.8	604.2
2004	172.5	262.0	23.6	116.8	574.8
2005	168.1	255.3	23.0	113.8	560.1
2006	181.7	275.9	24.8	123.0	605.5
2007	149.8	227.5	20.5	101.4	499.2
2008	159.0	241.4	21.7	107.7	529.8
2009	172.5	262.0	23.6	116.8	574.9
2010	143.1	217.4	19.5	96.9	476.9

Total discards (FAD)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	1385.7	889.5	16.6	243.8	2535.7
2004	1318.2	846.2	15.8	232.0	2412.1
2005	1284.4	824.5	15.4	226.0	2350.4
2006	1388.5	891.3	16.7	244.3	2540.9
2007	1144.9	735.0	13.7	201.5	2095.1
2008	1214.9	779.9	14.6	213.8	2223.2
2009	1318.4	846.3	15.8	232.0	2412.4
2010	1093.7	702.1	13.1	192.5	2001.4

Table 6: Estimated total bycatch, by-product and discards of the French purse seine fishery in 2003-2010 for all fishing modes, i.e. free-swimming and fish-aggregating device associated shoals

Total bycatch (All)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	2133.0	1256.2	65.7	397.0	3852.0
2004	2104.7	1207.2	65.8	381.8	3759.4
2005	1988.1	1166.2	61.4	368.6	3584.2
2006	2063.5	1246.9	62.7	393.9	3767.0
2007	1608.3	1013.1	47.7	319.8	2988.9
2008	1763.0	1084.1	53.0	342.4	3242.5
2009	1690.3	1140.5	48.0	359.5	3238.3
2010	1403.1	946.3	39.8	298.3	2687.5

Total by-products (All)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	246.8	297.0	39.3	133.0	716.1
2004	243.5	285.4	39.4	127.9	696.1
2005	230.0	275.7	36.7	123.5	665.9
2006	238.8	294.8	37.5	131.9	702.9
2007	186.1	239.5	28.5	107.1	561.2
2008	204.0	256.3	31.7	114.7	606.6
2009	195.6	269.6	28.7	120.4	614.3
2010	162.3	223.7	23.8	99.9	509.8

Total discards (All)					
Year	Tunas	Bony Fishes	Billfishes	Sharks and Rays	Total
2003	1886.2	959.2	26.4	264.1	3135.9
2004	1861.2	921.8	26.4	253.9	3063.3
2005	1758.0	890.5	24.7	245.2	2918.4
2006	1824.8	952.1	25.2	262.0	3064.0
2007	1422.2	773.6	19.2	212.7	2427.7
2008	1559.0	827.8	21.3	227.7	2635.8
2009	1494.7	870.9	19.3	239.1	2624.0
2010	1240.8	722.6	16.0	198.4	2177.8

Table 7: Species composition of all sets sampled (a total of 2 218 t for the 2003-2007 period) during the observer program on European purse seiners (Amande et al. 2008) in percentage of weight and by fishing mode

Species group	Species	% weight by Fishing mode			
		FSC	FAD	Total	% cum.
Tunas (1263.6 t)	<i>Katsuwonus pelamis</i>	25.7	48.2	45.5	45.5
	<i>Auxis thazard</i>	16.8	25.9	24.8	70.3
	<i>Auxis rochei</i>	36.6	9.2	12.5	82.8
	<i>Thunnus albacares</i>	7.4	8.9	8.8	91.5
	<i>Auxis sp.</i>	0.5	4.0	3.5	95.1
	<i>Thunnus obesus</i>	3.9	2.0	2.2	97.3
	<i>Euthynnus affinis</i>	8.9	1.0	1.9	99.2
	<i>Unk.</i>	0.0	0.8	0.7	100.0
	<i>Thunnus alalunga</i>	0.1	0.0	0.0	100.0
	Total Tunas	100.0	100.0	100.0	
Bony Fishes (730.5 t)	<i>Elagatis bipinnulata</i>	37.1	43.1	42.7	42.7
	Triggerfish	23.8	19.8	20.1	62.8
	<i>Coryphaena spp.</i>	10.2	18.2	17.7	80.5
	Mackerel scad	0.0	7.6	7.0	87.6
	Carangids	20.5	5.0	6.1	93.6
	<i>Acantocybium solandri</i>	6.8	4.2	4.4	98.0
	Others	1.3	1.4	1.4	99.4
	<i>Sphyrna sp.</i>	0.4	0.6	0.6	100.0
	Total Bony Fishes	100.0	100.0	100.0	
Sharks and Rays (183.6 t)	<i>Carcharhinus falciformis</i>	45.1	71.0	69.1	69.1
	<i>Carcharhinus longimanus</i>	6.6	13.6	13.1	82.2
	Requin non identifié	1.1	6.3	5.9	88.1
	<i>Manta birostris</i>	13.5	2.4	3.2	91.3
	Ordre Carcharhiniformes	0.8	1.9	1.8	93.1
	<i>Carcharhinidae sp.</i>	0.2	1.8	1.7	94.8
	<i>Mobula mobular</i>	11.3	0.8	1.6	96.3
	<i>Mobula coilloti</i>	1.1	1.4	1.4	97.7
	<i>Raie non identifiée</i>	10.1	0.2	0.9	98.6
	Others	10.2	0.7	1.4	100.0
	Total Sharks and Rays	100.0	100.0	100.0	
Billfishes (41.1 t)	<i>Makaira indica</i>	32.0	27.7	28.7	28.7
	<i>Tetrapturus audax</i>	22.3	29.2	27.6	56.3
	Famille des Istiophoridés	5.0	22.6	18.6	75.0
	<i>Makaira nigricans</i>	10.8	14.6	13.7	88.7
	<i>Istiophorus platypterus</i>	26.3	2.6	7.9	96.6
	<i>Xiphias gladius</i>	1.5	2.1	2.0	98.5
	<i>Tetrapturus angustirostris</i>	2.2	1.3	1.5	100.0
	Total Billfishes	100.0	100.0	100.0	

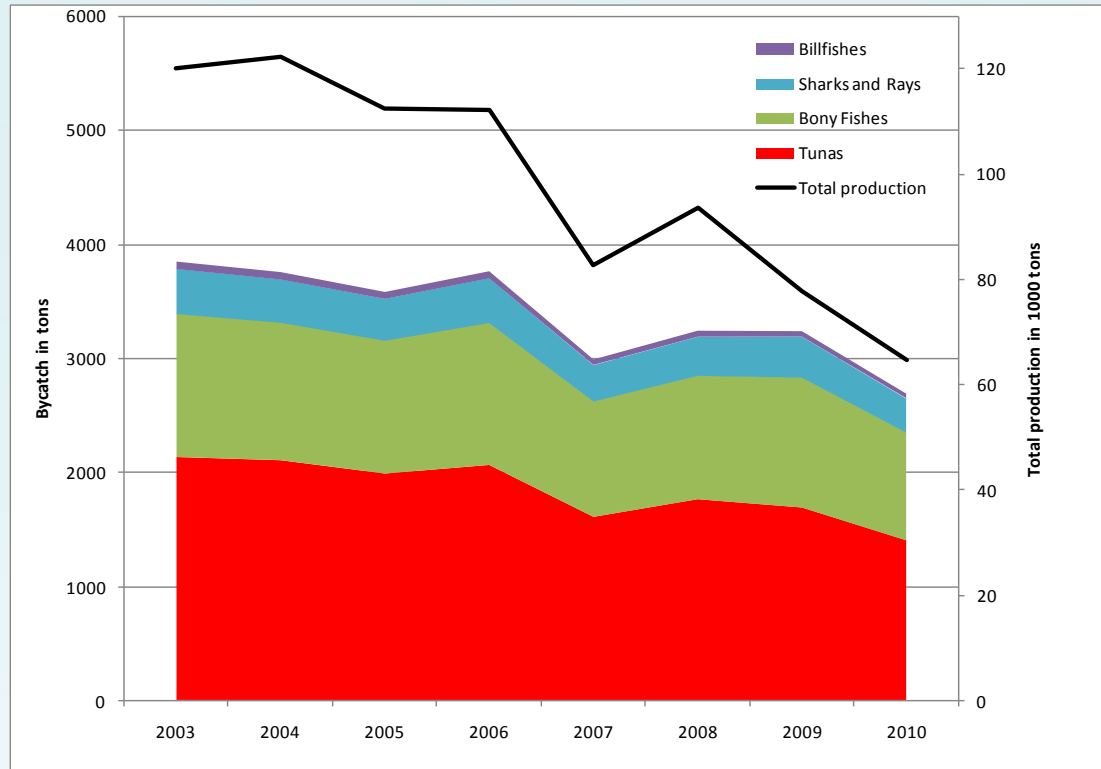


Figure 2: Bycatch by species group and total production for the French purse seine fishery 2003-2010