

## Composition of the Incidental Kill of Small Cetaceans in the US Purse-Seine Fishery for Tuna in the Eastern Tropical Pacific during 1986

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### ABSTRACT

Composition of incidental kill of small cetaceans by US registered purse-seiners fishing in the eastern tropical Pacific during 1986 is reported by area, species, stock, sex, length and reproductive condition. The data were collected by technicians of the Inter-American Tropical Tuna Commission and of the National Marine Fisheries Service during 47 vessel-trips.

### INTRODUCTION

Several papers describing small cetacean kill incidental to fishing activities of tuna purse-seiners in the eastern tropical Pacific (ETP) have been published, as noted by Wahlen, Walker, Miller and Oliver (1986) and by Hall and Boyer (1986; 1987). In this, the fifth of a series of papers (Perrin and Oliver, 1982; Oliver, Walker and Miller, 1983; Wahlen, *et al.*, 1986; Wahlen, Miller and Macky, 1987), we report the incidental kill of small cetaceans by US registered vessels in the ETP during 1986. These kills are classified by area, species, stock, sex, length and reproductive condition. Species represented in this report are: pantropical spotted dolphins, *Stenella attenuata*; spinner dolphins, *S. longirostris*; striped dolphins, *S. coeruleoalba*; common dolphins, *Delphinus delphis*; Fraser's dolphins, *Lagenodelphis hosei*; and bottlenose dolphins, *Tursiops truncatus*.

### DATA AND METHODS

Data were collected by Inter-American Tropical Tuna Commission (IATTC) and National Marine Fisheries Service (NMFS) technician-observers aboard a sample of US registered tuna purse-seine vessels fishing in the ETP (Lo, Powers and Wahlen, 1982). Data collected aboard US registered tuna seiners chartered by non-US companies were also included.

Observed kills by area, species, stock and sex, if determined, were obtained from the 'tally' databases. Length frequencies by sex and reproductive condition for females were obtained from the 'life history' databases containing extensive biological data for those dead animals which were available for 'hands-on' inspection by the technicians. The life history databases thus contain biological data for only a subset of the animals reported as killed in the tally databases, since the technicians are unable to physically examine each animal killed. See Perrin and Oliver (1982) for detailed descriptions of data recorded in these databases.

We allocated kills of offshore spotted and whitebelly spinner dolphins to geographic stocks as in Perrin and Oliver (1982). Laboratory procedures for processing specimens and determining sexual maturity are referenced in Perrin and Oliver (1982), as is the methodology of the computer programs used to summarize the reproductive condition data.

### RESULTS AND DISCUSSION

Kill data were collected from each of 47 observed trips, including four trips by US seiners chartered by non-US companies. The geographical distribution of the kill is presented in Fig. 1. Kill data are summarized by stock, sex and area for 6,405 spotted dolphins (Table 1) and 2,478 spinner dolphins (Table 2); by sex and area for 792 common, 70 striped, 4 bottlenose and 68 Fraser's dolphins (Table 3); and by area only for 538 unidentified dolphins (Table 3). In Tables 1-3, which were obtained from the tally databases, the stock or species totals may be larger than the sum over sexes because the sex of some animals in the tally databases was not determined.

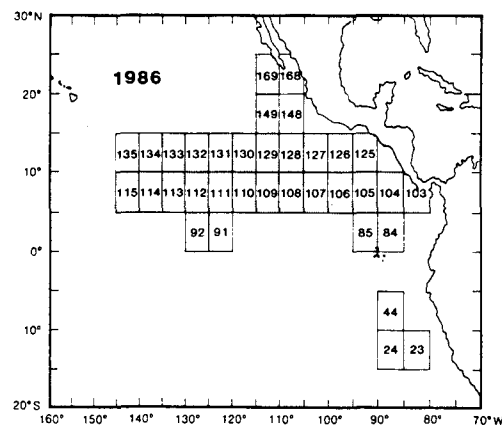


Fig. 1. Five-degree blocks in the eastern tropical Pacific Ocean in which dolphins were killed during fishing operations of US vessels in 1986. Numbered blocks without shading indicate areas in which tally data only were collected. Numbered blocks with shading indicate areas in which both tally and life history data were collected. Blocks without a number indicate areas in which no dolphin kills were recorded.

Length frequencies for sexed animals are tabulated by stock for 877 spotted and 332 spinner dolphins (Table 4) and by species for 35 common, 18 striped and 4 bottlenose dolphins (Table 5). The length frequency totals (Tables 4 and 5) are less than or equal to the kill by sex and area

totals (Tables 1-3) because lengths were obtained from the life history databases, which contain data for only a subset of the animals in the tally databases. Female reproductive condition results are reported by stock for 502 spotted and 169 spinner dolphins (Table 6) and by species for 19 common and 4 striped dolphins (Table 7).

Table 1

Total kill of spotted dolphins observed by US vessels during 1986, by stock, sex (M = male, F = female), and 5° block number. No kills were reported for the coastal stock, and the reported kill of 4 unidentified spotted dolphins is not included. T = total

5° block	Northern offshore			Southern offshore			5° block	Northern offshore			Southern offshore		
	M	F	T	M	F	T		M	F	T	M	F	T
23	0	0	0	41	38	151	113	9	17	257	0	0	0
24	0	0	0	46	26	117	114	3	12	39	0	0	0
44	0	0	0	12	3	23	115	2	6	36	0	0	0
84	2	2	16	0	0	0	125	39	36	137	0	0	0
85	9	3	279	0	0	0	126	2	3	9	0	0	0
91	1	1	308	0	0	0	127	5	12	20	0	0	0
92	1	3	20	0	0	0	128	4	3	15	0	0	0
103	5	7	21	0	0	0	129	8	19	104	0	0	0
104	2	0	42	0	0	0	130	14	15	80	0	0	0
105	19	30	105	0	0	0	131	22	35	259	0	0	0
106	22	27	317	0	0	0	132	64	97	733	0	0	0
107	68	89	1,346	0	0	0	133	6	14	65	0	0	0
108	137	146	575	0	0	0	134	56	69	269	0	0	0
109	8	11	49	0	0	0	135	0	0	8	0	0	0
110	30	30	185	0	0	0	148	5	4	12	0	0	0
111	11	20	213	0	0	0	149	4	17	47	0	0	0
112	12	29	544	0	0	0	Total	570	757	6,110	99	67	291

Table 2

Total kill of spinner dolphins by observed US vessels during 1986, by stock, sex (M = male, F = female), and 5° block number. No kills were reported for the Costa Rican stock, and the reported kill of 42 unidentified spinner dolphins is not included

5° block	Eastern			Northern whitebelly			Southern whitebelly		
	M	F	Total	M	F	Total	M	F	Total
23	0	0	0	0	0	0	0	1	2
24	0	0	0	0	0	0	0	5	11
44	0	0	0	0	0	0	0	0	2
84	0	0	3	0	0	16	0	0	0
85	0	0	0	0	0	95	0	0	0
91	0	0	0	0	0	23	0	0	0
103	23	13	44	0	0	44	0	0	0
105	0	1	2	0	0	0	0	0	0
106	0	0	1	0	0	0	0	0	0
107	4	5	26	19	21	121	0	0	0
108	3	1	10	23	24	87	0	0	0
109	2	0	23	7	1	37	0	0	0
110	11	9	49	6	3	28	0	0	0
111	0	0	1	4	8	98	0	0	0
112	3	0	3	12	10	185	0	0	0
113	0	0	0	3	4	40	0	0	0
114	0	0	0	8	3	42	0	0	0
115	0	0	0	1	5	19	0	0	0
125	13	10	47	0	0	0	0	0	0
126	4	5	12	0	0	1	0	0	0
127	8	2	33	0	0	0	0	0	0
128	20	23	72	0	0	0	0	0	0
129	11	7	49	3	1	7	0	0	0
130	8	4	34	4	2	10	0	0	0
131	15	12	192	6	3	22	0	0	0
132	17	12	160	46	46	238	0	0	0
133	0	0	0	12	10	94	0	0	0
134	0	0	0	25	32	431	0	0	0
135	0	0	0	0	0	12	0	0	0
149	0	0	10	0	0	0	0	0	0
Total	142	104	771	179	173	1,650	5	4	15

Finally, it should be noted that Hohn and Scott (1983) have identified a sampling bias in the life history data resulting from the collection process. The magnitude of the effect of this bias on the life history statistics presented here (Tables 4-7) is unknown but will probably not significantly

affect life history parameter estimates (A. Hohn, Southwest Fisheries Center, P.O. Box 271, La Jolla, California 92038, USA, pers. comm. May 1986).

Table 3

Total kill of common, striped and bottlenose dolphins by observed US vessels during 1986, by sex (M = male, F = female) and 5° block number. Total kills only are included for unidentified dolphins since sex was not determined for such animals. Reported kill of 68 Fraser's dolphins (6 males, 16 females) in block number 24 is not included

5° block	Common			Striped			Bottlenose			Unidentified Total
	M	F	Total	M	F	Total	M	F	Total	
85	0	0	0	0	0	0	0	0	0	30
91	0	0	0	0	0	0	0	0	0	9
103	10	13	28	0	0	0	0	0	0	0
104	80	67	555	10	14	48	0	0	0	0
105	2	6	17	0	0	0	0	0	0	0
106	10	12	31	0	0	0	0	1	1	0
107	0	0	0	9	3	13	0	0	0	50
108	0	0	0	0	0	0	0	1	1	102
109	0	0	0	0	0	0	0	0	0	248
110	0	0	0	0	0	0	0	0	0	6
111	0	0	0	0	0	0	0	0	0	2
112	0	0	0	0	0	0	0	0	0	1
125	0	0	0	0	0	0	0	1	1	0
128	0	0	0	0	0	0	0	0	0	2
129	0	0	0	0	0	0	0	0	0	4
130	0	0	0	0	0	0	0	0	0	10
131	0	0	0	0	0	0	1	1	0	63
132	0	0	0	5	1	8	0	0	0	9
133	0	0	0	0	0	0	0	0	0	2
168	0	0	6	0	0	0	0	0	0	0
169	8	15	155	0	0	0	0	0	0	0
Total	110	113	792	24	18	70	1	3	4	538

Table 4

Length frequencies of northern offshore spotted dolphins and of eastern and northern whitebelly spinner dolphins killed by observed US vessels during 1986, by sex (M = male, F = female). No kills were reported for coastal or southern offshore spotted dolphins, or for Costa Rican or southern whitebelly spinner dolphins. Reported kill of 11 unidentified spinner dolphins is not included. A = northern offshore, B = eastern, C = northern whitebelly

Length (cm)	A		B		C		Length (cm)	A		B		C	
	M	F	M	F	M	F		M	F	M	F	M	F
0-69	0	0	0	0	0	0	150-154	5	8	2	3	4	9
70-74	0	0	0	0	0	1	155-159	8	17	4	4	7	6
75-79	2	0	0	0	0	0	160-164	27	21	4	6	9	15
80-84	1	0	0	0	0	2	165-169	33	37	6	6	21	17
85-89	0	1	0	0	0	1	170-174	41	43	4	7	22	24
90-94	2	1	0	0	1	0	175-179	37	50	6	8	16	15
95-99	6	1	0	0	0	1	180-184	33	65	8	3	8	13
100-104	2	2	0	0	1	0	185-189	32	77	6	1	10	5
105-109	6	4	0	0	0	0	190-194	21	76	1	0	1	0
110-114	3	3	0	0	3	0	195-199	26	37	1	0	1	1
115-119	1	4	0	1	1	0	200-204	25	16	0	0	1	0
120-124	1	4	1	2	0	0	205-209	15	4	0	0	0	0
125-129	3	4	0	1	0	2	210-214	9	2	0	0	0	0
130-134	2	3	2	0	1	0	215-219	6	0	0	0	0	0
135-139	5	4	1	2	2	2	220-224	2	0	0	0	0	0
140-144	8	8	0	1	1	4	225-	0	0	0	0	0	0
145-149	13	10	2	1	6	4	Total	375	502	48	46	116	122

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Table 5

Length frequencies of common, striped and bottlenose dolphins killed by observed US vessels during 1986, by sex (M = male, F = female). A = Common, B = striped, C = bottlenose

Length (cm)	A		B		C		Length (cm)	A		B		C	
	M	F	M	F	M	F		M	F	M	F	M	F
0-104	0	0	0	0	0	0	185-189	2	5	3	0	0	0
105-109	0	1	0	0	0	0	190-194	2	2	3	1	0	0
110-114	0	0	0	0	0	0	195-199	2	0	1	1	0	1
115-119	0	0	0	0	0	0	200-204	1	2	4	1	0	0
120-124	0	0	0	0	0	0	205-209	1	0	1	0	0	0
125-129	0	0	0	0	0	0	210-214	2	0	0	0	0	0
130-134	0	0	0	0	0	0	215-219	1	0	0	0	0	0
135-139	0	0	0	0	0	0	220-224	2	0	0	0	0	1
140-144	0	1	0	0	0	0	225-229	0	0	0	0	0	0
145-149	0	0	0	0	0	0	230-234	0	0	0	0	0	1
150-154	0	1	0	0	0	0	235-239	0	0	0	0	0	0
155-159	0	0	0	0	0	0	240-244	0	0	0	0	0	0
160-164	0	0	0	0	0	0	245-249	0	0	0	0	0	0
165-169	0	1	1	0	0	0	250-254	0	0	0	0	0	0
170-174	1	5	0	0	0	0	255-259	0	0	0	0	1	0
175-179	1	1	0	1	0	0	260-	0	0	0	0	0	0
180-184	1	0	1	0	0	0	Total	16	19	14	4	1	3

Table 6

Reproductive condition of female northern offshore spotted dolphins and of female eastern and northern whitebelly spinner dolphins killed by observed US vessels during 1986. Both sample sizes (N) and percentages (%) are indicated. Reproductive condition information was not obtained for coastal or southern offshore spotted dolphins, or for Costa Rican or southern whitebelly spinner dolphins. U = Maturity undetermined; I = Sexually immature; MU = Sexually mature, condition undetermined; P = Pregnant only; PL = Pregnant and lactating; L = Lactating only; RCL = 'Resting' with corpus luteum; R = 'Resting' without corpus luteum; PR = Post-reproductive

Reproductive condition	Northern offshore		Eastern		Northern whitebelly	
	N	%	N	%	N	%
U	235	46.8	24	52.2	64	52.0
I	107	21.3	13	28.3	35	28.5
MU	2	0.4	1	2.2	0	0.0
P	31	6.2	0	0.0	5	4.1
PL	5	1.0	0	0.0	1	0.8
L	94	18.7	6	13.0	16	13.0
RCL	5	1.0	0	0.0	1	0.8
R	23	4.6	2	4.3	1	0.8
PR	0	0.0	0	0.0	0	0.0
Total	502	100.0	46	100.0	123	100.0

Table 7

Reproductive condition of female common and striped dolphins killed by observed US vessels during 1986. Both sample sizes (N) and percentages (%) are indicated. Reproductive condition information for bottlenose dolphins is not included; none of the female bottlenose specimens was sexually mature. Abbreviations are as in Table 6

Reproductive condition	Common		Striped		Reproductive condition	Common		Striped	
	N	%	N	%		N	%	N	%
U	6	31.6	3	75.0	L	4	21.1	0	0.0
I	6	31.6	0	0.0	RCL	0	0.0	0	0.0
MU	0	0.0	0	0.0	R	0	0.0	0	0.0
P	2	10.5	1	25.0	PR	0	0.0	0	0.0
PL	1	5.3	0	0.0	Total	19	100.0	4	100.0

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