PROGRESS REPORT ON 1986 RESEARCH ON DALL'S PORPOISE

Annual Report to the
International North Pacific Fisheries Commission

by
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Research was conducted in 1986 under the auspices of Article 10 of the International Convention of the High Seas Fisheries of the North Pacific Ocean as amended in 1978 and the Memorandum of Understanding signed in 1981 between the Governments of Japan and the United States.

Areas of study by the United States in 1986 were 1) monitoring of the incidental take of marine mammals; 2) collection of biological specimens and data from animals incidentally taken by the salmon mothership fishery; 3) collection of marine mammal sightings data; and 4) analyses of biological specimens and other data. This report describes studies conducted and preliminary results of the field research.

1. Monitoring of the Incidental Take

U.S. and Japanese observers monitored the incidental take of marine mammals onboard three catcherboats in each salmon mothership fleet. Japanese observers monitored the take from the beginning of the fishing operations on 9 June 1986; U.S. observers began monitoring after the fleets moved into the U.S. Exclusive Economic Zone (EEZ) on 12 June. The total number of sets monitored in 1986 was 369 (Table 1) out of approximately 5,817 operations. Fishing operations ended on 16 July.

The total number of Dall's porpoise observed in the gillnets was 95 in 302 operations in the U.S. EEZ (Table 2) and 15 porpoise in 60 operations in the Bering Sea, north of the U.S. EEZ. South of the U.S. EEZ only seven operations were monitored, with one Dall's porpoise incidentally taken (Table 3). Based on observed gillnet operations the incidental take rates (numbers of Dall's porpoise per gillnet

operation) were 0.32 (95% confidence limits: 0.25-0.39) in the EEZ and 0.25 (95% confidence limits: 0.08-0.42) in the Bering Sea. Take rates for each observer are listed in Tables 4 and 5.

The total number of Dall's porpoise incidentally taken in the U.S. EEZ in 1986, based on the observed take rates, was estimated to be 1,456 (95% confidence limits: 1,155-1,798) and 216 in the Bering Sea (95% confidence limits: 69-362)(Table 6). Total estimated take of Dall's porpoise by the salmon mothership fishery in 1986 was 1,719 (Table 6).

The total number of Dall's porpoise incidentally taken reported by the salmon mothership fishery was 1,607 in the U.S. EEZ, 215 in the Bering Sea north of the EEZ, and 43 south of the EEZ. The total reported take was 1,865 Dall's porpoise (Table 6). The U.S. quota for Dall's porpoise inside the U.S. EEZ is 5,500 porpoise annually. The estimated size of the population in the western North Pacific is between 483,000 and 955,000 Dall's porpoise (Bouchet et al. 1986).

The low take of Dall's porpoise in 1986 is related to the short fishing season (35 days in the U.S. EEZ) and lower take rates, the second lowest observed since 1981. The low take rate may be the result of 1) increased use of modified gillnets that may have reduced incidental take of porpoise, 2) changes in the distribution of porpoise or fishing effort, and/or 3) the early closure of the fishing season since there is generally an increase in the take rates in mid to late July.

In 1986, as required under U.S. regulations, 75% of the catcherboats of each mothership fleet used modified gillnets with three strands of hollow tubing along the midline of the nets. One U.S. and the Japanese observer in each fleet monitored operations using modified gear while the remaining U.S. observer monitored operations using standard gillnets. In the U.S. EEZ, 207 operations with modified, and 94 with standard gillnets, were monitored. The take rates were 0.31 (95% confidence limits: 0.24-0.40) and 0.33 (95% confidence limits: 0.18-0.48) porpoise per operation respectively (Table 4). Confidence intervals were calculated using bootstrap techniques with 1,000 replicates. No significant difference between take rates of the modified and standard gillnets were detected (Chi Square Goodness of Fit Test, $p > 0.05$).

Incidental take data obtained by the observers in the U.S. EEZ were analyzed by year and pooled for the period 1983-1986 to compare Dall's porpoise take rate for modified and standard gillnets (Figure 1). There was no significant difference between the two gear types for the years 1983, 1984 and 1986 ($p = 0.24$, 0.32 and 0.22 respectively, Chi Square Goodness of Fit Tests) while in 1985 and for the pooled data there was a significant difference in gear types. The data do not show a clear trend for reduction in incidental take rates when modified gear is used (Table 4).

2. Research Aboard Salmon Motherships

One U.S. marine mammal biologist was onboard each Japanese salmon mothership operating inside the U.S. EEZ. These biologists collected biological samples and data from all marine mammals returned to the motherships by the catcherboats.

A total of 898 Dall's porpoise and one harbor porpoise were examined in 1986. Ninety-five Dall's porpoise were caught in the Bering Sea north of the U.S. EEZ, 15 south of the EEZ and the remainder (788) in the EEZ. Eleven newborn animals (<120 cm) were taken in July in the EEZ. Twenty-eight whole carcasses were collected for training purposes at the National Marine Mammal Laboratory, including three truei-type porpoise. No all-black Dall's porpoise were taken in 1986.

The total number of porpoise examined represents 49% of the total reported catch in the U.S. EEZ; approxiamtely 21% of the animals taken in the EEZ were released alive (n = 332) and 26% were lost during retrieval operations (Table 7). An additional 4% were caught but not returned to the motherships. Most of these were caught during scoutboat operations.

3. Collection of Marine Mammal and Debris Sightings Data

Marine mammal sighting data were collected by U.S. observers onboard salmon catcherboats and transfer vessels in June and July. The number of hours of sighting effort was 575 (Table 8). The majority of the effort occurred during beaufort 2-4 conditions (good-fair). Sighting data were also obtained aboard U.S. NOAA research vessels in

the eastern North Pacific and Bering Sea. A new sightings program was initiated in April 1986 aboard U.S. commercial container vessels transiting the North Pacific on Great Circle routes from Tacoma, Washington, to Yokohama, Japan. One eleven-day cruise was completed in April. One cruise is scheduled monthly for the fall-winter period in 1986.

Sightings of net debris and discard were also recorded by observers on catcherboats. Two pieces of net were discarded during retrieval operations (Table 9). Three pieces of trawl net, two pieces of gillnet and 1 unidentified net type were also observed but not recovered (Table 7). One tufted puffin which may have been recently entangled was observed in the net debris. No other animals were entangled in the observed debris.

4. Laboratory Analyses

A contract project on the incidence of the parasites Phyllobothrium sp. and Crassicauda sp. in Dall's porpoise was completed. Results showed significant differences between levels of parasites in animals in the Bering Sea and the western North Pacific.

A study was initiated on the distribution of observed vessels within mothership fleets for the period 1982-1986.

Analyses of the response of porpoise to vessels and the effect of visibility conditions on porpoise sightings are continuing.

Study of the genetic variation in Dall's porpoise using mitrochondrial DNA has also been initiated. Electrophonetic techniques will also be used to examine genetic variation from the same specimens collected in 1986.

Summary

Based on 302 observed gillnet operations (out of 4,621) in the U.S. EEZ in 1986, the incidental kill rate of Dall's porpoise was 0.32 porpoise per operation, one of the lowest rates observed. The estimated incidental take was 1,456 (U.S. quota is 5,500). In 1986, 75% of the catcherboats in each fleet used modified nets with three hollow strands along the midline. Incidental take rate for these nets was 0.31 Dall's porpoise (n = 207) compared to 0.33 for standard nets (n = 94).

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References

Bouchet, G. C., Ferrero, R. C., and B. J. Turnock. 1986. Estimation of the abundance of Dall's porpoise (Phocoenoides dalli) by shipboard sighting surveys. (Submitted to the Ad Hoc Committee on Marine Mammals, Intnatl. N. Pac. Fish. Comm. March 1986.)

TABLE 1.--Summary of gillnet operations observed in 1986 by U.S. and Japanese marine mammal observers onboard catcherboats of the Japanese salmon mothership fishery.

Mothership	Area	Number of operations	Number of sets observed	Number of days of no fishing	Retrieval dates no U.S. observer	Retrieval dates no Japanese observer
JINYO						
	So. of EEZ	86	2	0		-
	EEZ-S	1,156	77	1	Jun 12, Jul 25	-
	EEZ-N	0	-	-		-
	Bering	216	15	1		-
	TOTAL	1,458	94	2		
KIZAN						
	So. of EEZ	78	2	0		-
	EEZ-S	1,119	72	2		-
	EEZ-N	0	-	-		-
	Bering	224	15	0		-
	TOTAL	1,421	89	2		
MEIYO						
	So. of EEZ	82	2	0		-
	EEZ-S	1,134	76	3	Jun 12	-
	EEZ-N	29	1	0		-
	Bering	225	15	0		
	TOTAL	1,470	94	3		
NOJIMA						
	So. of EEZ	86	1	0		Jun 10
	EEZ-S	1,183	76	0	Jun 12	-
	EEZ-N	0	-	-		-
	Bering	199	15	2		-
	TOTAL	1,468	92	2		
Season Totals	So. of EEZ	332	7			
	EEZ-S	4,592	301			
	EEZ-N	29	1			
	Bering	864	60			
		5,817	369			

Notes: Bering Sea is defined as the area north of the U.S. Exclusive Economic Zone (EEZ).
EEZ-S is the area south of 53°N to limit of U.S. EEZ.
EEZ-N is defined as the area inside the U.S. EEZ north of latitude 53°N.

TABLE 2.--Frequency of numbers of Dall's porpoise entangled per gillnet set in the U.S. Fishery Conservation Zone, 1981-1986. Data collected by marine mammal observers onboard catcherboats of the Japanese salmon mothership driftnet fishery in the western North Pacific.

Year	Number of porpoise per observed set									Total sets	Date fishing ended
	0	1	2	3	4	5	6	7	8		
1981	310	71	14	4	0	1	0	0	0	400	26 July
1982	251	104	31	14	7	2	2	0	1	412	30 July
1983	274	105	30	5	4	1	0	0	0	419	28 July
1984	250	82	24	9	0	0	0	0	0	365	26 July
1985	248	82	32	3	3	2	0	0	0	370	30 July
1986	226	61	11	4	0	0	0	0	0	302	16 July

TABLE 3.--Observed incidental take, number of gillnet sets and take rates (number of porpoise per 330 tans of gillnet) of Dall's porpoise by the Japanese salmon mothership fishery outside the U.S. Exclusive Economic Zone (EEZ).

	No. taken	No. of sets	Take rate	95% Confidence Limits
A. South of U.S. EEZ				
1981	1	24	0.04	
1982	9	28	0.32	
1983	2	30	0.07	
1984	3	30	0.10	
1985	0	10	0	
1986	1	7	0.14	
Total	16	129	0.12	
B. North of U.S. EEZ				
1981	4	25	0.16	
1982	16	34	0.47	
1983	14	35	0.40	
1984	20	92	0.22	
1985	18	69	0.26	
1986	15	60	0.25	0.08-0.42
Total	87	315	0.28	

TABLE 4.--Observed incidental take rates of Dall's porpoise in the Japanese salmon mothership driftnet fishery in 1986. Number of operations observed in parentheses.

A. U.S. Exclusive Economic Zone, Standard Gillnets

Observer	Mothership Jinyo	Kizan	Meiyo	Nojima	Total
1	0.25 (8)	0.67 (6)	0.00 (6)	0.00 (6)	
2	0.57 (7)	0.33 (9)	0.25 (12)	0.00 (9)	
3	0.50 (10)	0.33 (6)	0.83 (6)	0.22 (9)	
4	-	-			
Mean (N)	0.44 (25)	0.43 (21)	0.36 (24)	0.08 (24)	0.33 (94)

B. U.S. Exclusive Economic Zone, Modified Gillnets (3 strands, midline)

Observer	Mothership Jinyo	Kizan	Meiyo	Nojima	Total
1	0.00 (7)	0.00 (8)	0.55 (9)	0.14 (7)	
2	0.36 (11)	0.57 (7)	0.00 (6)	0.33 (9)	
3	0.50 (6)	0.40 (10)	0.20 (10)	0.44 (9)	
4	0.33 (27)	0.38 (26)	0.30 (27)	0.27 (26)	
Mean (N)	0.31 (51)	0.35 (51)	0.29 (52)	0.29 (51)	0.31 (205)

C. U.S. Exclusive Economic Zone, All Gear Types

Observer	Mothership Jinyo	Kizan	Meiyo	Nojima	Total
1	0.13 (15)	0.29 (14)	0.33 (15)	0.08 (13)	
2	0.44 (18)	0.44 (16)	0.17 (18)	0.17 (18)	
3	0.50 (16)	0.38 (16)	0.44 (16)	0.33 (18)	
4	0.37 (27)	0.39 (26)	0.30 (27)	0.27 (26)	
5	0.00 (1)	-	1.00 (1)	0.00 (1)	
Mean (N)	0.35 (77)	0.38 (72)	0.31 (77)	0.22 (76)	0.32 (302)
95% Confidence Limits:					0.25-0.39

Table 5.--Observed incidental take rates for Dall's porpoise in the Japanese mothership salmon fleets in the U.S. Exclusive Economic Zone in 1981-1986.

	1981				1982				1983			
Observer	JINYO	KIZAN	MEIYO	NOJIMA	JINYO	KIZAN	MEIYO	NOJIMA	JINYO	KIZAN	MEIYO	NOJIMA
1	0.41	0.33	0.22	0.17	0.95	0.81	0.95	0.41	0.72	0.43	0.41	0.45
2	0.40	0.41	0.28	0.21	0.96	0.83	0.90	0.62	0.26	0.36	0.57	0.63
3	0.44	0.48	0.13	0.29	0.67	0.76	0.54	0.29	0.47	0.33	0.50	0.65
4	0.25	0.36	0.13	0.29	0.38	0.49	0.79	0.50	0.54	0.38	0.44	0.51
Observed Mean	0.38	0.40	0.19	0.24	0.74	0.72	0.80	0.46	0.49	0.37	0.47	0.56
Fleet[1]	0.19	0.20	0.17	0.18	0.35	0.37	0.36	0.38	0.38	0.36	0.37	0.44

	1984 Standard nets				1985 Standard nets				1986 Standard Nets			
Observer	JINYO	KIZAN	MEIYO	NOJIMA	JINYO	KIZAN	MEIYO	NOJIMA	JINYO	KIZAN	MEIYO	NOJIMA
1	0.83	0.33	1.40	0.50	0.89	1.00	0.86	0.67	0.25	0.67	0.00	0.00
2	0.33	0.50	0.18	0.33	1.00	0.20	0.08	0	0.57	0.33	0.25	0.00
3	0.47	0.50	0.30	0.32	0.83	0.63	0.25	0.56	0.50	0.33	0.83	0.22
4	0.56	0.39	0.37	0.19	0.55	0.58	-	0.50	-	-		
Observed Mean			0.42	0.28	0.75	0.57	0.33	0.49	0.44	0.43	0.36	0.08
Fleet Mean	0.47	0.47	0.27	0.32	0.63	0.43	0.34	0.41				
	Modified nets				Modified nets				Modified nets			
1	0.14	0.50	0.08	0.18	0.45	0.46	0.06	0	0.00	0.00	0.55	0.14
2	0.58	0.75	0.30	0.46	0.14	0.60	0.29	0.50	0.36	0.57	0.00	0.33
3	1.33	0.90	0.30	-	0.38	0.71	0.50	0.91	0.50	0.40	0.20	0.44
4								0.33	0.33	0.38	0.30	0.27
Observed Mean	0.64	0.54	0.16	0.33	0.35	0.57	0.19	0.48	0.31	0.35	0.29	0.29
Fleet Mean	0.43	0.42	0.28	0.30	0.48	0.46	0.28	0.35				

[1] Incidental take rates calculated from data reported by Fisheries Agency of Japan to the International North Pacific Fisheries Commission.

Table 6.--Incidental take of Dall's porpoise by Japanese salmon gillnet fisheries.

A. U.S. EEZ by Mothership Fishery

Year	Fish. effort[1]	No. of sets	Reported by Japan No. dead[2] (Percent)	Alive	Lost	Total	Estimated from observer data (95% Conf. limits)
1978	1.68	5,091	333	-	20	353	-
1979	2.00	6,060	600	-	-	600	-
1980	2.14	6,543	806	-	32	838	-
1981	2.02	6,121	690(61)	158	288	1,136	1,850 (1,493-2,206)
1982	2.05	6,217	1,284(54)	366	745	2,395	4,187 (3,494-4,881)
1983	2.05	6,217	1,201(50)	452	746	2,399	2,906 (2,442-3,389)
1984	1.88	5,694	1,071(50)	479	579	2,129	2,443 (1,971-2,832)
1985	1.87	5,670	1,091(45)	597	735	2,423	2,760 (1,710-3,517)
1986[3]	1.52	4,621	857	332	418	1,607	1,456 (1,155-1,798)

B. All areas by Mothership Fishery

Year	Fish. effort[1]	No. of sets	Reported by Japan No. dead (Percent)	Alive	Lost	Total	Estimated from observer data (95% Conf. limits)
1978	2.72	8,284	353	-	146	499	-
1979	2.80	8,611	622	-	61	683	-
1980	3.15	9,551	924	-	75	999	-
1981	2.90	8,788	792(58)	200	362	1,354	2,862 (2,100-3,109)
1982	2.94	8,909	1,594(50)	505	1,090	3,189	5,903 (4,924-6,879)
1983	2.95	8,967	1,429(48)	574	983	2,986	4,280 (3,562-4,997)
1984	2.74	8,333	1,304(49)	621	745	2,670	3,355 (2,636-3,973)
1985	2.31	7,048	1,213(44)	690	844	2,747	3,239 (1,856-4,349)
1986	1.92	5,814	988	393	484	1,865	1,719 (1,224-2,160)

C. Landbased fishery

Year	Fish. effort[1]	Reported by Japan	Estimated based on mothership data
1978	3.37	303	-
1979	3.22	127	-
1980	3.14	139	-
1981	3.23	696	2,936
1982	2.96	1,691	6,010
1983	3.11	1,291	4,429
1984	2.26	813	3,356
1985	2.44	781	2,979

[1] Effort in millions of tans where 1 tan equals about 50 m length.
[2] The majority of animals in this category are returned to the mothership for examination.
[3] Preliminary results.

TABLE 7.--Number of Dall's porpoise reported incidentally taken by Japanese high seas salmon mothership fishery, 1986. Number dead in net, number alive and released, and number lost from nets during retrieval. Number in parentheses are percentages of the total incidentally taken.

	South of U.S. EEZ				Southern EEZ			
	Dead	Alive	Lost	Total	Dead	Alive	Lost	Total
JINYO	4	2	3	9	156(37)	97	168	421
KIZAN	3	3	2	8	230(54)	106	89	425
MEIYO	3	3	2	8	252(63)	84	64	400
NOJIMA	15	1	2	18	210(61)	41	94	345
	25	9	9	43	848	328	415	1,591

	Northern EEZ				Bering Sea (north of 56°N)			
	Dead	Alive	Lost	Total	Dead	Alive	Lost	Total
JINYO	0	1	1	2	26(30)	23	38	87
KIZAN	-	-	-	-	32(54)	17	10	59
MEIYO	9	3	2	14	17(57)	9	4	30
NOJIMA	-	-	-	-	31(79)	3	5	39
	9	4	3	16	106	52	57	215

	TOTALS			
	Dead	Alive	Lost	Total
JINYO	186(36)	123(24)	210(40)	519
KIZAN	265(54)	126(26)	101(21)	492
MEIYO	281(62)	99(22)	72(16)	452
NOJIMA	256(64)	45(11)	101(25)	402
	988	393	484	1,865

TABLE 8.--Sighting effort (hours:minutes) by beaufort stage in 1986 by Dall's porpoise observers on salmon catcherboats.

	Beaufort stage					
	0	1	2	3	4	5
	0	4:30	5:30	10:00	1:00	0
	0	4:18	11:13	2:40	0	0
	0	0	1:00	3:00	3:00	0
	0	0	11:30	4:00	6:00	0
	6:20	10:04	7:28	29:55	5:03	0:20
	0	2:00	10:24	5:18	26:36	0
	4:53	14:14	7:36	13:02	10:56	1:00
	2:30	6:25	5:40	11:19	9:25	0
	2:00	3:00	9:27	8:10	3:27	0
	0	0	2:45	7:15	4:10	0
	4:42	3:30	7:54	15:20	14:00	3:00
	2:00	8:00	21:03	10:40	13:13	6:30
	2:00	5:06	18:20	15:48	9:12	0
	0	1:10	9:00	20:30	11:00	1:00
	2:00	1:00	7:00	14:00	12:25	0
	2:20	0:55	5:00	9:57	16:21	3:13
Total	28:45	64:12	140:50	180:54	145:48	15:03

Total Hours: 575:32

TABLE 9.--Sightings of net debris by Dall's porpoise observers in 1986 onboard salmon catcherboats.

Date	Position	Net Type	Size	Entanglements	Comments
0616	5134 17337 E	?Black	$1m^2$	None	Off effort
0627	4959 17318 E	Trawl	?	None	During retrieval
0707	5734 17831 W	Trawl	2m x 1m	None	During retrieval
0712	5338 17455 E	Trawl	4m x 1m	None	Off effort
0715	5101 17402 E	Gillnet with 1 float	$30cm^2$	1 tufted puffin	Off effort
Observed discard of net					
0618	5131 17338 E	Gillnet	$5cm^2$		During retrieval
0713	5202 17329 E	Gillnet	$10m^2$		During retrieval

FIGURE 1. Incidental take rates of Dall's porpoise in Japanese salmon gillnets in the North Pacific, U.S. Exclusive Economic Zone. Vertical bars are the 95% confidence limits for the combined gillnets.