Table 3

Observed and estimated fishing effort and marine mammal mortality in California's set gillnet fisheries for halibut and angel sharks from the 1983 to 1988 CDFG observer program (Diamond and Hanan, 1986; Hanan *et al.*, 1986; Hanan *et al.*, 1987; Hanan *et al.*, 1988; Hanan and Diamond, 1989; Konno, in press) and the 1990 to 1993 NMFS observer program (Lennert *et al.*, 1994; Perkins *et al.*, 1992; Julian, 1993; 1994). Missing data indicate no available estimates.

	Observation period								
From	4/83	4/84	4/85	4/86	4/87	7/90	1/91	1/92	1/93
To	3/84	3/85	3/86	3/87	3/88	12/90	12/91	12/92	12/93
Effort									
Est. no. net pulls	26,210	37,155	39,104	39,497	29,623	8,070	22,300	16,900	16,300
Effort in days	-	-	-	-	-	3,041	7,089	5,468	5,380
No. observed net pulls	962	1,723	1,499	2,107	978	406	2,231	2,155	2,641
% observed net pulls	3.7%	4.6%	3.8%	5.3%	3.3%	5.0%	10.0%	12.8%	16.2%
Observed marine mammal mortality									
Harbor porpoise	14	19	33	16	13	4	5	6	2
Common dolphin	-	-	-	-	-	0	0	2	0
California sea lion	76	69	84	90	174	67	149	340	239
Harbor seal	31	66	148	103	156	30	43	93	71
Northern elephant seal	-	-	-	-	-	13	3	7	11
Southern sea otters	-	-	-	-	-	3	0	0	0
Estimated marine mammal mortality									
Harbor porpoise	303	226	227	197	34	44	38	44	12
Common dolphin	-	-	-	-	-	0	0	17	0
California sea lion	3,427	2,244	2,207	4,288	2,722	847	1,858	3,255	1,984
Harbor seal	834	1,138	1,886	2,028	903	392	559	1,136	480
Northern elephant seal	-	-	-	-	-	144	26	51	71
Southern sea otters	-	-	-	-	-	33	0	0	0

(C) Washington gillnet fisheries for salmon

Gillnets are used to catch salmon in Washington state by both Native Americans and non-native commercial fishermen. By treaty, half the surplus salmon production is allocated to Native Americans. Set nets are used by the Makah tribe in western Washington (Gearin *et al.*, 1990; 1994). The incidental take of harbor porpoises in this fishery was recognized after unusually large numbers of porpoise were found dead on beaches of the Olympic National Park (Kajimura, 1990). In 1988–89, a cooperative study was initiated between NMFS and the Makah Tribal Fisheries Management Division to study the magnitude of harbor porpoise mortality in this fishery and the size of the affected populations (Kajimura, 1990; Gearin *et al.*, 1990; 1994). Another gillnet fishery for salmon by Native Americans takes place from Semiahmoo Bay, Washington. Incidental mortality of cetaceans has been recorded in this fishery (Baird and Guenther, 1994), but little information is available.

The non-native salmon allocation is divided among sport fishing and commercial fishing. The latter includes trolling, purse seining and gillnetting which have not been covered by observer programs.

Primary ports

The primary ports are Neah Bay, Sekiu and Semiahmoo Bay (Native Americans) and Seattle, Grays Harbor, and Willapa Bay (commercial).

Target species

The target species are chinook salmon (Makah tribe) and all salmon species (non-native commercial).

Area of operation

The area of the Makah fishery is along the northwest coast of Washington state in the Pacific Ocean and in the Strait of Juan de Fuca east to the Sekiu River and including Neah Bay. The non-native commercial fishery is in the Strait of Juan de Fuca and Puget Sound, Columbia River, Grays Harbor and Willapa Bay.

Vessels and crew

The Makah fishing vessels are small, 5–7m skiffs crewed by 1–3 US fishermen (Native Americans only). The current fleet size is 6–10 boats. In the non-native commercial fishery, approximately 600 vessels fish in the Columbia River, Grays Harbor and Willapa Bay, and, although 1,146 vessels were issued gillnet permits to fish in Puget Sound in 1990, the actual number fishing is somewhat less than this. The size of commercial vessels is probably similar to those in Prince Williams Sound, Alaska (see G below) given that many vessels there also fish in Puget Sound (Wynne, unpublished data).

Gear specifications

In the Makah fishery, monofilament and multifilament nylon nets are used with a stretch mesh size of 19–22cm and a maximum length of 183m. Nets are up to 100 meshes deep. In the non-native commercial fishery, nets are 230–550m long (typically 550m), 30–180 meshes deep and have mesh sizes of 13–22cm (net configurations vary with species and area).

Operations

In the Makah fishery, nets are set along the bottom in water depths of 11–18m and are anchored at both ends. Fishermen can fish a maximum of three 183m nets. The fishing season is from 1 May to 15 September with maximum effort in July and August. Nets are usually tended each day, but are typically not picked up or moved. Soak times can exceed 48hrs due to adverse weather. In the non-native fishery, driftnets are used.