North Pacific Albacore Catch in the U.S. Longline Fishery – An Update [1]

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Albacore are caught in the North Pacific by U.S. longline vessels based in Hawaii and California. The Hawaii-based part of the fleet is the larger of the two components. The longline fleet operates in a wide region of the eastern and central Pacific between the equator and waters of the North Pacific Transition Zone (Figures 1-2). Albacore are not targeted by the fishery. However, they are an important component of the catch on longline trips using shallow-set gear directed at swordfish or gear deployed deeper in the water column, largely for bigeye tuna. In 2007, there were 130 U.S. longliners active in the fishery, including 129 in Hawaii and a single vessel in California. The total fleet size has remained fairly stable over the past several years (Table 1). The nominal effort by the U.S. fleet was about 40.3 million hooks in 2007, the highest recorded to date. Hawaii-based vessels accounted for nearly all of the effort.

The catch of albacore by the U.S. longline fleet reached its highest levels in the late 1990s, peaking at 1,652 metric tons (t) in 1997. In 2002, the catch declined substantially and has remained at a much lower level (Table 2). The albacore catch in 2007 is estimated at 258 t.

In 2002, a temporary halt to shallow-set operations by the Hawaii-based fleet was imposed to reduce interactions with protected sea turtles in the primary grounds for swordfish, the Subtropical Frontal Zone north of Hawaii. On April 2, 2004, the Hawaii fleet was allowed to resume shallow-set operations under a "model fishery" subject to a reduced number of shallow sets – limited to half the previous effort level – and strict limits on the number of interactions with sea turtles. Vessels targeting swordfish also were required to use circle hooks and mackerel or mackerel-type bait only, among other restrictions. The primary swordfish season is December-May, so only 6 trips with shallow-set gear were completed in 2004; most fishing effort remained directed towards tuna in lower latitudes. The Hawaii-based shallow-set fishery was open for all of 2005, but in March, 2006, it was once again closed by the Pacific Islands Regional Office of the National Marine Fisheries Service (NMFS; NOAA Fisheries), this time because the fleet had reached its allowable annual limit of 17 interactions with loggerhead turtles. The Hawaii-based swordfish fishery resumed on January 1, 2007 and has remained open to date. Targeting of swordfish by the California-based fleet has been prohibited since May 2004.

[2] PIFSC Working Paper WP-08-002
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Although the large reduction in albacore catch in 2002 coincided with the suspension of shallow-set operations by Hawaii-based vessels, the two events may not be linked. The albacore catch did not rebound when the swordfish fishery resumed, but declined further.

Nominal longline fishing effort and catch are monitored through mandatory Federal logbooks submitted to NMFS by vessel captains after each fishing trip. Logbook data for Hawaii-based vessels are maintained by the NMFS Pacific Islands Fisheries Science Center (PIFSC). Those for California-based vessels are maintained by the Southwest Fisheries Science Center (SWFSC). Captains are required to record the numbers of fish and protected species caught along with information on the number of hooks deployed, set and haul locations, and other data. In both the Hawaii-based and California-based longline fleets, NMFS also places observers on designated vessels. Observers are required on 100% of the trips using shallow-set gear to target swordfish. In 2007, there were 78 swordfish trips departing from Hawaii and 0 from California (none were allowed). Observers are required on at least 20% of the longline trips using deep-set gear to target tuna. In 2007, there were 1,382 tuna trips departing from Hawaii, 20% carrying observers. There were five tuna trips by California-based vessels departing in 2007, all with an observer.

Although their primary task is to collect reliable data on turtle, seabird, and marine mammal interactions, observers also record data on fish catch and effort and measure lengths of fish caught. Before 2006, observers on Hawaii-based longliners gave priority to measuring billfishes and tunas, including albacore (Figure 3), and were able to measure most albacore brought aboard. To enable stock assessment of other pelagic fishes and monitoring of bycatch, observers now are required to collect length data from a longer list of species. Accordingly, their protocol is to measure every third fish, and the sample size for albacore measurements has been reduced. The preliminary 2007 length distribution for albacore caught by Hawaii-based vessels is based on 703 fish (Figure 3). Albacore length data are not yet available from California-based vessels that fished in 2007.

When the Hawaii observer data are examined by type of longline operation, combined length compositions from 2005–2007 (with 2007 being incomplete) indicate that larger albacore are caught on deep-set operations (targeting bigeye tuna) than shallow-set operations (directed at catching swordfish) (Figure 4).

In addition to Federal data collection, the State of Hawaii Division of Aquatic Resources (HDAR) collects data on the number, weight, and ex-vessel price of all albacore landed and sold through wholesale fish dealers in Hawaii. A database for the Hawaii dealer data is maintained by the Western Pacific Fisheries Information Network (WPacFIN) at PIFSC. Until recently, most albacore caught by the Hawaii fleet were landed whole. Since December 2004, Federal seafood safety regulations have required that all tunas be landed gilled and gutted. When fish have been landed in a processed form, conversion factors have been applied to estimate whole weight. For landings in 2007, estimated total weight data from a subset of 9,441 albacore were used to update the historical series of HDAR weight frequency distributions (Figure 5). Albacore landings by California-based longline vessels are documented by the California Department of Fish and Game (CDFG) through landings receipts. The receipts include information on the aggregate landed weight (always round weight) and ex-vessel price per pound. CDFG landings data are stored in the Pacific Fisheries Information System (PacFIN) database.

Logbooks of U.S longliners indicate that most albacore caught are kept for sale. For fishing trips landing in 2007, captains of Hawaii-based vessels reported that 5.3% of their albacore catch was discarded. California-based vessels reported that all albacore were retained. In the Hawaii-based fleet, albacore discarding is noticeably higher on swordfish trips than on trips targeting tuna. A preliminary comparison of aggregated Hawaii observer data and Hawaii logbook data suggests that logbook statistics may underestimate the actual extent of albacore discarding; this matter should be investigated further using paired logbook and observer records from monitored trips. Size frequency data collected by observers on Hawaii-based vessels indicate that on some trips albacore are high graded, i.e., discarded albacore generally are damaged or smaller than those kept for sale.

The "catch" estimates in Table 2 are really landings; they exclude fish caught but discarded by fishermen. The 2007 catch (landings) in weight for Hawaii-based vessels was estimated as the product of the total number of albacore kept by Hawaii-based fishermen (from logbook data, using data for fishing trips reporting a 2007 landing date) and the average round weight of albacore landed in Honolulu (from dealer records). This calculation is preliminary; a final estimate of the 2007 albacore catch by Hawaii longline vessels will be reported later in 2008. The albacore catch for California-based vessels was based on landings receipts compiled by CDFG. In addition to the number of albacore caught, logbooks for California-based vessels also have the captain's estimates of the weight of albacore caught. These weight data were not used in the catch computations.

In addition to the U.S. longline vessels based in Hawaii and California, since 2006 there has been some exploratory fishing activity, but no sustained effort, by a longliner based in Guam and a few trial longline operations by a company in the Commonwealth of the Northern Mariana Islands. So far these ventures have had little success. Nevertheless, WPacFIN staff in Honolulu are working with local fishery authorities to ensure catches are properly monitored.

Table 1. Number of active vessels in the Hawaii- and California-based U.S. longline fleets.

Year	Total Vessels
1986	39
1987	37
1988	50
1989	88
1990	138
1991	144
1992	125
1993	129
1994	156
1995	132
1996	118
1997	130
1998	147
1999	130
2000	129
2001	125
2002	123
2003	129
2004	125
2005	125
2006	128
2007	130

Table 2. Total annual albacore catch (metric tons) by U.S. longline vessels based in Hawaii and California as documented in the ISC database. Catches are quantity of fish landed; discards are not included. Sources: Catches for 1952 through 1986 are from State of Hawaii fishery statistics; catches for 1987 through 1999 are from Ito and Machado 2001[3]; catches for 2000 through 2007 are from Russell Ito (PIFSC, Honolulu, *pers. comm.*) and John Childers (SWFSC, La Jolla, *pers. comm.*). Parentheses indicate preliminary estimate.

Year	Catch (t)	Year	Catch (t)	Year	Catch (t)
1952	46	1971	11	1990	177
1953	23	1972	8	1991	313
1954	13	1973	14	1992	337
1955	9	1974	9	1993	440
1956	6	1975	33	1994	546
1957	4	1976	23	1995	883
1958	7	1977	37	1996	1,187
1959	5	1978	54	1997	1,652
1960	4	1979	--	1998	1,120
1961	5	1980	--	1999	1,540
1962	7	1981	25	2000	940
1963	7	1982	105	2001	1,295
1964	4	1983	6	2002	525
1965	3	1984	2	2003	524
1966	8	1985	0	2004	361
1967	12	1986	--	2005	304
1968	11	1987	150	2006	274
1969	14	1988	308	2007	(258)
1970	9	1989	249		

[3] Ito, Russell Y., and Walter A. Machado. 2001. Annual report of the Hawaii-based longline fishery for 2000. National Marine Fisheries Service, Southwest Fisheries Science Center Administrative Report, H-01-07, 37 p.

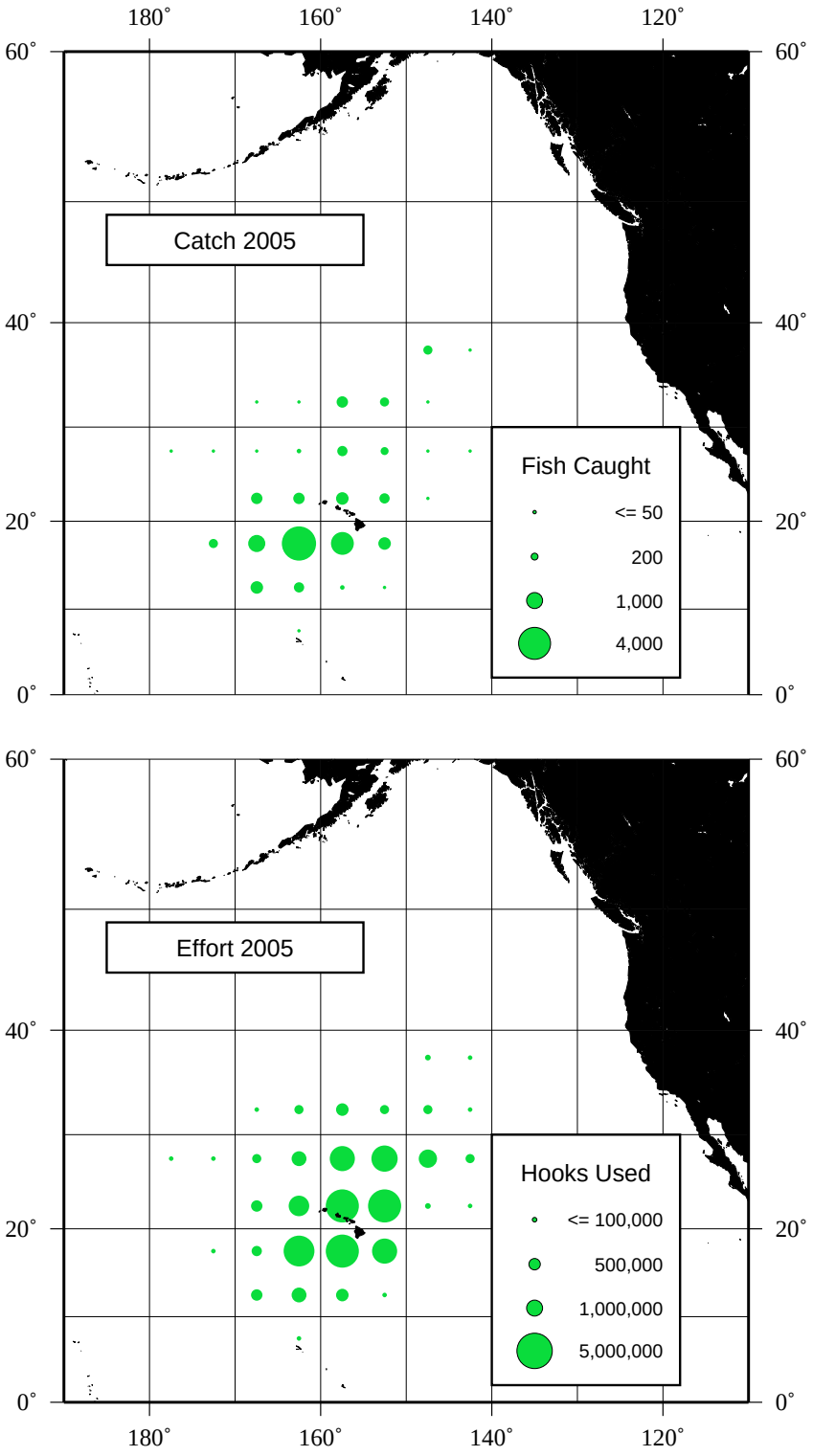

Figure 1. Distribution of albacore catch and nominal effort in the North Pacific Ocean by U.S. longline vessels, 2005. From NMFS logbook data. Only non-confidential data are displayed.

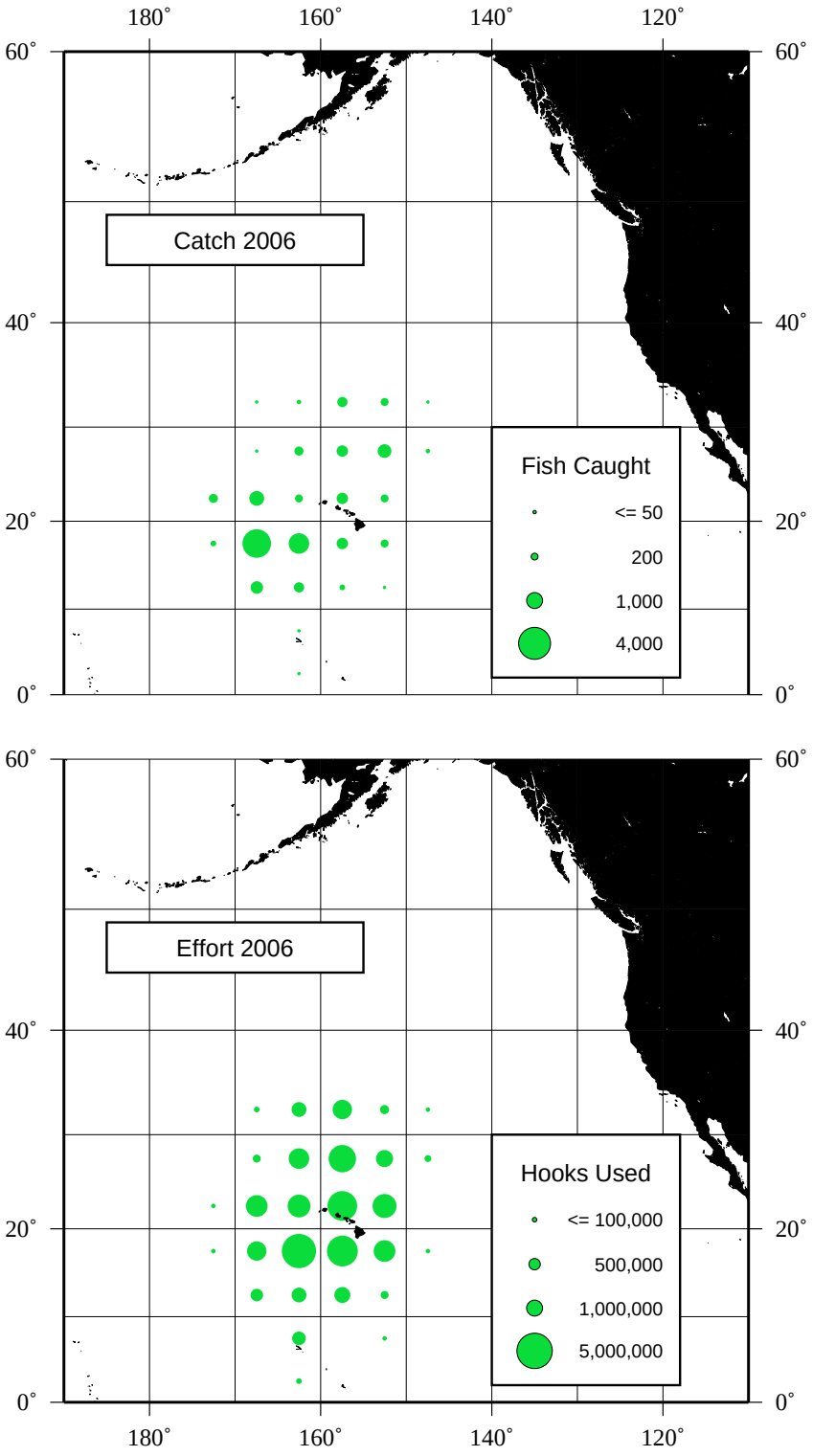

Figure 2. Distribution of albacore catch and nominal effort in the North Pacific Ocean by U.S. longline vessels, 2006. From NMFS logbook data. Only non-confidential data are displayed.

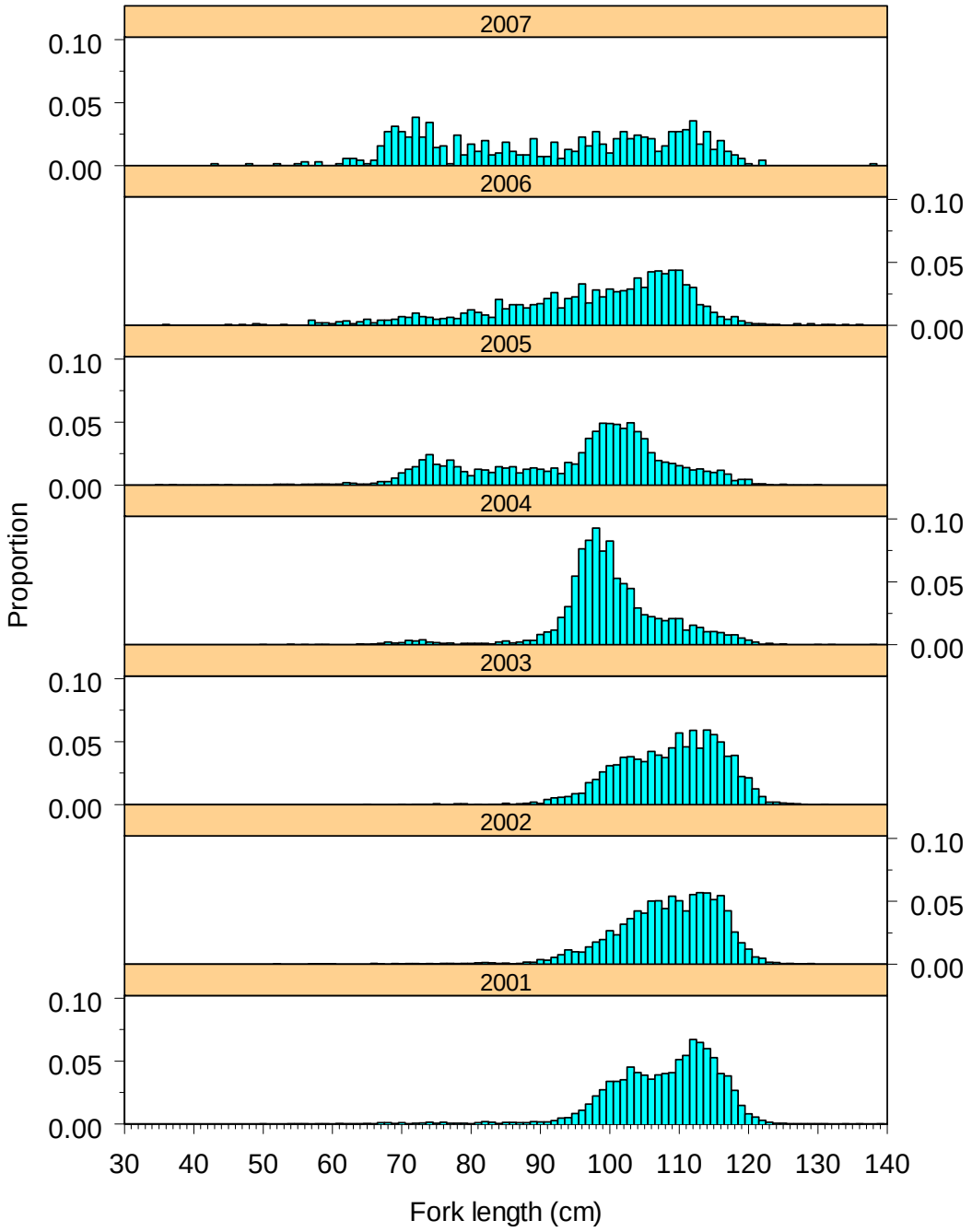

Figure 3. Frequency distribution of fork length (cm) for albacore caught by Hawaii-based longline vessels and measured by NMFS observers. Data for 2001–2007 [preliminary].

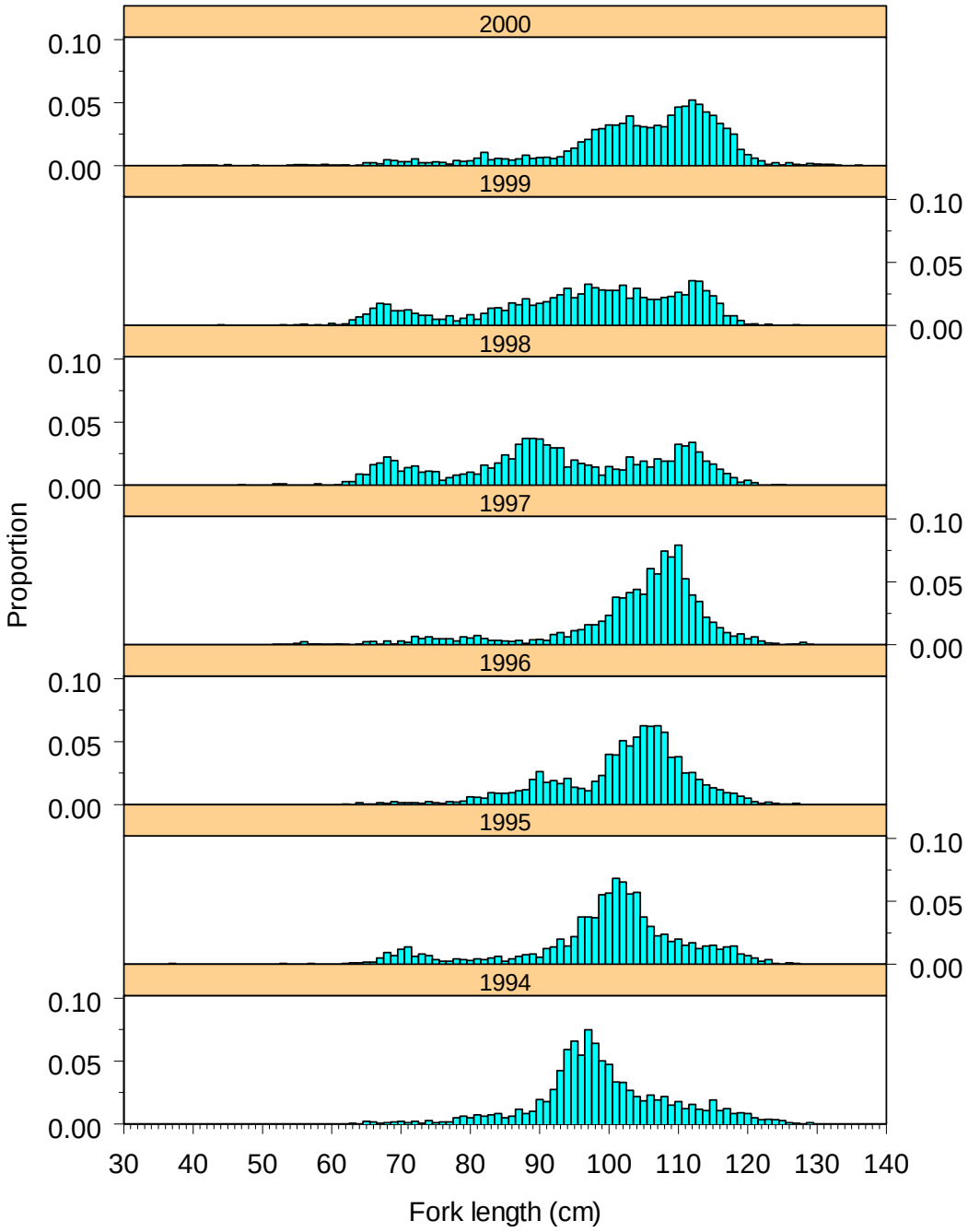

Figure 3. (continued) … Data for 1994–2000.

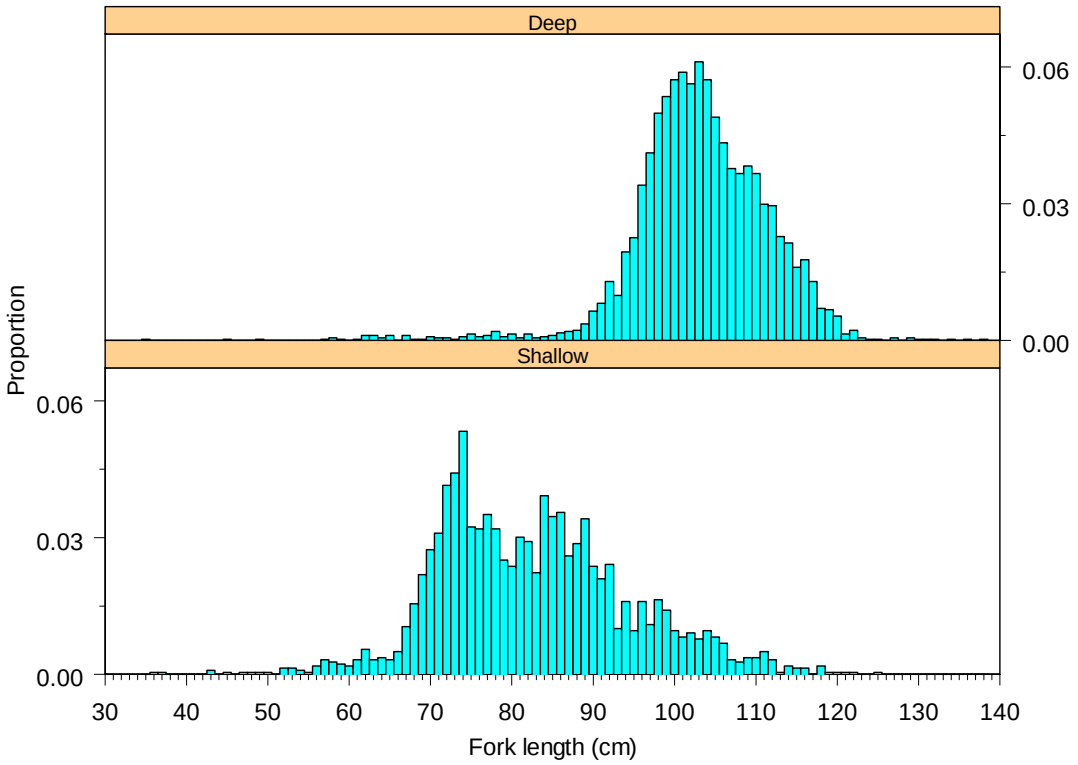

Figure 4. Frequency distribution of fork length (cm) for albacore caught by Hawaii-based longline vessels and measured by NMFS observers. Data for 2005–2007 combined, by type of fishing operation (deep-set or shallow-set).

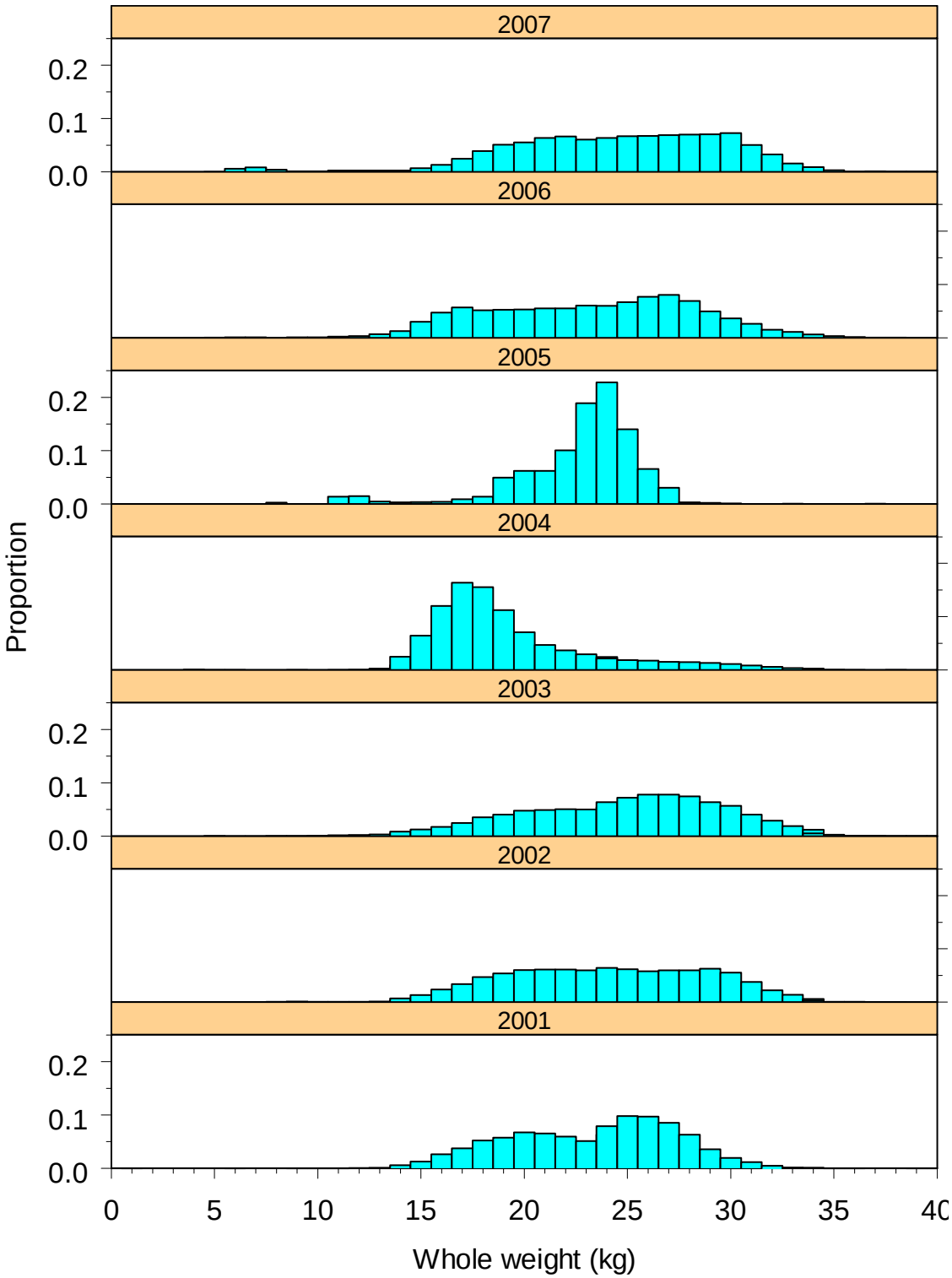

Figure 5. Frequency distributions of whole weight (kg) for albacore caught by Hawaii-based longline vessels and landed in Honolulu. Data for 2001–2007 [preliminary].

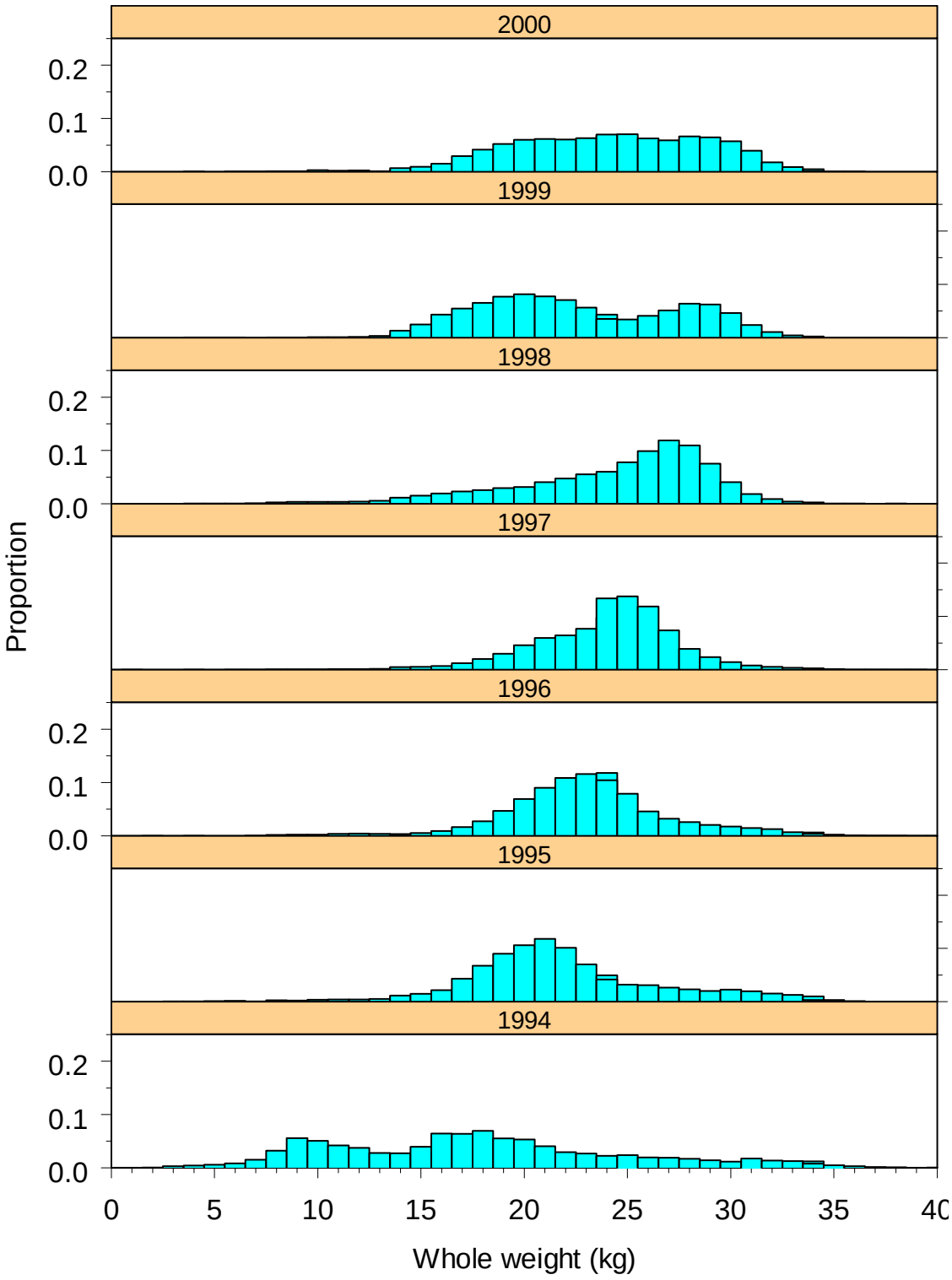

Figure 5. (continued) … Data for 1994–2000.

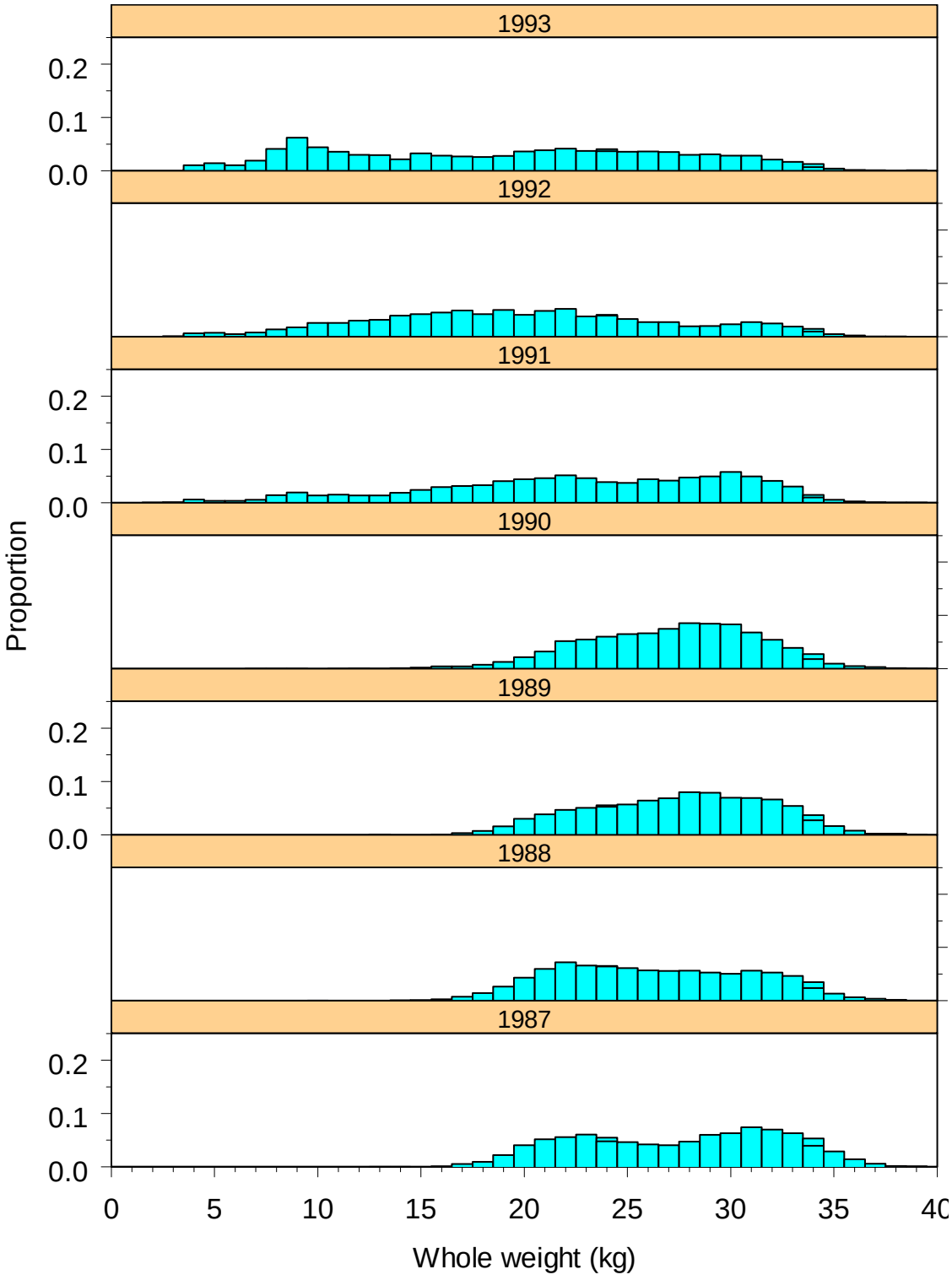

Figure 5. (continued) … Data for 1987–1993.