Submission of 2007-2008 U.S. Fishery Statistics for the Western and Central Pacific Ocean to the Western and Central Pacific Fisheries Commission[1]

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This is the fifth submission of annual fishery statistics by the Pacific Islands Fisheries Science Center (PIFSC), of NOAA's National Marine Fisheries Service (NMFS), to the Western and Central Pacific Fisheries Commission (WCPFC). The submission consists of provisional 2008 data for U.S. fisheries targeting tuna and tuna-like species in 2008, and updated data for 2007, unless otherwise indicated. Annual catch estimates are included for all fisheries over 5 years (2004-2008). This year's data submission, like last year's, includes aggregated catch and effort data from identified deep- and shallow-set sectors of the longline fisheries, aggregated catch and effort data on the albacore troll fishery, individual fish weights from marine fish dealer data covering Hawaii-based fisheries, and observer measurements from fisheries based on the U.S. west coast and in American Samoa.

In reports submitted prior to 2008, tropical troll fishing was sometimes combined with handline fishing where both gears targeted a broad variety of tropical tunas, istiophorid billfishes, and associated species such as dolphin fish, using tropical island-based small vessels. In these old reports, tropical troll fishing and handline and pole-and-line fishing were sometimes combined under the name "small-scale" fisheries (referring to the fact that these fisheries comprise a very small fraction of U.S. production). For this data submission, tropical troll fishery catch and vessel count data are listed separately from handline and pole-and-line (however, data on landed fish weights from the State of Hawaii Marine Dealer reports still do not distinguish between troll and handline landings, so the same average weights were assumed for both fisheries). The tropical troll fishery is distinguished from the troll fishery for albacore that operates mostly in temperate waters with catches composed almost exclusively of albacore. The U.S. does not consider the tropical troll fishery to be a fishery "for" albacore, as it catches almost no albacore. The troll fishery for albacore has previously been termed the "distant-water" troll fishery, but a large component of this fishery operates close to home ports on the U.S. west coast. So the "distant-water" term seems somewhat inappropriate and also not descriptive of the difference between tropical troll and albacore troll fishing.

Three categories of fishery data are provided: 1) Category I -- annual catch estimates and numbers of active vessels in each fishing fleet (purse seine, longline, albacore troll, tropical troll, handline, and pole-and-line, etc. (most of these data are provided in the US Annual Report to the

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Commission Part 1…WCPFC-SC5-AR/CCM-26), 2) Category II -- catch (in number and weight of fish) and effort (logbook) data in aggregated form for longline and albacore troll fisheries, and 3) Category III – size (length or weight) data for key species and fisheries. The methods used in compiling the three categories of fishery statistics and other specifics are described below. For some fisheries, statistics were compiled by the year the catch was landed and for others they were compiled by the year the fishing gear was set or hauled. For the troll fishery targeting albacore in the South Pacific, data are also provided by fishing season (July of year x through June of year x+1). The procedure for determining the dates upon which to base summaries have not been standardized among all the fisheries, and may not match the standard used in some prior data submissions. The longline fisheries statistics have been compiled by date of the fishing operation (date of set, for both Category I and Category II), as have all other Category II data. For some other fisheries, Category I data are summarized by date of landing. When we complete the development and documentation of standardized data summarization procedures we will apply the procedures to the historical data and submit revised statistics.

Category I: Statistics on Annual Catch and Active Vessels

The estimates of annual "catch" for 2004-2008 (Table 1) were compiled from a number of sources: 1) American Samoa Department of Marine and Wildlife Resources offshore creel survey catch data; NMFS American Samoa federal longline logbooks and size frequency data from the NMFS cannery sampling program; 2) Guam Division of Aquatic and Wildlife Resources offshore creel survey catch data and commercial landings data; 3) Hawaii Division of Aquatic Resources (HDAR) Commercial Fisherman reports (catch data), Commercial Marine Dealer reports (landings data), and NMFS federal longline logbook landings data (fish kept); 4) Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife Commercial Purchase landings data; 5) Pacific Fisheries Information Network (PacFIN) data which may contain landings data from all three U.S. Pacific coast States; and 6) U.S. Pacific albacore logbook and U.S. South Pacific Tuna Treaty purse seine logbook and landings data. Therefore, the U.S. annual catch statistics are nominally a mixture of estimated catches and landings. With the exception of logbook data, which report discards along with kept catch, the fishermen's reports and the surveys generally include only kept catch (landings).

In using logbook data to compute Category I landings statistics for longline fisheries, catches in numbers of fish kept, by species, were summed for those longline sets located in the WCPFC Area (http://www.wcpfc.int/doc/scientific-data-be-provided-commission-revised-wcpfc4-2007), and in the Eastern Pacific Ocean (EPO, east of 150 W. longitude) north of the Equator for N. Pacific albacore, striped marlin, and swordfish. For the longline fleet, the final estimate of landed weight for each species was derived as the product of number of fish kept (logbook data) and mean whole fish weight from HDAR dealer data or other weight estimates (e.g., from PacFIN). Average weights were estimated separately for the deep-set ($\geq$15 hooks between floats) and shallow-set (<15 hooks between floats) longline fishery sectors, by month of landing, as long as weights were available from at least 20 fish per sector per month. Otherwise annual averages, averages across sectors, or other proxy weights were applied. The Category I statistics are summed for both sectors (but data segregated by deep- and shallow-set fishery sectors are included in the Category II data described below). Separate average weights were estimated for bigeye tuna in the WCPFC Area and the EPO for each sector. Procedures for

separately estimating bigeye tuna weight by region were developed to better monitor cumulative catch in relation to catch limits.

Data from the single longliner operating out of California in the EPO in 2005-2008 are combined with data from Hawaii-based vessels in the EPO. In tabulating catches by fishery, California and Hawaii are considered as one North Pacific-based fishery. Catches for a fishery based outside of the 50 United States (e.g., the American Samoa-based fishery) are tabulated separately. No tabulation is possible for the small longline fishery based in Guam, as the entire fishery represents less than three vessels. Note that because the California-based fishery catch total represents a single vessel, and is reported in combination with the Hawaii-based total, neither total can be reported separately without revealing fisheries-confidential data (by difference).

The HDAR has improved the coverage and quality of the dealer data and these data represent nearly complete coverage of longline landings. Landed fish are weighed to the nearest half pound. If fish were landed in processed form (e.g., gilled and gutted), conversion factors were used to estimate their whole weight. California longline data and other west coast fishery statistics were then added as needed to derive the total landings for N. Pacific albacore, swordfish, and striped marlin. Total landings were then expressed in units of metric tons. American Samoa longline landings in numbers of fish were also converted to metric tons using average size of landed fish. For this submission, the average size data were compiled and applied on a monthly basis, unless fewer than 20 fish were measured per month, in which case a sample from a longer time frame (i.e., annual) or other proxy average weight was used.

Category I statistics are weights estimated from reported numbers or are reported weights with no adjustment to account for discarded or unreported fish catch, except for the U.S. purse seine fishery operating in the western Pacific. Although longline logbooks include information on numbers of fish discarded, a procedure for estimating the average weight of discarded fish has not yet been developed. Summary statistics on the numbers of principal fish species discarded ("released") in the Hawaii longline fishery are available at http://www.pifsc.noaa.gov./fmsd/reports.php. With respect to under-reporting, observer data do not suggest substantial under-reporting of commercial (landed) fish species caught by Hawaii longliners.

There is some misidentification of species in the logbook data, which can result in simultaneous over- and under- reporting of similar species, and all longline logbook species data provided in this report rely solely on fishermen's identifications. As an example, nominal Hawaii longline data indicate that the annual CPUE for blue marlin in 1995 was the highest reached in recent years. However, comparisons of this CPUE statistic with concurrent HDAR landings data and data collected by observers deployed on selected Hawaii longline vessels by the NMFS Pacific Islands Regional Office (PIRO) demonstrated that it was considerably inflated by misidentification of striped marlin as blue marlin (see http://www.soest.hawaii.edu/PFRP/reprints/walsh_sdarticle.pdf). Providing feedback and training to fishermen seems to have reduced misidentification in recent years.

Catches by the Hawaii troll and handline fisheries were shown to be under-reported in the past, but improvements in the HDAR dealer data system may have greatly reduced this problem. For American Samoa, fishing effort reported in logbooks was compared with data from the creel survey (http://www.wpcouncil.org/pelagic.htm, choose "Pelagics Annual Report"). Results were used to evaluate the difference between reported and estimated catch, indicating that in 2005-2007 the underreporting of catch was no more than 0.5% for the entire American Samoa longline fishery. Information on 2008 is not available at this time.

Recreational catches are not included in the total annual catch estimates for Hawaii or the Northern Mariana Islands but are included for American Samoa and Guam, where such data are collected through offshore Creel surveys.

Catches from the albacore troll fishery are estimated from landings information obtained from the PacFIN database system, cannery reports from the 2 canneries in American Samoa, and reports provided by industry and foreign fisheries agencies where U.S. albacore troll vessels may unload their catches. Catches from the South Pacific fishery are allocated to the year of catch using logbook data.

Category II: Catch and Effort (Logbook) Statistics

Three longline data sets were integrated to calculate aggregated Category II logbook data (Table 1) for 2007-2008, with information provided on numbers and weight of fish caught and kept by species, effort in sets and hooks, and location of catch. United Nations Food and Agriculture Organization 3-alpha species codes were used as species labels. The largest data set used derives from the mandatory submission of the NMFS Western Pacific Longline Fishing Log by Hawaii-based fishers. A rigorous quality control process is followed, including a quick review conducted with the provider when the logs are received from the vessels, a subsequent visual inspection of the logs, and finally a computer-based error checking algorithm that screens each data element with preselected ranges. The second largest data set used derives from a similar program for American Samoa-based longline vessels. These data are collected by NMFS field agents stationed in American Samoa and also by the American Samoa Department of Marine and Wildlife Resources in cooperation with NMFS. The third source of data includes logbooks and landings receipts from the longline fishery based in California.

All longline data sets were merged into a single logbook data set. These combined logbook data, therefore, represent all operations of the American Samoa-, Hawaii-, and California-based fleets, not just operations taking place in the WCPO. Estimated weights are included in these files. The Category II longline data (Table 1) were aggregated by fishery (Hawaii = HI, California combined with Hawaii = CH, American Samoa = AS), set depth (deep-set = D, shallow-set = S), year, month, and 5º longitude x 5º latitude blocks. Confidential statistics (i.e., those from 5° x 5° x month blocks with fewer than 3 vessels reporting) were aggregated by annual intervals into large areas of the ocean (termed "quads" in the longline data files). These areas coincide with RFMO jurisdictions and are labeled WCPFC-N (westward from 150° W and N of the equator), WCPFC-S (westward from 150° W and S of the equator) and IATTC-N (east of 150° W and N of the equator). There were no U.S. longline fisheries operating east of 150° W and S of the equator. Nor were there any other U.S. fisheries operating in the area of overlap between the WCPFC and IATTC statistical areas, with the

exception of the albacore troll fishery in the South Pacific, as indicated in the Category II data (Table 1). Annual catch estimates (Category I) not yet been provided for that area.

Data from the single longliner operating out of California in the EPO in 2007-2008 are included in annual quad summaries, combined with data from Hawaii-based vessels in the same quad (fishery = CH). The number of 5º longitude x 5 º latitude blocks that were combined into large annual quads to preserve confidentiality, as well as the small numbers of blocks suppressed (because they comprised all of the data for a fishery and set depth in the entire annual quad and still represented less than 3 vessels) are provided with the data. The percent of 5° x 5° blocks combined represented 40-37% of the total number of blocks but only 3.6-3.2% of the total number of hooks in 2007 and 2008, respectively. The number of blocks and hooks that were suppressed totaled less than 1%. These percentages do not include the suppressed data from the Guam-based longline fishery. The estimate of under-reporting (in logbooks) of no more than 0.5% by artisanal-scale vessels from the American-Samoa based fishery in a single 5º longitude x 5 º latitude block enclosing the Island of Tutuila, which was based on comparison with creel-survey estimates for 2005-2007 has not been revised or updated for 2008 data. The Category II data have not been raised here (nor were Category I catch totals raised).

The catch and effort data for albacore troll fishing were summarized for 2007 and 2008 by 1º longitude x 1º latitude x month strata in the N. and S. Pacific. Data on pole and line fishing for albacore were also provided for these years at the same resolution. The summarized data provided for the WCPFC area were for the South Pacific albacore troll fishery only, as fishing in the N. Pacific in the WCPFC area was conducted by fewer than three vessels. To meet domestic fisheries data confidentiality requirements, a 3-boat filter was applied to each 1° x 1° x month block of summarized data, i.e., data in blocks with fewer than 3 boats fishing were excluded. A simple summary of the impacts of this filtering is included at the bottom of each worksheet of Category II troll data.

Category III: Size Composition Statistics

Size data for a major subset of Hawaii longline landings (whole weight to the nearest half pound converted to kilograms) were compiled from the HDAR Commercial Marine Dealer data from vessel-trips with landing years 2007-2008 and are provided by month and set depth for albacore, yellowfin and bigeye tuna, blue and striped marlin, and swordfish (Table 1). The source database (HDAR) does not identify the fishery (e.g., longline, troll). This must be determined by matching landing dates and license numbers (fisheries confidential, suppressed) with logbook data. The Category I and II estimated longline catch weights are estimated for the month of catch using the average weight from the Category III data for the month of landing of those catches. For this reason and because 100% matching is not possible, the summed Category III weight data will not match the estimated weight of the catch provided in Category I and II. Monthly means of these average weights by set depth were used to estimate the weights of catches (numbers of fish by set depth) based on landing date for the Category I and II data (above). When fish were landed in processed form (e.g., gilled and gutted), conversion factors were used to estimate the whole weight. Likewise, weights for the Hawaii tropical troll and handline landings were compiled for yellowfin tuna, skipjack tuna, striped marlin, and blue marlin for 2008. No updates are provided to the 2007 data submitted last year. These data are the remainder after the HDAR dealer longline data have been segregated, and are not separated

between tropical troll and handline. Troll and handline operations cannot be distinguished by license numbers, which may represent both types of fishing. Some records in these files represent more than one fish (as indicated by pieces > 1) and in submissions made prior to 2008 these records were removed in creating the frequency distributions that were submitted instead of the data.

Length frequency statistics from port sampling of the American Samoa longline landings in 2008 were compiled monthly and provided for albacore, yellowfin, and bigeye tuna (Table 1). No updates are provided to the 2007 data submitted last year.

The requirement to submit size data by area has not been met by the data submitted on the longline or tropical troll and handline fisheries. The available HDAR dealer data do not identify area of catch. A procedure was developed to link dealer subsets of bigeye tuna weight data to longline trips that fished in the WCPFC Area and the EPO for catch limit monitoring. These data were used to separately estimate bigeye tuna weights for these areas in the Category I and II data, but are combined in the Category III data provided. Further development is intended to assign some mean or central trip position to landings. This will only be possible at the trip level, and each trip has sets from a wide geographic range that cannot be individually linked to landed weights. We hope to use such a procedure to categorize the geographic location of the dealer data in the next data submission.

Size data for the albacore troll fishery in the North Pacific (2007-2008) and South Pacific (2007) and for the albacore pole and line fishery in the North Pacific (2007) are taken by port samplers (trained scientific technicians) as vessels unload in California, Washington, and Oregon ports and in Pago Pago, American Samoa. For several fisheries (Table 1) the data for 2008 were not available. Category I weight estimates for these fisheries in 2008 were based on 2007 average weights.

Table 1. Names and contents of data files provided.

Data Category	Contents	File Name
Category I:	Estimated Annual Catches (metric tons) and Numbers of Active Vessels	
		CAT_I_WCPFC 2004-2008 ver 2.5
Category II:	Logbook Data (numbers of fish and effort) aggregated by non-confidential strata, each representing at least 3 licenses (i.e. vessels):	
	Longline files show deep- and shallow-set (<15 hooks per float) data from North Pacific-based and American Samoa-based fleets, including estimated weight	CAT_ II_LL WCPFC 2007-2008 ver 1.0
	Albacore Troll and Pole and Line	CAT II_Other 2007-2008 SWFSC ver 20090414.1
Category III:	Size Composition:	
	Am. Samoa Longline Landings Port Samples (lengths)	CAT_III_ AM_SAM_LL_YFT_2008.XLS
	Hawaii State Division of Aquatic Resources Dealer Data (weights) inferred to be from deep-set or shallow-set longline landings	CAT_III_HI_LL_BET_2007Q1.csv CAT_III_HI_LL_BET_2007Q2.csv CAT_III_HI_LL_BET_2007Q3.csv CAT_III_HI_LL_BET_2007Q4. csv CAT_III_HI_LL_BET_2008Q1. csv CAT_III_HI_LL_BET_2008Q2. csv CAT_III_HI_LL_BET_2008Q3. csv CAT_III_HI_LL_BET_2008Q4. csv CAT III HI LL YFT-ALB-BUM-MLS-SWO 2007.csv CAT III HI LL YFT-ALB-BUM-MLS-SWO 2008.csv

Data Category	Contents	File Name
	Hawaii State Division of Aquatic Resources Dealer Data (weights) inferred to be from non-longline (i.e., from troll or handline) landings	HI_T-HL_TUNAS_2008.XLS HI_T-HL_MARLINS_2008.XLS
	Albacore Troll and Pole and Line	CAT_III_Other 2007-2008 SWFSC ver 20090414.1
Metadata Document:	This Data Report	DR-09-010.doc; DR-09-010.pdf