



PLENARY 09

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National Report of the United States (US Fisheries and Research on Tuna and Tuna-like Species in the North Pacific Ocean)¹

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Summary

U.S. fishing fleets harvest highly migratory species (HMS), including tuna and tuna-like species, from the North Pacific Ocean (NPO) in the U.S. exclusive economic zones and in the high seas. Fisheries operate within the Eastern Pacific Ocean (EPO) and Western and Central Pacific Ocean (WCPO) from coastal waters of North America to the archipelagos of Hawaii, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), and American Samoa. Small-scale gillnet, harpoon, pole-and-line, troll, and handline fleets operate primarily in coastal waters; while most of the tuna catches are from large-scale purse seine, albacore (*Thunnus alalunga*) troll, and longline fleets that operate both within the U.S. exclusive economic zone and on the high seas. In addition, thousands of small-scale troll and handline vessels operate in waters of the tropical Pacific; however, these fleets account for a small fraction of the total tuna catch. In 2025, notable fisheries patterns included reduced participation by the U.S. WCPO purse seine fleet relative to recent years, a southward expansion of Hawaii-based longline fishing effort, and an increased contribution of yellowfin tuna to longline catches compared to the recent five-year average.

In 2025, NOAA Fisheries continued research on Pacific tunas and associated species at its Southwest and Pacific Islands Fisheries Science Centers, often in collaboration with scientists from other organizations. Stock assessment research on tuna and tuna-like species was conducted primarily through collaboration with participating scientists of the International Scientific Committee (ISC) for Tuna and Tuna-Like Species in the NPO and international Regional Fisheries Management Organizations. In 2025, two noteworthy studies investigated ways to improve stock assessments. Research studies were conducted on fisheries operating in the waters of the U.S. Pacific coast, Hawaiian Islands, U.S. territories, and the high seas. Studies investigated methodology to improve stock assessments, biology of tuna, tuna-like species, and bycatch species caught in these fisheries; the marine ecosystems where these fisheries occur; and the socio-economics of these fisheries. NOAA Fisheries scientists produced reports summarizing monitoring data collected for pelagic fisheries and fisher observations for small boat fisheries operating out of Hawaii, Guam, and the CNMI.

Highlighted research includes:

- Stock assessment research (Berger *et al.* 2025; Brodziak *et al.* 2025);
- Foraging and dietary studies (Muhling *et al.* 2025; Portner *et al.* 2025; Preti *et al.* 2025);
- Life history characteristics of Pacific blue marlin (*Makaira nigricans*) (Chang *et al.* 2025) and Pacific bluefin tuna (*Thunnus orientalis*) (Lin *et al.*, 2025);
- Natal origin and migration of Pacific bluefin tuna (Ku *et al.* 2026);
- Applications of species distribution modeling (Karp *et al.* 2025);
- Organic pollutant accumulation and habitat use in thresher sharks (Lyons *et al.* 2025);
- Conditions influencing cookie cutter shark (*Isistius* spp.) damage in longline fisheries (Suca *et al.* 2025); and
- Unintended multi-species conservation consequences of large-scale spatial closures in pelagic fisheries (Van Wert *et al.* 2025).

1 Introduction

Various U.S. fishing fleets harvest tuna and tuna-like species in the NPO. Large-scale commercial purse seine, albacore troll, and longline fisheries operate both in coastal waters and in the high seas. Small-scale commercial fisheries generally operate in coastal waters along the North American coast using purse seine, gillnet, harpoon, troll, handline, and hook-and-line gears and around the archipelagos of Hawaii, Guam, CNMI, and American Samoa using troll and handline gears. Recreational sport fisheries also operate in these areas, including guided charter trips. In some areas, fishers may sell fish and retain fish for personal use. Overall, the range of U.S. fisheries harvesting tuna and tuna-like species in the NPO is extensive, from coastal waters of North America to the U.S. territories of Guam, CNMI, and American Samoa in the WCPO, and from the equatorial region to the upper reaches of the North Pacific Transition Zone.

In the U.S., the federal government (NOAA Fisheries) shares monitoring responsibilities for tunas and billfishes with partner fisheries agencies in the states of California, Oregon, Washington, Hawaii, and territories of American Samoa, Guam, and the CNMI. NOAA fisheries offices based in California (West Coast Regional Office, WCRO, and Southwest Fisheries Science Center, SWFSC) and in Hawaii (Pacific Islands Regional Office, PIRO, and the Pacific Islands Fisheries Science Center, PIFSC) monitor HMS fisheries catch, effort, and biological information from landings and sales records, fisher self-reported logbooks, observer data, and creel surveys (that may include shoreside fisher interviews, biological sampling, and collection of effort data). In California, Washington, and Oregon, landings receipts are collected by state agencies and maintained in the federally-funded Pacific Fisheries Information Network ([PacFIN](#)) data system at the Pacific States Marine Fisheries Commission (PSMFC). State agencies also collect fisher reports (logbooks) and size composition data for some fisheries. In the WCPO, data collected by U.S. territory partner agencies includes market sampling and creel surveys of fishery activities and is managed by PIFSC and coordinated by the federally-funded Western Pacific Fishery Information Network ([WPacFIN](#)). Together, the SWFSC, WCRO, PIFSC, and PIRO share responsibilities for reporting on the data collected from the U.S. Pacific fisheries for tuna and tuna-like species.

This report provides information on the number of active vessels by fleet and their catches of tunas and billfishes in the NPO based on the data available through 15 March 2026. The U.S. fisheries data reported for 2025 are considered preliminary. Although this report focuses on tunas and billfishes, some of the U.S. fisheries catch other pelagic species important to the fishing fleets and local economies. Catch data for these species are not reported here but are included in the U.S. data submissions to the ISC for 2025.

NOAA Fisheries also conducts scientific research in support of marine resource conservation and management both domestically and internationally. These studies include stock assessments, biological and oceanographic studies, socio-economic analysis, and more. This report includes highlights of recent and ongoing scientific work by NOAA Fisheries of interest to the ISC.

2 Fisheries

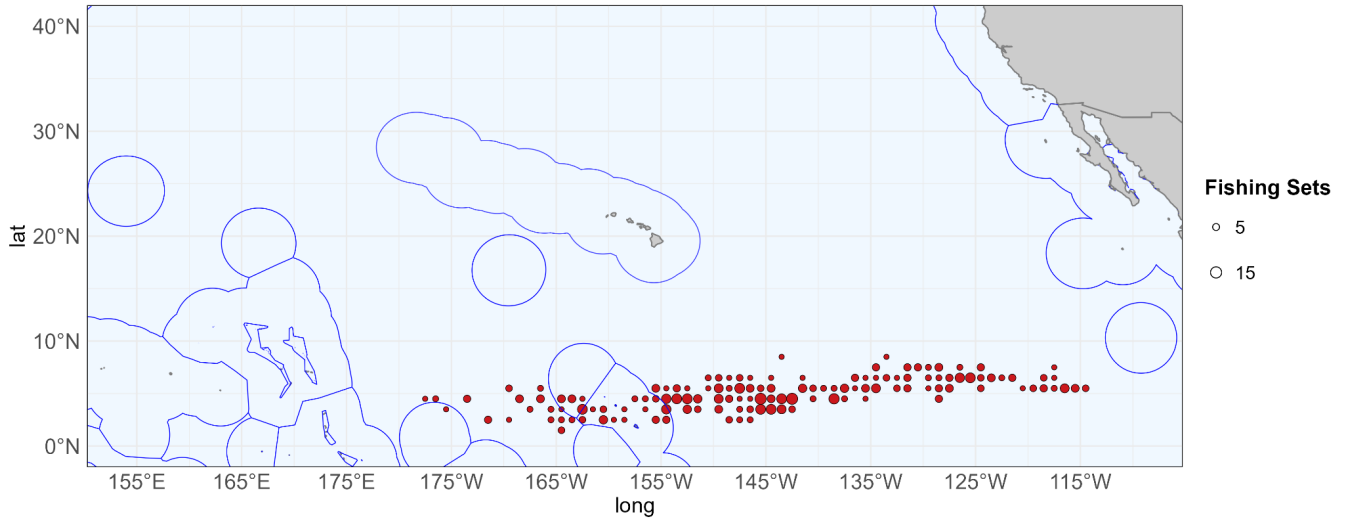
2.1 Purse Seine

Currently, the U.S. purse seine fishery consists of two separate fleets, one composed of large purse seine vessels that operate mostly in the WCPO (most of effort is within the Western and Central Pacific Fisheries Commission [WCPFC] management area but some is in the Inter-American Tropical Tuna Commission [IATTC] management area), and a small coastal purse seine fleet that operates in the EPO off the coast of Southern California. Prior to 1995, the purse seine fleet targeted free-swimming schools of tuna in the WCPO and fished on tuna schools associated with dolphins in the EPO. Since 1995, most catches in the WCPO have been associated with fish aggregation devices (FADs) or other floating objects. Historically, most of the U.S. purse seine tuna catch was from the EPO where the fishery began in the 1950s. However around 1993, fishing operations shifted to the WCPO as many vessels moved in response to dolphin conservation measures in the EPO. Fishing became possible in the WCPO when access was granted to the U.S. by the South Pacific Tuna Treaty (SPTT) in 1987.

The WCPO purse seine fleet in the NPO operates in areas between 0°N and 10°N latitude and 155°E and 110°W longitude (Figure 1). In 2025, there was limited fishing west of 180 compared to the previous five years. The number of unique large purse seine vessels fishing north of the equator in the WCPO has fluctuated from a high of 74 vessels in 1988 to a low of 11 in 2006. In 2025, 15 large purse seine vessels fished north of the equator around the WCPO, which was below the prior 5-year average of 22 vessels.

The Inter-American Tropical Tuna Commission (IATTC) monitors the purse seine fleets fishing in the EPO; while the U.S. purse seine vessels fishing in the WCPO are monitored by NOAA Fisheries under the SPTT (since 1988). The SPTT requires submission of purse seine landings data and fisher self-reported logbooks with logbooks at 100% coverage of fishing operations in the WCPO. Historically, catch was sampled for species and size composition from vessels landing in American Samoa by NOAA Fisheries personnel or by Secretariat of the Pacific Community (SPC) samplers in other ports; however, this sampling program was discontinued. Instead, biological data are derived from fisheries observers with the Forum Fisheries Agency (SPTT Treaty Manager) placing observers on 100% of the purse seine trips in the WCPO. In the EPO, logbooks are submitted by vessel operators to either NOAA Fisheries or the IATTC, and landings data are obtained for each vessel trip from canneries or fish buyers. IATTC fishery observers are required on all large purse seine vessels in the EPO.

U.S. NPO Purse Seine Fishing Effort 2025



U.S. NPO Purse Seine Fishing Effort 2020-2024

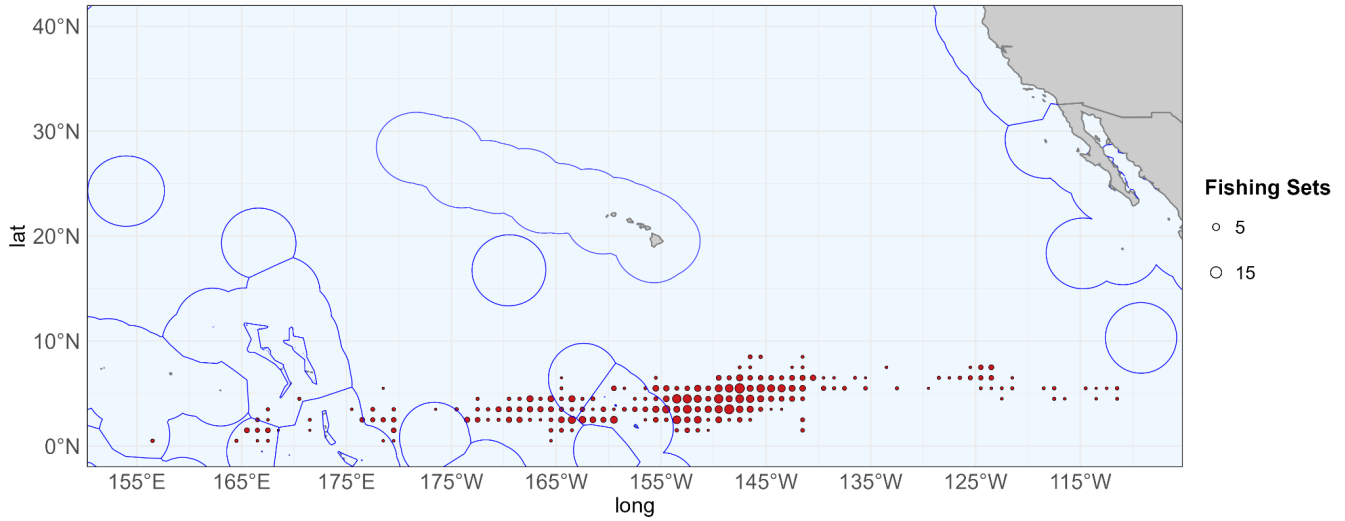


Figure 1: Spatial distribution of reported logbook fishing effort by the U.S. Western Pacific purse seine fishery in the North Pacific Ocean (NPO) within 1° latitude by 1° longitude grids for 2025 (top) and the average of 2020-2024 (bottom). Effort in some areas is not shown in order to preserve data confidentiality.

2.2 Longline

The U.S. longline fisheries targeting tuna and tuna-like species in the NPO includes fleets based in Hawaii and California. The fishing fleets are separated into a deep-set sector defined by ≥ 15 hooks set between floats that targets bigeye tuna (*Thunnus obesus*) and a shallow-set sector with < 15 hooks set between floats that targets swordfish (*Xiphias gladius*). The Hawaii-based deep-set fleet accounts for the bulk of both catch and effort, though a few vessels also engage in the shallow-set fishery and may offload their catch in California.

The shallow-set fishery overlaps spatially and temporally with seasonal abundance of sea turtles, which resulted in closures in 2018 and 2019 when annual loggerhead sea turtle interaction limits were reached (34 loggerhead sea turtles in 2018; 17 loggerhead sea turtles in 2019). However, it is less likely that this fishery will close as there are no longer annual interaction limits on loggerhead sea turtles, the species most commonly interacted with by this fishery. Current regulations include an annual interaction limit of 16 leatherback sea turtles and trip limits of 5 loggerhead and 2 leatherback sea turtles.

The U.S. longline fishery operates in the NPO between 120°W to 180° longitude and from 0°N to 40°N latitude with the highest effort directly south and southwest of the Hawaiian Islands with moderate effort extended across the subtropical mid-latitudes (Figure 2). In 2025, effort was similar to previous years; however, the fishery extended further south below 10°N . The total number of U.S. vessels fishing in the NPO was 149 vessels in 2025, which is similar to the prior 5-year average of 148 vessels.

Tuna catch is dominated by bigeye and yellowfin tuna (*Thunnus albacares*) with the largest catches south and southwest of the Hawaiian Islands (10°N – 20°N , 155°W – 165°W) (Figure 3). Bigeye tuna is widespread throughout the fishery footprint and dominates the sub-tropical northern bands (25°N – 35°N), while yellowfin tuna makes up a significant portion of the secondary catch, especially south of 20°N and west of 155°W . Albacore catch is more restricted spatially and comprises a portion of the catches in the northern temperate waters (25°N – 40°N). Fishing effort increased between 0°N – 10°N in 2025; yellowfin tuna dominated catches in these areas. Yellowfin tuna also comprised a larger portion of the catch in the past two years, especially south of the Hawaiian Islands, an area typically dominated by bigeye tuna as seen with the 5-year average. In addition, there was a smaller proportion of albacore catch in 2025 compared to the 5-year average.

Billfish catch is marlin-dominated in the tropics and swordfish-dominated further north (Figure 4). During 2020–2024, striped (*Kajikia audax*) and blue marlin proportions were similar in high-effort zones southwest of Hawaii. Regionally, blue marlin dominated south of 15°N , while striped marlin dominated 15 – 30°N , east of 145°W . Where the shallow-set and deep-set fisheries overlap (20°N – 35°N), swordfish to blue marlin catch ratios shift from comparable proportions in the south to swordfish dominance north of 30°N . In 2025, striped marlin composed a greater proportion of the large billfish catches from 10 – 20°N , west of 150°W . South of 10°N where the fishery spatial footprint deviated from the previous five-year average, blue marlin dominated western catches and swordfish dominated eastern catches.

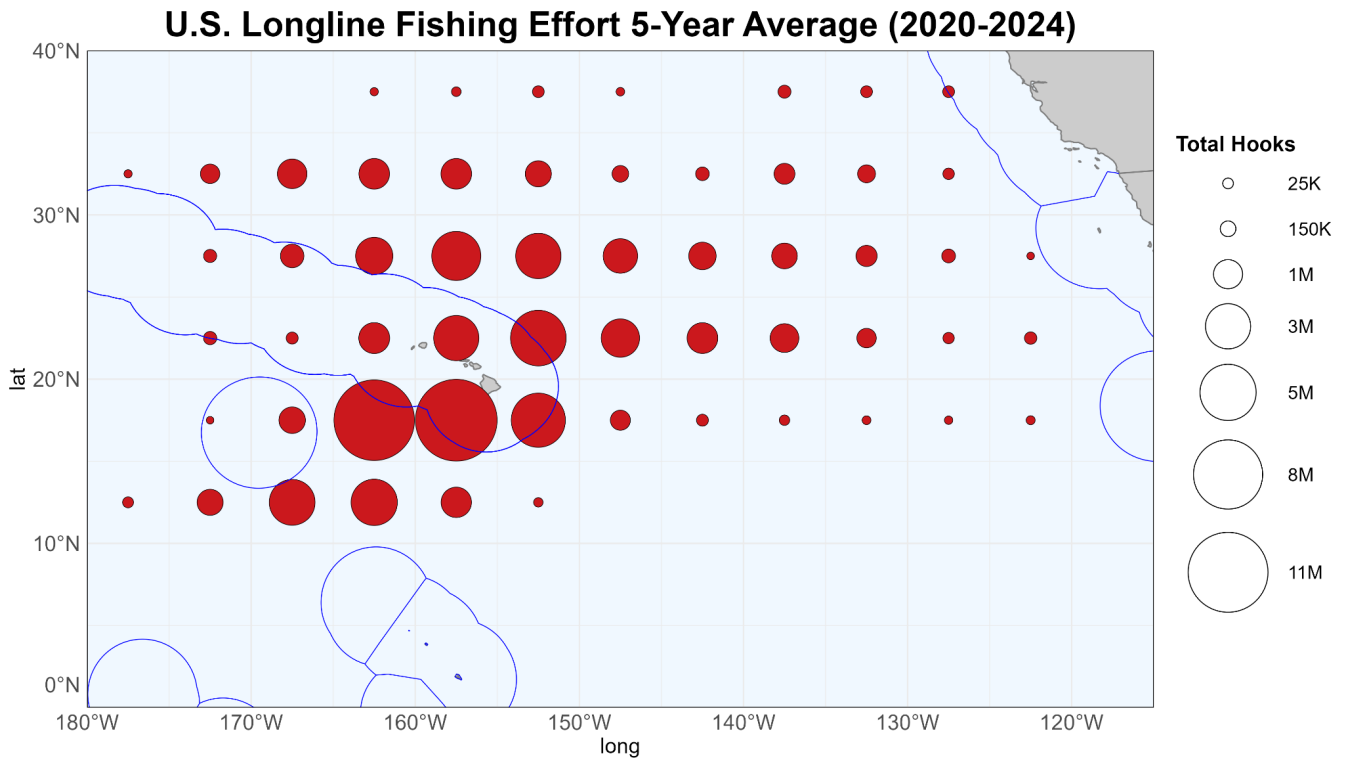
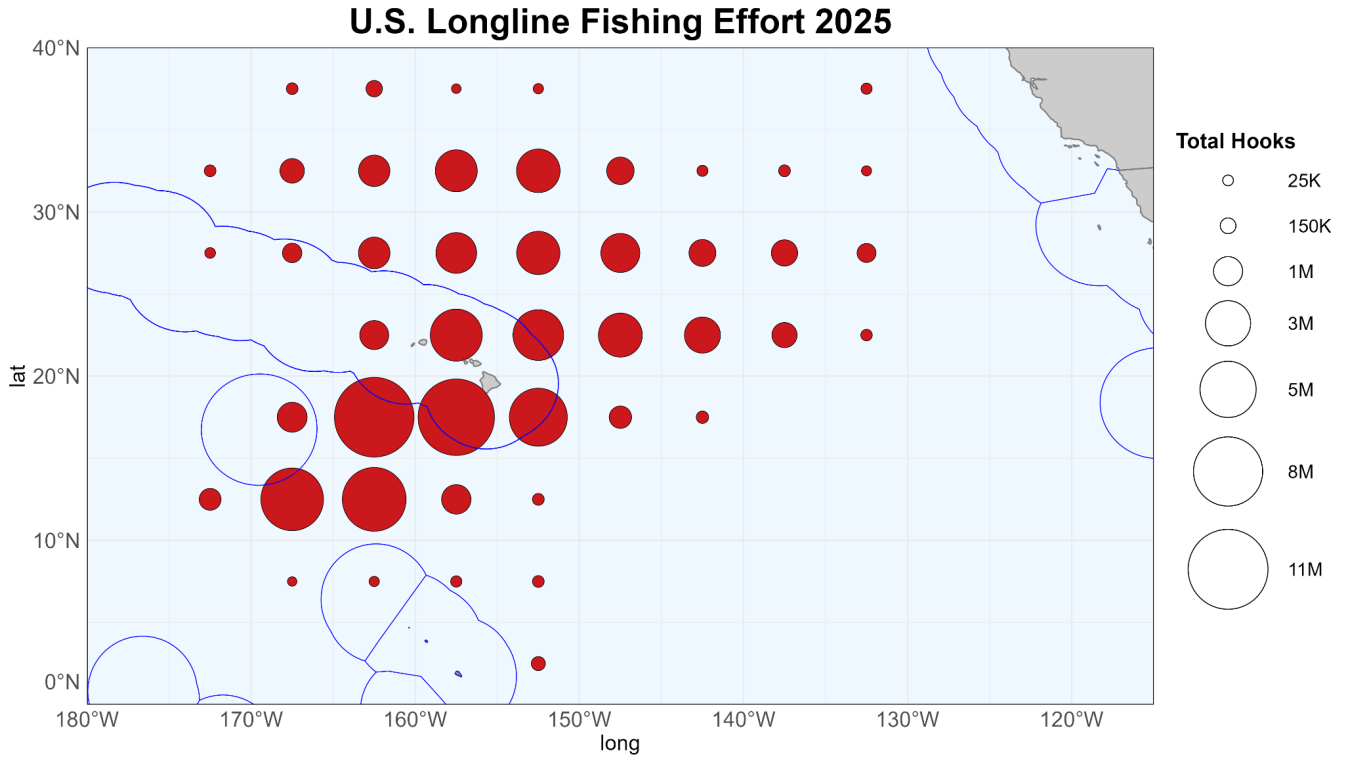
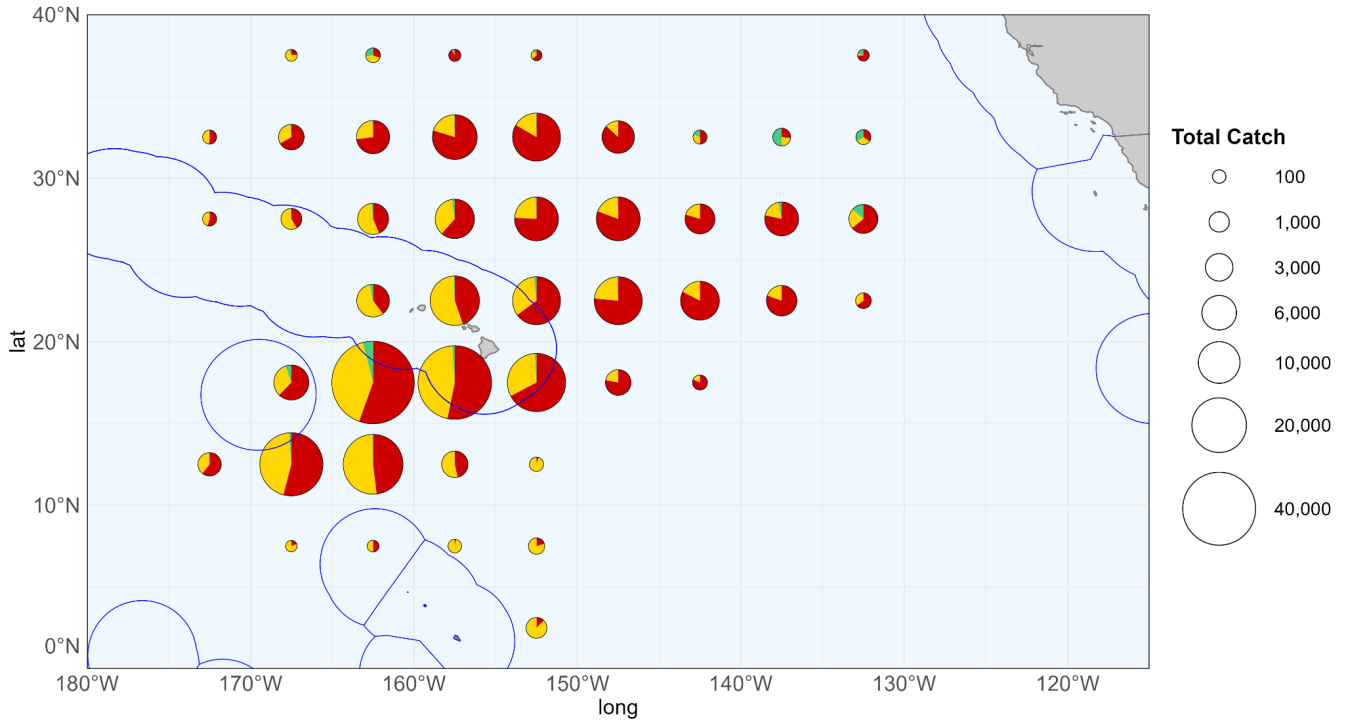


Figure 2: Spatial distribution of U.S. longline fisheries in the North Pacific Ocean within 5° latitude by 5° longitude grids for 2025 (top) and the average of 2020-2024 (bottom). Data are based on fisher reports in federal logbooks. Effort in some areas is not shown in order to preserve data confidentiality.

U.S. Longline Tuna Catch 2025

Red: Bigeye tuna | Yellow: Yellowfin tuna | Green: Albacore



U.S. Tuna Catch 5-Year Average (2020-2024)

Red: Bigeye tuna | Yellow: Yellowfin tuna | Green: Albacore

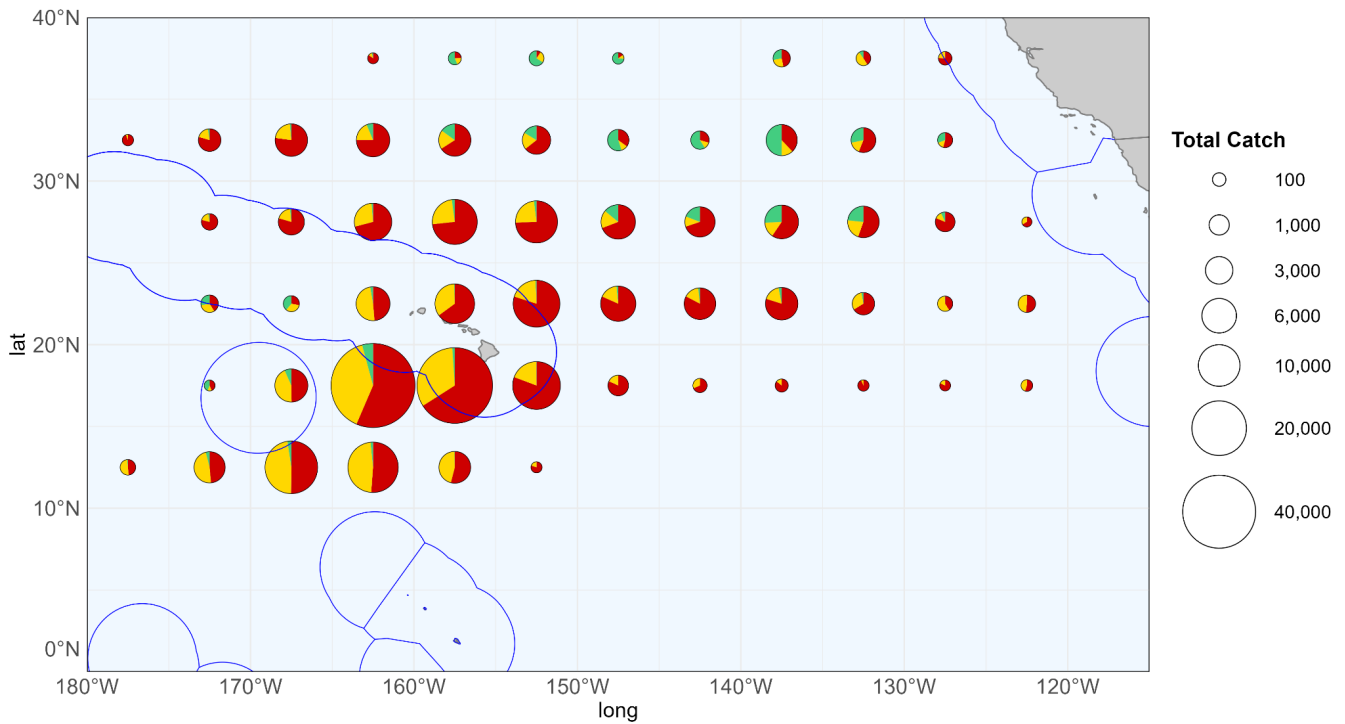
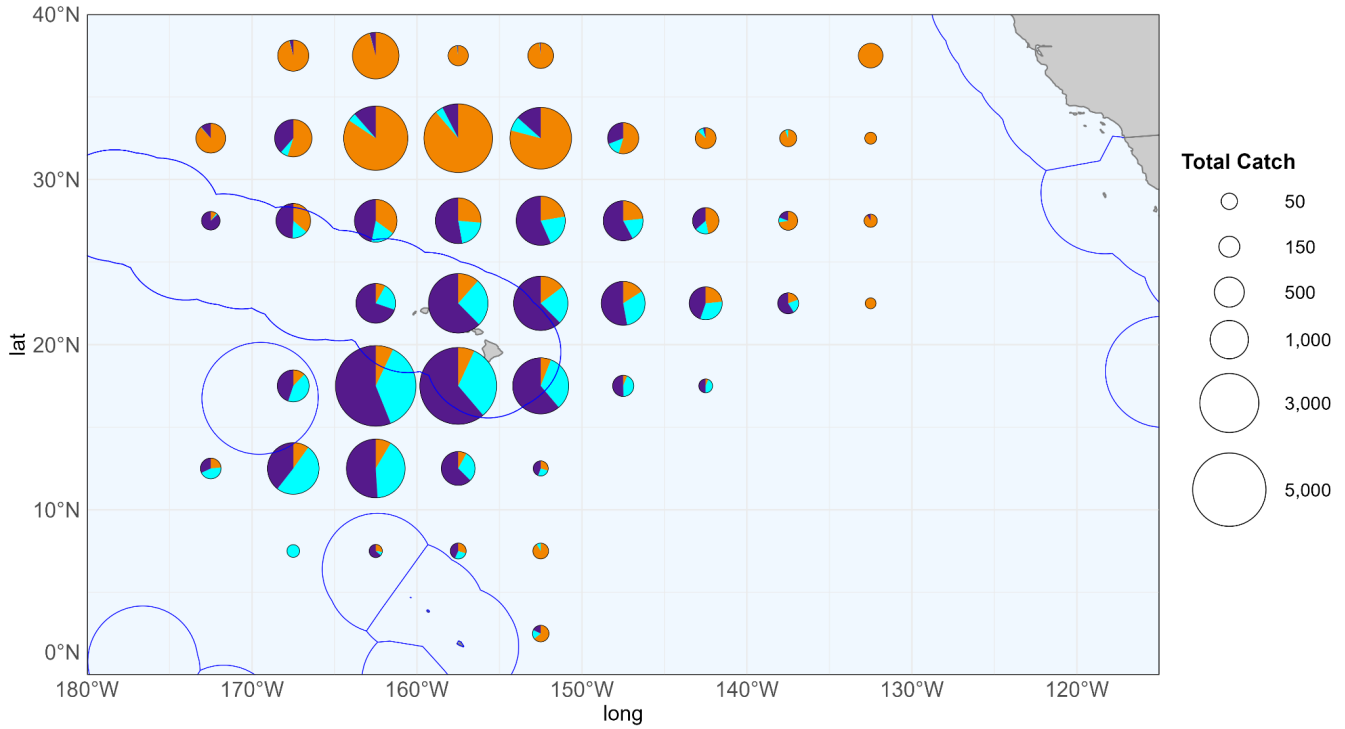


Figure 3: Spatial distribution of U.S. longline fisheries retained catch in the North Pacific Ocean for bigeye tuna (*Thunnus obesus*), yellowfin tuna (*Thunnus albacares*), and albacore tuna (*Thunnus alalunga*) within 5° latitude by 5° longitude grids for 2025 (top) and average of 2020-2024 (bottom). Data are based on fisher reports in federal logbooks. Catch in some areas is not shown in order to preserve data confidentiality.

U.S. Longline Billfish Catch 2025

Orange: Swordfish | Blue: Blue Marlin | Purple: Striped Marlin



U.S. Longline Billfish 5-Year Average Catch (2020-2024)

Orange: Swordfish | Blue: Blue Marlin | Purple: Striped Marlin

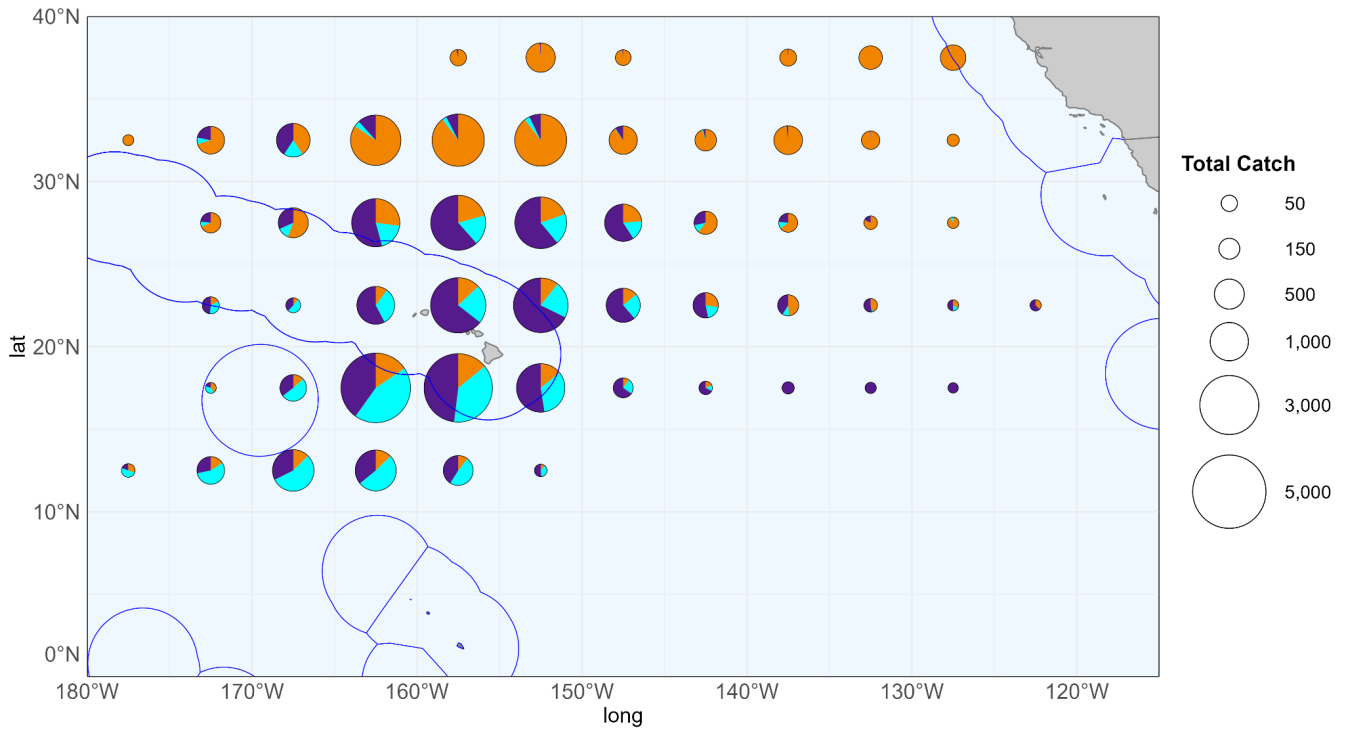


Figure 4: Spatial distribution of U.S. longline fisheries retained catch in the North Pacific Ocean for blue marlin (*Makaira nigricans*), striped marlin (*Kajikia audax*), and swordfish (*Xiphias gladius*) within 5° latitude by 5° longitude grids for 2025 (top) and the average of 2020-2024 (bottom). Data are based on fisher reports in federal logbooks. Catch in some areas is not shown in order to preserve data confidentiality.

The U.S. longline catch in the NPO is dominated by bigeye tuna with annual landings totaling over 4,000 t annually for the past twenty years. In 2025, the bigeye tuna catch was 6,272 t, which was below the 5-year average of 6,680 t. Swordfish was the dominant component of the longline catch from 1990 through 2000 with a peak catch of 4,834 t in 2000 and a low of 728 t in 2020. In 2025, the U.S. swordfish catch in the NPO was 1,102 t, which was slightly above the prior 5-year average of 1,048 t. Note that whole weights are used for reporting. Swordfish are generally landed headed, tailed, and gutted; tunas and large marlins are landed gilled and gutted; and other bony fishes landed whole. Landed weights are converted to whole weight using standard conversion factors.

The size distribution (by weight) of landings in the longline fisheries is shown for tuna (Figure 5) and billfish (Figure 6) species for 2020-2025. Albacore caught in the fishery are generally smaller and exhibit more year-to-year fluctuations in their size distribution compared to bigeye and yellowfin tuna. In 2021 and 2023, smaller albacore dominated the catch due to large influxes of new recruits, whereas 2024 and 2025 were dominated by larger fish. In 2025, the bigeye median weight (27 kgs) was the smallest in the six year time series, while the yellowfin median weight (32 kgs) remained relatively stable.

The blue marlin size distribution was consistently unimodal for the past six years with a long, right tail representing occasional catches of exceptionally large individuals. The striped marlin size distribution was much more variable. Both marlin species experienced an influx of small fish in 2024. In 2025, the blue marlin size distribution remained similar to 2024, with a smaller median weight compared to prior years, while the striped marlin median weight increased 10 kgs compared to 2024.

The swordfish size distribution remained consistently right-skewed for the past six years. In 2025, an influx of small fish drove the median weight down to 47 kgs, a sharp decline compared to the prior 5-years (69-91 kg). While all three billfish species saw recruitment pulses recently, the marlins experienced their surge in 2024, whereas the swordfish pulse was noticeable in 2025.

The U.S. longline fisheries are monitored by NOAA Fisheries through mandatory fisher reports (federal longline logbooks), landing reports, and fisheries observers. Logbooks provide information on fishing effort, area fished, catch by species, and other details of fishing operations. Commercial Marine Dealer landing reports are required by Hawaii's Division of Aquatic Resources (DAR) and California's Department of Fish and Wildlife (CDFW) and provide weight data for retained fish. Trip coverage rates are close to 100% for both logbooks and landing reports. Fisheries observers contracted by NOAA Fisheries provide information for fish species that are discarded, protected species interactions, length data for retained and discarded catch, and other data on vessel operations. Hawaii-based longline vessels have historically had about 20% coverage of deep-set fishing trips. However, coverage dropped to 17% in 2023, 13% in 2024, and 7% in 2025; while the shallow-set longline fishery has maintained coverage rates of 100%.

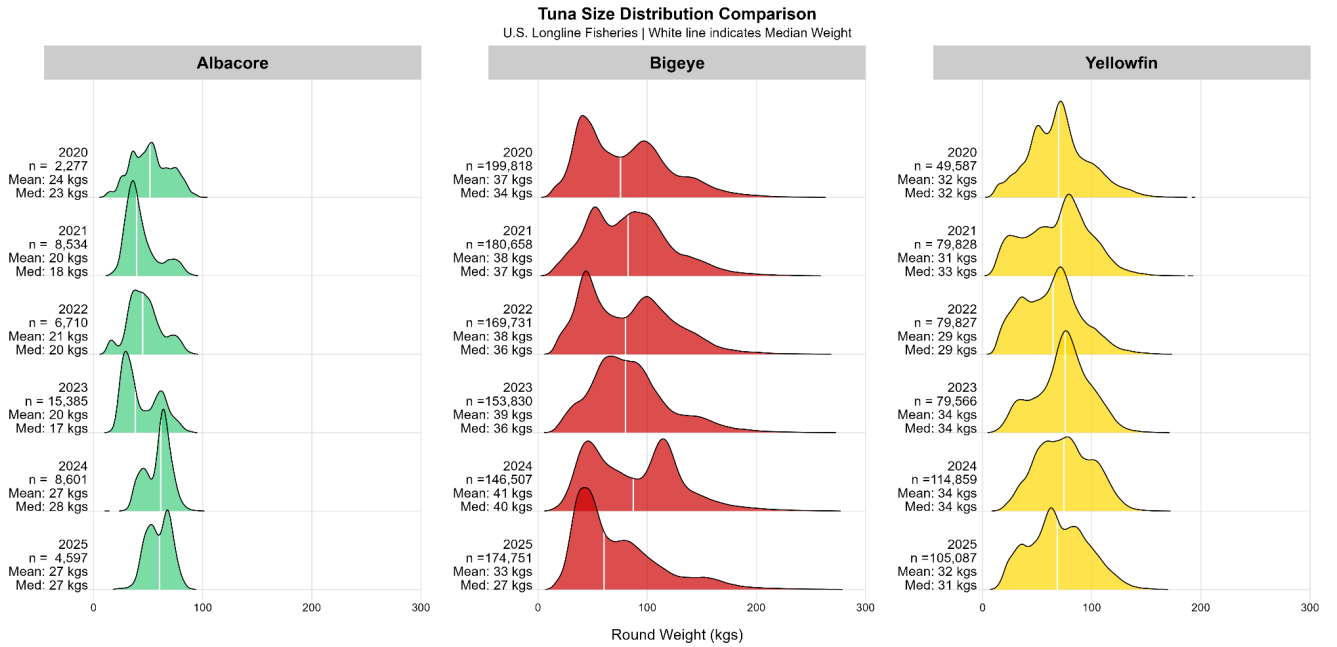


Figure 5: Size distribution of tunas landed by the U.S. longline fishery in kilograms (kg), including albacore (*Thunnus alalunga*), bigeye tuna (*T. obesus*), and yellowfin tuna (*T. albacares*).

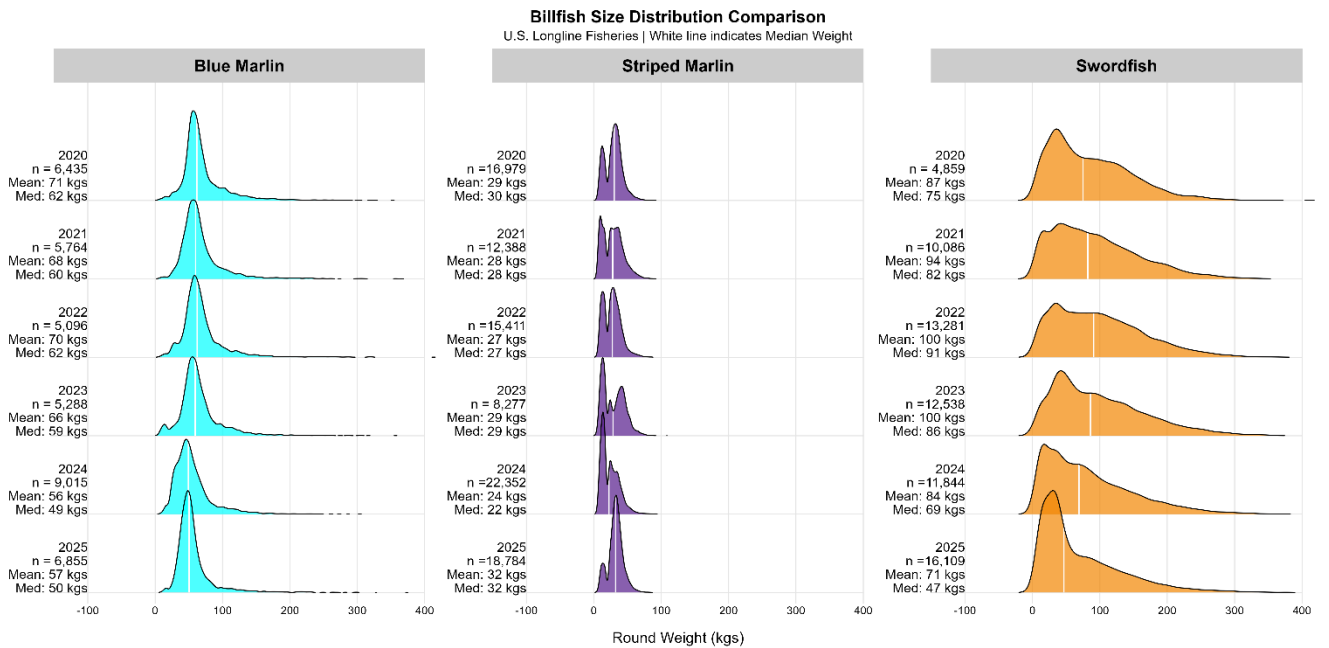


Figure 6: Size distribution of billfish landed in the U.S. longline fishery in kilograms (kg), including blue marlin (*Makaira nigricans*), striped marlin (*Kajikia audax*), and swordfish (*Xiphias gladius*).

2.3 Albacore troll and pole-and-line

The U.S. troll and pole-and-line fisheries in the NPO consist of small and large vessels that target albacore. Fishing operations range between the U.S. West Coast and 160°W longitude with the 2025 spatial distribution concentrated along the coast and near 130°W within the U.S. Exclusive Economic Zone (Figure 7 and Figure 8). Fishing usually occurs from summer through fall. The fishery catches almost exclusively albacore with minor incidental catches of Pacific bluefin tuna, eastern Pacific bonito (*Sarda chiliensis lineolata*), yellowtail (*Seriola lalandi*), and mahimahi (*Coryphaena hippurus*).

NOAA Fisheries monitors the U.S. albacore troll and pole-and-line fisheries through mandatory fishing reports (logbooks), dealer landing reports, and biological data collected from landed fish. Logbooks have been submitted to NOAA Fisheries since 2005, and the requirements have been dictated by the Highly Migratory Species Fishery Management Plan, as established by the Pacific Fishery Management Council (PFMC) under the authority of the Magnuson–Stevens Fishery Conservation and Management Act (MSA). Since 1961, NOAA Fisheries has supported albacore size data collected from landings in Oregon and Washington ports by state staff, and NOAA has provided sampling instructions and database maintenance.

In 2025, 363 vessels participated in the NPO fisheries, similar to the prior 5-year average (372 vessels). The albacore catch in 2025 was 8,839 t, which is an increase from 3,651 t in 2023 and 4,696 t in 2024. A total of 98.9% of the catch was within the U.S. EEZ, an increase from 91.8% the previous year. The U.S. and Canada did not establish an active reciprocal fishing regime for the 2025 albacore season. Consequently, U.S. vessels could not fish in the Canadian Exclusive Economic Zone (EEZ) nor land their catch at Canadian ports. The nominal CPUE (catch per unit effort) rose to 213 albacore per fishing day, up from 140 albacore per fishing day in 2024 and 109 albacore per fishing day in 2023. The average sampling length in 2025 was 71 cm, compared to the 2024 average of 72 cm.

In 2025, a total of 19,210 albacore were measured for length, the average sampling length in 2025 was 70 cm, compared to an average of 67 cm in the 2024 albacore season. The length distribution for albacore samples from 2020 to 2025 is shown (Figure 9).

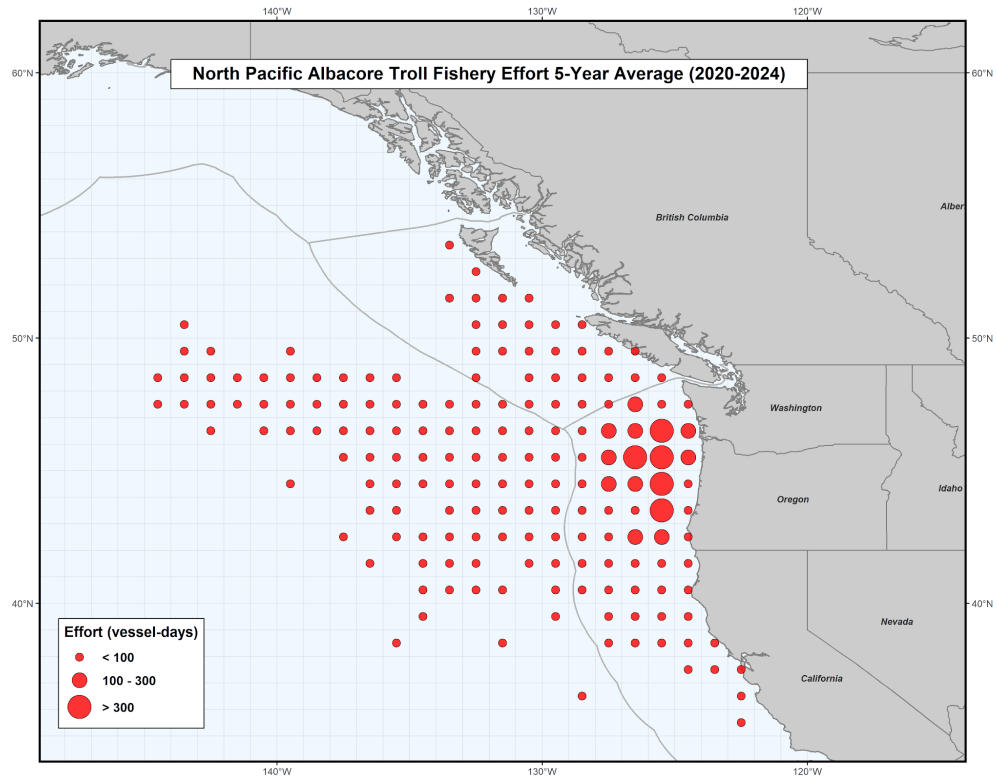
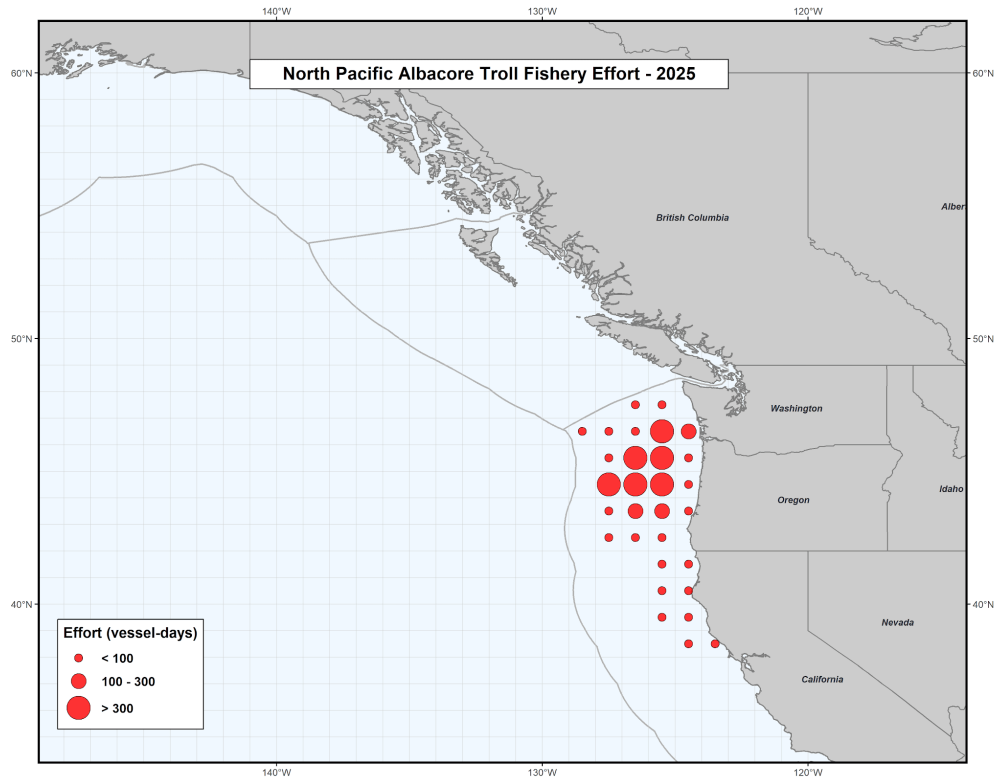


Figure 7: Spatial distribution of reported logbook fishing effort by the U.S. albacore troll and pole-and-line fishery in vessel days for 2025 (top) and the average of 2020-2024 (bottom). The size of circles is proportional to the amount of effort. Some effort areas are not shown to preserve data confidentiality.

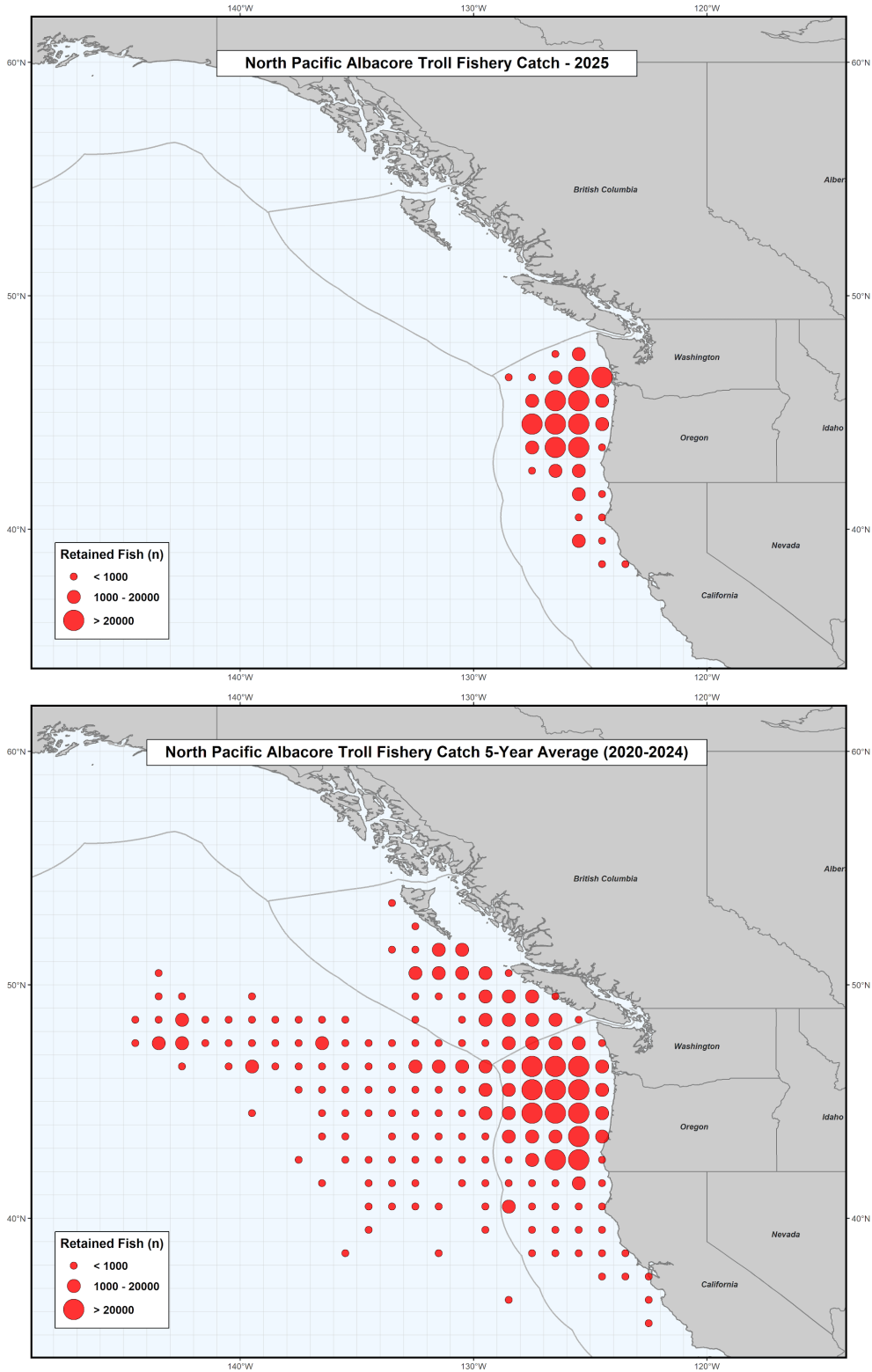


Figure 8: Spatial distribution of reported logbook catch by the U.S. albacore troll and pole-and-line fishery in number of fish for 2025 (top) and the average of 2020-2024 (bottom). The size of the circles is proportional to the amount of catch. Some catch areas are not shown to preserve data confidentiality.

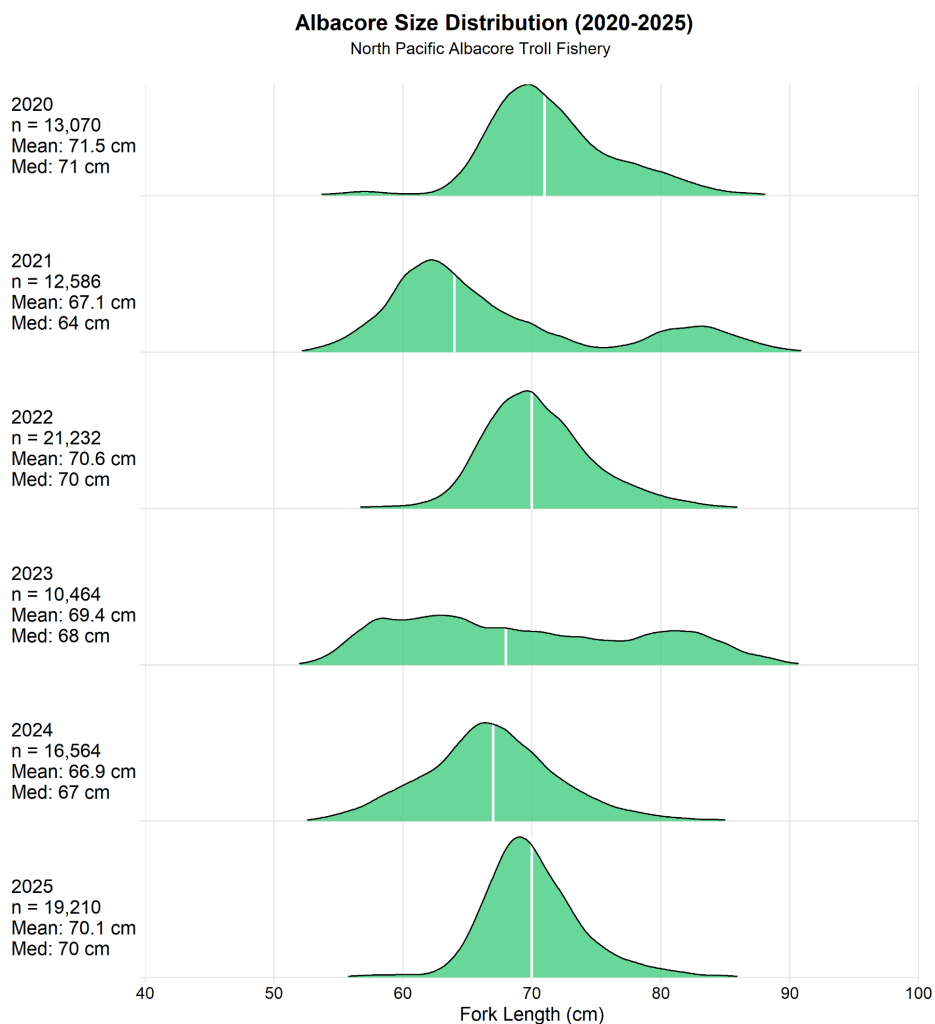


Figure 9: Size distribution of albacore (*Thunnus alalunga*) caught in 2020–2025 in the U.S. albacore troll and pole-and-line fishery. The white line represents the median length.

2.4 Small Boat Fisheries

A large number of small vessels (typically around 8 m in length) operate from the archipelagos of Hawaii, Guam, and the CNMI and target tuna and tuna-like species in the NPO. The majority of fishers use tropical troll fishing gear with some fishers operating out of Hawaii and Guam using handline fishing gears. Generally these fishers make one-day fishing trips that may be for commercial, recreational, or subsistence purposes with trips often including fish that are both sold and retained for personal use. Commercial fishing trips may also include charter fishing trips where fish are not sold but instead profit is derived from paid clients. Generally commercially sold fish are landed whole with some catch gilled and gutted. Standard conversion factors are applied for any processed fish as whole weights are used for reporting.

The Hawaii-based tropical troll and handline fisheries are monitored through Hawaii DAR Commercial Fish Catch Reports and Commercial Marine Dealer Landing Reports. Fisher catch reports are required for trips by fishers that have commercial permits (including charter fishers) no matter if fish are being sold on a

trip. However, if fishing trips are performed solely for subsistence, personal use, or recreational purposes and a fisher is not commercially permitted, then no catch reports are required.

Territorial troll fisheries are monitored through creel surveys by CNMI Division of Fish and Wildlife (DFW) and Guam Division of Aquatic and Wildlife Resources (DAWR) staff. Size composition and catch and effort data are collected through shoreside interviews of fishers, with additional effort data collected through logging boat activity across the islands. The sampling data are entered into WPacFIN data warehouse, and estimates of total catch and effort are derived from these data.

In 2025, a total of 1,871 tropical troll and handline vessels operated in the NPO. The 2025 total retained catch from tropical troll and handline fisheries in the NPO was 900 t, which was below the prior 5-year average (1,279 t). The catch composition has been similar in the last 5 years with the majority of troll catch from yellowfin and skipjack tuna (*Katsuwonus pelamis*) with other catch mostly composed of mahimahi, blue marlin, and wahoo (*Acanthocybium solandri*), and the majority of handline catch from yellowfin and bigeye tuna. In 2025 catch consisted of 386 t of yellowfin tuna, 253 t skipjack tuna, 128 t blue marlin, and 57 t bigeye tuna, with remaining catch from other pelagic species, mostly wahoo and mahimahi.

2.5 Drift Gillnet

The U.S. large-mesh drift gillnet (DGN) fishery targets swordfish and common thresher sharks, with bycatches of pelagic sharks, small amounts of tunas, and other pelagic species. Fishing operations occur within the U.S. EEZ off California and historically extended off the coast of Oregon, although no landings have been reported there since 2004. Regulatory changes are expected to phase out the fishery in the coming years, with the fishery scheduled to sunset by 2027. Participation has steadily declined from a peak of 220 vessels in 1986 to only 7 vessels in 2025. Swordfish dominate the catch, peaking 2,990 t in 1985. The 2025 swordfish catch was 21 t, slightly below the prior 5-year average of 28 t. An estimated 4 t Pacific bluefin tuna were caught in 2025, which is below the prior 5-year average of 25 t.

The drift gillnet fishery is monitored through mandatory fisher reports (federal logbooks), landing reports, and fisheries observers. Federal logbooks have been used since 2019, with state agency-issued logbooks before that time. Size (length) composition data were historically (1981–1999) collected by CDFW for landed swordfish from less than 1% of landings. NOAA fisheries observers have collected size (length) data since 1990 and information on fishing location, protected species interactions, fish catch, and disposition of catch and bycatch. A total of 2 drift gillnet vessels were monitored by fisheries observers in 2025.

2.6 Harpoon

A small harpoon fishery targeting swordfish operates within the U.S. EEZ off California between 32°N and 34°N latitude. In 2025, 14 vessels participated in this fishery. Fleet size has fluctuated considerably over time, peaking at 113 vessels in 1986. Swordfish catches have also varied substantially, ranging from a high of 305 t in 1985 to a low of 5 t in 2012. The 2025 swordfish catch was 19 t, slightly below the prior 5-year average of 20 t.

2.7 Sport

Sport (recreational) fisheries targeting tuna and other pelagic fish occur along the U.S. West Coast, with fishers operating from private vessels and commercial passenger fishing vessels (CPFVs). Most of the highly migratory species (HMS) catch in these fisheries consist of albacore, yellowfin, and Pacific bluefin tuna. In 2025, recreational albacore tuna catch was 877 t, above the prior 5-year average (505 t) and similar to the previous year catch of 865 t in 2024. In 2025, the Pacific bluefin tuna catch was 1,274 t, just

below the prior 5-year average (1,423 t).

Catch and effort are monitored through fisher logbooks and survey programs conducted by the states of California, Oregon, and Washington, with data maintained through the Recreational Fisheries Information Network (RecFIN) at the Pacific States Marine Fisheries Commission. Fishermen submit logbook data for California-based trips to the California Department of Fish and Wildlife, while logbooks for Oregon- and Washington-based trips are submitted directly to NOAA Fisheries.

In addition, Pacific bluefin tuna size composition data have been collected from CPFVs at fishing ports by NOAA Fisheries staff since 2014 and previously by the Inter-American Tropical Tuna Commission (IATTC) from 1993 to 2012. In 2025 a total of 3,006 Pacific bluefin tuna samples were measured for fork-length, the average sampling length was 90 cm in 2025, compared to an average length of 102 cm in the 2024 season. The size distribution for the last six years is shown in Figure 10.

2.8 Deep-Set Buoy gear

On September 15, 2023, NOAA Fisheries approved deep-set buoy gear (DSBG) as an alternative gear type for harvesting swordfish and other highly migratory species (HMS) off the U.S. West Coast, with lower bycatch rates compared to other fishing methods such as the drift gillnet fishery. In 2025, swordfish landings in the DSBG fishery totaled 11.6 t, an increase from 8 t in 2024, although landings remained relatively low overall. Participation in the DSBG fishery increased as well, with the number of active vessels rising from 13 in 2024 to 18 in 2025.

Pacific Bluefin Tuna Size Distribution (2020-2025)
Sports Fishery

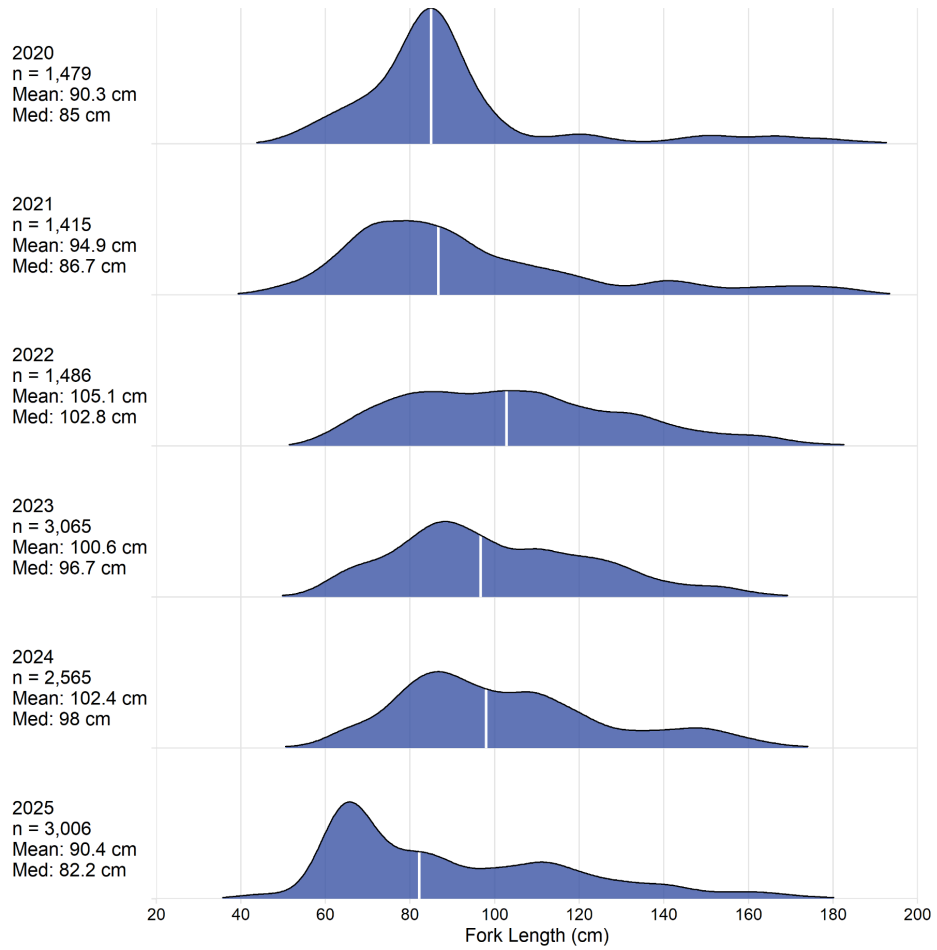


Figure 10: Size distribution of Pacific bluefin tuna (*Thunnus orientalis*) caught in 2020–2025 in the U.S. West Coast sportfishing industry. The white line represents the median length.

3 Highlighted Research

'Building the (Im)perfect Beast': Strategies for Identifying Appropriate Spatial Stock Assessment Model Complexity From an International, Blinded High-Resolution Simulation Experiment

Berger *et al.* (2025) conducted a blinded international simulation experiment to identify barriers to implementing spatial stock assessments and to formulate strategies for managing model complexity. Spatial stock assessments are powerful tools for managing migratory and climate-impacted fish stocks, yet they remain underutilized in management due to technical challenges and the difficulty of balancing model parsimony with physical complexity. Seven analyst teams built spatially aggregated and spatially explicit assessment models using data simulated from high-resolution operating models based on Indian Ocean yellowfin tuna and Ross Sea Antarctic toothfish dynamics. Each team documented how assessment software, data analysis, and diagnostics influenced their model's realism. A clear consensus emerged on key assessment-building approaches: conducting high-resolution data analyses to identify spatial structures; starting with simplified models and incrementally adding complexity; iteratively evaluating diagnostics to determine necessary spatial complexity; and maintaining models that balance physical realism with parsimony. The experiment also highlighted the value of data pre-processing with spatiotemporal models to inform data-sparse regions and regression trees to identify fleet and spatial structures. These findings demonstrate that international collaborations and simulation experiments are crucial for evaluating whether the added complexity of spatial models is justified given management objectives.

Engineering a prototype for a next-generation stock assessment modeling platform

Brodziak *et al.* (2025) proposed and developed a strategy for engineering a next-generation, spatially explicit stock assessment modeling platform to address shifting fish stock distributions and fishing footprints. Traditional stock assessment tools struggle to model complex metapopulation dynamics under changing environmental conditions, which can lead to inaccurate population estimates. To resolve this, the authors designed and tested a system prototype called the Metapopulation Assessment System (MAS), engineered to be easy to use, modular, and extensible. The MAS prototype supports complex metapopulation modeling by successfully handling multiple populations, areas, fleets, surveys, and sex-specific dynamics. The software's infrastructure integrates three core components: GitHub for collaboration and code organization, C++ to model system dynamics and estimation, and R for the input-output interface and systematic testing. Systematic testing was embedded into the development life cycle to ensure the accurate estimation of key management quantities. This technical breakthrough shows how modern software engineering and quality control procedures can successfully modernize stock assessment platforms to support sustainable fisheries management in nonstationary environments.

Estimation of the two-stanza growth curves with age determination uncertainty for Pacific blue marlin (*Makaira nigricans*) in the western and central North Pacific Ocean

Chang *et al.* (2025) refined age and growth estimates for the highly migratory Pacific blue marlin in the western and central North Pacific Ocean (WCNPO). Accurate descriptions of age-length relationships are vital for stock assessments, but biological parameters are often degraded by age determination uncertainty and sexual dimorphism. To address this, the study integrated daily otolith micro-increment counts from 13 juveniles and sectioned dorsal fin spines from 504 specimens collected off Taiwan, alongside historical WCNPO length-at-age data and bomb radiocarbon dating. Daily growth ring analysis predicted an eye-to-fork length (EFL) of 146.92 cm at age one, and the maximum observed age was 27 years for females and 18 years for males. The growth was highly sexually dimorphic, with females growing

faster and consistently attaining larger sizes than males from age one onward. Fitting von Bertalanffy and Two-Stanza Growth Models (TSGM) using a Bayesian errors-in-variables approach revealed that the TSGM provided a superior fit by capturing a distinct growth transition near age one. These refined growth estimates resolve historical uncertainties and enhance the accuracy of growth parameters used in regional stock assessment models.

Applications of species distribution modeling and future needs to support marine resource management

Karp *et al.* (2025) reviewed the diverse ways species distribution and density models (SDMs) can support marine resource management and outlined future needs for their development. Marine resource management operates across multiple spatial and temporal scales, requiring scientific synthesis of environmental variables to predict animal presence. The study highlights that SDMs are powerful statistical tools for characterizing species-environment relationships and predicting distributions in unsampled areas. SDMs can be used to optimize survey designs (by predicting where and when a species is likely to be found), inform single-species stock assessments, designate essential fish habitats, and assess spatial protected species risks. However, the current development and usage of SDMs within fisheries management agencies remain somewhat haphazard. The authors emphasize the need to build a stronger community of practice to streamline SDM use, integrate mechanistic knowledge, and link SDMs to regional climate and ecosystem projection models. By transitioning from static to dynamic spatiotemporal predictions, SDMs will become increasingly vital for climate-ready ocean planning and fisheries decision-making.

Natal Origin and Trans-Pacific Migration of Pacific Bluefin Tuna (*Thunnus orientalis*) Inferred From Otolith Oxygen and Carbon Isotope Analysis

Ku *et al.* (2026) used stable isotope analysis of otoliths to investigate natal origins and migration patterns of Pacific bluefin tuna across the Pacific Ocean. Results showed that the majority of individuals sampled in the California Current originated from the Philippine Sea–East China Sea spawning region, highlighting its dominant contribution to the population. Isotopic signatures also revealed that most adults in western Pacific spawning areas had previously migrated across the Pacific. These findings confirm strong connectivity across regions and support management of Pacific bluefin tuna as a single, highly interconnected stock, with important implications for international fisheries management.

Spawning stock recovery of Pacific bluefin tuna (*Thunnus orientalis*): Evidence from length, age and catch data of Taiwanese longline fishery in 2010–2023

Lin *et al.* (2025) investigated changes in the age and size composition of Pacific bluefin tuna landed in Taiwan from 2010 to 2023. As total catch increased, the population shifted toward younger, smaller individuals, with the spawning stock now dominated by fish aged 8–12 years rather than older age classes. This shift corresponded with earlier reductions in juvenile fishing pressure, suggesting improved survival to adulthood. A lagged relationship between juvenile and adult catches further supported this recovery pattern. These findings provide evidence that management measures reducing juvenile harvest can contribute to rebuilding spawning populations.

Nearshore use increases propensity to accumulate persistent organic pollutants in two thresher shark species

Lyons *et al.* (2025) used persistent organic pollutants (POPs) and stable isotopes to examine how habitat use influences contaminant accumulation in Common Thresher Sharks (*Alopias vulpinus*) and Bigeye Thresher Sharks (*Alopias superciliosus*) from Southern California. Common Threshers, which occupy more coastal habitats, exhibited significantly higher concentrations of all contaminant groups compared to the more offshore Bigeye Threshers. Species-specific contaminant signatures and isotopic differences

indicated distinct ecological niches, with limited overlap. DDX concentrations were positively associated with ^{13}C , supporting the role of nearshore habitat use in contaminant exposure. These findings highlight how spatial ecology, along with biological factors such as size and sex, can influence pollutant accumulation in marine predators.

Climate change impacts to foraging seascapes for a highly migratory top predator

Muhling *et al.* (2025) developed an energetics-based framework to better understand habitat use and climate vulnerability in juvenile North Pacific Albacore Tuna. By combining laboratory data, field observations, and environmental models, the study identified how energy gain and loss shape seasonal migrations between the California Current and offshore North Pacific. Results showed that migration pathways align with energetically efficient thermal corridors, while foraging success peaks in spring and summer. Climate projections suggest a reduction in total suitable habitat, particularly in subtropical regions, but improved foraging conditions in higher-latitude and coastal areas. This work demonstrates the value of incorporating physiological and energetic processes into species distribution models to improve predictions under climate change.

Resource partitioning among pelagic predators remains stable despite annual variability in diet composition

Portner *et al.* (2025) analyzed a 20-year diet time series (1998–2018) from 10 pelagic predator species in the southern California Current Ecosystem to assess resource use and partitioning. Despite interannual variability in diet composition, predators generally maintained consistent ecological separation over time. However, a sharp increase in northern anchovy abundance after 2015 led to greater dietary overlap between some species, including Pacific bluefin tuna and swordfish. Predators feeding on shallow prey exhibited more variable diets than those targeting deeper prey. These findings show that while pelagic predators can maintain niche partitioning under changing conditions, shifts in prey availability can alter competitive interactions and ecosystem structure.

Foraging ecology of swordfish in the California Current Large Marine Ecosystem during an ecosystem regime shift

Preti *et al.* (2025) examined changes in swordfish diet in the California Current over 17 years (2007–2023), spanning a major marine heatwave (2014–2016). The study documented a shift from cephalopod-dominated diets to increased consumption of epipelagic fishes such as Pacific hake and northern anchovy during and after the period. These changes were associated with oceanographic conditions, including elevated temperatures, increased stratification, and shifts in prey availability. The results indicate that swordfish are flexible, opportunistic predators that respond rapidly to environmental change, supporting their role as indicators of ecosystem variability.

Relative role of operational patterns and environmental conditions on cookie cutter shark damage in the Hawai'i longline fishery

Suca *et al.* (2025) investigated the factors associated with cookie cutter shark (*Isistius* spp.) damage on hooked fish in the Hawai'i pelagic longline fishery. Depredation by these cryptic sharks causes significant commercial fish damage, yet their deep-water, nocturnal habits make on-the-water distribution studies exceptionally difficult. The researchers analyzed hook damage records alongside spatial, temporal, and environmental data for the nighttime shallow-set fishery targeting swordfish and the daytime deep-set fishery targeting bigeye tuna. They found that cookie cutter shark bites primarily occurred on hooked fish when operations extended longer into nightfall, during periods of low lunar illumination, and along the edges of the North Pacific Subtropical Gyre. While shark damage was historically more common on average in the shallow-set fishery due to its nighttime fishing window, the deep-set fishery has experienced a rising frequency of shark bites over time as fishing sets extend further into nighttime hours.

This research provides crucial ecological insights into cookie cutter sharks and warns fishers of the direct economic costs associated with extending daytime operations into nightfall.

Hawai'i's pelagic longline fishery demonstrates the need to consider multispecies impacts in bluewater time-area closures

Van Wert *et al.* (2025) evaluated the unintended conservation consequences of a cap-based, large-scale spatial closure in a pelagic fishery. To protect false killer whales (*Pseudorca crassidens*) in the Hawai'i deep-set longline fishery, managers implemented the Southern Exclusion Zone (SEZ)—a temporary, 343,796 square kilometer closure triggered when bycatch exceeds a set threshold. The authors used an Ensemble Random Forest (ERF) modeling approach to assess how the displacement of fishing effort during SEZ closures altered bycatch risk for eight other protected species of concern. They found that when the SEZ closed, vessels displaced their fishing effort, concentrating sets heavily along the eastern and southern boundaries of the closure. This displaced effort created a highly concentrated bycatch risk for oceanic whitetip sharks, giant manta rays, and olive ridley sea turtles, which were highly susceptible to overlap with the relocated longline sets. In contrast, scalloped hammerhead sharks, green sea turtles, and leatherback sea turtles faced moderate risk near heavy fishing, while loggerheads and false killer whales faced diffuse risks. The study highlights that single-species spatial closures can displace fishing effort in ways that increase bycatch for other threatened taxa, emphasizing that effective ecosystem-based fisheries management must evaluate the entire species portfolio when designing conservation strategies.

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