Netting Billions 2020: A Global Tuna Valuation

Contents

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Poseidon's research and analysis focused on estimating the first sale and retail value, not stock status or management arrangements. The conclusions drawn from the data about the need for improved management of tuna fisheries are made by Pew.

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Overview

Commercial tuna fisheries represent a significant part of the blue economy, with seven species—yellowfin, skipjack, bigeye, albacore, and Atlantic, Pacific, and southern bluefin—among the most valuable fishes on the planet.[1] Whether canned or served as high-quality sashimi, tunas are not only a sought-after commodity, but also an important source of protein in countries around the world. And they also play a vital role as predators and prey in tropical and temperate waters while supporting the livelihoods of many artisanal fishers.

High demand for tuna products, however, has significantly depleted several populations, making sustainably managing tunas critically important. One way to support better population management is to improve our understanding of tunas' importance to the global economy and marine ecosystems. Although it is difficult to put a monetary value on the role that tunas play in the marine environment, their benefits to fishers and the fishing industry can be estimated by looking at data on the catch and sale of tuna products around the world.

In 2016, The Pew Charitable Trusts published the first estimate of the global values of commercial fisheries that target these seven species—and the value of the resulting products, such as sashimi—based on data from 2012 and 2014. Now, together with Poseidon Aquatic Resource Management Ltd., an independent fisheries and aquaculture consultancy based in the United Kingdom, Pew has improved the methodology and updated the valuation, using commercial data from 2016 and 2018.[2,3] This updated report estimates that the end value of the commercial fisheries targeting these seven species—the total paid by final customers—was $40.8 billion in 2018. That figure does not include the substantial values associated with subsistence and artisanal fisheries, sport fisheries, unreported catch, and ecosystem benefits of living tunas, which could not be accurately measured.

In 2018, commercial fishing vessels landed about 5.2 million metric tons of the seven species, with an estimated dock value—the amount paid to fishers—of $11.7 billion. Both figures are up from 2016, when vessels landed 5 million metric tons, earning fishers an estimated $11.3 billion dockside. Products derived from this catch garnered an estimated end value of $37.5 billion. (See Table 1.) The bigger catch in 2018—up 12% from 2012—did not translate to higher revenue, however. The end value was down 2% from that base year.

Trends in catch volume and revenue are not always aligned, particularly in highly commoditized tuna products. The prices paid to fishers and by the final consumer in 2018 were lower for almost all species than in 2012, driving the lower values reported here. This result also suggests that the ideal catch level, economically speaking, may not be as high as the determined maximum sustainable yield (MSY).

Table 1
Total Value of Seven Most Commercially Important Tuna Species

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	4.6	$12.2	$41.6
2014	5.0	$9.8	$42.2
2016	5.0	$11.3	$37.5
2018	5.2	$11.7	$40.8

Note: Dock values and end values are in nominal dollars.

Source: Poseidon Aquatic Resource Management Ltd., 2019

In all the years studied, skipjack and yellowfin—most commonly sold in cans—generated the highest revenue because of the high volume caught. In 2018, the two species alone accounted for more than 75% of the total end values. But at the level of individual fish, the three bluefin species—Atlantic, Pacific, and southern—were still by far the most highly prized by consumers. A single bluefin typically fetched more than a ton of canning-grade yellowfin.

Excessive fishing pressure, however, is continuing to threaten this and other tuna species. In 2018, the year with the most recent economic data, stocks of eastern Pacific yellowfin, Pacific bluefin, Atlantic bigeye, Indian Ocean yellowfin, and southern bluefin were overfished,[4] meaning that their populations had been reduced below scientifically recommended levels, threatening their role in marine ecosystems. Some stocks are severely depleted and cannot sustain any increase in fishing. This depletion isn't just a problem for marine ecosystems: It also affects the value of these populations. The catch of these stocks is currently worth a combined $8.5 billion at the final point of sale, but their value could be increased with sustainable management.

Stock depletion, lack of recovery, and associated loss of value are often driven by fisheries managers' prioritization of short-term profits over the long-term health of fish populations. But they could eliminate this ineffective cycle by adopting a modern approach to fisheries management, known as harvest strategies or management procedures. This approach encourages stakeholders (e.g., government agencies, industry) to agree on long-term goals for fisheries, and then use rigorous, science-based models to determine the management actions that best support these goals. Sound harvest strategies also increase transparency and predictability on the part of fisheries management, which promotes industry stability.

Given the importance of tunas to the health of marine ecosystems—and to the industries and livelihoods that rely on them—international management of these fisheries must be improved. Regional fisheries management organizations (RFMOs) should improve their oversight of tuna fisheries by adopting science-based harvest strategies and effective compliance regimes. This report presents data that underscores the value of the seven species and outlines how improvements might be achieved.

Tuna ecology and history

Tunas are some of the world's fastest fishes, migrating thousands of miles over their lifetimes, across oceans, national waters, and fisheries management jurisdictions. Unlike nearly all other fishes, most tuna species are warm-blooded; the heat created in their huge muscles enables bursting speeds and sharp vision that make them excellent predators.

Adult tunas range in size from a few kilograms to 680 kg (nearly 1,500 pounds)—roughly the size of a full-grown polar bear. But they all start as small as an eyelash. Some tunas live for only a few years while others can survive for decades. As top open-ocean predators, tunas eat fishes, squids, and crustaceans. Juveniles are also important prey for sharks, whales, and even other tunas.

Fishers have been catching tunas for thousands of years, originally for their own consumption and, more recently, for trade. Large tunas have been a key part of the culture and economies of Mediterranean and Pacific societies for much of recorded history, reflected in music, art, and literature. Bluefin are even stamped on early Greek coins.

Tuna fishing nations

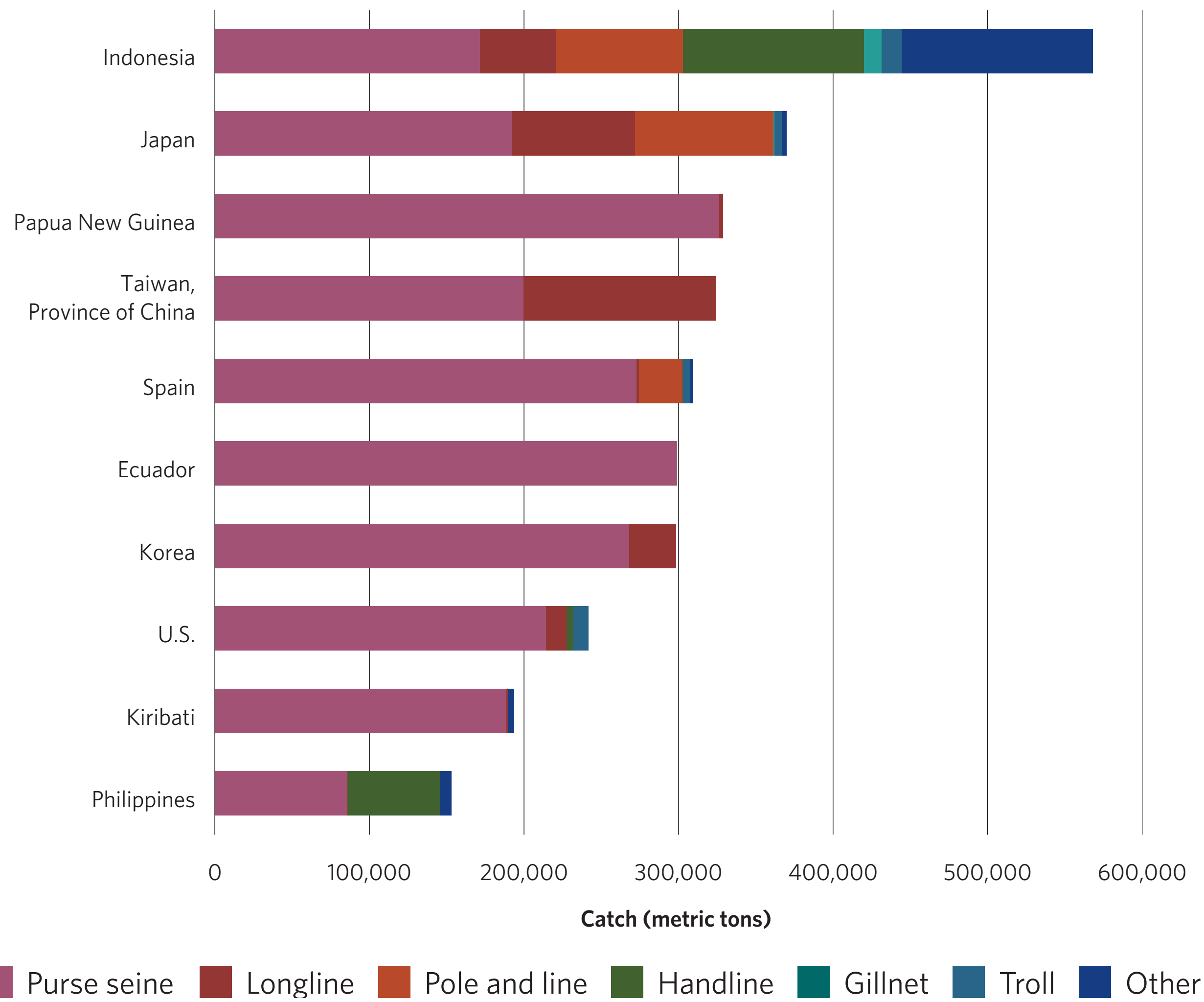
Based on data reported to the world's regional fisheries management bodies, Indonesia and Japan were consistently the top two tuna fishing nations from 2012 to 2018, in terms of total reported landings. (See Figure

1.) In 2018, Indonesia landed 568,170 metric tons, followed by Japan at 369,696 metric tons. Compared to 2012, nine countries remained among the top 10 fishing nations, by landings. Although Mexico's landings remained consistent, Kiribati increased its landings by 152%, replacing Mexico on the list in 2018. Since 2012, Papua New Guinea has risen in the ranks from the eighth-largest lander to the third—boosting landings by 37%. Spain and Ecuador have also increased landings, by 12% and 20%, respectively. In contrast, the United States and Philippines reported drops in landings, by 18% and 35%, respectively.

Most of these nations have diverse fleets with boats that use multiple gear types and target a wide range of species. Five of the top 10—Japan; Taiwan, Province of China; Spain; Korea; and the United States—have large fleets that fish far from their home waters. In contrast, the remaining top countries have very large local or regional fleets that fish in the highly productive eastern tropical Pacific (Ecuador) or western and central tropical Pacific (Indonesia, Kiribati, the Philippines, and Papua New Guinea).[5]

Figure 1

Top 10 Tuna Fishing Nations, 2018



Note: 2018 tuna landings (seven species combined) based on data provided by fishing nations to regional fisheries management bodies.

Source: Poseidon Aquatic Resource Management Ltd., 2019

Although worldwide tuna landings increased by 12% from 2012 to 2018, the global shares and total landings of the top 10 tuna fishing nations decreased. In 2018, the top 10 fishing nations accounted for 60% of all tuna landings, down from 66% in 2012. The lower share may be the result of a changing tuna fishing landscape, in which quota allocation and investments are shifting from nations with large consolidated fleets to those that are just beginning to develop tuna fisheries.

The value of tuna

Just as the biology of tuna varies by species, so does the value. (See Figure 6.) A single fish of one species commands the same price as a few tons of another. The method used to catch tunas and where they are caught also influences market price.

By species

Small-bodied but extremely abundant, skipjack tuna is by far the most commonly caught species by number and by weight. In all the years studied, skipjack accounted for more than half of the total volume of tuna landed globally. (See Figure 2.) Along with these huge volumes, however, comes a relatively low price per metric ton, compared with larger tuna species. As a result, skipjack's share of the total dock value is smaller than its share of the total catch; the reverse is true for the other species.

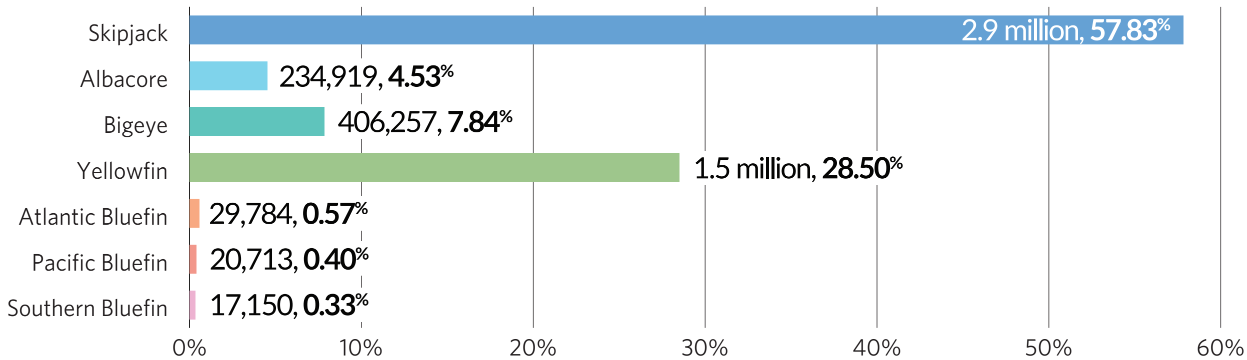

BluePlanetArchive/David B. Fleetham

Figure 2

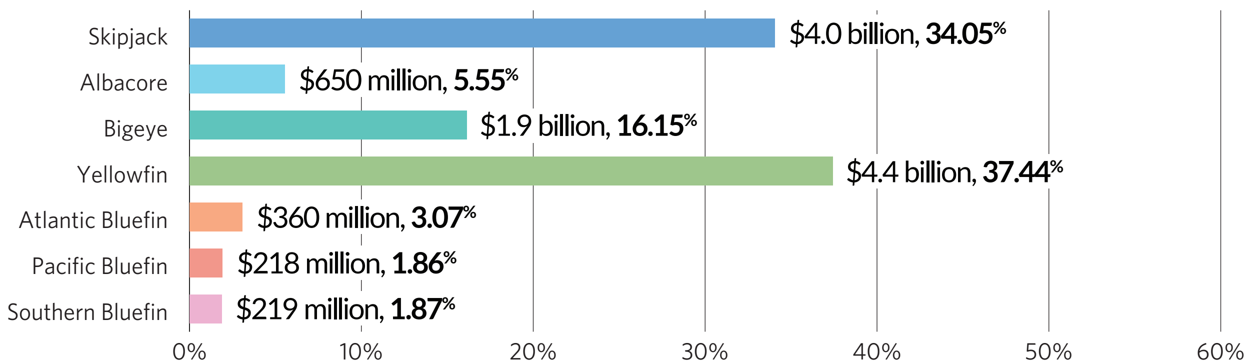
Tuna Values Vary by Species and Volume

With less than a third of the total landings, yellowfin's dock value roughly equaled skipjack's, while the bluefin species were the most valuable per metric ton.

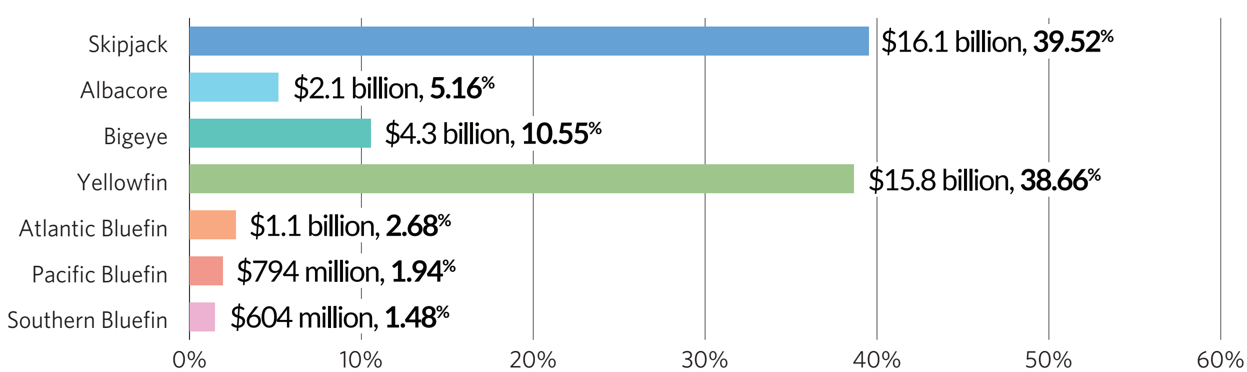
2018 Landings by species (metric tons)



2018 Dock Value by species (USD)



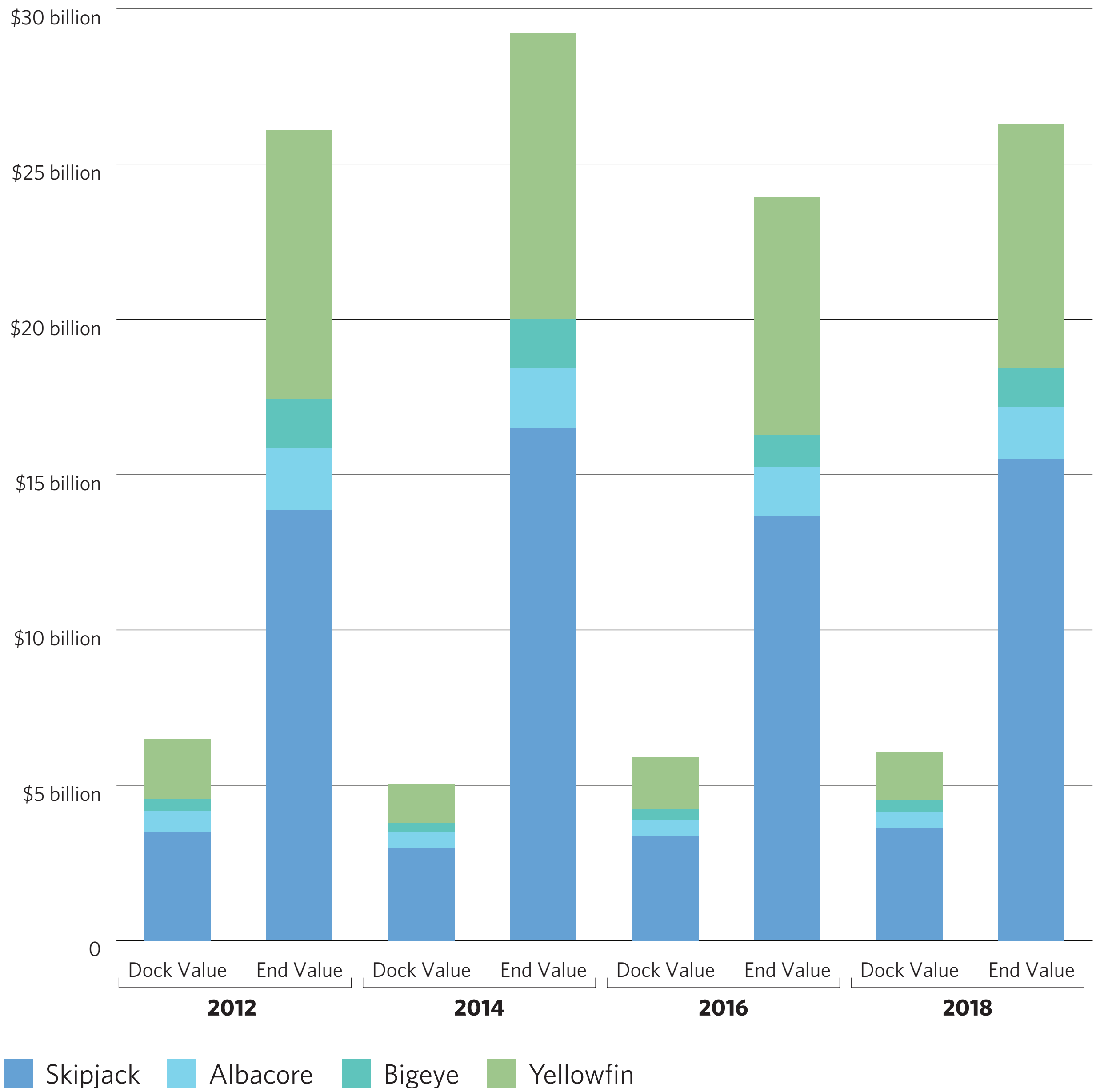
2018 End Value by species (USD)



Source: Poseidon Aquatic Resource Management Ltd., 2019

Yellowfin accounted for 29% of total landings in 2018 and is sold both canned and as high-value sashimi or tuna steaks. The species' total value, at the dock and final point of sale, is close to that of skipjack, even though skipjack landings are twice as high. Adult bigeye and all three bluefin species command higher prices per metric ton in whole or semiprocessed form than yellowfin for sashimi and fresh/frozen value-added products. Albacore, labeled as "white tuna" when canned in North America, is sold almost exclusively as a higher-priced alternative to canned skipjack.

Figure 3
Dock and End Value of Canned Tuna (2012-18)



Note: Total value to canneries including byproducts.

Source: Poseidon Aquatic Resource Management Ltd., 2019

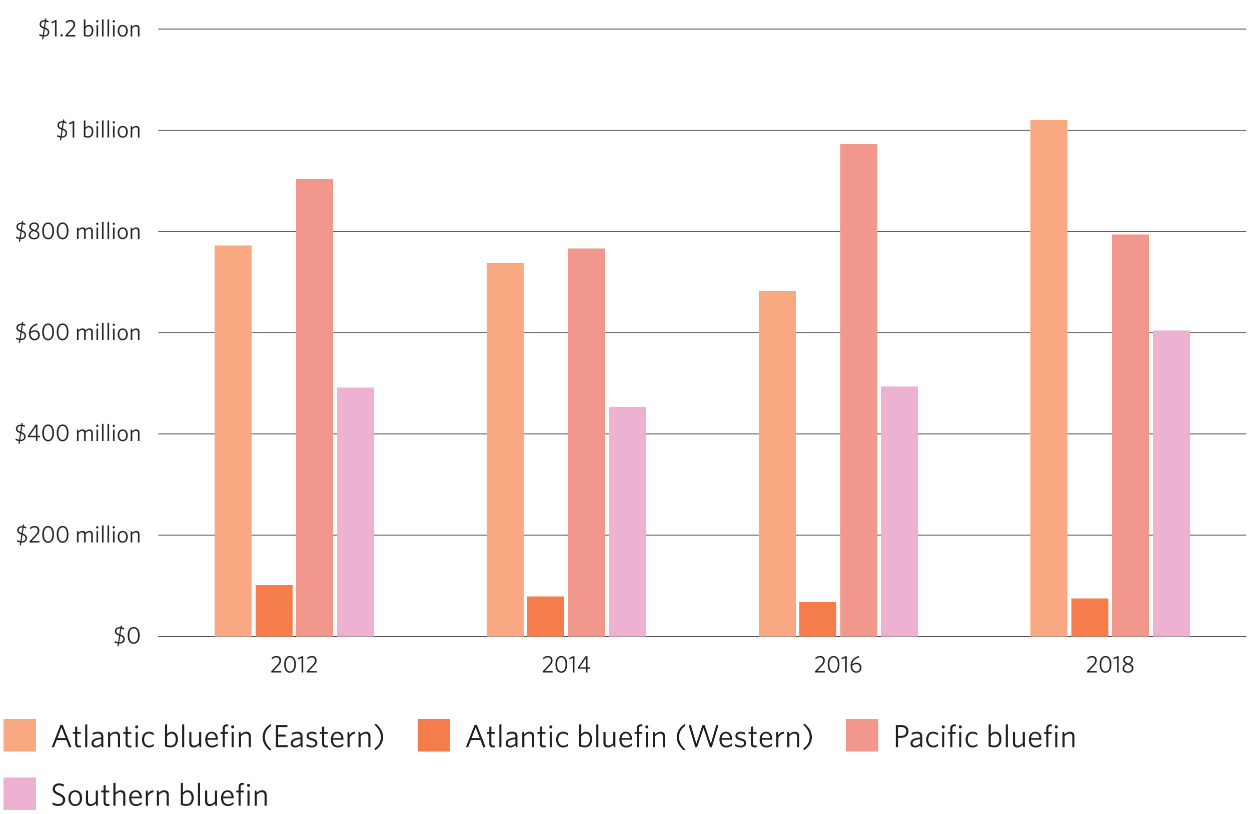
At least three-quarters of all landed tuna is canned, and the species that find their way into store shelves include skipjack, yellowfin, albacore, and, to a lesser extent, bigeye. Skipjack, in particular, is sold in virtually every region of the world. With canned tuna, volume is key: Although the price per metric ton may be modest, the total tonnage is enormous. Canneries processed 4.1 million metric tons of tuna in 2018, worth more than $18 billion at the final point of sale. The end value—the full cost of the can and contents—was nearly $26 billion, reflecting about 63% of total tuna end values, versus 33% for sashimi products. Although tuna remains a staple protein, canneries also produced 1.4 million metric tons of byproduct, primarily used in fish meal and pet food and estimated to be worth another $448 million.

The bluefin species are caught in smaller quantities and are often sold as individual fish. Although the three bluefin species represent a very small portion of the total catch, they are by far the most valuable per metric ton. At the final point of sale, Pacific bluefin was the highest-priced of all tuna species in 2018, at about $38,300 per metric ton, followed by Atlantic bluefin at $36,700 and southern bluefin at $35,200. The price by weight, however, dropped significantly in the study period for Atlantic bluefin. It was the highest-priced tuna in 2012, with an average cost per metric ton of $69,000.

Although the combined catch of all bluefin species accounted only for about 1% of total tuna landings by weight—ranging from 40,000 to 68,000 metric tons each year—these species generated an estimated $610 million to $800 million for fishers and accounted for about 6% of the global tuna end value ($2 billion to $2.5 billion).

Figure 4

Bluefin End Value from 2012-18



Source: Poseidon Aquatic Resource Management Ltd., 2019

The market for bluefin sashimi continues to grow. The combined catch tonnage of all bluefin species rose 73% from 2012 to 2018—totaling 67,647 metric tons in 2018. All three bluefin species are depleted, the Pacific and southern species severely so.[6] Increasing demand and a lack of political will to take strong management actions continue to hinder the recovery of these species.

Low-quality product that is not able to enter higher-value market chains is typically sold in domestic markets in its whole, round form. In 2018, the end value of domestic markets was just over $1.1 billion.

The end value for most species has been consistent from 2012 to 2018, although skipjack's value has fluctuated more than other species and bigeye's value trended downward. (See Figure 5.)

Figure 5

Dock and End Values by Species

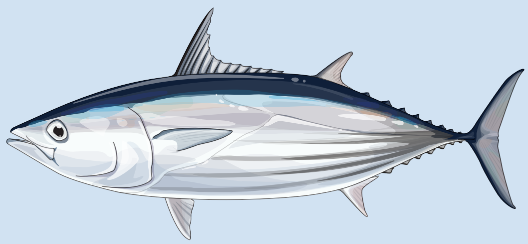
Note: Values for 2012, 2014, 2016, and 2018 are in nominal dollars.

Source: Poseidon Aquatic Resource Management Ltd., 2019

Figure 6

Global Tuna Landings and Values by Species

Skipjack and yellowfin have the highest end value, but the bluefin species are far more valuable per metric ton.



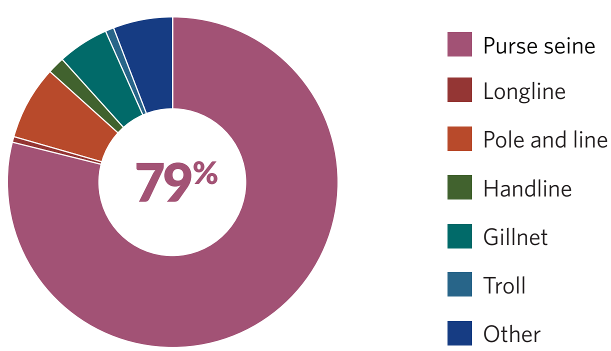
Skipjack

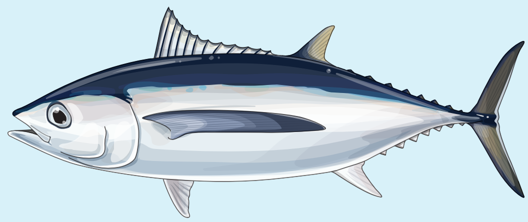
(Katsuwonus pelamis)

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	2.5	$4.0	$15.1
2014	2.9	$3.4	$17.7
2016	2.9	$3.9	$14.5
2018	3.0	$4.0	$16.1

Landings by gear type (2018)





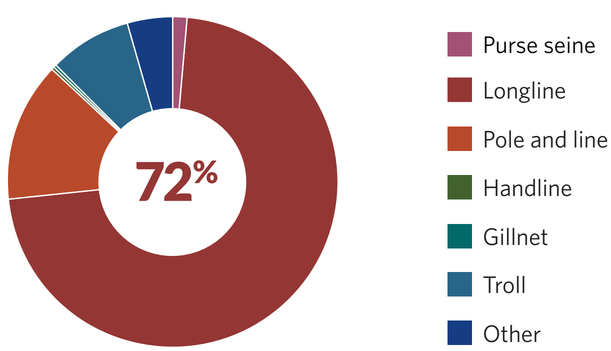
Albacore

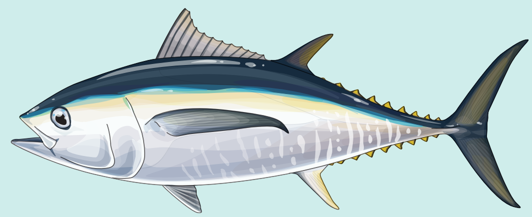
(Thunnus alalunga)

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.3	$0.9	$2.5
2014	0.3	$0.7	$2.4
2016	0.2	$0.6	$1.9
2018	0.2	$0.7	$2.1

Landings by gear type (2018)





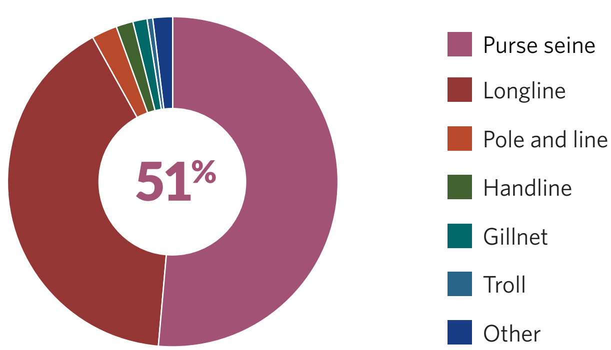
Bigeye

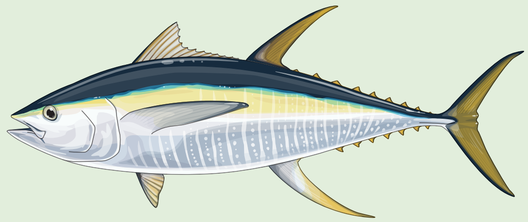
(Thunnus obesus)

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.5	$2.7	$6.5
2014	0.4	$1.9	$5.2
2016	0.4	$2.1	$4.4
2018	0.4	$1.9	$4.3

Landings by gear type (2018)





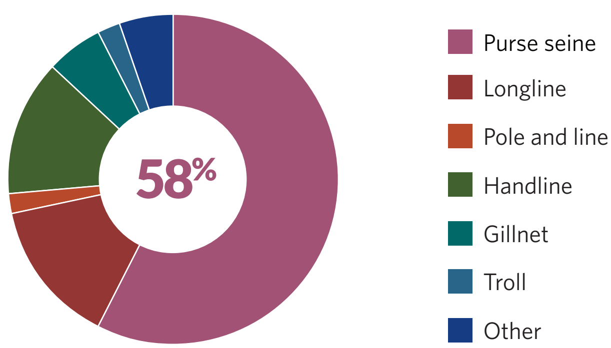
Yellowfin

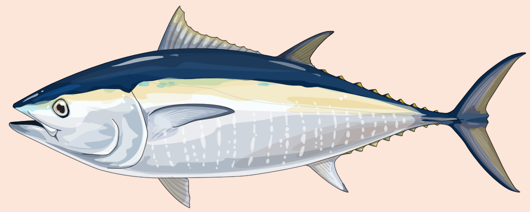
(*Thunnus albacares*)

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	1.3	$3.9	$15.4
2014	1.4	$3.2	$14.9
2016	1.5	$4.0	$14.5
2018	1.5	$4.4	$15.8

Landings by gear type (2018)





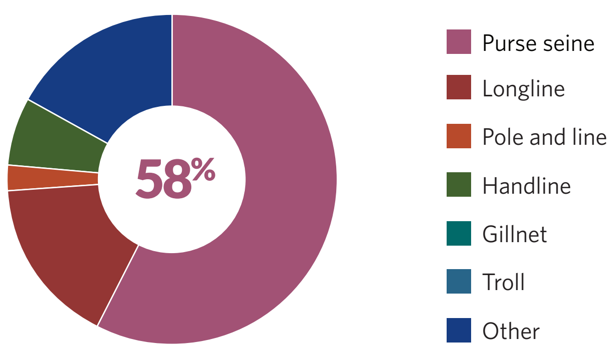
Atlantic Bluefin

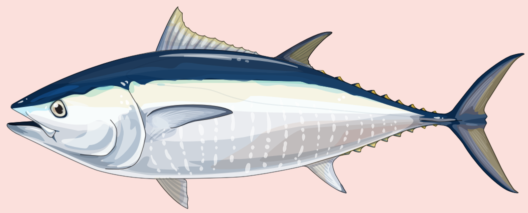
(Thunnus thynnus)

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.01	$0.2	$0.9
2014	0.02	$0.2	$0.8
2016	0.02	$0.3	$0.8
2018	0.03	$0.4	$1.1

Landings by gear type (2018)





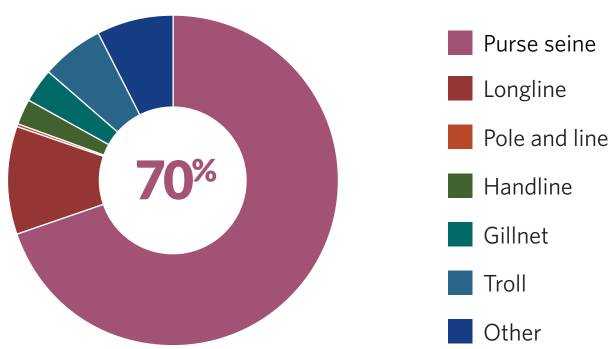
Pacific Bluefin

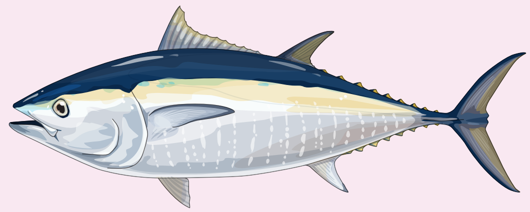
(*Thunnus orientalis*)

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.01	$0.4	$0.9
2014	0.02	$0.3	$0.8
2016	0.03	$0.3	$1.0
2018	0.02	$0.2	$0.8

Landings by gear type (2018)





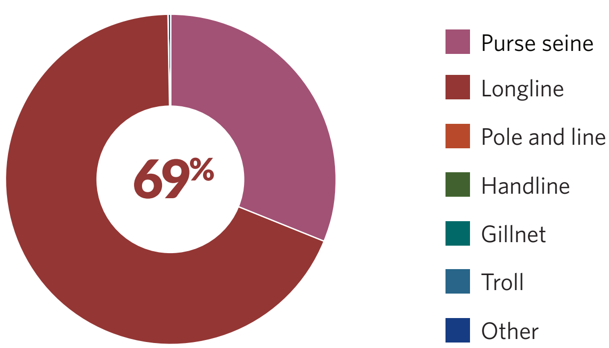
Southern Bluefin

(Thunnus maccoyii)

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.01	$0.1	$0.5
2014	0.01	$0.1	$0.5
2016	0.01	$0.2	$0.5
2018	0.02	$0.2	$0.6

Landings by gear type (2018)



Note: Dock values and end values for 2012, 2014, 2016, and 2018 are in nominal dollars.

Source: Poseidon Aquatic Resource Management Ltd., 2019

By fishing gear

Purse seine vessels, which use very large nets to encircle schools of fish, continue to land the majority of tunas worldwide. This fishing method is the dominant one used to catch skipjack and yellowfin (see Figure 7) that are destined for canneries because it can be used to efficiently catch large volumes. Juvenile bigeye caught incidentally by purse seiners is also sold for canning and use in alternative byproducts, such as pet food and fish meal. Purse seine vessels also catch low volumes of extremely valuable bluefin to use in "ranching," in which juvenile bluefin are encircled and carefully towed to cages in the ocean. Once inside, they are fed and left to grow for up to two years, increasing their size and value. In 2018, a relatively small number of purse seine vessels captured about half of the dock and end value of all tuna fisheries.

Longlines, which consist of main lines with thousands of baited hooks suspended from branch lines, were the main fishing method for albacore and southern bluefin in 2018. The gear was the second most commonly used type after purse seine to catch several other species, supplying high-quality fresh or frozen fish to the market. In each year studied, longlines accounted for more than 11% of total landings of the seven tuna species. Yellowfin, bigeye, and bluefin caught by longlines and handlines for sashimi markets command higher prices per metric ton than tuna for canning that is caught by purse seine vessels. Other fishing gears—including pole and line, gillnet, and troll—account for fewer landings and therefore smaller values for the fisheries. Pole and line vessel landings dropped from 9.5% of total landings in 2012 to 5.6% in 2018. The price paid to handline and pole and line fishers was higher than that paid for gillnet-caught tunas, indicating that efforts to transition fisheries away from gillnets may have economic as well as ecological benefits.[7]


BluePlanetArchive/Steve Drogin

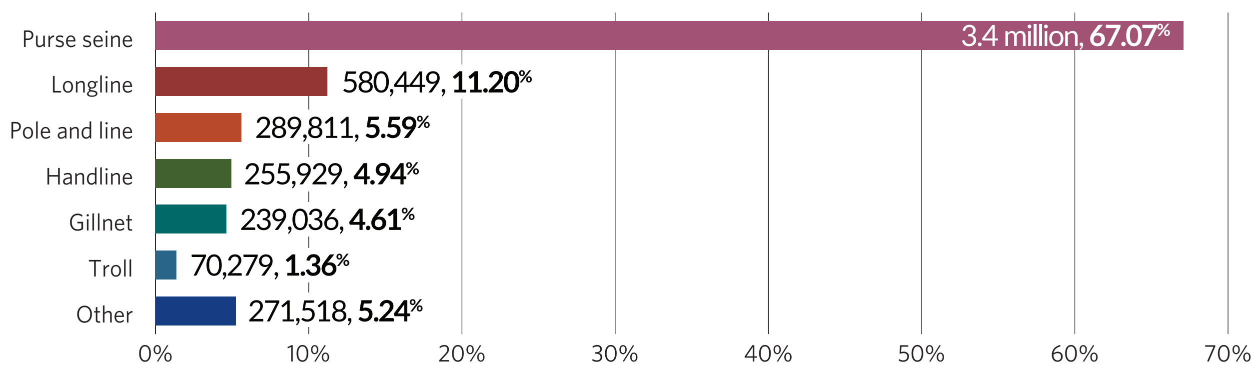

Paulo Oliveira/Almay Stock

Figure 7

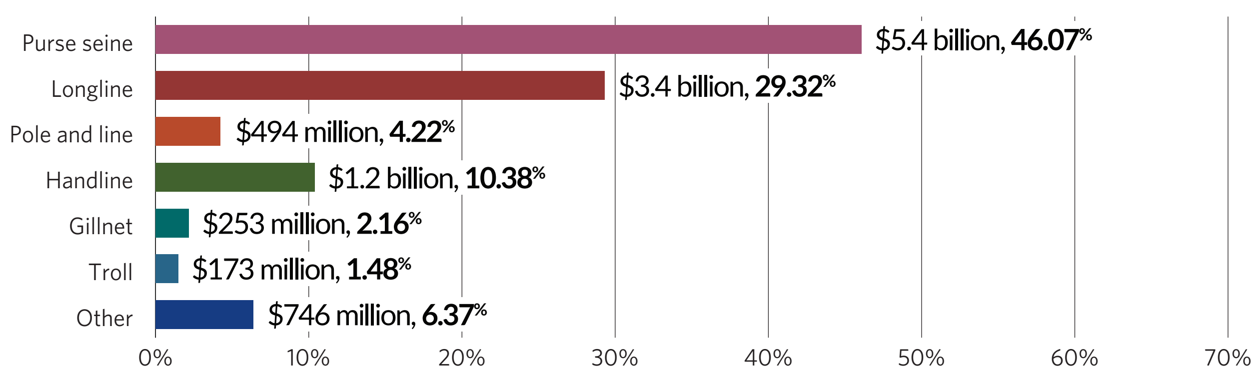
Two Fishing Gears Hauled in Most Tuna Revenue in 2018

Catch by purse seine vessels was more valuable overall but longline-caught tunas were priced higher per metric ton

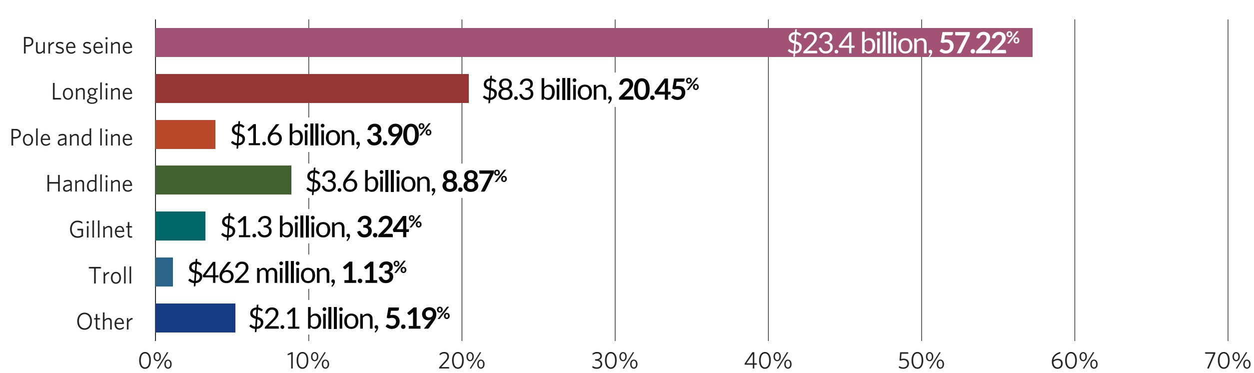
2018 Landings by Gear Type (Metric Tons)



2018 Dock Value by Gear Type (USD)



2018 End Value by Gear Type (USD)

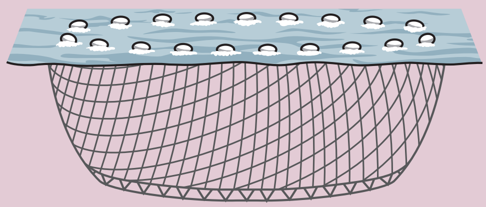


Source: Poseidon Aquatic Resource Management Ltd., 2019

Figure 8

Global Tuna Landings and Values by Gear Type

Most skipjack and yellowfin are landed by purse seine; longliners catch much of the mature bigeye

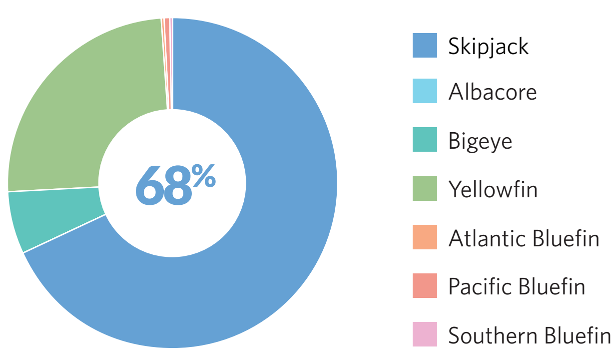


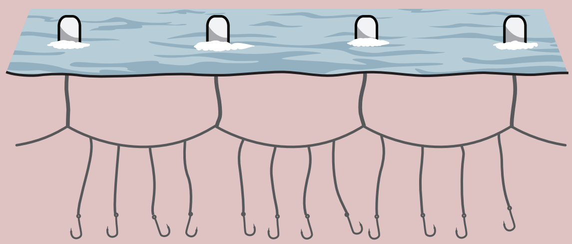
Purse seine

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	2.9	$5.7	$23.0
2014	3.4	$4.5	$26.0
2016	3.3	$5.2	$21.5
2018	3.5	$5.4	$23.4

Landings by species (2018)



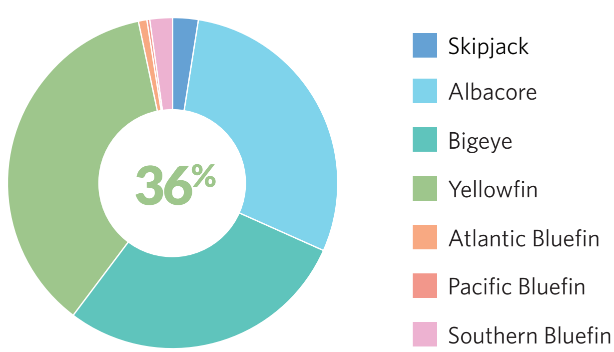


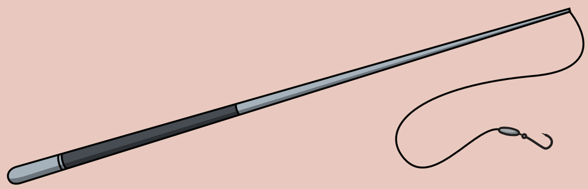
Longline

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.6	$3.7	$9.6
2014	0.6	$2.8	$7.6
2016	0.6	$3.2	$7.5
2018	0.6	$3.4	$8.4

Landings by species (2018)



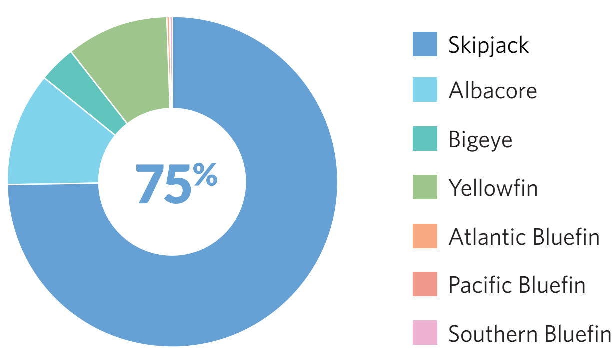


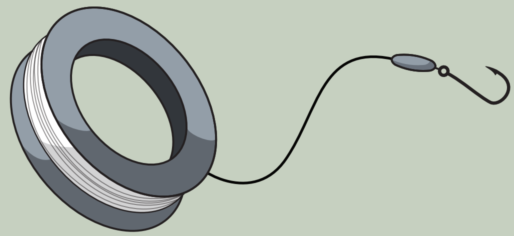
Pole and line

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.4	$0.8	$2.7
2014	0.4	$0.5	$2.3
2016	0.4	$0.7	$2.0
2018	0.3	$0.5	$1.6

Landings by species (2018)



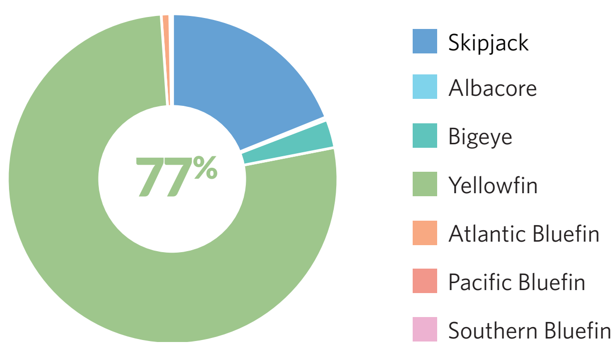


Handline

Landings and value by year

Year	Catch (million metric tons)	Dock value (billion US$)	End value (billion US$)
2012	0.2	$0.7	$2.5
2014	0.3	$1.1	$3.3
2016	0.3	$1.1	$3.2
2018	0.3	$1.2	$3.6

Landings by species (2018)



Source: Poseidon Aquatic Resource Management Ltd., 2019

By region

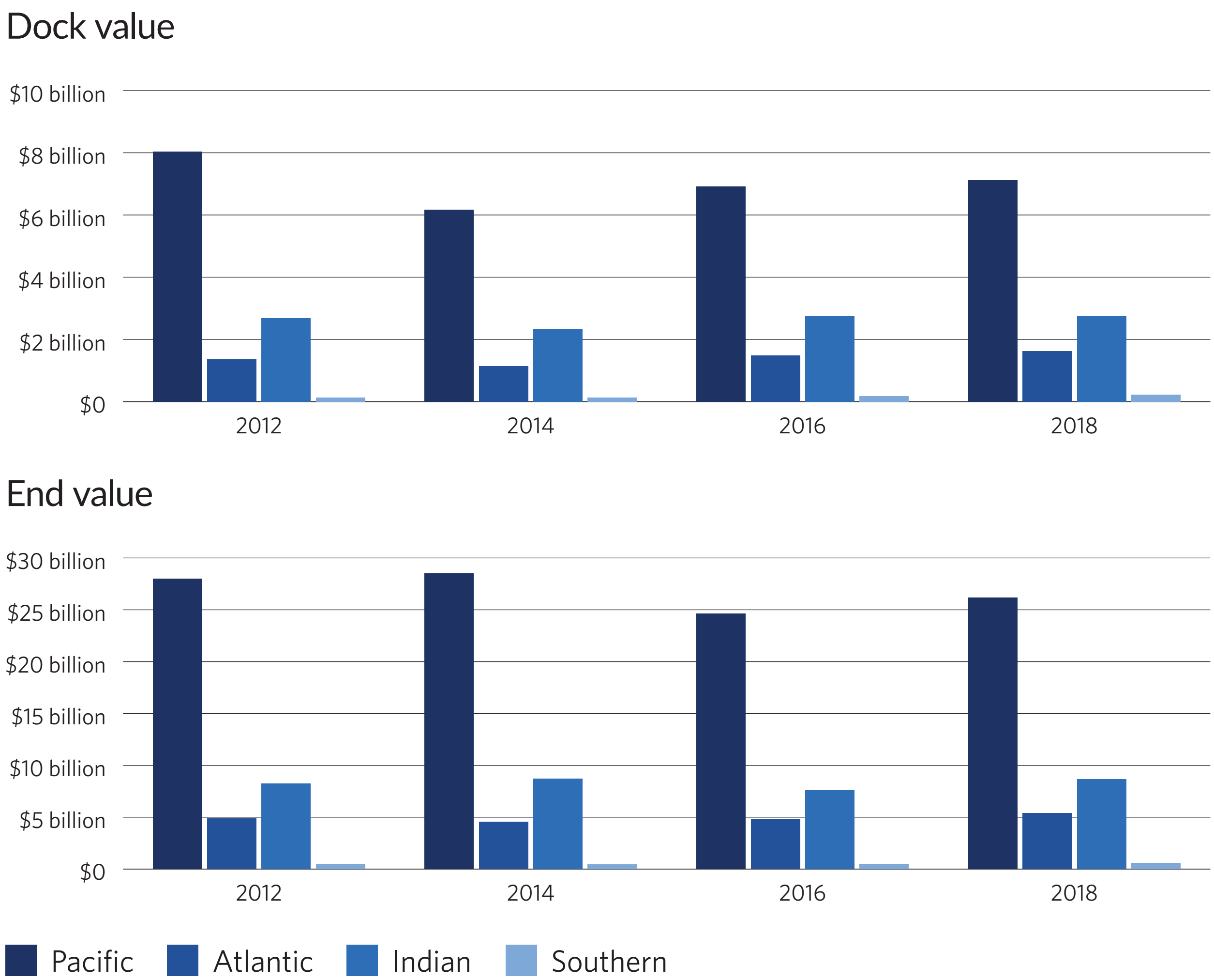
Tuna from the Pacific has both the lowest price per metric ton and the highest total value of any region. This seeming paradox is because purse seine skipjack fisheries in that ocean are enormous, and that catch is destined for low-priced cans. The price per ton is low, but overall tonnage is very high.

In 2018, 66% of tuna landings came from these waters, and sales of tunas from the Pacific made up almost two-thirds of the global dock and end values in all the years studied. Commercially landed Pacific tunas generated dock values of $7.1 billion in 2018 (see Figure 9), down from more than $8 billion in 2012. The end value of Pacific tunas surpassed $26 billion for each year studied.

Conversely, tuna from the Southern Ocean has by far the highest price per metric ton and lowest total value—at the dock and at the final point of sale—because these fisheries target very small volumes of highly valuable southern bluefin. (See Figure 9.)

Figure 9

Dock and End Value by Ocean Basin



Note: Values for 2012, 2014, 2016, and 2018 are in nominal dollars.

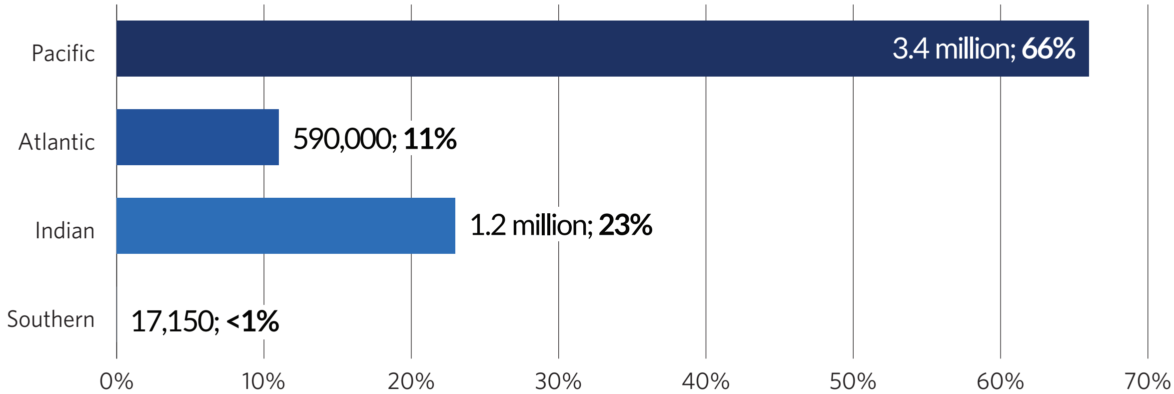
Source: Poseidon Aquatic Resource Management Ltd., 2019

Figure 10

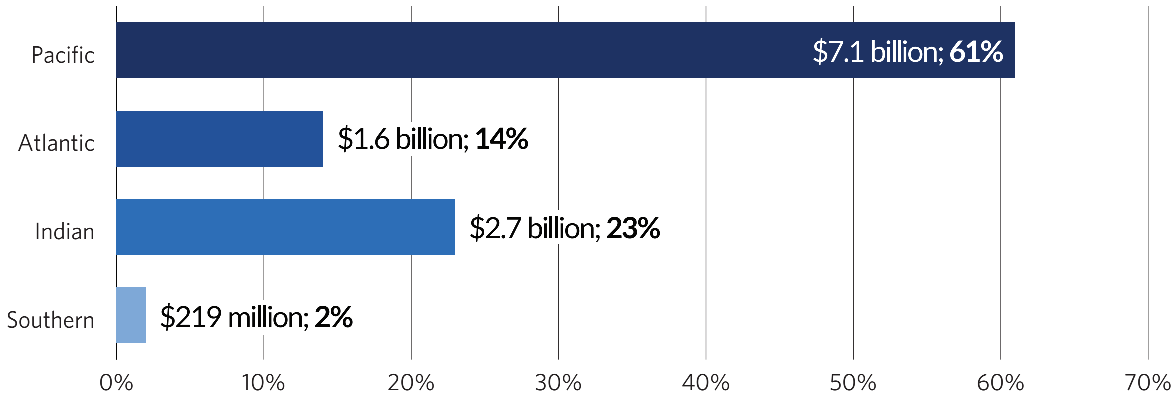
The Pacific: World's Largest and Most Valuable Tuna Fisheries

Region claimed the most landings and end and dock values in 2018

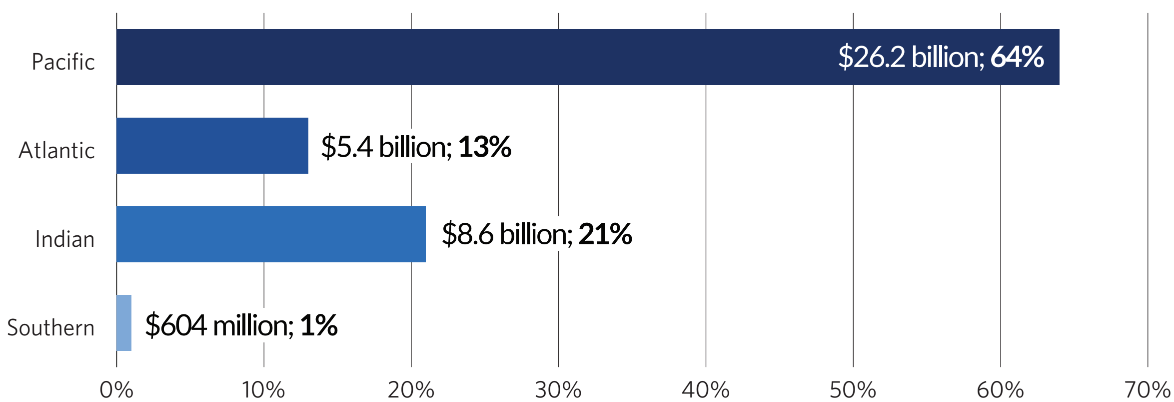
2018 Landings by Ocean (Metric Tons)



2018 Dock Value by Ocean (USD)



2018 End Value by Ocean (USD)



Source: Poseidon Aquatic Resource Management Ltd., 2019

Market trends and implications

This latest estimate of the value of the seven most commercially important tuna fisheries demonstrates their continued importance to economies around the world. With a combined worth of more than $40 billion a year, the fisheries support enormous industries and produce significant revenue, from commoditized canned tuna to highly desired, top-shelf bluefin sashimi. Tunas are a low-cost source of protein for much of the world and provide employment in areas where fishing and processing are concentrated. However, long-term sustainability is often traded for short-term political or economic gains.

Although total dock values rebounded to more than $11 billion in 2016 and 2018, up from $9.8 billion in 2014, fishing operations had to work harder to earn this revenue. Globally, vessels caught more tuna, but they were paid less at the dock for that catch in recent years. These comparisons do not account for inflation or for the potentially higher cost of doing business (e.g., fishing licenses, fuel), so although revenue has gone up, profits may not have rebounded.

The prices paid to tuna fishers or charged by retailers depend on several factors, including the relationship between supply and demand, quality of the product, distance to the final market, and volume. The findings in this report and a 2019 study published in PLOS ONE show that a bigger catch does not always translate into more revenue.[8] And when factoring in the costs associated with higher catches, profits may even decline.

This phenomenon occurred for two of the bluefin species. The Atlantic bluefin catch rose substantially throughout the study period, up more than 136% from 2012 to 2018, albeit from a relatively low volume base. The larger catch, however, has not been matched by a higher dock value or an end value of the same magnitude. (See Tables 2 and 3.) The difference was even more significant for Pacific bluefin: Catch increased by 27%, but its dock price per metric ton dropped about 52%.


BluePlanetArchive/Richard Herrmann

Table 2

Species Dock Price (USD) per Metric Ton

	2012	2014	2016	2018	% difference (2012 to 2018)
Skipjack	$1,590	$1,170	$1,374	$1,330	-16%
Albacore	$3,486	$2,634	$2,789	$2,766	-21%
Bigeye	$5,758	$4,292	$5,069	$4,655	-19%
Yellowfin	$3,005	$2,366	$2,752	$2,967	-1%
Atlantic bluefin	$13,715	$12,763	$11,781	$12,080	-12%
Pacific bluefin	$22,086	$16,454	$10,003	$10,506	-52%
Southern bluefin	$12,526	$11,690	$12,364	$12,749	+2%

Source: Poseidon Aquatic Resource Management Ltd., 2019

Table 3

Species End Value (USD) per Metric Ton

	2012	2014	2016	2018	% difference (2012 to 2018)
Skipjack	$5,931	$6,157	$5,067	$5,383	-9%
Albacore	$9,270	$9,070	$8,349	$8,975	-3%
Bigeye	$13,996	$11,932	$10,706	$10,603	-24%
Yellowfin	$11,778	$10,893	$9,986	$10,683	-9%
Atlantic bluefin	$69,320	$54,887	$35,656	$36,769	-47%
Pacific bluefin	$55,550	$44,908	$37,157	$38,317	-31%
Southern bluefin	$47,878	$38,033	$34,155	$35,221	-26%

Source: Poseidon Aquatic Resource Management Ltd., 2019

The ideal catch level, economically speaking, may not always be as high as the maximum sustainable yield (MSY) determined by scientists. In the Western Pacific, several fishing nations are concerned that fishing skipjack at the MSY would bankrupt many operations because the price paid per ton would plummet due to increasing supply.[9] For some other tunas—bigeye in particular—a gradual recovery to a population level that would allow for fishing at MSY, coupled with shifting fishing strategies, could support more catch and higher returns in the future. For example, adult bigeye that is caught by longlines and destined for sashimi markets is priced substantially higher than juvenile bigeye caught by purse seine vessels and destined for canneries, both at the dock and final point of sale.[10] And along with increased revenue, targeting higher-value adults may have the secondary advantage of raising the MSY of the fishery in the future.[11]

Management of tuna fisheries

Sustainably managing tuna fisheries and allowing depleted stocks to recover maximize their value. However, regional fisheries management organizations (RFMOs)—the multinational governing bodies charged with overseeing tuna fisheries—have been slow to adopt critical management tools, such as catch limits, recovery plans, and harvest strategies. Tuna RFMOs, for example, are failing to sustainably manage bigeye stocks around the world, despite the high price paid for the species at the dock. Their inability to effectively balance the needs of a diverse range of stakeholders could undercut the value of the bigeye catch, which approaches $5 billion a year.

The use of harvest strategies, or pre-agreed frameworks for making fisheries management decisions (including setting quotas), would help protect the value of the fisheries for bigeye and other commercially important tunas. These strategies may be tailored to individual settings or needs, but all include the same basic elements: management objectives, a monitoring program, reference points (or other fishery indicators), a stock assessment methodology, and harvest control rules.[12] Moving from traditional fisheries management, in which politics and the requirement for consensus-based decision-making often delay management action, to a system in which the scientific advice more directly influences management decisions is a key step toward better fishery management. Some tuna stocks, including southern bluefin tuna and North Atlantic albacore, are already managed using this approach. If harvest strategies are fully implemented, depleted species can be restored to healthy population sizes, and the high values reported here could be preserved or enhanced.

Successful fisheries management also requires well-developed monitoring programs. To better monitor fisheries, many RFMOs have mandated that observers be on board all purse seine vessels to collect fishing data. However, because observers typically cover less than 5% of longline fishing activity, fisheries managers lack sufficient information to properly oversee activity on these vessels.[13] Fishing operations using other gears often have little or no monitoring.

This lack of observer coverage can influence the catch data that fishing vessels report. As managers recognize the need to increase monitoring, using electronic technology is becoming a proven way to expand observer coverage without placing additional personnel on board. RFMOs should prioritize the development and adoption of standards and programs that will allow electronic monitoring to supplement human observer coverage. By also improving compliance and enforcing stronger consequences for noncompliance, RFMOs can ensure that these valuable fisheries are being governed effectively.

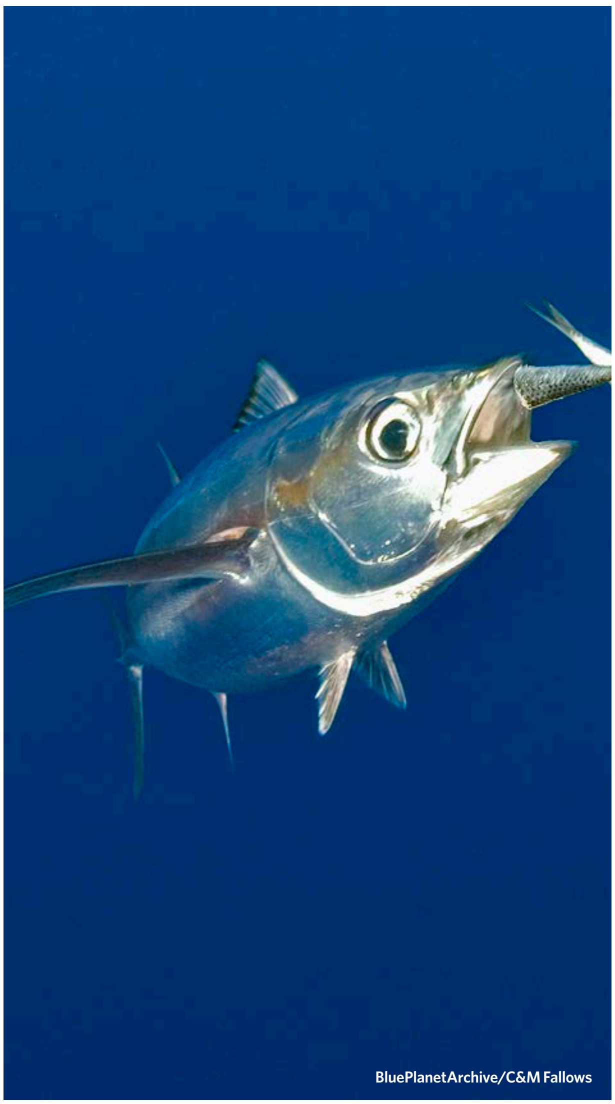
Conclusion

Although fisheries are critical for the 260 million jobs that depend on them,[14] ensuring that they are sustainable is also important for the health of the ocean. RFMOs, whose members include more than half of the world's governments, collectively oversee activities in more than 95% of the ocean. It is imperative that they adopt science-based, enforceable rules for the species they manage.

To conserve and build on the billions of dollars that international fisheries generate, RFMOs and countries should take the following steps to improve the precautionary management of fish stocks globally:

- Modernize management through harvest strategies.
- Improve oversight and accurate reporting of fishing activities.
- Ensure consequences for noncompliance with fisheries rules.

Without these measures, there could be significant negative consequences for the industries, communities, and ecosystems that depend on tunas. These actions would improve global fisheries governance and secure strong financial returns in international fisheries while ensuring the health of the marine environment.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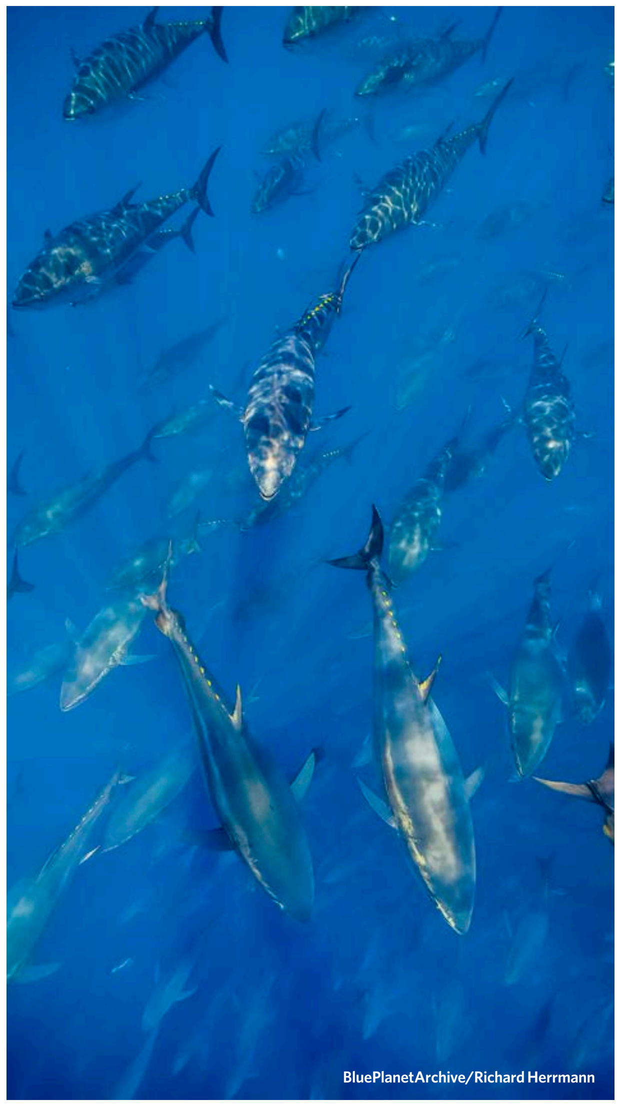
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Appendix

Methodology

To estimate the global value of commercial tuna fisheries, Poseidon collected information on how much tuna is landed each year, what markets it enters, and what the consumer ultimately pays. This data distinguished between the total revenue of recently landed tunas for the fishers who caught them and the total end retail value after processing, shipping, and marketing. The approach and methodology are largely the same as the previous study to allow for comparability. However, some improvements were made for the 2016 and 2018 datasets where possible—including a broader examination of global tuna prices and the inclusion of more trade data. The steps taken to determine these figures are described below. A more detailed methodology is included in the technical documents produced for this analysis.[15]

Landings

The volume of tuna landings in 2016 and 2018 was collected from the five major tuna RFMOs[16] and the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean[17] (ISC) to build a single landings database. Poseidon then sorted the data by country, species, gear type, and ocean basin to allow for multiple analyses. To check for robustness of the joint database, it compared the totals to the numbers reported by members of the U.N. Food and Agriculture Organization (FAO), a body that includes all marine fishing nations. The totals presented here are close to those reported to FAO.[18] Poseidon made some estimations for the proportion of 2018 landings for different gear/species combinations destined for different markets (e.g., ranching, canning). These estimates were guided by market flows for similar gear/species combinations found in the 2016 study.

Market flow

Different tuna products command different prices, so the percentages of the landed volume destined for various final products had to be determined. This required in-depth analyses of individual fisheries for each ocean basin or for smaller regions within basins to consider where catch of different species made by different fishing gear is likely to end up being sold and in what product form. Expert interviews, published literature, personal interactions with managers at fish processing facilities, and personal experience informed market flow estimates for species and gears in each ocean region. Some paths to markets proved relatively easy to determine. Nearly all bigeye, yellowfin, and skipjack caught by purse seine vessels are destined for canneries, while bluefin caught by this gear is typically sent to ranches. Skipjack is the most commonly used species in canned tuna products, accounting for 65% of the raw material in 2016. Generally, albacore caught with longlines goes to canneries, while yellowfin and bigeye caught this way are often used for fresh or frozen sashimi. Other pathways were more difficult to determine—for example, how much skipjack caught with pole and line goes to local markets as opposed to canneries and how much longline-caught bigeye is frozen for sashimi versus kept fresh.

Dock and end value

Converting the volumes and market flows into final prices (either at the dock or at the point of final sale) required an estimated wholesale price paid to fishers and retail price paid by the consumer. To estimate the average price paid to fishers, data was collected by Poseidon from several government agencies, trade organizations, and other fisheries-related organizations. Given the global nature of tuna fisheries and the technological capabilities of tuna vessels, such as refrigeration, prices paid to fishers are fairly consistent across ports for products of equal quality. Data sources included Japanese customs; the Tokyo Metropolitan Central Wholesale Market; Thai customs; the Sustainable Fisheries Partnership; and the National Oceanic and Atmospheric Administration, the agency responsible for stewardship of U.S. marine resources.

For end values, data collection methods depended on the end product (i.e., canned tuna, fish meal/pet food, whole round form for domestic markets, fresh sashimi, and frozen sashimi). Canned tuna prices were based on market surveys conducted at supermarkets around the world. Compared with the previous study, efforts were made to improve the survey coverage. As a result, Poseidon collected more than 700 price records from 12 countries, representing North America, Europe, Asia, and Africa.

Fresh and frozen sashimi prices were determined by Poseidon via market surveys and using recorded price data from household expenditure surveys, as well as at several wholesale and retail markets in Japan. In 2012, Japan accounted for approximately 80%[19] of the global sashimi market, but that proportion decreased to 70% to 75% in 2018. The 2016 study highlighted some evidence that U.S. and European Union wholesale prices are comparable to wholesale prices in Japan, and therefore it was assumed that data from Japan is a reasonable proxy for all sashimi prices. For this study, Poseidon was able to collect wholesale and retail prices from a wider range of locations and for all species. Retail prices were found to be 52% higher on average than wholesale prices for a given species. This finding compares to a ratio of 75% that was used when data was unavailable in the previous study, indicating that the 2016 report may have overestimated the end value for sashimi. Prices for fresh and frozen sashimi were assumed to be equivalent for the purposes of this study due to data limitations.

Poseidon obtained fish meal and pet food prices for byproducts of fish canning from a variety of sources, including feed mill associations and a fish meal supplier. The prices of tuna caught and sold domestically were based on data for Indonesia, the Maldives, and Sri Lanka—the countries with the largest estimated domestic sales of tuna not destined for canning or sashimi markets.

Once Poseidon estimated wholesale prices paid to fishers and retail prices paid by the consumer, it calculated dock values and end values by multiplying landings by market flow by price. Between the two studies, these values have been estimated for 2012, 2014, 2016, and 2018.

Endnotes

1 They are skipjack (Katsuwonus pelamis), albacore (Thunnus alalunga), bigeye (T. obesus), yellowfin (T. albacares), Atlantic bluefin (T. thynnus), Pacific bluefin (T. orientalis), and southern bluefin (T. maccoyii).

2 G. Macfadyen et al., "Netting Billions: A Global Valuation of Tuna (An Update)" (Poseidon Aquatic Resources Management Ltd., 2019).

3 The full technical documents produced for this analysis, including a detailed methodology, can be found at pewtrusts.org/TunaValue.

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15 The full technical documents produced for this analysis, including a detailed methodology, can be found at pewtrusts.org/TunaValue.

16 They are the International Commission for the Conservation of Atlantic Tunas, Indian Ocean Tuna Commission, Western and Central Pacific Fisheries Commission, Inter-American Tropical Tuna Commission, and Commission for the Conservation of Southern Bluefin Tuna.

17 Data on landings in the north Pacific Ocean were provided by ISC for Pacific Bluefin tuna only, as done in the previous study.

18 A cross-check of data for 2016 between the FAO dataset and the Poseidon catch database compiled (based on data provided by RFMOs) reveals that the global landings of the seven tuna species that are the focus of this study is 2% lower. This is likely because the FAO data submissions were underestimates for the Atlantic and Pacific oceans. RFMO landings data is considered to be more robust than the FAO data. FAO data was not available for 2018 to compare robustness.

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