

Facing Extinction: Can the Pacific Bluefin Tuna be Saved?

Rob Gilhooly

Stocks of Pacific Bluefin tuna continue to decline to dangerous levels, with figures published in an International Scientific Committee report in April estimating that spawning stock levels are now less than three percent of their unfished levels. In line with international recommendations, Japan, which consumes 80 percent of the world's tuna, has implemented measures to counter the trend. However, some experts question their efficacy, and warn that, if current catch levels continue, Bluefin may well be a leading topic of discussion at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) when members meet in Johannesburg later this year.

Keywords: Japan, fisheries, Pacific, Bluefin, tuna, overfishing, stocks, farming, aquaculture, sushi, sashimi, CITES, extinction



Buyers look through frozen tuna on sale at the fish market in Tokyo's Tsukiji district. In 2013, Japanese sushi restaurant chain owner Kiyoshi Kimura paid \$1.76 million at a New Year's auction at Tsukiji for a 222-kg Bluefin tuna, which was rarely seen in Japanese restaurants until the 1970s,

after which it became a luxury item nicknamed "black diamond." Photo: Rob Gilhooly.

In 2014, the International Union for Conservation of Nature reported that the spawning stock biomass (SSB) of Pacific Bluefin tuna in 2012 was just 4.2 percent of "unfished" levels – a theoretical calculation through simulations of a time when there was no commercial exploitation of tuna (often referred to as "virgin spawning biomass or "B0"), thought roughly to be around 1900.

Indeed, in late 2014, the IUCN moved Pacific Bluefin into the "vulnerable" category on its red list, which is reserved for species facing "high risk of extinction." ¹

In April 2016, however, the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean² published a draft of its latest stock assessment, stating that the spawning stocks were now 2.6 percent of unfished levels³, which are estimated to have once been in excess of 600,000 tons. (see figure 1)

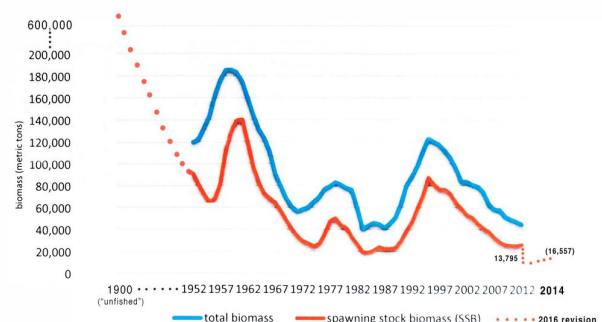


Figure 1: Total biomass and spawning stock biomass of Pacific bluefin tuna. Adapted from Western and Central Pacific Fisheries Commission data.

Moreover, a downward revision of the 2012 figures, from the 26,324 tons reported in 2014 to 13,795 tons in April's provisional report, meant spawning stocks four years ago were in fact just shy of 50 percent lower than originally thought.

According to the report, the model used to perform the assessment, which was released ahead of the Inter-American Tropical Tuna Commission (IATTC) science meeting in La Jolla, California commencing June 20, 2016, was “substantially improved” over that used in previous assessments, making the figures all the more alarming, experts say.

“The assessment shows that the impact of overfishing is even greater than previously anticipated ... (so) the population is even more depleted than previously thought,” says Amanda Nickson, director of global tuna conservation for the Pew Charitable Trusts, adding that the new figures “seriously jeopardized the chance of a population recovery” for Bluefin.

Japan is responsible for 80% of global tuna consumption, according to WWF estimates.⁴ Adult Bluefin can grow to weigh in excess of 450 kilograms and travel thousands of miles in ordinary migrations. The fish, commonly known in Japan as *kuro-maguro* or *hon-maguro*, is especially prized as *sushi* and *sashimi* and brings very high prices, close to \$400 per pound, in Japanese markets. It has been called “the million dollar fish”⁵ due to the high prices it has been known to fetch during auctions at Tokyo Tsukiji market.

Overfishing and the Impact on Local Fishing Communities

Some officials believe that measures implemented in recent years have slowed the population decline. Others disagree, stating that overfishing continues unabated, especially in Japan. This has resulted in a level of “recruitment” (new fish entering the population) in 2014 that, at 3.69 million fish, is more than seven times lower than a decade earlier and the second lowest since official records began in 1952.⁶

Katsukawa Toshio, a fisheries expert at Tokyo University of Marine Science and Technology, believes the Bluefin may well be listed on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) when members meet in Johannesburg later this year.

“Overfishing has led to a massive depletion of stocks,” Katsukawa says.. “If the current situation continues, the Pacific Bluefin could be facing extinction in the very near future.”

Reports from local fisheries around Japan would seem to support his claim.

Catch data from Katsumoto, the main port on Iki Island in Nagasaki Prefecture, shows that while some 358 tons of Bluefin were unloaded there by the island’s 400 *ippon-zuri* (single rod and line) fishermen in 2005, they brought home just 23 tons in 2014.



Nishi Kanji pulls out a bluefin tuna from the waters of Iki Island, Nagasaki

Prefecture in April 2009. Catches of Bluefin in Iki have fallen from 358 tons unloaded at Katsumoto in 2005 to just 23 tons in 2014, forcing Nishi to quit rod and line tuna fishing. Photo Rob Gihooly

"There are simply no tuna to catch," says local fisherman Nishi Kanji, whose front room is decorated with commemorative photos of a dozen of the 200-plus-kg Bluefin he has caught. "You rarely see that size anymore – the last big tuna I caught was nine years ago. It's not so long ago that you could bring home 20 or 30 tuna in a day. Now you're lucky to land one."

The situation is so dire that Nishi has packed in tuna fishing in favor of work aboard long-line vessels that fish in the waters off Ashibe port in Iki for *kue*, or grouper kelp.

"There's no work (in tuna fishing) anymore," he says. "Some of the younger (tuna) fishermen have already quit."

It's a familiar trend throughout Japan. More than 230 long-line boats operating off the coast of the Kii Peninsula in Wakayama Prefecture landed 64 tons of Bluefin in 2014, compared with 439 tons a decade earlier, according to local fisheries official Naka Tatsumi. Overall tuna catch, meanwhile, was up around 14 percent over the same period, though still down 30 percent compared with a decade earlier.

"While data suggests a glimmer of hope for tuna overall, that certainly can't be said for Bluefin," Naka says. "They get snapped up on the Sea of Japan before they are given the chance to mature fully. If fishermen there could wait a little longer, I think we'd all be able to catch bigger Bluefin once more."

Many fishermen in the Aomori Prefecture coastal town of Oma, well known as Japan's Bluefin Mecca, are also struggling to stay afloat. "If you were to go by the TV footage of

the monster Bluefin being hauled out of the sea, you'd get the impression that Oma is blessed with huge stocks," local fisherman Noto Katsuo recently told *Wedge* magazine, in reference to special programs aired on tuna fishing, particularly at New Year.⁷ "But most of my colleagues are blighted by poor catches and facing the very real possibility of going out of business."

Purse Seiners on the Spawning Ground

In his Tokyo office, fisheries researcher Katsukawa uses color-coded charts to explain just how critical the situation has become. Japan, he explains, has two spawning grounds – one in the Sea of Japan, the other off Okinawa. The fish that traditionally have gathered there have one crucial difference.

The former, he explains, are young parents that spawn about five times, but, after attaining a body length of about two meters, migrate southwest to the breeding grounds of Okinawa, where spawners are older and larger. However, the data available make clear that this pattern changed "dramatically" after 2004, he says.

By examining distribution maps for both grounds, Katsukawa concluded that new recruits were no longer arriving at the westernmost spawning grounds and only the older adults remained.

That change coincided with a notable shift in fishing practices by some of the 66 purse seine vessels operating in Japan's waters,⁸ which relocated away from the Pacific, where Bluefin were becoming increasingly scarce, and over to the Sea of Japan in the summer months. Other purse seiners that had previously netted rapidly depleting stocks of mackerel, herring and sardines also joined them.

The target of these vessels, many of which are operated by affiliates of Japan's big two fisheries companies, Maruha Nichiro and Nippon Suisan Kaisha (NISSUI), including

TAIYO A&F and Kyowa Suisan,⁹ was the Bluefin spawning grounds that stretch from off Ishikawa's Noto Peninsula and spread westward just beyond the Oki Islands in Shimane Prefecture. Even when stocks are seriously depleted, tuna make their way there in the spawning season in vast schools, their movements detected by the purse seiner's cutting-edge sonar systems, experts say.

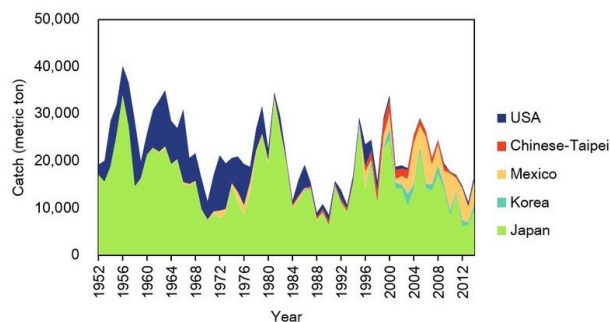


Figure 2: Annual retained catches of Pacific bluefin tuna reported by ISC members in the North Pacific Ocean. Courtesy of ISC.

"It's a specific place with favorable spawning conditions that is known to the purse seiners," says Sakaguchi Isao, a professor of environmental governance at Gakushuin University and an expert in the science of Bluefin tuna. "Purse seiners go to those areas at the exact moment of spawning, with their massive nets at the ready. It's easy."

Fishermen cut open the fish and remove the eggs, before selling them to outfits who process them into meal for fish farms, experts say.

Those Bluefin that manage to escape migrate toward Nagasaki, known as an important nursery for Bluefin juveniles, which also swim up from Okinawa, Sakaguchi says. There purse seiners, along with trollers and, to a lesser degree, coastal nets, strike again — a practice that started around 30 years ago but intensified in the mid-1990s, he adds.

In the Pacific Ocean, nearly 70 percent of Bluefin are harvested before reaching one year of age and only 1.2 percent is aged 4 or above. As it is believed that Bluefin start spawning at age 3 and that all have reached maturity by age 5, experts estimate that over 96 percent of Bluefin caught in Japan are taken from the water before they can reproduce. "If they hadn't done this, then probably the stocks could have stayed at a healthy level for fishermen to continue catching Bluefin in the Pacific," Sakaguchi says.

Regulatory Reluctance

Japan has shown a reluctance to act, but last year it introduced new regulations set by the Western and Central Pacific Fisheries Commission, an international body that monitors most of the western Pacific.

Starting January 2015, allowable catches of Bluefin weighing less than 30 kilograms were reduced to 50 percent of the catch average between 2002 and 2004 — or 4,007 tons. Around half (2,000 tons) was allocated to purse seiners. It also called for a limit on catches of Bluefin weighing more than 30 kilograms to the 2002-04 average, equating to a quota of 4,882 tons¹⁰, though in this instance the restriction is voluntary, experts say.

However, Katsukawa says calls for tighter regulations on fishing in the spawning grounds fell on deaf ears, much like the calls for Japan to re-evaluate its annual "scientific whaling" expeditions in the Antarctic.

The regulations that were implemented were nothing more than "rhetoric," he says. "They are using expressions like 'cut in half' to give the impression that strict action is being taken, but the catch base period being used represents a time when there was double the amount of tuna."

What's more, the new quota for fish weighing less than 30 kilograms is "pointless," because it

“cannot be reached no matter how hard the fishermen try,” he adds.

To demonstrate his point, Katsukawa points to official data relating to current regional catch quotas and the actual volume being caught. For the western Kyushu block, which includes Iki Island, a catch quota of 1,269 tons has been set for an 18-month period starting January 2015. The first 10 months of that period yielded just 159 tons and as of May 30, 2016, 681 tons had been reported.¹¹

Katsukawa says this is the outcome of plummeting resources in the Pacific, concerns about which he has voiced for more than a decade.

“Those concerns were ignored,” he says. “It was only since the Bluefin faced extinction that the need for regulations has been acknowledged. It’s like idly chatting about what should be done in the case of a fire while the fire is already raging around you.”

The stated aim of restrictions set by the Japan Fisheries Agency was to increase spawning stock levels to the “historical” median, or 6.7 percent of unfished stock volume, by 2024, a figure three times lower than the 20 percent proposed by the United States.

Miyahara Masanori, who heads the Fisheries Research Agency, told reporters at a briefing in July 2015 that domestic fishermen would effectively be forced to reduce their catches to zero if the U.S. proposal was adopted and, “worse still, face the danger of being cornered into artificial fishing bans.”¹²

According to Sakaguchi, the normal benchmark of stock management is 20 percent of spawning stocks. As a management standard, if stocks fall below this level, a strict catch reduction should be implemented, he says. Generally, when stocks fall below 10 percent, they are considered to have collapsed, and because this has been the case with Bluefin for so long,

complete cessation of fishing would be the only way to ensure recovery, he adds.

Waseda University researcher Sanada Yasuhiro calls Japan’s proposed measures “woefully inadequate” and highly unlikely to bring about a recovery of the depleted stocks.

“Even though the stocks have been so decimated, I believe the U.S. target of 20 percent is realistic,” Sanada says, adding that Japan’s high tuna consumption (over 80 percent of the world’s total, according to the WWF¹³) and catch share (63 percent of global harvests) means Japan has an obligation to regulate. “Japan says its measures aiming to increase the present spawning stock to the historical median from the period 1952 to 2012, are more realistic, but tuna fishing was going on well before 1950, when the population would have been significantly bigger.”

Indeed, research undertaken by the National Research Institute of Far Seas Fisheries in Shizuoka Prefecture revealed substantial tuna fishing in Japan dating back to the late 19th century.¹⁴ This peaked in the prewar years, with one graph revealing catches of more than 85,000 tons in 1939 alone.

Yet, some experts argue that the most significant data starts from the 1970s, when Bluefin first gained popularity with Japanese consumers. “In the 1960s, no one wanted Bluefin,” writes Svati Kirsten Narula in *the Atlantic*. “Japan fished for it, but few people there liked the Bluefin’s bloody, fatty meat.”¹⁵

Japan’s Fisheries Agency Rejects Science-Based Strategies

Jamie Gibbon, a senior researcher in the Global Tuna Conservation Group of the Pew Charitable Trusts, agrees with Sanada’s assessment, saying that Japan’s measures won’t result in a “meaningful improvement under the water.”

However, he adds, “all tuna management”

should now move away from yearly quota setting, which takes up a lot of time through lengthy negotiation and results in quotas and catch limits “that don’t reflect the best available science.”



Fisherman weigh Bluefin tuna landed at Oma in Aomori Prefecture. Oma is known as Japan’s Bluefin mecca, though like many coastal fishing towns around Japan where coastal tuna fishing is prominent, tonnage of tuna landed has plummeted in recent years as stocks of bluefin have fallen to critical levels. Photo Rob Gihooly

An example of a discussion that could drag on for some time is an item on the agenda for the 12th regular session of the WCPFC Northern Committee, to be held in Fukuoka in late August. Then, WCPFC members will discuss a possible “emergency rule” to be implemented “if appropriate” and based on the 2016 stock assessment conducted by the ISC.¹⁶ An emergency rule is normally invoked when a resource is seen to have collapsed, as indicated by an extremely low level of catch. In such an instance, a case can be argued for a temporary moratorium on fishing and/or reducing catches for several years. It was at last years’ WCPFC meeting that members first agreed that emergency measures should be implemented in the case of Bluefin catch numbers falling to extremely low levels.

During the 78th Resource Management Subcommittee of the Fisheries Policy Council on July 13, however, JFA’s Ota Shingo said Japan would only consider such an emergency rule “appropriate” if there were an “abnormal situation” whereby extremely low recruitment levels of Bluefin continued for three consecutive years. Only then would such a critical situation be considered a condition for invoking the emergency rule, Ota said.¹⁷

Official data reveals that Bluefin recruitment volume fluctuates from year to year, but low levels (i.e. levels below 4.5 million fish) have only once been recorded in two consecutive years – in 1992 (4.56 million) and 1993 (4.37 million), after which stocks recovered, Ota added.

Fisheries researchers believe this is simply a delaying tactic by the influential Japanese fisheries agency. “The recruitment of Pacific Bluefin tuna has never been low for three consecutive years, so it means they won’t do anything to conserve this species,” says Waseda’s Sanada. “Some Japanese fisheries scientists closely tied with the Fisheries Agency allege that the amount of adult fish has little to do with the stock status as it is the ocean environment that determines recruitment numbers. So, even if the number of adult fish dropped to the historically low level, (they believe) it doesn’t mean that it is necessary to conserve adult fish.”

Gibbon believes the time is ripe for Bluefin to move toward longer-term “harvest strategies,” where a set of rules that are pre-agreed by all members of the WCPFC allow scientific information to be fed into those rules to determine a catch limit.

“There were attempts during the 2015 WCPFC Northern Committee meeting (in Sapporo) to start this process ... with the U.S. suggesting a 20 percent recovery goal over 10 to 15 years,” says Gibbon, whose organization believes that the complete cessation of netting of Bluefin

weighing under 20 kg in the Pacific could lead to a 400 percent increase in stocks within five years.¹⁸ “We were really disappointed that even before the meeting started Miyahara indicated that Japan was not willing to even enter the discussion about these long-term management measures.”

Experts such as Sakaguchi say data-based logic is often in short supply when it comes to claims by Japan’s leading fisheries body. The Fisheries Agency claims that there is no scientific evidence connecting purse seine fishing of spawning stocks with a detrimental impact on recruitment, adding that low recruit numbers are due to unfavorable environmental factors such as rising ocean temperatures.

Sakaguchi says he has examined all relevant records and scientific papers from the International Scientific Committee, but “couldn’t find a single statement” to support such views.

“The ISC has never taken such a stance (that fishing of spawners doesn’t damage Bluefin stocks) because it has never specifically analyzed that impact,” he says.

Sakaguchi says that to perform the required multiple factor regressive analysis to show the stipulated relationship “is easy” and was, in fact, undertaken by a group of Japanese researchers in the 1990s — the results of which are in direct conflict with the Fisheries Agency’s claims.

“Nonetheless, the Fisheries Agency made its claim without ever undertaking such basic analysis,” says Sakaguchi, who also claims to have uncovered examples where the Fisheries Agency has deliberately “disguised” data presented in the Japanese Diet that sought to downplay the impact of purse seine catches of Bluefin spawners. “From a scientific perspective, that is beyond absurd. All the researchers at the Fisheries Research Agency know this, but cannot say so for fear of

punishment.”

Waseda’s Sanada agrees, adding: “The JFA doesn’t conduct scenario analysis because if it did, concrete evidence would emerge to prove that spawning stock regulations are inevitable. And that’s the last thing they want.”

Pew’s Gibbon says the most worrisome element of the Fisheries Agency’s argument is that it means they are effectively absolving themselves of the need to manage the capturing of adults. Gibbon calls this a “risky business” for a fishery that’s only at 2.6 percent of its historical high.

Collusion and Short-Term Profits

The Fisheries Agency’s regulation phobia is deep-rooted, dating back to a time when fishermen freely exploited marine resources far and wide, according to Tokyo University of Marine Science and Technology’s Katsukawa.

From the 1970s, various regional and international mandates curtailed such forays, and Japan set out on a mission to object to any kind of regulations “in order to protect its vested interests,” Katsukawa says.

“It has continued to object to protect fisheries’ short-term profits,” he says. “This is why Japanese fisheries-related entities and the Fisheries Agency’s basic mentality is to object to regulations on Bluefin and view all environmental activists as the bad guys.”

Experts say the lack of meaningful change is also down to deep-rooted ties between Fisheries Agency officials and the three main companies and their subsidiaries operating the majority of the Bluefin-targeting purse seine liners.

“One reason the government won’t accept meaningful proposals for change is that Japanese bureaucrats never admit failure,” Sanada says. “Another reason is their ties to

the purse seine industry — so-called *amakudari* (the practice of providing retired ministry officials with lucrative jobs in private firms and quasi-government entities)."

Sakaguchi gives examples of this golden parachuting, pointing to one Cabinet Secretariat document dated Sept. 18, 2015¹⁹ showing that former director of the JFA's stock enhancement division, Takahide Naruko, had landed an advisory post at the Federation of North Pacific Purse Seine Fisheries Cooperative Association, before quickly being named vice-president of the All Japan Purse Seine Fisheries Association. Indeed, according to Sakaguchi, the president of Japan Purse Seiner's Association, Kato Hisao, was formerly head of the JFA's fisheries coordination division, while Fisheries Research Agency chief Miyahara previously held top positions at the JFA between 1978 and 2014, when he retired.

"These connections run deep, and any decisions regarding Bluefin policy are influenced greatly by the economic interests of the purse seine industry," he says.

Mediterranean Moderation

The targeting of spawning Bluefin is not a Japan-only practice. For almost 20 years, hundreds of purse seiner vessels from nations including Morocco, Libya, France, Spain, Italy and Japan (many of which are members of the International Commission for the Conservation of Atlantic Tunas),

used sonar and spotter planes to trawl the Mediterranean Sea for spawning Atlantic Bluefin tuna. According to one World Wildlife Fund report published in 2008, their annual catch potential was estimated at almost 55,000 tons – more than 3.5 times the catch levels advised by scientists to prevent stock collapse (15,000 tons).²⁰

European scientists claimed that Bluefin tuna

stocks in the Mediterranean and eastern Atlantic fell drastically as a result of these practices, but a series of stringent control measures implemented over the past decade – including patrol boats and aircrafts and a satellite-based catch control system instigated by the European Commission²¹ – have brought about a partial recovery of Bluefin populations in the Mediterranean. Indeed, recovery was deemed sufficient to allow a 20 percent catch quota increase in 2015.²²

Dispute over the ISC Data

There are those who interpret the 2016 ISC assessment of Bluefin stocks in the Pacific as cause for similar hope. While the ISC report indicated that spawning stocks in 2012 (2.1 percent of unfished levels) were in fact considerably lower than had been assessed in 2014 (4.2 percent), stock estimates for 2014 had shown an increase of 0.5 percent to 2.6 percent²³. In an article published on its website in May 2016²⁴, the West Coast regional arm of the National Oceanic and Atmospheric Administration (NOAA) focused on this upward turn, stating that the current measures in place had made "eating domestically caught Bluefin a sustainable choice" and encouraged consumers to "look to the local retailers for fresh Bluefin."

Critics are skeptical. "Frankly, anyone that simply uses the slightly larger population size without admitting that only 2.6 percent of the population remains is just causing unnecessary confusion," says Nickson of The Pew Charitable Trusts, who posted a scathing riposte on PEW's website in May, in which she stated that the U.S.'s "recent guidance on Pacific Bluefin calls into question its commitment to protecting and rebuilding this troubled species."²⁵



Ito Masahito prepares a bowl of fresh tuna on rice at Hama Zushi restaurant in Oma, Aomori Prefecture. Photo Rob Gihooly

In the PEW article, Nickson went on to state that the NOAA had omitted crucial information “notably how severely depleted the population has become; that fishing across the Pacific remains significantly above the levels required for rebuilding the species; and that U.S. fishermen are not bound by the recovery plan instituted in the western Pacific Ocean.” The NOAA article also failed to recognize that fishing under current regulations “is directly contributing to the severely threatened status of the species,” Nickson wrote

Some Japan-based experts believe that Japan has had a big part to play in the revised statistics. “The ISC is heavily influenced by Japan and is the only institute that does not provide any transparency with regard to the data it produces,” says Hanaoka Wakao, a former Greenpeace campaigner who now runs Seafood Legacy, a company promoting the sales of sustainably caught seafood in shops and restaurants. “The new figures are therefore impossible to verify.”

Aquaculture angst

Since the 1970s, the farming of Bluefin has been seen as Japan's Holy Grail and the key to

solving the stock shortage issue.

In 1970, when Bluefin spawning stock was estimated to have fallen by 50 percent of the amount recorded when official records began in 1952,²⁶ a government-backed project was convened to develop technology that would support the fully closed life-cycle aquaculture of Bluefin tuna. A number of organizations and research facilities, including Kinki University (“Kindai”), Tokai University and prefectural research labs in Kochi and Nagasaki, were given three years to succeed. In reality it took 32 years to get there, largely thanks to the continued research at Kindai, which finally succeeded in the complete farming of Bluefin in 2002, when tuna born artificially in the mid-'90s spawned.

Other attempts at tuna seed production have been carried out at the JFA's National Center for Stock Enhancement on Ishigaki Island, Okinawa (later moved to another facility in Kagoshima), and also in the private sector. Major tuna farming companies include Amami Yogyo and TAIYO A&F, and Seinan Suisan and Kaneko Sagyo, the former two being affiliates of Maruha Nichiro, the latter two affiliates of NISSUI, Japan's biggest seafood companies that both also operate affiliates heavily involved with the purse seine netting of Bluefin.²⁷

The JFA's development of seed production technology continues, while Amami Yogyo succeeded in the harvesting of fertilized eggs in the early 1990s (even producing 1,600 fry in 1996), only to abandon its research soon after due to the prohibitive costs involved in larger-scale production. In recent years Maruha Nichiro has resumed experiments on seed production and in 2010 became the first private sector corporation to succeed in the fully closed life-cycle aquaculture of Bluefin.

Consequently, the seed business has flourished in the past two decade. According to the Fisheries Agency, 92 domestic companies were operating tuna farms by the end of 2013, and

the number of seed tuna being put into pens that year was around 600,000 – almost triple the 2005 figure (205,000).

Most are caught by small-scale troll fisheries, though purse seiners operated by the likes of fisheries corporations Kyowa Suisan and Toyo Gyogyo have also been targeting juvenile tuna in recent years to supply to the aquaculture industry as seed tuna. Indeed it is this trend rather than the overfishing of spawning adult Bluefin tuna that has captured greater international attention.

But all is not rosy in Japan's ever-expanding world of tuna aquaculture. The cost of setting up just one of the numerous 30-meter-diameter holding pens used by Kindai researchers alone is reportedly ¥20 million, and in the private sector the risk to these expensive projects from natural disasters means only the largest companies can seriously compete in the farming industry, leading to what Sanada says is the “oligopolization by major seafood and trading companies such as Maruha Nichiro, NISSUI, KYOKUYO, Mitsubishi and Sojitz ...”²⁸

Meanwhile the 250 Bluefin raised at Kindai require 1 ton of mackerel feed per day.²⁹ “From the viewpoint of sustainability, wild fishing is more desirable than farming because farming requires a huge amount of fish meal,” says Sanada. “For every 1 kg of Bluefin tuna (raised on a farm), we need 12 to 15 kg of feed, such as saury, sardines, mackerel, and so on.”

According to some reports this so-called FI:FO (Fish In:Fish Out) ratio for farmed tuna can be as high as 1:20 – in other words, to produce 1 kg of farmed tuna that can be sold to consumers requires up to 20 kg of feed.

According to sustainable fisheries advocacy group SeaChoice, “This translates into an overall protein loss from our marine ecosystems and global food supply.”

What's more, experts say that before there can

be aquaculture, huge quantities of larvae must survive. In truth, however, due to their fragility almost two-thirds of artificial seeds die within 50 days after being put into pens and 1 percent of the remainder survives until maturity³⁰. Scientists undertaking research at the University of Maryland Baltimore County's Institute of Marine and Environmental technology estimate the “bottleneck” for Bluefin larvae is a significantly shorter three to four weeks.³¹

“The ultimate goal is a switch to fully closed life-cycle aquaculture, but this is still some way off,” says Yamamoto Naotoshi, a Nagasaki University fisheries researcher who was previously a researcher at Kindai's Wakayama facility until 2008. “At that time artificial breeding was nothing to write home about and most was raised in the pens within the research facility. Now they are working with private companies such as Toyota Tsusho to mass produce, but that is not going to happen overnight.”

As a result, the ratio of artificially raised and hatched tuna is just 3 percent of the farmed tuna that was shipped in 2013, pushing up demand for natural seeds and, as a consequence, the unit price to boot, according to Sanada.

This demand, he says, has turned into a business chance for some ippon-zuri and other tuna fishermen who have been made largely redundant as a result of the overfishing.

“The annual income of fishermen is not as high as you think, maybe even less than ¥2 million,” says Sanada. Catching juvenile tuna for the so-called tuna “ranching” industry, where young tuna caught in the wild are fattened up in pens, is a rare area of growth and an opportunity for struggling fishermen, whose numbers have been declining, he adds.



Frozen tuna are unloaded at Misaki port in Kanagawa Prefecture. Imports of Atlantic Bluefin from the Mediterranean peaked in 2006 at 22,600 tons. Six years later they had fallen about 64 percent to 8,200 tons. Photo Rob Gihooly

Sea Change

Sanada says a sea change in the past few years is an increase in voices calling for a revision of Bluefin policy and a move toward sustainable fisheries. Organizations such as Seafood Legacy, which started operations last year, are working with retailers to stock sustainably caught Bluefin and other produce, while Tsukiji tuna trader Ikuta Yoshikatsu has developed a labeling system whereby sustainably caught tuna bares the label of his organization, Seafood Smart.

"I believe that changing the Japanese market to a sustainable one will directly contribute to saving the oceans," says Hanaoka of Seafood Legacy, which played a hand in supermarket chain AEON inaugurating its "Seafood Baton" sustainable catch corner last year. "In the West, many retailers stop selling seafood if it becomes endangered and consumers applaud that approach. We need that level of consciousness in Japan, too, and AEON is providing a real beacon of hope.

Hanaoka also works with catering companies and some, he says, are already looking toward the Tokyo Olympics in 2020.

"I am sure Japan has one eye on Rio, which is already saying it will offer sustainable seafood at the Olympics this year," he says. "The question is, will 2020 be too late for Bluefin?"

Iki's fishermen believe it could be. Perturbed by the lack of meaningful action by the government, they took matters into their own hands last year and, along with fishermen from neighboring Tsushima, instigated a self-imposed three-year ban on tuna fishing during June and July.

"Our objective is to think of ways to ensure a sustainable and continuous utilization of Bluefin resources and act on them," said Nakamura Minoru, chairman of an Iki fisherman's association focused on protecting tuna resources, which was nominated for a SeaWeb Seafood Champion Award in April.

"We thought that if we showed our intentions, it would stir the government into doing something about the situation in the Sea of Japan spawning grounds," Nakamura says. "In fact, however, there has been little change, with regard to the government at least."

Unrelenting Market Forces and the Role of Government

According to a source who declined to be named, major fisheries company Maruho Nichiro, whose affiliated companies landed 60 percent of Bluefin catches in 2014, suddenly decided to reduce its catch last year. "In the end, however, the Fisheries Agency pressured Maruho not to go through with this cut," the source says. "It was concerned that to do so would amount to tacit approval of those lobbying for such quota cuts."

Another source with over 25 years experience of working in fisheries, including overseas, says

the self-imposed quota was in fact carried out. "However, it made absolutely no difference, because other industry players simply grabbed that unfished portion," the source said on condition of anonymity.

The situation with Bluefin is representative of Japan's overall fisheries policy, the source says. "Take mackerel for example, in Norway fishermen are restricted to only taking mackerel over three years old, because below that age they will not be able to spawn. In Japan however, they allow catches of one-year-olds and then wonder why the stocks are declining. It's the same with Bluefin."

Whereas in Oceania, America and Europe governments first take into consideration the amount of spawning stock before setting quotas, Japan has a tendency to implement systems that are both outdated and lacking in any scientific basis, the source adds. What's more, it then hoodwinks the Japanese public into believing that the measures in place are internationally approved.

"There are no experts (advising the government), only academic flunkies creating a system that makes it easy for the government to operate and dodge any objections," he says. "Until Japan surrendered in the Pacific war, nobody thought they would lose because the people were fed false information claiming Japan was winning. The same thing is happening today with its fisheries: there are some truly insane things going on when it comes to fisheries resource management, but the Japanese people are being fed lies, such as that the measures being implemented are being praised by the international community. So nobody knows the truth and we end up with the vicious cycle we have, where too many fish are taken, stocks decline and regional fishermen get crucified. ... Japan simply has no plan toward a sustainable approach to stock management."

And without such a plan in place it is

unreasonable to expect self-regulation by the purse seine companies, who will simply follow the quotas set, the source adds.

Allegedly, however, there are those who don't even do that. According to Iki fisherman Nakamura there is a little-mentioned black market for Bluefin, which includes the unreported catching of smaller fish to be sold to farms. "These smaller fish are part of the 50 percent cut of bluefin weighing under 30 kg, but it's uncertain if any of the real catch data is being reported accurately," Nakamura says. "There has to be proper monitoring but Japan is not acting positively to address any of these stock-related issues. If it did then there would likely be a huge global change."

Proof of that can be seen in the vastly different state of bluefin stocks in the Atlantic compared with the Pacific, he adds.

Nagasaki University's Yamamoto argues it is unreasonable to place too much blame on purse seiners, who are after all only following the ebbs and flows of market forces, particularly while the development of complete tuna aquaculture remains a largely lab-based practice.

"There are a number of places in Japan including the private sector, Nagasaki Prefecture and the JFA, that are working toward the development of technology to mass produce artificial seeds ... but, for some years now the trend has been to take small fish from the Ocean, fatten them up and sell them in Japan's markets," Yamamoto says. "Companies overseas did the same thing, fattening up mature Bluefin and shipping them off to Japan, where they suddenly started to become readily available even in supermarkets and kaitenzushi ("conveyor belt sushi" restaurants), unlike before when Bluefin was solely a luxury item sold at high-class restaurants."

As a result, the scale of tuna farming expanded rapidly and new players entered the market,

which pushed up demand for natural seeds, and also the unit price, he adds. "In that kind of situation, where produce that was previously of little value, or at best a niche player in the sashimi market, suddenly can be sold at a high price, market players are bound to go out of their way to cast their nets for more. ... If the switch to mass production of artificial seeds becomes a reality, I think it is a matter of course that the burden on natural stocks of Bluefin in the Oceans will ease as it will no longer be necessary to fish them."

Yamamoto agrees that purse seiners targeting Bluefin spawners is far from ideal, but insists that other elements in the Bluefin tuna business - including a complex distribution system and the habits of tuna consumers themselves - also are playing an important role in those purse seiner's fishing strategies.

This likely will be of little comfort for the likes of Nishi and ippon-zuri fishermen around Japan, many of who joined members of the fisheries industry in April to attend the inaugural Tuna Summit on Iki island.

From the information shared during the summit, it was clear Iki's fishermen were far from being alone in suffering from the plunging Bluefin tuna stocks and the role of the purse seiners in their plight was a leading topic of discussion. As indeed was the fisheries agency's claim that the purse seiners' catch volume during the spawning season is no more than 6 percent of the total, which many attending dismissed as a gross underestimation.

Yet, it would seem that the criticism of purse seiner strategies is beginning to gain traction. One fisheries official from Sakae-Minato in

Tottori Prefecture, a base for purse seiners during the spawning season, told *Wedge* that while he couldn't risk giving names due to risk of being ostracized, he believed that companies involved in netting "in one fell swoop" a finfish rapidly facing extinction before it can even give birth should stop before it's too late.³²

Iki's Nishi says the lack of official action to make this happen and the impact that it has had on him and other local fisherman is less of a concern than what it means for future generations. His son, Shota, now 21, had long expressed a desire to become a tuna fisherman, but the poor prospects persuaded him to take work aboard a cargo ship, he says.

"What we are doing here in Iki is a drop in the ocean," Nishi says of the self-imposed three-year ban. "For things to recover, it would require a much wider effort, from the government and from those operating the purse seiners. However, it seems they are unable to think about the future. All they can think about is the here and now — and themselves."

Rob Gilhooly is a British photographer and writer who has lived in Japan for 20 years. A former staff reporter at the Japan Times, his work has appeared in publications around the globe including Newsweek, Time, The New York Times, International Herald Tribune, The Times, The Guardian, New Scientist and the Australian. His home page is [here](#).

See the following articles on related themes:

- Justin McCurry and David McNeill, [Japan's King of Fish Faces Extinction](#)
- David McNeill and Taniguchi Tomohiko, [A Solution to the Whaling Issue? Former MOFA spokesman speaks out](#)

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Notes

¹ [IUCN Red List of Threatened Species. Entry for Pacific Bluefin tuna](#)

² The International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean was established in 1995 through an agreement between Japan and the United States to enhance scientific research and cooperation for conservation and rational utilization of the species of tuna and tuna-like fisheries which inhabit the North Pacific Ocean. Current members include Canada, China, Korea, Mexico, Japan and the United States.

³ [\(2\) ISC Executive Summary of the 2016 Pacific Bluefin Tuna Stock Assessment](#)

⁴ See [here](#).

⁵ See [here](#).

⁶ See [here](#), table 1, page 5.

⁷ Mata mo shigenryo “kaho-shusse” no kuromaguro fuan tsunoru suisancho no kanri sochi. Wedge, July 2016. p. 57

⁸ Additionally there are some 330 distant water tuna fishing vessels and 350 offshore tuna vessels, both including longliner and pole and line boats, according to government data.

⁹ A Repeated Story of the Tragedy of the Commons. Yasuhiro Sanada. pp. 92-94. (English), available [here](#).

¹⁰ [Taiheiyo kuromaguro no shigen jokyo to kanri no hokosei ni tsuite](#). Japan Fisheries Agency, May 2015.

¹¹ See [here](#).

¹² Kuromaguro shigenkanri de “B0=B ZERO ron”, Nihon ha kikikan no kyouyu wo.” Suisan Keizai Shimbun, July 21, 2015.

¹³ See [here](#).

¹⁴ [Search for the Japanese tuna fishing data before and just after World War II](#). Hiroaki Okamoto.

¹⁵ See 5 above

¹⁶ See [here](#).

¹⁷ Kuromaguro sannen renzoku teikanyu ga joken, kinkyu ruru de suisansho. Suisan-Keizai Shimbun, July 15, 2016

¹⁸ See [here](#).

¹⁹ See [here](#).

²⁰ Race for the last Bluefin. WWF.

²¹ The European Commission is the European Union's executive body, whose main roles are proposing legislation, enforcing European law and managing and implementing EU policies.

²² [Bluefin tuna fishing season 2015: EU benefits from recovery of the stock](#).

²³ See [here](#), p.8

²⁴ See [here](#).

²⁵ [Ahead of Critical International Meetings, the U.S. Should Not Promote Consumption of Highly Depleted Pacific Bluefin](#), Amanda Nickson. Pew Charitable Trusts website, May 24.

²⁶ See Note 3 above

²⁷ A Repeated Story of the Tragedy of the Commons. Yasuhiro Sanada. p. 59. (English), available [here](#).

²⁸ A Repeated Story of the Tragedy of the Commons. Yasuhiro Sanada. p. 90.

²⁹ [Can farmed tuna save the Bluefin from extinction?](#) Masami Ito, The Japan Times. January 23, 2016.

³⁰ Ibid/Yamamoto Naotoshi and Kitano Shinichi “kokunai maguro yoshokugyo ni okeru ote shihon no sannyu seisan jissei to shijo kozo” p.7

³¹ [Farming The Bluefin Tuna, Tiger Of The Ocean, Is Not Without A Price](#). Dan Charles, NPR.

³² Mata mo shigenryo “kaho-shusse” no kuromaguro fuan tsunoru suisancho no kanri sochi. Wedge, July 2016. p. 58