

FY2017 Trends in Fisheries

FY2018 Fisheries Policy

White Paper on Fisheries: Summary

This document is a report on fisheries trends and the policy implemented during FY2017 in accordance with the provisions of Article 10, paragraph (1) of the Fisheries Basic Act (Act No. 89 of 2001) as well as the fisheries policy to be implemented in FY2018 in accordance with the provisions of paragraph (2) of said Article.

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Development and Utilization of Technologies for the Fisheries Industry -Linking Science to Actual Practice-

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Section 1 History of Developments in Technologies for the Fisheries Industry

- Japan's fisheries industry adopted advanced foreign technologies during the Meiji period. Subsequently, a variety of technologies were developed within the country.
Expanding its fishing grounds to distant waters amid efforts made for post-war economic reconstruction, Japan developed into the world's leading fishing country.
- While Japan's fisheries industry later faces tough situations such as the downscaling of distant water fisheries with the advent of the 200 nautical miles era and decrease in catches partly due to resource fluctuations, originality and ingenuity are utilized for the application of diverse technologies to the industry in order to ensure stable supply of fish and fishery products.

History of Developments in Technologies for the Fisheries Industry

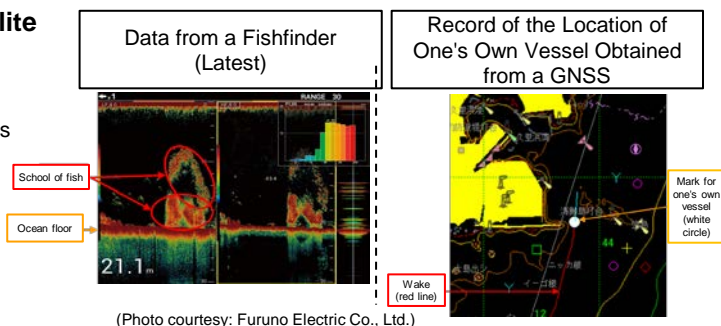
| Field | Up to the early modern period (~1867) | Meiji period (1868~1912) | Taisho period to early Showa period (1912~1945) | Post-WWII Showa period (1945~1988) | Heisei period (1988~) |
|--|---|--|---|--|---|
| Fishing (fishing boats and gear, etc.) | <ul style="list-style-type: none"> • Concurrently engaging in other businesses such as salt production or transportation services • Beach seines, set nets, etc. • Sardine fishing for fertilizers made from fish parts • Hemp fishing nets | <ul style="list-style-type: none"> • Powered fishing vessels (Norwegian whaling vessels, British trawlers, bonito vessels) • Imported cotton fishing nets • Powered net making machines | <ul style="list-style-type: none"> • Long-distance whaling using mother vessels • Powered fishing vessels (for codfish, crab, salmon and trout, and tuna fisheries) • Motorization of small coastal fishing vessels • Cold-storage/Refrigerated cargo vessels • Increase in the size of fishing nets | <ul style="list-style-type: none"> • Whaling, tuna fisheries, northern sea fisheries • Fishfinders, sonars • Refrigerator (-25°C to -55°C) • Small FRP fishing vessels • Aluminum fishing vessels • Diesel engines • Motorization, etc. of fishing devices • GPS sailing equipment | <ul style="list-style-type: none"> • Environment-conscious fishing technologies • Cost-reducing technologies • Fish-luring LED lights |
| Aquaculture / Propagation | <ul style="list-style-type: none"> • Carp culture • Oyster culture • Nori seaweed culture | <ul style="list-style-type: none"> • Rainbow trout culture • Eel culture • Pearl culture | <ul style="list-style-type: none"> • Nationwide extension of nori seaweed culture, oyster culture, and pearl culture | <ul style="list-style-type: none"> • Yellowtail cage culture • Artificial seedling collection of nori seaweed • Wakame seaweed culture • Freezing storage of nets for nori seaweed cultivation • Seedling production of common shrimp and sea bream • Intermediate growth • Compound feeds • Diversification of cultivating technologies (for silver salmon, white trevally, etc.) | <ul style="list-style-type: none"> • Biotechnologies • Overland culture • Complete farming of bluefin tuna • Complete farming of Japanese eel |
| Processing / Distribution | <ul style="list-style-type: none"> • Drying, salting, dried fish shavings • Markets (Osaka, Edo, etc.) | <ul style="list-style-type: none"> • Expansion of distribution (rail transportation, steam vessel transportation) • Canned salmon production | <ul style="list-style-type: none"> • Quick freezing technology | <ul style="list-style-type: none"> • Fish hams and sausages • Frozen minced fish • Refrigerated distribution • Live fish distribution • Packaging technologies such as aseptic filling technology • Super-chilled technology (ice temperature freezing technology) | <ul style="list-style-type: none"> • Commercialization of DHA and EPA • HACCP |
| Fishing port/ground enhancement | | <ul style="list-style-type: none"> • Development of harbors | <ul style="list-style-type: none"> • Increase in the size of fishing ports | <ul style="list-style-type: none"> • Improvement and development of coastal fishing grounds | <ul style="list-style-type: none"> • High-sanitary-control freight handling areas • Extension of fishing ground enhancement to offshore areas |

Source: Prepared by the Fisheries Agency, based on various materials

Column: "Fishfinder" and "Global Navigation Satellite System (GNSS)"

Soon after WWII, "fishfinders" to find schools of fish in the ocean were developed. Thereafter, searchlight sonars and scanning sonars were created, leading to greater chances to find schools of fish.

Furthermore, the operation of a GNSS, which receives signals from satellites, enables the location of a vessel to be found out (today the number of satellites has increased, making it possible to calculate any location for 24 consecutive hours). The recording of sailing routes and fishing locations with this technology has contributed to dramatically more efficient fisheries operations.

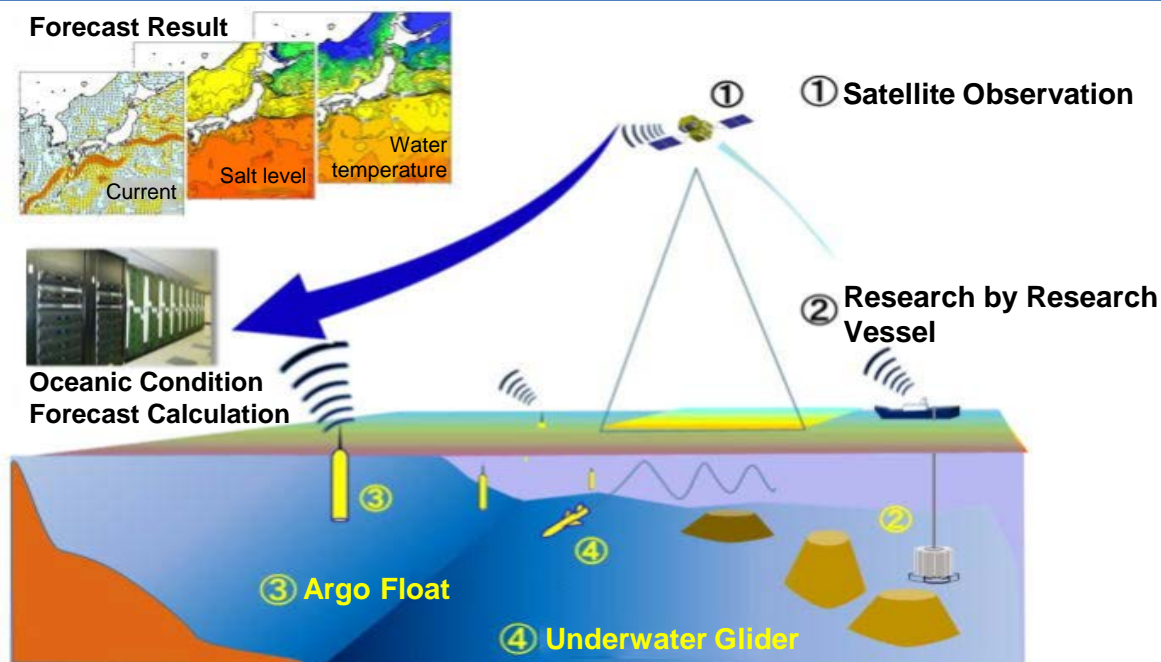


Section 2 Information on the Marine Environment and Resource Status, and Its Utilization

(1) Understanding the Marine Environment

- By conducting oceanographic observations, Japan has studied the relationship between the marine environment such as sea temperatures and fish distribution and catches for more than 100 years. Furthermore, Japan has continuously carried out fixed line observations to date. The provision of information on oceanic conditions to fishers has also continued. Since 1972, the Japan Fisheries Information Service Center (JAFIC) has performed this provision, sending out information on, inter alia, the marine environment and on fish catches.
- As sea surface temperature observation data from satellites of the National Oceanic and Atmospheric Administration (NOAA) became available during the 1980s, the JAFIC launched its provision of wide-area sea surface temperature maps from the satellites in 1985. Fishers became able to obtain the latest and detailed sea surface temperature distribution data in their fishing grounds by fax. This was the beginning of the era of satellite data use.
- From the 1990s, experiment and research institutes started receiving data from the NOAA's satellites in real time, thus the use of such data being expanded. In addition, owing to the spread of digital communication on the ocean, such data became available for direct use via the Internet.
- For Japan, the satellite "Shizuku" equipped with a microwave radiometer made it possible to measure the sea surface temperatures of clouded ocean areas in 2012, contributing to the enhancement of the precision of sea surface temperature observation when used with data from other satellites.
- In 2015, frequent sea surface temperature observation data were made available by "Himawari No. 8", and the use of such data for marine sectors also started. Subsequently, "Shikisai" was launched in 2017, resulting in high-resolution observation of sea surface temperatures and ocean colors, and thereby expected to improve the quality of information on oceanic conditions.
- To know marine conditions, it is necessary to have not only information on sea surface temperatures but also information on underseas temperatures and salt levels. That is why oceanographic observations are routinely implemented by using research vessels, etc.
- Since the 1990s, through the integration of water temperature data and salt level data acquired from field observations with sea surface temperature data and sea surface height data from satellites, some progress has been made in the development of an oceanic condition forecast system that uses technologies to reconstruct oceanographic structures and uses numerical models.
- In Japan, the Japan Meteorological Agency and the FRA regularly provide oceanic condition forecast information for up to two months ahead. Also, the FRA utilizes such information to forecast fishing conditions for sardines and Japanese common squid in the waters around Japan.
- In addition to oceanographic observation data, the expansion of field observation data through fishers' observations while engaging in fishing operations is effective in further streamlining fisheries activities.
- In particular, the provision of high-resolution oceanic condition forecast information based on oceanic condition forecast models is expected to be useful for coastal fisheries susceptible to complex oceanic conditions.

Utilization of Satellite Observation Data and Field Oceanographic Observation Data Obtained from Research Vessels, Argo Floats, etc.



(2) Understanding the Status of Resources

(a) Use of Quantitative Echo Sounders

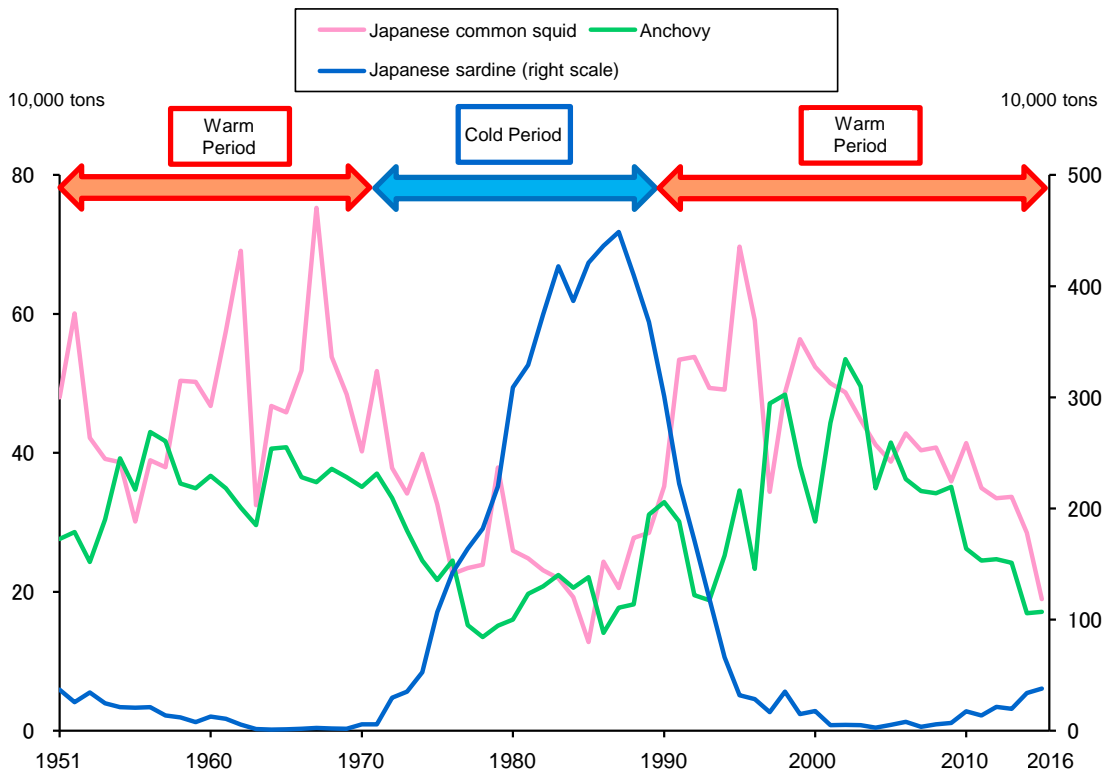
- Basic information necessary for the stock assessment is fisheries catch data, etc.
- However, there is a limitation on information that can be obtained from fisheries. For that reason, surveys using research vessels are conducted to collect information that is independent from fisheries.
- Surveys with fishfinders conducted in recent years use high-performance quantitative echo sounders to estimate the resource abundance, etc.

(3) Changes in the Marine Environment and Their Relationships with Fisheries Resources

(a) Marine Environment and Resource Fluctuations

- The level of abundance of fisheries resources fluctuates as strongly affected by the marine environment including the water temperature, oceanic current, feeding amount, etc. Among these factors, water temperature is easy to measure and a rich source of information. Therefore, for many resources, the relationship of water temperature with resource fluctuations has been studied and reported.
- The water temperature of the North Pacific Ocean has multidecadal-scale fluctuations called "regime shift". In the waters around Japan, the catches of anchovy, Japanese common squid, etc. tend to increase during a warming regime. On the other hand, the catches of Japanese sardine, etc. tend to increase during a cold regime. In recent years, the Japanese sardine abundance has risen, indicating a potential ongoing transition to a cold regime.
- It is confirmed that the water temperature optimal for the growth of larval Japanese sardine is lower than that for larval anchovy. This suggests a potential cause of the increase of Japanese sardine and the decline of anchovy during a cold regime.

Trends in the Catches of Fish Species that Go through Species Alternations

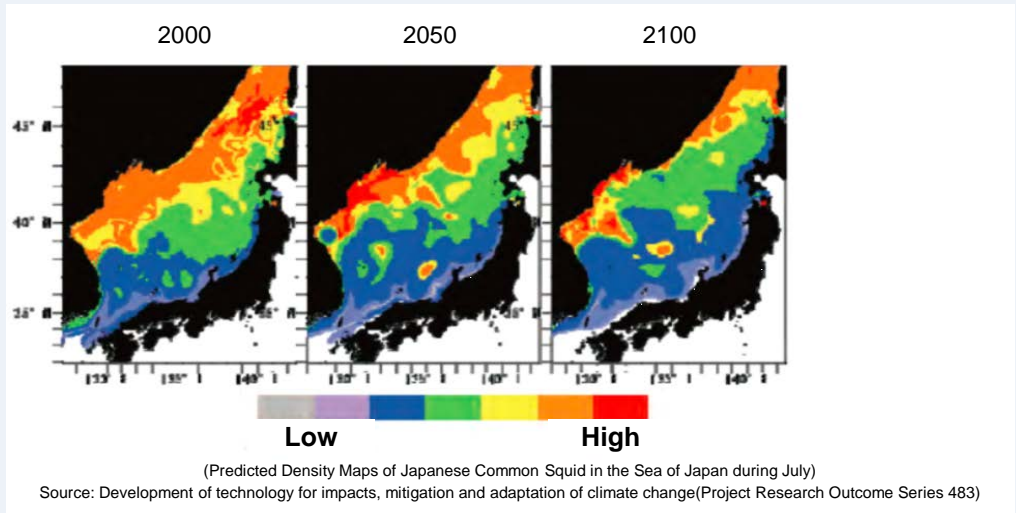


Source: Japan Fisheries Research and Education Agency

(b) Impact of and Adaptation to Climate Change

- Climate change affects fisheries resources, fisheries and aquaculture through, among other factors, increase in sea temperatures due to global warming. For instance, the northward movement of the distribution areas of Japanese amberjack, Japanese Spanish mackerel, etc., and the mass mortality of scallop in Mutsu Bay were reported in recent years. Against these cases, measures have been considered; for the fish species whose distribution areas have moved toward the north, the use of such species at the new distribution areas is encouraged; and with regard to the mass mortality of scallop, when the water temperature exceeds 20°C, scallop's aquaculture facilities are to be moved to a deeper layer with a lower water temperature.
- Assessments have been carried out to examine the impact of climate changes if they are to go on for a mid- or long-term in the future. The summer distribution areas of Japanese common squid in the Sea of Japan and salmon (chum salmon) in the North Pacific Ocean are predicted to move to the north around the year 2100.
- Climate change affects the vertical mixing, etc. of seawater and the progress of ocean acidification. It is necessary to monitor climate change by conducting observations using research vessels and satellites.
- With regard to climate change, it is important to have measures for both "mitigation" of the situation by, for example, controlling the emission of greenhouse gases, and "adaptation" to an unavoidable impact.
- With regard to adaptation, for example, the development of new nori seaweed species that can be grown at 24°C or more for two weeks or more (the existing species cannot be cultivated in a stable manner unless the water temperature is 23°C or less) has been promoted.

Changes in the Distribution of Japanese Common Squid around 2050 and 2100



(4) Significance of Information Collection and Utilization

- In the future, studies on the marine environment and resource situations continue to be advanced by utilizing new technologies, and highly-reliable information continues to be provided to fishers, both of which are expected to lead to sustainable fisheries.

Section 3 ICT Utilization

(1) ICT Utilization in Aquaculture

- For non-feeding aquaculture, it is essential to understand such data as water temperature to ensure systematic cultivation. Efforts have been made for the development of systems that allow the measurement of such data and the access to results of such measurement irrespective of time or location, expected to contribute to the implementation of precise aquaculture operations.
- For feeding aquaculture, in addition to the understanding of data such as water temperature, optimal feeding methods are explored by accumulating data including the feed amount and growth speed, in the hope that this will lead to new ways of production control that can reduce feed costs, etc. Furthermore, the development of techniques to automatically count up and accurately find out the population of farmed fish in preserves is underway, expected to lead to steady management and labor-saving.

Case Example 1: Approaches in Nori Seaweed Culture (the Ariake Sea)

In order to improve the quality and harvest of cultured nori seaweed, fishers installed buoys in their culturing places to measure the water temperatures, etc., in an attempt to remotely obtain data. In the Ariake Sea area of Saga Prefecture, the accumulation and management of video pictures, etc. of culturing places taken by drones, and the AI-based analysis of images enable any detected occurrence of diseases or the outbreak of red tide to be communicated to fishers at an early stage, which is expected to contribute to the implementation of precise measures against such diseases or red tide.



Marine Observation Buoy
(Photo courtesy: NTT DOCOMO)

Case Example 2: Approaches in Japanese amberjack Culture (Azuma Town Fisheries Cooperative in Kagoshima Prefecture)

For the Azuma Town Fisheries Cooperative that largely consists of business owners, the development of a mechanism to properly meet various demands of their clients is an urgent task. To tackle this issue, the use of a system that allows environmental data and aquaculture management data to be input into tablet terminals on fish preserves has started on a trial basis. In addition, the development of systems to accurately visualize production processes has been set forward, which include an image processing system to automatically measure fish lengths and fish populations in fish preserves with underwater cameras installed therein.



Production Control Utilized Tablet
(Photo courtesy: Japan Fisheries Research and Education Agency)

(2) ICT Utilization in Coastal Fisheries

- For coastal fisheries, ICT is expected to be utilized for the forecasting of fishing grounds and catches, resource management, etc. on the basis of past catch data, in addition to ICT utilization for the measurement of data such as water temperature as is the case for aquaculture.

Case Example 1: Sea Cucumber Resource Management (Rumoi City, Hokkaido)

With the digitalization of fishing diaries with tablet terminals, fisheries experimental stations estimate the level of resource abundance on the basis of catch data, etc. sent from fishers in real time. Its system reports the results of such estimation to fishers so that fishers realize the actual resource situation, which has contributed to actions aiming to recover the now declined sea cucumber abundance.

| 日付 | 時間 | 水温 | 水深 | 風速 | 風向 |
|----|-------|-------|-------|-----|-----|
| 1 | 08:07 | 09.18 | 01.00 | 0.5 | 北北東 |
| 2 | 09:25 | 10.33 | 01.00 | 0.5 | 北北東 |
| 3 | 10:02 | 11.01 | 00.40 | 0.0 | 北北東 |
| 4 | 11:30 | 12.04 | 00.00 | 0.2 | 北北東 |
| 5 | 13:00 | - | - | - | - |
| 6 | - | - | - | - | - |
| 7 | - | - | - | - | - |
| 8 | - | - | - | - | - |

Input Catch Information on Tablet Terminals
(Photo courtesy: Future University Hakodate)

Case Example 2: Approaches to Efficient Set Net Fishing (Higashi-Matsushima City, Miyagi Prefecture)

Whether fishing should take place is judged by referring to images taken by underwater cameras installed on set nets. The approaches taken include the realization of catch forecasting by installing buoys to measure marine data and analyzing such data and past catch data, and the initiation of direct trade with buyers by making catch information, etc. open to such buyers.



Confirming Data from Marine Observation Buoy on the Tablet Terminal
(Photo courtesy: KDDI Corporation)

Case Example 3: Fishing Ground Forecasting System (Northern-Kyushu coastal sea area)

A mechanism to provide fishers with forecast information is being constructed through the development of a fisher-participating waters observation network and of high-precision fishing ground formation forecast models for the coastal sea areas with use of data from the above observation. In achieving this goal, the development of compact measuring devices for fishers to obtain information on the water temperature, salt level, etc. of the water area in which they are fishing, and the development of application programs to deliver forecast information to fishers' personal digital assistants, etc. have started. These efforts are expected to "visualize fishing grounds" and thereby lead to effective fisheries even where fishers lack sufficient experience.



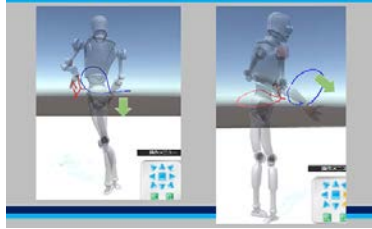
CTD Test Model
(Photo courtesy: Kyushu University)

(3) ICT Utilization in Offshore Areas

- In offshore areas, the utilization of fishing ground forecasting systems and ICT related to fishing operations has started. The saving of fuels and the introduction of highly-productive fishing tools are expected to stabilize fisheries management.

Case Example 1: Approaches to Preparing Big Data of Distant Water Skipjack and Tuna Fisheries

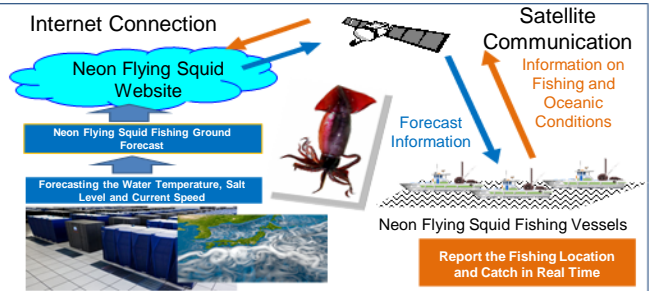
The development of new technologies (automatic skipjack fishing devices, fish catch determination by image processing, etc.) has been started for application to oceanic condition forecasting, the forecasting of fish migration, etc. through the aggregation of data on the marine environment and catches obtained by fishing vessels, and through communication of such data to the land for analysis (preparation of big data).



3-D motion (The Experienced and the Inexperienced)
(Photo courtesy: Japan Fisheries Research and Education Agency)

Case Example 2: Neon Flying Squid Fishing Ground Forecasting System (Northwestern Pacific Ocean)

For neon flying squid fishing in the northwestern part of the Pacific Ocean, fishing ground forecasting models were developed to estimate the optimal habitats of neon flying squid on the basis of information on fishing and oceanic conditions. Forecast results are sent to fishing vessels. Furthermore, a system has been run on a trial basis to find out gaps between the real-time fish catching situation in fishing grounds and fishing ground forecasts and the causes of such gaps, and to feed back recommended fishing areas to fishing vessels.



(Information provided by the Japan Agency for Marine-Earth Science and Technology)

(4) ICT Utilization in Diverse Fishery Sectors

- Various forms of ICT utilization are expected to lead to labor-saving, etc. in various sectors.

Case Example 1: Poaching Surveillance System (Countermeasure against Sea Cucumber Poaching)

As a countermeasure against the poaching of sea cucumber in Mutsu Bay of Aomori Prefecture, a mechanism was developed to automatically trigger alarms for relevant fisheries cooperatives, etc. when AI identifies poaching vessels by referring to images sent from 15 surveillance cameras installed. This enables real time surveillance 24 hours a day and 365 days a year, expected to lead to the recovery of sea cucumber abundance.



Surveillance Camera
(Photo courtesy: Aomori Prefecture Federation of Fisheries Cooperatives)

Case Example 2: Online System for Fishing License, "Fish Pass"

The Takedagawa Fisheries Cooperative in Fukui Prefecture introduced an online fishing license purchase system and thereby managed to resolve the problem of insufficient collection of fishing fees from fishers and to shorten the time taken to patrol the area.



Fish Pass App Screen on the Smartphone
(From the website of Fish Pass)

(5) Distribution and Processing With ICT

- The utilization of ICT has also started in the fields of distribution and processing, expected to lead to the expansion of e-commerce of fish and fishery products, the streamlining of and labor-saving in operations at processing sites, high-precision quality control, etc.

Case Example 1: ORAHO's Oyster Market (Electronic Wholesale Market)

The Miyagi Prefecture Fisheries Cooperative developed an electronic wholesale market to promote the producer-direct sale of in-shell oysters. This has made it possible to conduct e-commerce with buyers in the Tokyo metropolitan area. Furthermore, despite the declining number of workers engaging in shell-removing operation, it is possible to maintain the production volume and hope for some improvements in producers' income.



(From the website of "ORAHO's Oyster Market")

Case Example 2: Removal of Scallop Midgut Gland by Robots

The removal of scallop midgut gland by robots has resolved the issues of quality maintenance and workforce shortage. A robot takes and processes a photograph of a scallop and adjusts its angle to remove the midgut gland. It imitates the "movement of nipping and grabbing".



(Photo courtesy: Ishinomaki Suisan Tekko)

Section 4 For Sustainable Development of the Fisheries Industry by Combining Science and Actual Practice

(1) From "Technologies as Fishing Tools" to "Technologies for Understanding the Sea"

- Since the Meiji period, Japan's fisheries have developed "tools" to maximize fish catches and distribute such catches, for example, by motorizing and enlarging fishing vessels, enhancing the durability of materials for fishing gear, and introducing refrigeration technologies for the long-term storing of fish and fishery products.
- From the past, oceanographic observation has been continued to understand the marine condition. Now, it is possible to more accurately understand such condition thanks to the advancement of communication devices, the measurement of sea temperatures with sensors, and the utilization of satellite information.
- There has been some progress in the development of technologies for estimating fish locations, including the development of fishfinders, etc. In recent years, the development of technologies that utilize IoT or AI to forecast fishing grounds or catch quantities has started. Further progress in the development of technologies for "understanding the sea" is a possibility.
- The combination of fishers' intuition and experience that have been cultivated over time with such technologies will hopefully lead to more efficient operations than ever before.

(2) ICT Utilization Adapted to Unique Characteristics of Fisheries

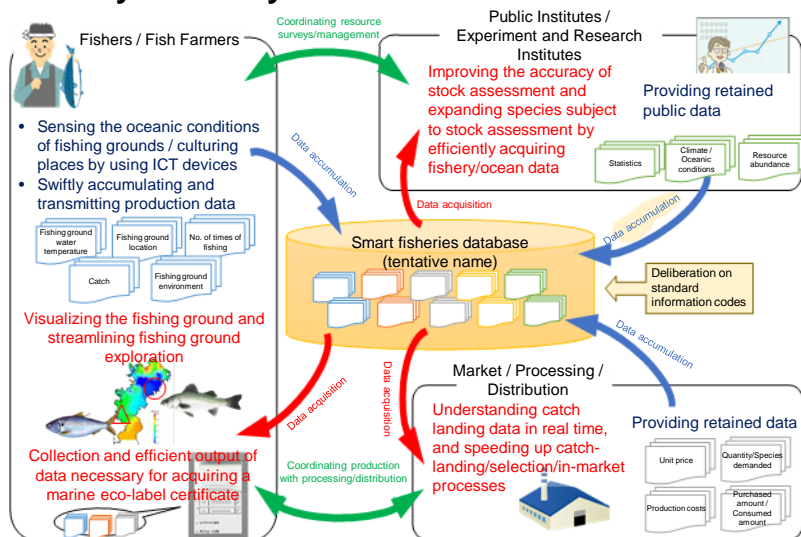
- The characteristics of fishery sectors are that the acquisition of various data of the vast and ever-changing seas itself poses a high hurdle to get over in terms of technology and cost, in addition to hostile environmental conditions including the target being moving fish species and the difficulty to receive signals when devices are used on the sea.
- In order to use ICT, it is necessary to develop low-cost devices that can be mounted on small fishing vessels, and to ensure that necessary devices are easy to use and systems do not require much time for data input so that operations at fishing locations, such as the provision of information on the sea or fishing ground or the reporting of catches, will not obstruct essential fishing operations.
- Fishers feel greatly uncomfortable with making their catch information open in real time. This is because a good fishing ground that a fisher has found is to be known by other fishers, thereby potentially increasing competitors. For that reason, the release of information requires a certain consideration.
- As shown above, for the introduction of ICT into fishery sectors, it is important to sufficiently understand the characteristics of fisheries and seek the understanding and cooperation of fishers.

(3) Enhancement in Productivity and Improvements in the Working Environment through Labor-Saving

- The utilization of ICT can enhance efficiency, for example, by shortening operation hours and supplementing workforce that tends to be scarce, and is therefore beneficial in terms of fisheries management.
- In particular, there are likely to be more opportunities for AI utilization in addition to its use for productivity enhancement, such as its application to surveillance systems.
- Since fishery processing is conducted overland, the environment makes it easy to utilize ICT. The introduction of ICT for the purpose of streamlining and labor-saving is expected to be advanced in this sector in the future.

(4) To Establish the Smart Fisheries Industry that Fully Utilizes Data

- In order to promote approaches to sharing and utilizing data among fishers, fish farmers, distributors, processors, and experiment and research institutes, central data platforms will be constructed to promote the acquisition, sharing and utilization of wide-ranging data in the future. These will be likely to achieve improvements in the productivity, etc. of the whole value chain.
- The Fisheries Agency plans to implement fisheries policies that receive the understanding of the public by adopting new information and communication technologies, etc., transforming the current fisheries industry into efficient and advanced one based on data, and visualizing the actual situation of fisheries.



Chapter II

Trends in Japan's Fisheries Since FY2016

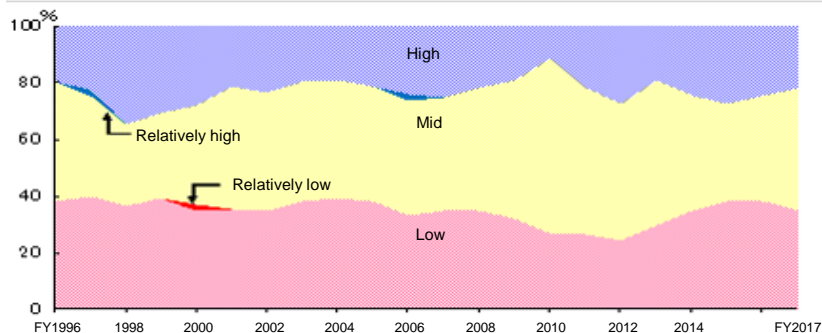
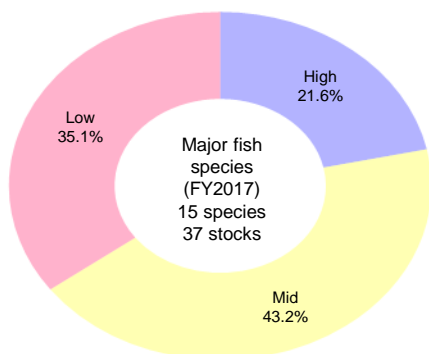
Introduction New Basic Plan for Fisheries

- The new Basic Plan for Fisheries formulated in 2017 lays out comprehensive and systematic measures to be implemented to further sophisticate fisheries resource management and to transform the fisheries industry into a growing industry by enhancing the productivity of the industry and increasing income of fishers, with the aim of fully utilizing rich fisheries resources around Japan in a sustainable manner, stably supplying fish and fishery products, and maintaining and developing fishing communities.
- The target self-sufficiency rate of edible fish and fishery products for FY2027 has been set as 70%.

Section 1 Trends in Fisheries Resources and the Fishing Ground Environment (1) Fisheries Resources in the Waters around Japan

- In the management of fisheries resources, it is indispensable to estimate the resource abundance, levels, and trends through stock assessment, and, based on the results of such assessment, to take appropriate management measures.
- The results of the FY2017 stock assessment in the waters around Japan (for 84 stocks of 50 species) show that resource levels are high in 14 stocks, moderate in 31 stocks and low in 39 stocks.
- As for major 37 stocks of 15 species closely linked to the lives of people, resource levels are high in 8 stocks, moderate in 16 stocks and low in 13 stocks.

Status and Trends in Resource Levels in Waters around Japan (Major Species)



Source: Prepared by the Fisheries Agency, based on the Fish Stock Assessment in the Waters around Japan (the Japan Fisheries Research and Education Agency and the Fisheries Agency)

(2) Japan's Fisheries Resource Management

(a) Japan's Fisheries Resource Management System

- Techniques for resource and fisheries management are primarily classified into 1) input control, 2) technical control, and 3) output control. A variety of methods are combined in Japan to properly manage resources, taking into account the characteristics of fisheries, the number of fishermen, the status of targeted stocks, etc.
- The resource management in shellfish/seaweed collection, in set net fishing, and in aquaculture is conducted based on a fishing rights system whereas the resource management in offshore/distant water fisheries based on a fishing permit system.
- The Total Allowable Catch (TAC) system has so far covered 7 fish species. Since 2018, bluefin tuna has been added to the system.
- In the future, the IQ system will be used to the extent possible, taking account of the actual situation of fisheries.

Correlation Between Resource Management Methods

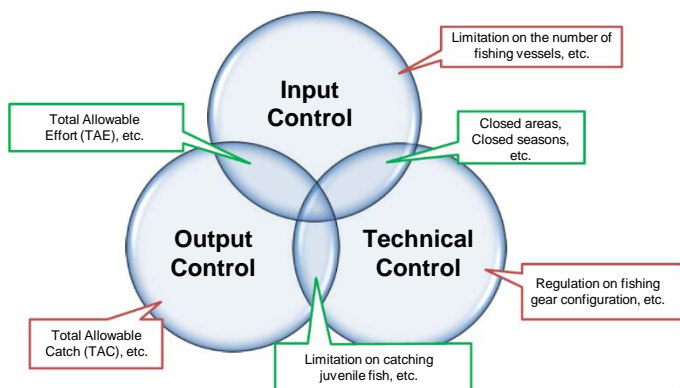


Illustration of Fishing Operations (June)

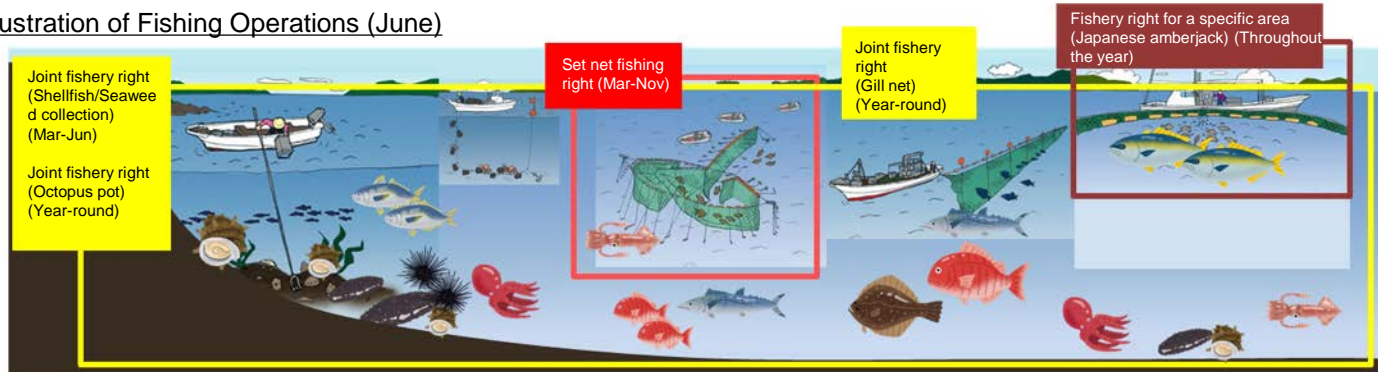
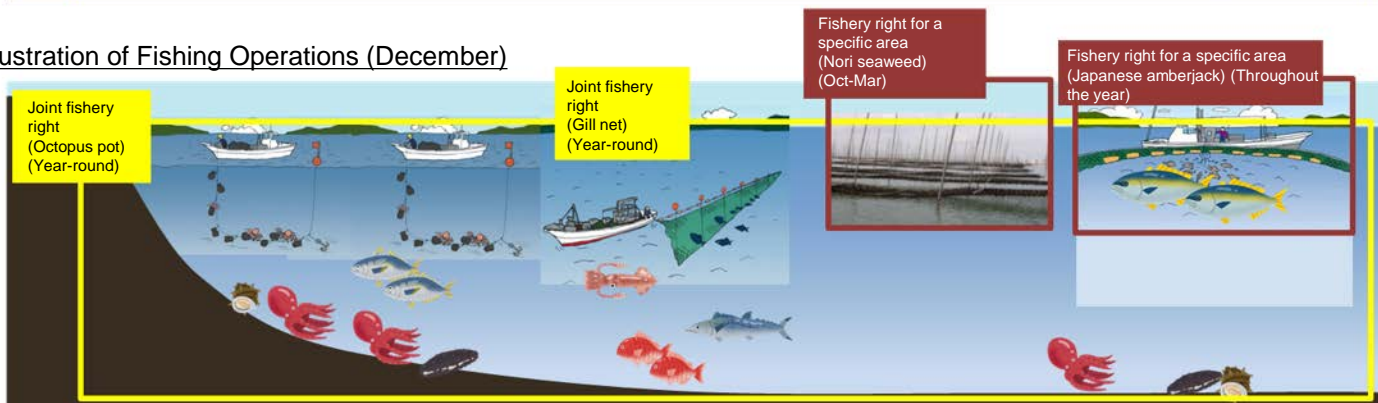


Illustration of Fishing Operations (December)



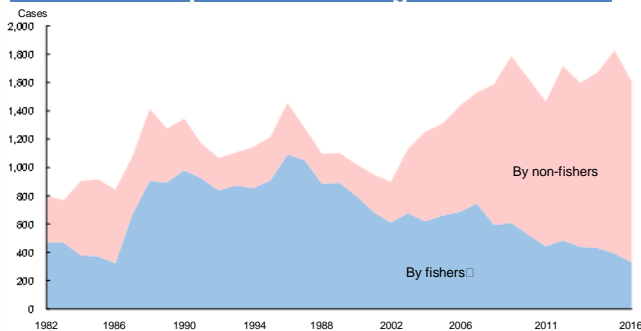
(b) Joint Management Based on Resource Management Plan

- In Japan, not only statutory regulations but also fishers' voluntary resource management, which imposes limits on fishing periods, fish lengths, operating times, fishing areas, etc., play a key role in fisheries resource management.
- The national and prefectural governments set the "Resource Management Guidelines" from FY2011, based on which the groups of fishers develop and implement their own resource management plans. The "Resource Management and Income Stability Measure" is implemented for fishers who are systematically engaged in resource management.

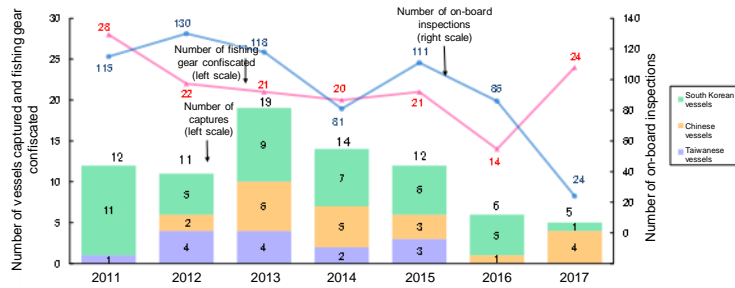
(3) Approaches to Practical, Effective Resource Management

- Authorized fisheries supervisors are engaged in regulatory activities in cooperation with the coast guard and police officers while fishers belonging to fisheries cooperatives patrol fishing grounds, report illegal fishing, and implement measures to prevent poached catches from being distributed.
- The number of arrests for violation of fisheries laws and regulations stood at 1,630 in 2016 (1,531 in coastal waters and 99 in inland waters). The number of poachings conducted by non-fishers has increased. In particular, the poaching of reef resources, which is systematically conducted by antisocial forces, has become rampant.
- In 2017, the Fisheries Agency conducted 24 on-board inspections and captured 5 foreign fishing vessels; and the number of confiscations of illegal fishing gear totaled 24.
- In waters surrounding Yamato Ridge of the Sea of Japan, illegal operations conducted by fishing vessels belonging to North Korea, etc. have been on the increase. In response, vessels for fishery inspection are deployed on a priority basis to remove illegal vessels by taking rigorous actions such as the use of water cannon. As a result, in 2017, the number of cases in which an expulsion warning, etc. was issued to foreign fishing vessels stood at 5,191.
- In order to deal with changes in the situation in which illegal operations conducted by foreign fishing vessels in the waters around Japan were becoming malignant and becoming increasingly sophisticated and spread out, the Fisheries Agency "Fisheries Enforcement Headquarters" was established in January 2018 with the Director-General of the Fisheries Agency as the Direct General of the Fisheries Enforcement Headquarters.
- Illegal operations will be strictly dealt with, for example, by conducting intensive surveillance in sea areas in which, and at times during which, illegal operations occur frequently.

Trends in the Number of Poaching Events in Japan's Marine Regions



Trends in the Number of Foreign Fishing Vessels Captured or Inspected



A vessel for fishery inspection belonging to the Fisheries Agency, "Shoyo Maru", is using a water cannon to remove a fishing vessel appearing to be a North Korean vessel from Japan's EEZ.

(4) Measures to Actively Enhance Fisheries Resources

- In each area, a seedling release program is in place to raise juvenile fish to certain sizes for release in order to actively increase resources.
- Such programs as the "Resource-creating Farming Fisheries," in which part of adult fish are conserved for the next generation reproduction, are promoted.
- The government has implemented the "Frontier Fishing Ground Enhancement and Development Project" that is to enhance offshore fisheries resources by constructing protective and nursery reefs and mound reefs. These activities have been working well in the conservation and propagation of fisheries resources.
- Inland water fisheries cooperatives, meanwhile, are working on programs to release sweetfish/eel seedlings and set up spawning beds.

Aquatic Animals Captured in Protective and Nursery Reefs

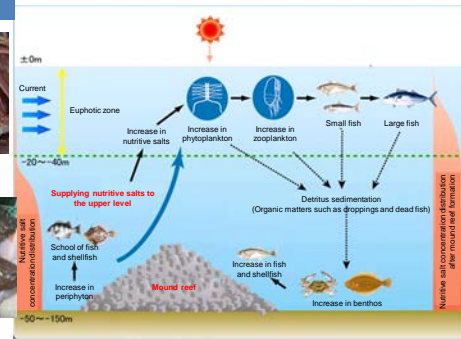


Snow crab



Flathead flounder

Mound Reef Mechanism



(5) Trends in Fishing Ground Environment

- It is important to raise the level of productivity in the entire ecosystem through the conservation of seaweed beds and tidal flats and the recovery of their functions. Broad-based conservation measures have been promoted by combining local governments' development of seaweed beds/tidal flats with fishers' and residents' conservation of seaweed beds/tidal flats.
- In fish farms, fisheries cooperatives, etc. formulate "Fishing Grounds Area Improvement Plans". Improvement of the fish farm environment has been promoted with support based on the "Resource Management and Income Stability Measure".
- As far as inland water fisheries are concerned, in accordance with the "Guidelines on Promotion of Inland Water Fisheries", the relevant ministries and agencies, local governments, and fisheries cooperatives have been cooperative with one another in setting forward their efforts for the recovery of the fishing ground environment.
- Since it has been pointed out that the decline, maldistribution, etc. of nutritive salts including nitrogen and phosphorus is potentially reducing the primary productivity of sea areas such as the Seto Inland Sea, surveys and research are promoted to find out the impact of nutritive salts on fisheries resources.
- Ocean pollution problems due to plastic wastes have attracted the public attention. Plastic wastes have an impact on the environment and ecosystems as well as on fisheries through being mixed into fishery catches. The Japanese government has financially supported surveys on actual conditions concerning marine litter and the collection and disposal of litter, etc. drifted ashore conducted by local governments. In addition, measures to be taken in relation to people's daily life play an important role, which include the management and recycle of domestic wastes that is regarded as a source of marine litter.

Column: Marine Litter Collection Activities

Some data suggest that 80% of marine litter originates from land areas, and such litter causes problems including adverse effects on the ecosystem and enormous costs for litter disposal. The Clean Sea and Beach Foundation calls on fisheries cooperatives, volunteer organizations, etc. all over Japan and organizes cleaning activities on beaches, rivers, etc. Participants' feedbacks include, "Surprised at the high volume of litter", and "A good opportunity to be aware of the fishing ground environment".



Participants are picking up litter.

(Photo by the Clean Sea and Beach Foundation)

(6) Damage to Fisheries Caused by Wildlife and Mitigation Measures

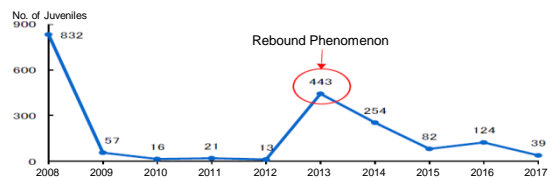
- In recent years, reports have come out about damage to fisheries caused by wildlife such as Steller's sea lions and *Asciidiella aspersa*. Especially in the sea areas around Hokkaido, damage to fishing gear and feeding damage to catches frequently occur, caused by Steller's sea lions, etc. For wildlife that range/migrate across prefectural borders, only if wide-area measures are expected to be effective for damage prevention/reduction, the national government supports investigations on the occurrence status, the provision of related information, the development of technologies to reduce damage, and control activities, etc.
- Inland water fisheries have been facing the problem of feeding damage to resources caused by largemouth bass, great cormorant, etc., and therefore control measures against them are promoted.

Column: Do Non-native Fish Rebound? -Countermeasures against Non-native Fish-

As a result of efforts made to exterminate largemouth bass in Sonenuma of Hikone City, Shiga Prefecture, its population gradually declined to a significantly low level. However, the population of its juveniles suddenly rose in 2013. This phenomenon is called a rebound phenomenon.

Adult largemouth bass were found to eat their juveniles (cannibalization) when the population of indigenous fish species, which are their prey, became low. The extermination of adult fish, which are a natural enemy of juveniles, induced an increase of juveniles.

Therefore, it is important to implement a systematic capture, etc. of juveniles while checking the effect of extermination.



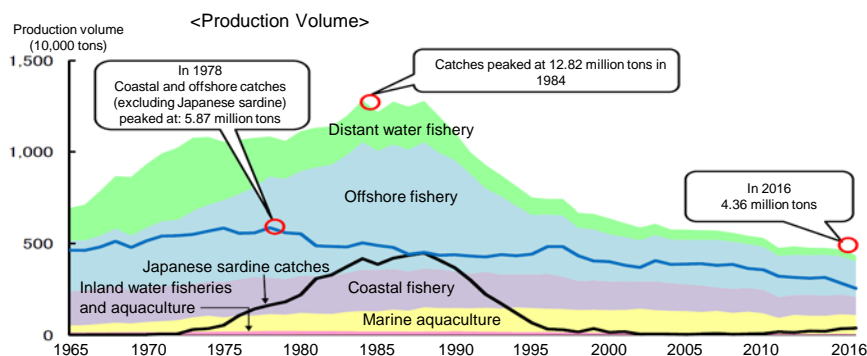
Number of Largemouth Bass Juveniles Captured in Set Net Surveys in Sonenuma during June to September (Information provided by Shiga Prefecture)

Section 2 Trends in Japan's Fisheries

(1) Trends in Fisheries and Aquaculture

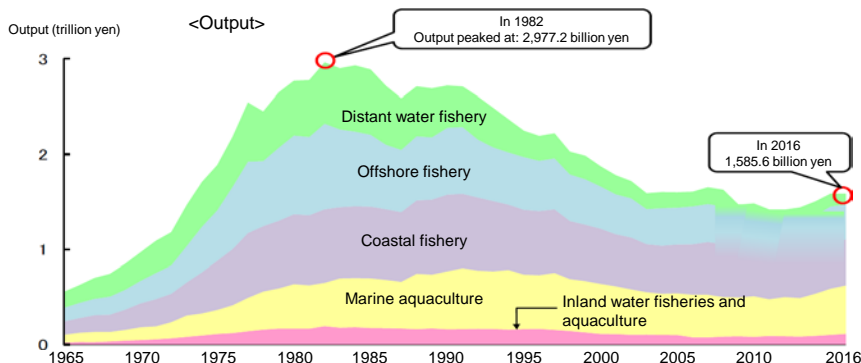
- The volume of domestic fisheries and aquaculture production was 4.36 million tons in 2016, which is lower by 270,000 tons than in the previous year. Marine fisheries production decreased by 230,000 tons to 3.26 million tons. Salmon, Japanese common squid, etc. decreased while Japanese sardine increased. Marine aquaculture decreased by 40,000 tons to 1.03 million tons. Scallop, etc. decreased. Inland water fisheries and aquaculture production decreased by 6,000 tons to 63,000 tons.
- The output of fisheries and aquaculture was 1,585.6 billion yen in 2016, which was at the same level as the previous year. The output of marine fisheries decreased by 33.6 billion yen to 962.1 billion yen, that of marine aquaculture increased by 23.1 billion yen to 509.7 billion yen, and that of inland water fisheries and aquaculture increased by 10.2 billion yen to 113.8 billion yen.

Trends in Production Volume and Output of Japan's Fisheries and Aquaculture



Source: Fisheries and Aquaculture Production Statistics (the Ministry of Agriculture, Forestry and Fisheries)

| | | (1,000 tons) |
|-------------------|-----------------------|--------------|
| | | FY2016 |
| Production volume | Total: | 4,359 |
| | Marine | 4,296 |
| | Fisheries | 3,264 |
| | Distant water fishery | 334 |
| | Offshore fishery | 1,936 |
| | Coastal fishery | 994 |
| | Aquaculture | 1,033 |
| | Inland water | 63 |
| | Fisheries | 28 |
| | Aquaculture | 35 |



Source: Gross Fisheries Output (the Ministry of Agriculture, Forestry and Fisheries)

Note 1: The figures of distant water fishery, offshore fishery, and coastal fishery shown above (2007-2010) are all estimates.

Note 2: Marine fisheries output by segment in terms of value has not been available since 2007.

Note 3: Fishery income produced is the amount obtained by subtracting the expenses of materials (including depreciation costs and indirect taxes) from the amount of the fisheries output and then by adding ordinary subsidies to the resulting difference.

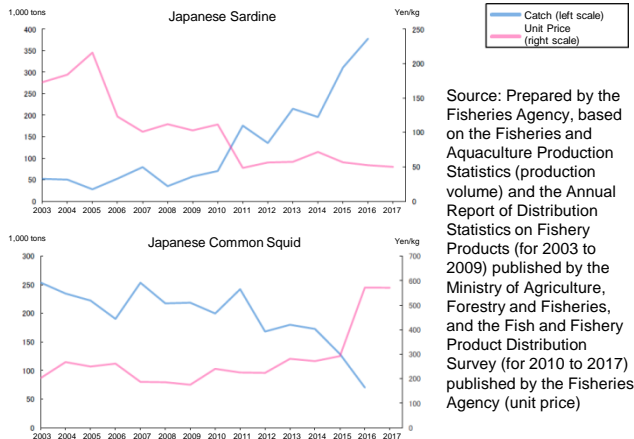
| | | (100 million yen) |
|-------------------------|--------------|-------------------|
| | | FY2016 |
| Output | Total: | 15,856 |
| | Marine | 14,718 |
| | Fisheries | 9,621 |
| | Aquaculture | 5,097 |
| | Inland water | 1,138 |
| | Fisheries | 198 |
| | Aquaculture | 940 |
| Fishery income produced | | 8,076 |

(2) Trends in Fishery Management

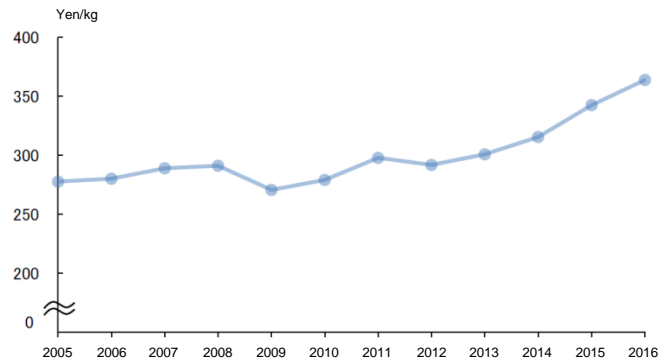
(a) Trends in the Local Prices of Fish and Fishery Products

- The prices of fishery products vary depending on multiple factors including the fishery condition of each species, the status of overseas fishery production, and domestic and overseas demand for species.
- In recent years, the average local price in fisheries and aquaculture is on an upward trend. The price increased by 21 yen/kg to 364 yen/kg in 2016, compared with the previous year.

Trends in Catches and Prices



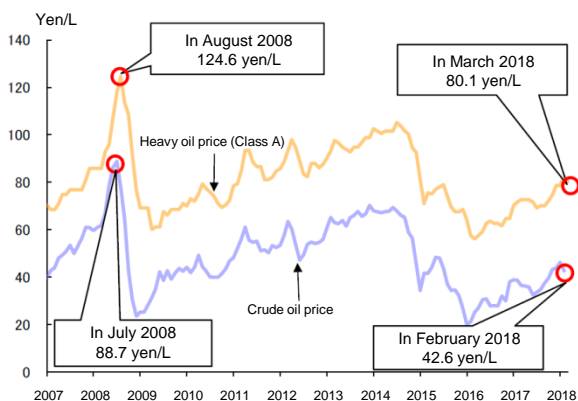
Average Local Price in Fisheries and Aquaculture



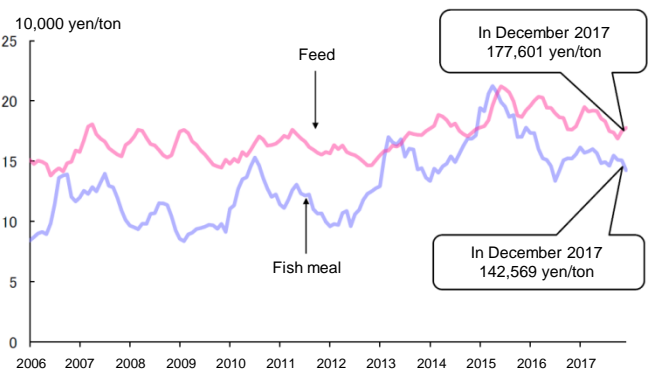
(b) Trends in Boat Fishery/Aquaculture Management

- The average fishing income of coastal fishing households decreased by 260,000 yen to 2.35 million yen in 2016, as compared to the previous year, or 2.53 million yen including non-fishing income.
- Businesses engaged in boat fishery reported that, in FY2016, although the deficits in fishing income expanded compared to the previous fiscal year, the operating profit was 12.67 million yen since non-fishing profits (from fish processing, etc.) increased.
- Fishing vessels used for fisheries in Japan have further aged, with 59% of all the licensed fishing vessels for designated fisheries being aged 20 years or older as of FY2017.
- Fuel oil prices have fluctuated significantly over the past decade. In recent years, the prices have been rising.
- The fishing income of marine aquaculture households in 2016 increased by 1.82 million yen to 10.04 million yen as compared to the previous year.
- Imported fish meal prices in April 2015 increased to nearly 2.6 times the average price in 2005, which may be due to growing consumption by aquaculture (primarily in China) and due to a decrease in fish meal production caused by declining anchovy resources in Peru. Subsequently, the prices have slightly leveled off.

Trends in Fuel Oil Prices



Trends in Feed Prices and Imported Fish Meal Prices



(c) “Seashore Revitalization Plan” to Boost Incomes

- The “Seashore Revitalization Plan” aims to boost fishing incomes by at least 10% in five years with voluntary efforts to come up with measures and implement them. 659 cases entered an implementation stage by the end of March 2018.
- In FY2015, the “Wide-Area Seashore Revitalization Plan” also started, in which efforts are made to enhance wide-range competitiveness. By the end of March 2018, 140 cases were established and carried out.

Case Example: “Seashore Revitalization Plan” Suits for Each Region's Circumstances

1. Shimizu Group, Kochi Prefecture

In the Seashore Revitalization Plan of Shimizu Group (Kochi Prefecture), the branding, etc. of “Shimizu Mackerel of Tosa” has been underway.



(Photo courtesy: Kochi Prefecture)

2. Senshu District, Osaka Prefecture

In the Wide-Area Seashore Revitalization Plan of Senshu District (Osaka Prefecture), the adoption of high-speed vessels has been set forward in order to achieve the centralization and freshness maintenance of catches.



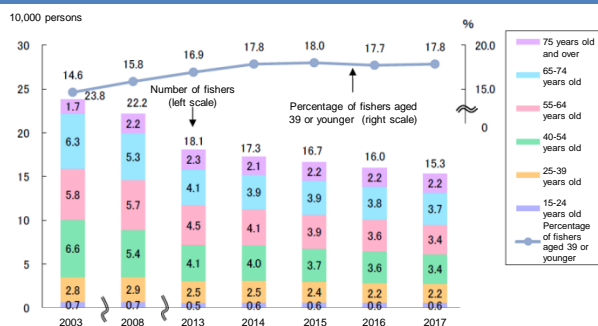
Illustration of Centralization

(3) Trends in Number of Fishers

(a) Trends in Fishers and Efforts to Secure New Entrants into Fisheries

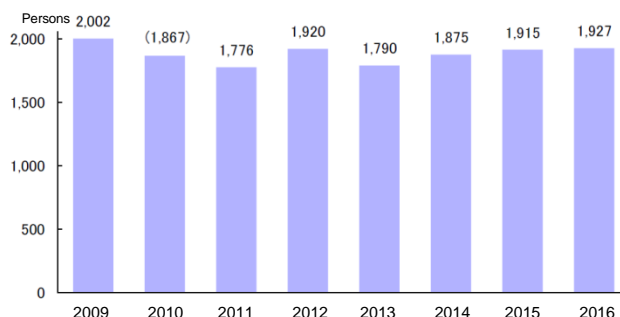
- The number of fishers follows downward trends and totaled 153,490 in 2017.
- The number of new entrants into fisheries has remained at the same level since 2009, about 70% of which are 39 years old or younger. The ratio of fishers aged 39 or younger among all the fishers has remained at the same level.
- To encourage entry into fisheries, the government supports the holding of employment consultation seminars and long-term training on fisheries operation sites. Giving support appropriate for each stage will promote entry and settlement into fisheries.

Trends in Number of Fishers



Source: The Census of Fisheries and the Report on the Trends in Fishery Employees (the Ministry of Agriculture, Forestry and Fisheries)

Trends in Number of New Entrants into Fisheries



Source: Estimates based on prefectural governments' surveys on new entrants
Note: The data for 2010 are estimates obtained based on the trends in other prefectures than Iwate, Miyagi and Fukushima.

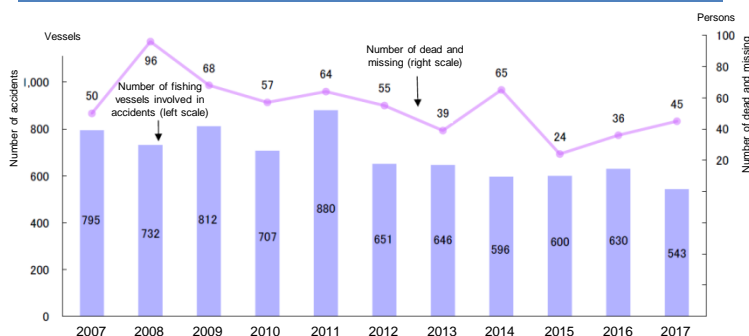
(b) Securing and Fostering Marine Technicians in Fisheries

- In order to secure the safety of the sailing of fishing vessels, the required types of maritime certificates and the required number of persons are specified according to the tonnage, etc. of each fishing vessel. Since each fishing trip spans a long period of time in distant water fisheries, it is difficult to have opportunities to acquire a higher-grade maritime license. Due to this situation, the aging and shortage of marine technicians has become a serious problem.
- Fishery-related organizations recruit new entrants through their employment consultation services, and make efforts to offer systematic training programs, etc.

(4) Provision of a Safe Working Environment for Fisheries

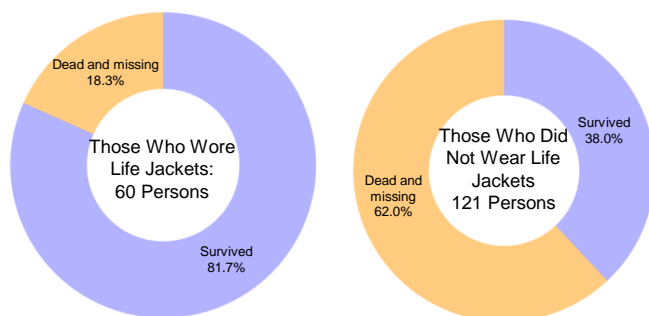
- In 2017, the number of accidents was 543, and the number of dead and missing reported in those accidents was 45.
- 87 fishers fell overboard in 2017 (excluding those related to marine accidents), of which 56 persons were dead or missing.
- Life jackets are vital to saving the lives of those who fall overboard. The government expanded the scope of obligation to wear life jackets to small water crafts. In 2018 and ahead, all persons on board, in principle, any ship or vessel and outside the cabin are required to wear life jackets.
- To ease the anxiety of fishers in relation to the missile launches by North Korea in recent years, the Fisheries Agency calls fishing vessels' attention by issuing fishery safety information through fishery radio stations, etc., and checks the safety of fishing vessels.
- Because of the widen gap between lands and sea areas in terms of the availability of broadband connection, relevant ministries and agencies considered potential measures, etc. to improve the internet environment at sea so that crews and passengers can use smartphones on board in the same manner as on land, and in March 2018 organized issues and prepared a report on efforts for the future diffusion.

Trends in the Number of Fishing Vessel Accidents and the Number of Dead and Missing Associated with the Accidents



Source: Status of Marine Accidents and Preventive Measures (the Japan Coast Guard)

Survival Rates of Those Who Fell Overboard with and without Life Jackets

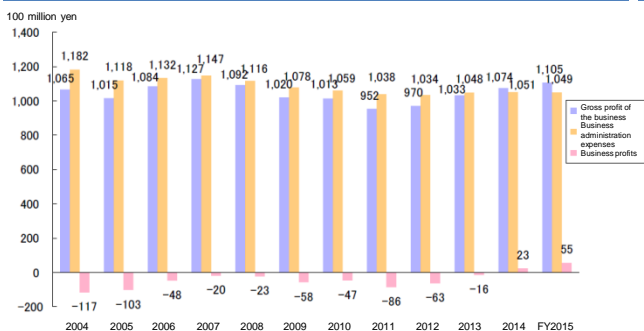


Source: Status of Marine Accidents and Preventive Measures, 2017 (the Japan Coast Guard)

(5) Trends in Fisheries Cooperatives

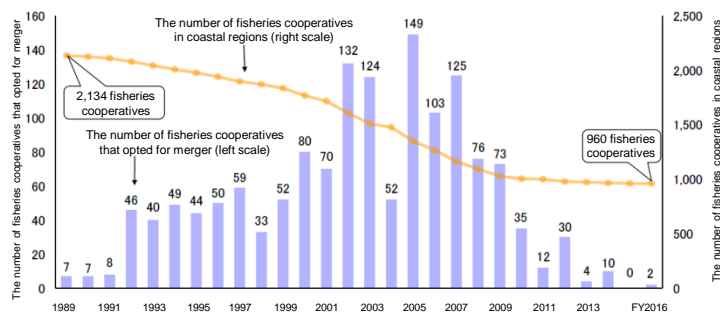
- A fisheries cooperative is an organization that plays a core role in improving fishery management, appropriately using and managing fishery resources, and supporting regional economies and social activities in a fishing community.
- The business profits of all fisheries cooperatives in coastal regions in FY2015 were 5.5 billion yen.
- Fisheries cooperatives should continue to promote mergers between them. The number of fisheries cooperatives as of the end of March 2017 was 960.

Trends in the Business Conditions for Fisheries Cooperatives in Coastal Regions



Source: Statistic Table of Fisheries Cooperatives (the Fisheries Agency)

Trends in the Number of Fisheries Cooperatives in Coastal Regions and the Number of Fisheries Cooperatives that Opted for Mergers



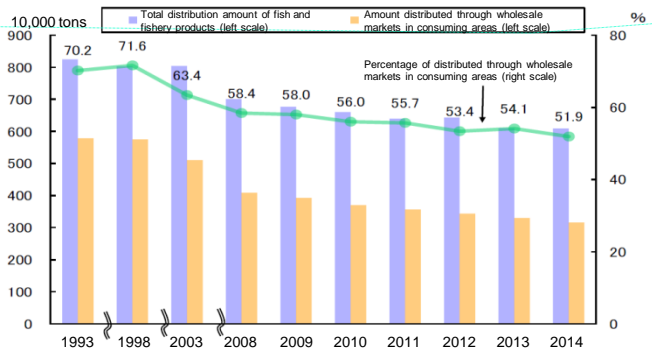
Source: Annual Report of Fisheries Cooperatives surveyed by the National Federation of Fisheries Co-operative Associations (the Fisheries Agency)

(6) Trends in the Distribution and Processing of Fish and Fishery Products

(a) Trends in the Distribution of Fish and Fishery Products

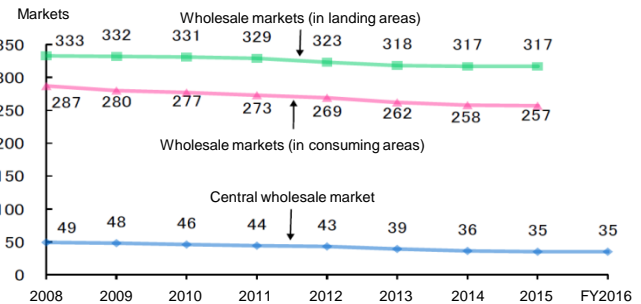
- In 2014, the percentage of the amount of fish and fishery products distributed through wholesale markets in consuming areas was 52% of the total.
- Both the number of wholesale markets in landing areas and that of wholesale markets in consuming areas decreased.
- Wholesale markets play a critical role in effectively distributing fish and fishery products. However, a challenge that wholesale markets in landing areas face is that such markets are in a weak position in terms of price formation. It is necessary to maintain and strengthen them through market abolition and consolidation, etc. For food distribution as well as wholesale markets in consuming areas, it is important to respond precisely to the diverse needs of consumptive interests, etc.

Volume Distributed Through Wholesale Markets in Consuming Areas and Its Percentage in Total



Source: Wholesale Market Database (the Ministry of Agriculture, Forestry and Fisheries)

Trends in the Number of Wholesale Fishery Markets



Source: Wholesale Market Database (the Ministry of Agriculture, Forestry and Fisheries)

Note: Data for central wholesale markets are the data at the end of every fiscal year but data for local wholesale markets are the data at the beginning of each fiscal year (up to FY2011) and at the end of each fiscal year (FY2012 or later).

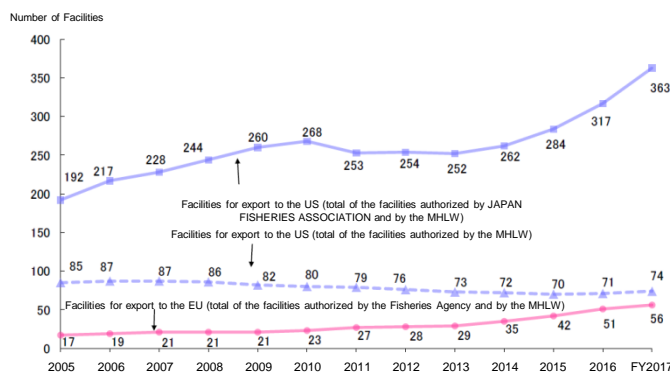
(b) Trends in the Fishery Processing Industry

- The production volume of processed edible fishery products decreased by 50,000 tons from the previous year to 1.63 million tons in 2016.
- Almost all fish processing companies are small- and medium-sized businesses with 300 employees or less. The number of fish processing companies, especially small-sized fish processing companies, is decreasing.
- An important challenge in the fishery processing industry is to secure processing ingredients and employees.

(c) HACCP

- Fishery processing facilities, etc. need to implement the HACCP (Hazard Analysis Critical Control Point) system and to conform to related facilities criteria, as required by the US and the EU, when exporting fish and fishery products to the US, the EU, etc.
- Accordingly, the government holds seminars, etc. about general sanitary control and HACCP-based sanitary control, and also supports the renovation, etc. of fishery processing and distribution facilities for acquiring the authorization that demonstrates facilities' fulfillment of such additional requirements as sanitary control and facility criteria based on HACCP, and that is required for export to the EU and the US.
- In order to accelerate the authorization process for facilities to export to the EU, the Fisheries Agency became an authorization body in October 2014, in addition to the Ministry of Health, Labour and Welfare. As of the end of March 2018, in the fishery processing industry, etc., the number of facilities authorized to export to the EU is 56, and the number of facilities authorized to export to the US is 363.

Trends in the Number of Facilities Authorized to Export to the EU/US in Fishery Processing Industry, etc.



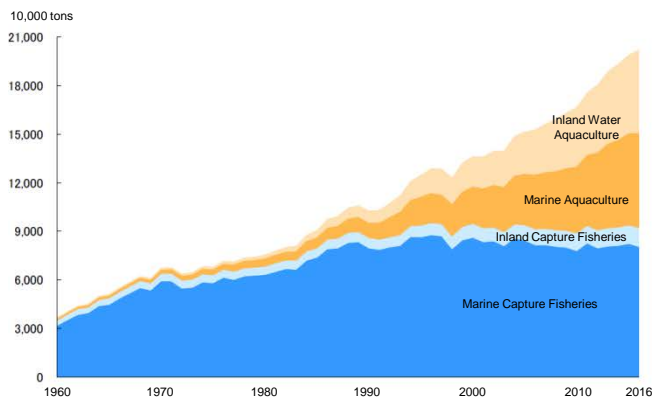
Source: Prepared by the Fisheries Agency

Section 3 International Situation Surrounding the Fisheries Industry

(1) Production of World Fisheries and Aquaculture

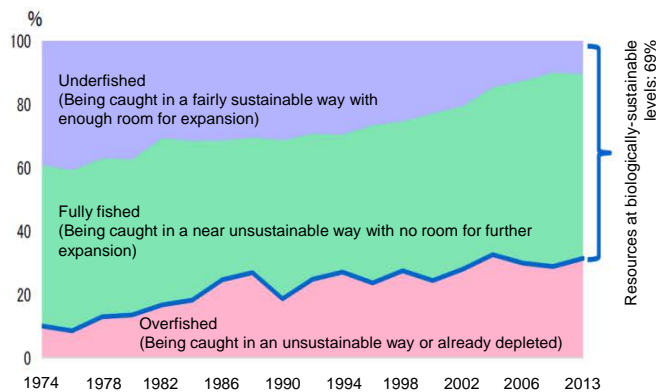
- The production volume of world fisheries and aquaculture increased by 2% from the previous year to 202.24 million tons in 2016. The breakdown of this volume shows that the capture fisheries production volume stayed flat and there was a drastic increase in the aquaculture production volume.
- For example, in the EU, the United States, and Japan, the capture fisheries production volumes have remained almost flat or have been on a declining trend. In contrast, the capture fisheries production volumes in China, Indonesia, Vietnam, etc. have increased.
- The aquaculture production volume has significantly increased in both marine and inland-water aquaculture production. China is dominant in world aquaculture production, both marine and inland water.
- The ratio of world fisheries resources being exploited within biologically-sustainable levels is on a gradually-decreasing trend. In 2013, 69% of world fisheries resources were at biologically-sustainable levels, and 31% of the resources were at overfished levels. World fishery resources with enough room for production expansion were 11%.

Trends in Production Volume of World's Fisheries and Aquaculture



Source: Prepared by the Fisheries Agency, based on the Fishstat (FAO) and the Fisheries and Aquaculture Production Statistics (the Ministry of Agriculture, Forestry and Fisheries)

Status of World Fish Stocks

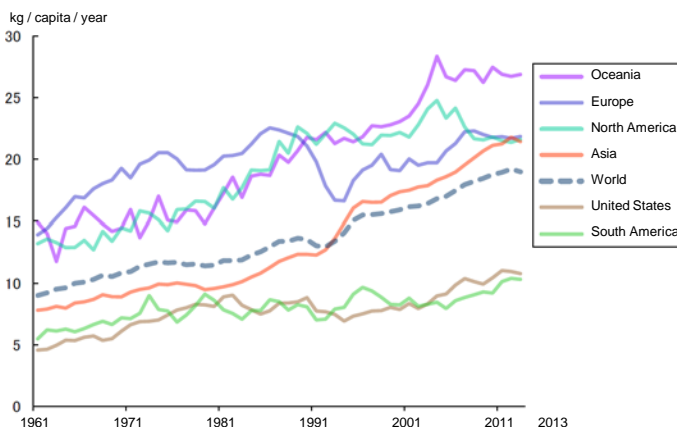


Source: Prepared by the Fisheries Agency, based on the State of World Fisheries and Aquaculture (FAO)

(2) World Consumption of Fish and Fishery Products

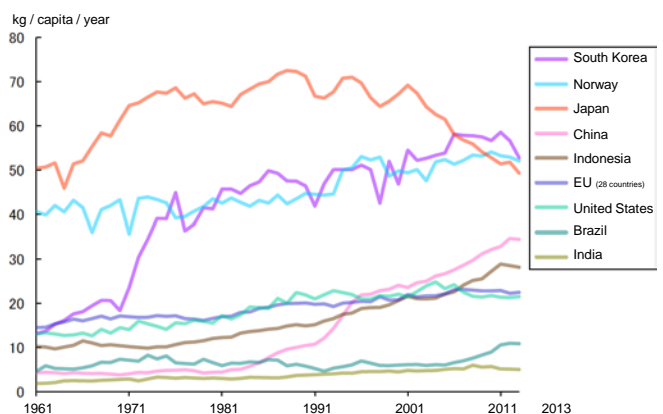
- The world's per capita consumption of fish and fish products has nearly doubled in the past half century, as a result of food distribution internationalization, a shift to high-protein dietary habits, and so on. The consumption shows significantly-increasing trends, especially in emerging countries such as China.
- Although Japan's consumption is still in a high level, it has declined to the same level as the level 50 years ago.

Trends in World's Annual Consumption of Edible Seafood Per Capita by Region (Gross Food Based)



Source: FAOSTAT (Food Balance Sheets) by the FAO

Trends in Annual Consumption of Edible Seafood Per Capita in Major Countries/Regions (Gross Food Based)

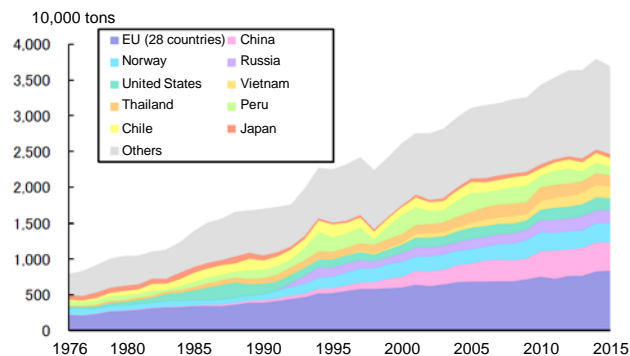


Source: FAOSTAT (Food Balance Sheets) by the FAO (except for Japan), and the Food Balance Sheet by the Ministry of Agriculture, Forestry and Fisheries (Japan)

(3) World Trade of Fish and Fishery Products

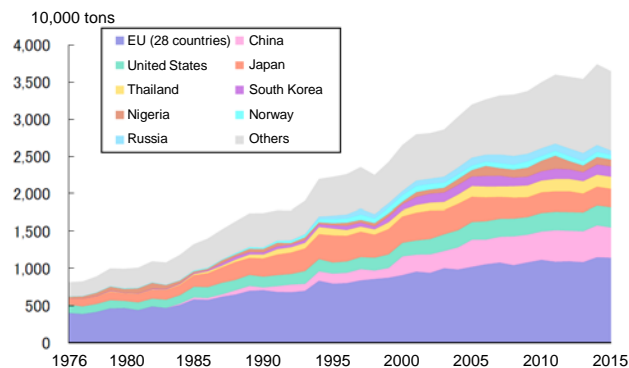
- The trade of fish and fishery products is on an upward trend as a whole, in terms of quantity and value (price). In terms of export volume, the EU, China, and Norway are ranked high. In terms of import volume, the EU, China, and the United States are ranked high.
- In terms of export and import value, China is the world's largest net exporter. The EU, the United States, and Japan are major net importers.

World's Export Volume



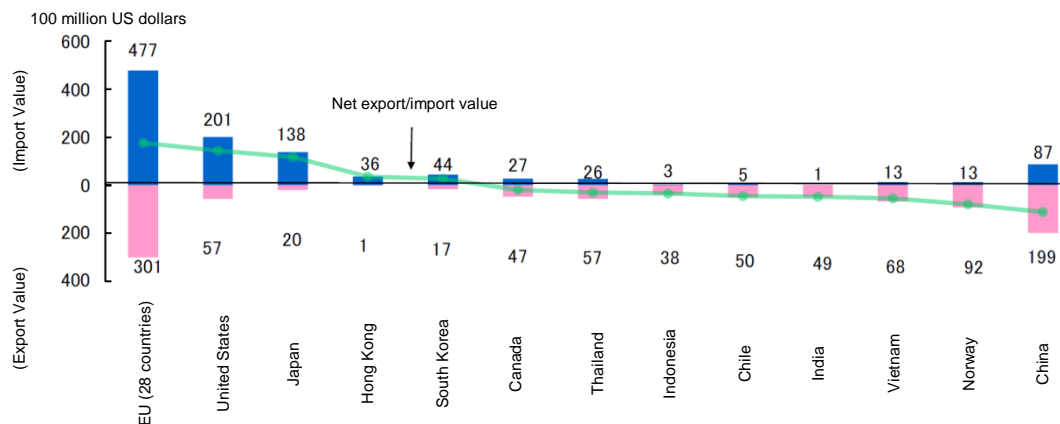
Source: Fishstat (Commodities Production and Trade) by the FAO

World's Import Volume



Source: Fishstat (Commodities Production and Trade) by the FAO

Major Countries' and Regions' Export and Import Values and Net Export/Import Values Concerning Fish and Fishery Products



Source: Prepared by the Fisheries Agency, based on the Fishstat (Commodities Production and Trade) in 2015 by the FAO

(4) International Situation Surrounding the Trade of Fish and Fishery Products

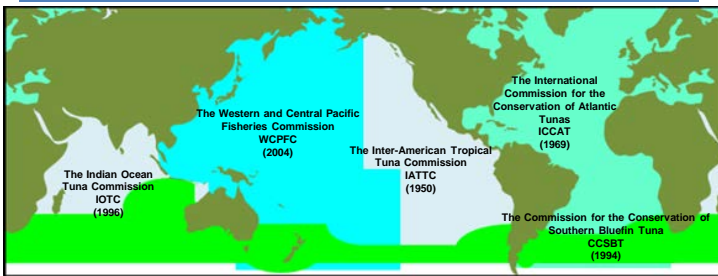
- In WTO rule negotiations, discussions have been continued about the establishment of disciplines on fisheries subsidies. Japan takes a stance of limiting prohibited subsidies to which truly cause overcapacity and overfishing.
- In February 2016, the 12 participating countries signed the TPP agreement. In January 2017, Japan reported to the depositary nation, New Zealand, that necessary domestic procedures had been completed, and concluded the agreement. Subsequent to the US's announcement of its withdrawal from the TPP in the same month, the 11 countries excluding the US engaged in discussions concerning the early effectuation of the TPP, and reached a substantive agreement on the TPP-11 agreement in November of the same year. In January 2018, the text of the TPP-11 agreement was finalized, and the participating countries signed the TPP-11 agreement in March of the same year. In the future, the TPP-11 agreement will come into force 60 days after the day on which the remaining 6 signatory countries report the completion of their respective domestic procedures to the depositary nation.

(5) Multilateral Relations in Fisheries

(a) Trends in Tunas Regional Fisheries Management Organizations

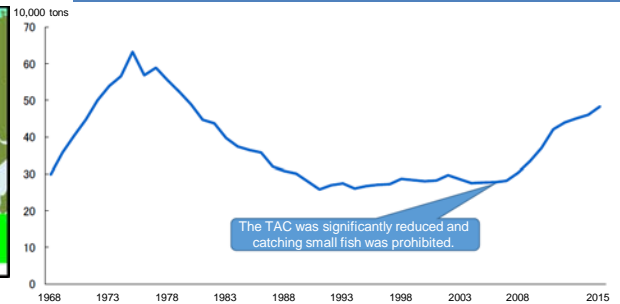
- The global tunas and tuna-like species' resources are managed by five regional fisheries management organizations (tRFMOs), and Japan is a member of all of tRFMOs. Japan, as a responsible fishing nation, actively takes part in tRFMOs for appropriate management and sustainable use of resources.
- In relation to Pacific bluefin tuna, the Western and Central Pacific Fisheries Commission (WCPFC) agreed on the second rebuilding target to be reached by 2034, or 10 years after reaching the Initial rebuilding target, whichever is earlier, and on harvest control rules during initial rebuilding period, etc. For tropical tunas, bigeye, yellowfin, and skipjack, one-year provisional measures have been agreed for the year 2018.
- The Inter-American Tropical Tuna Commission (IATTC) has been taking measures equivalent to the Pacific bluefin tuna management measures by the WCPFC, and has implemented such measures as the tightening of regulations concerning purse seine fisheries for bigeye and yellowfin.
- The International Commission for the Conservation of Atlantic Tunas (ICCAT) has been strengthening control of tuna species, resulting in dramatic recovery of Atlantic bluefin tuna resources in recent years. Accordingly, the TAC has been raised incrementally.
- The Indian Ocean Tuna Commission (IOTC) has enhanced its measures to limit the number of fish aggregating devices per purse seine fishing vessel with the aim of rebuilding yellowfin stock.
- The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) has increased the TAC for each of the three years from 2018, since southern bluefin tuna resources have been on a rebuilding trend.

Tunas Regional Fisheries Management Organizations (tRFMOs)



Note: The years in parentheses are the years of effectuation of the relevant treaties.

Trends of Spawning Stock Biomass Eastern Atlantic Bluefin Tuna

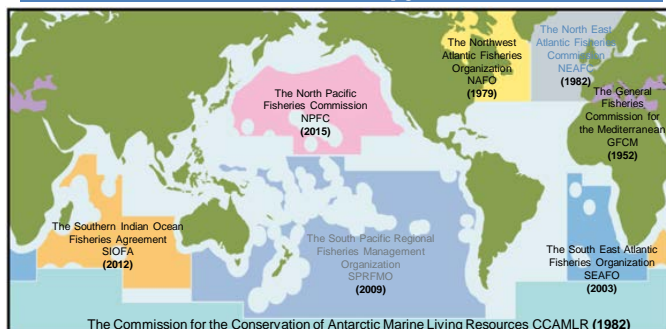


Source: The Standing Committee on Research and Statistics (SCRS) of the ICCAT, 2017

(b) Trends in Regional Fisheries Management Organizations such as the NPFC

- New regional fisheries management organizations for fishery resources other than tunas and skipjacks were established in recent years, which include the North Pacific Fisheries Commission (NPFC).
- The NPFC was established in 2015 under the leadership of Japan, and manages fishery species such as Pacific saury, chub mackerel and North Pacific armorhead in the high sea area adjacent to the Japan's EEZ in the North Pacific.
- With regard to Pacific saury, the NPFC has agreed to prohibit increasing the number of saury fishing vessels permitted to operate in the high seas. The NPFC has also agreed to complete the stock assessment on chub mackerel as soon as possible, and until then to prohibit increasing the number of chub mackerel fishing vessels permitted to operate in the high seas. It has also adopted a list of Illegal Unreported and Unregulated (IUU) fishing vessels. Japan will continue efforts for the further enhancement of conservation and management measures such as appropriate limitations on catches in NPFC.

Major Regional Fisheries Management Organizations Managing Other Resources than Tunas and Skipjacks



Notes: 1) Currently, Japan is neither a member of the SPRFMO nor of the NEAFC.
2) The years in parentheses are the years of effectuation of the relevant treaties.

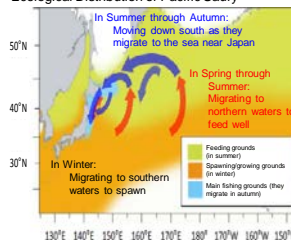
Column: The Reason Why the NPFC Holds Discussions about Pacific Saury and Chub Mackerel

Although Pacific saury is a highly migratory species, it has been caught and managed mainly in Japan's EEZ. However, rapid expansion of fishing for Pacific saury on the high seas by foreign fishing vessels requires international approaches for its management.

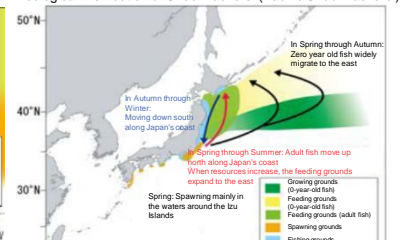
Although, Chub mackerel mainly inhabits Japan's EEZ, its distribution has expanded into the high seas as it has increased owing management efforts in Japan's EEZ, and consequently fishing activity by foreign fishing vessels are increasing.

There has been increasing needs for international discussion on the conservation and management measure regarding Pacific saury and Chum mackerel.

Ecological Distribution of Pacific Saury



Ecological Distribution of Chub Mackerel (Pacific Chub Mackerel)



Source: Japan Fisheries Research and Education Agency

(6) Bilateral Relations in Fisheries

- Japan conducts fishery operations under the bilateral governmental agreements with Russia, South Korea, China, and Taiwan.
- The Japanese and Russian governments had consultations regarding mutual conditions for fishing in bilateral waters, the conditions of Russian salmon and trout fisheries, etc.
- The Japanese and Korean governments have not reached agreement about operation conditions for mutual fishing access, etc., and therefore mutual consultations are still underway.
- The Japanese and Chinese governments have not reached agreement about operation conditions for mutual fishing access, and therefore mutual consultations are still underway.
- The Japanese and Taiwanese governments had consultations toward the establishment of rules to ensure that Japanese fishing vessels can engage in fishing operations.
- Although the EEZs of the Pacific Island countries continue to serve as vital fishing grounds, the severity of fishing conditions continues to increase due to fishing fee hikes, establish the marine protect area, etc.

(7) International Situation on Whaling

- Japan considers that whales are an important food resource that can be used in a sustainable manner based on scientific knowledge. Accordingly, Japan has been working to realize sustainable use of whale resources under the framework of the International Whaling Commission (IWC). However, due to the confrontation based on fundamental differences in positions concerning whales, the IWC is not able to fulfill its function to make important decisions. For the next IWC meeting in September 2018, Japan is appealing to other relevant countries to take part in discussions about the IWC's "way forward".
- In order to obtain scientific knowledge necessary for the resumption of sustainable commercial whaling, Japan continued to conduct, from FY2015, the Research Plan for New Scientific Whale Research Program in the Antarctic Ocean (NEWREP-A) and also, from 2017, the Research Plan for New Scientific Whale Research Program in the western North Pacific (NEWREP-NP) that is a new program whose objectives are to calculate, in a more elaborate manner, the catch limits of common minke whales around the coastal waters of Japan and the proper catch limits of sei whales offshore the country.
- For early resumption of commercial whaling, the "Act Concerning Implementation of Scientific Whale Research Programs for Implementation, etc. of Commercial Whaling" was enacted in June 2017.
- Although sabotage activities which could threaten the safety of research vessels, etc. were not carried out by anti-whaling organizations in the scientific whale research program during FY2016, close attention will continuously be paid to the situation, and sufficient safety measures will be implemented under the cooperation among relevant ministries and agencies.

Column: Living with Whales -Regional Efforts-

Taiji Town in Wakayama Prefecture, which is regarded as the birthplace of the traditional style of whaling, has handed down from generation to generation tangible and intangible cultural heritage that passes on not only whaling itself but also the history and culture of whaling.

Even after the IWC commercial whaling moratorium in 1988, the town has fed its way into fisheries targeting small-sized whale species not subject to control, such as dolphins, and aims to treat whaling as the core of its community development; for example, it strives to establish itself as a whale research base. Against the background of this history, the Kumanonada region has inherited the whaling culture and utilizes it for tourism, making efforts to boost the development of the town as a whale town.

With such efforts being highly regarded, "Living with Whales", a story based on its whaling culture, was designated as a Japanese Heritage in 2016.



Taijiura Whale Festival
(Photo courtesy: Taiji Town)

(8) Overseas Fishery Cooperation

- For the purpose of the promotion of the fisheries industry and fishing resources management, the Japanese government offers grant aid (for the construction of fisheries facilities, etc.) and technical cooperation (the dispatch of experts, etc.) to fishery sectors in countries that have important fishing grounds for Japanese fishing vessels and countries sharing the principle of sustainable use of marine living resources.
- With regard to coastal countries such as Pacific Ocean island countries, in the waters of which Japanese fishing vessels operate, the Japanese government supports private organizations' cooperation provided to such countries in the repair, etc. of fisheries facilities and in the transfer or dissemination of fisheries technologies.
- The Japanese government provides financial and technical assistance to the Southeast Asian Fisheries Development Center (SEAFDEC) in order to achieve sustainable fisheries in the Southeast Asia region.

(9) Technical Intern Training Program for Foreign Nationals

- In 2017, the "Act on the Appropriate Implementation of Technical Intern Training for Foreign Nationals, and Protection of Technical Intern Trainees" came into force for the purpose of promoting international cooperation by transferring technologies, etc. to developing areas through human resource development.
- In relation to the fisheries industry, technical intern training is provided in the sectors of fisheries/aquaculture (9 types) and fishery processing (8 types). Trainees acquire skills, etc. through work on site, thereafter contributing to the economic development of developing areas, etc.
- In December 2017, the Japanese government established the Fisheries Technical Intern Training Program Council. The council strives to make technical intern training in fisheries/aquaculture appropriate, for example, by determining the treatment of technical intern trainees and setting up a system to protect them.

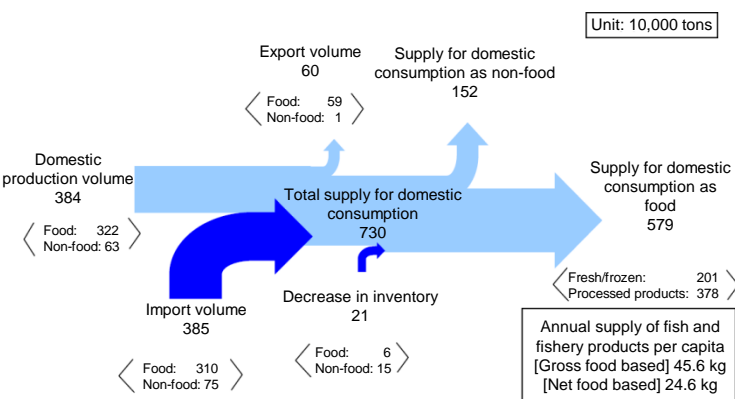
Section 4 Trends in the Supply-Demand and Consumption of Fish and Fishery Products in Japan

(1) Supply-Demand Situation in Fish and Fishery Products

- The supply of fish and fishery products for domestic consumption was estimated at 7.30 million tons for FY2016 (converted on a fresh fish basis, estimates), of which 5.79 million tons (79%) were for human consumption (food) and 1.52 million tons (21%) for feed and fertilizer (non-food).
- The self-sufficiency rates (estimates) of fish and fishery products for FY2016 decreased by 3 point from the previous year to 56%.

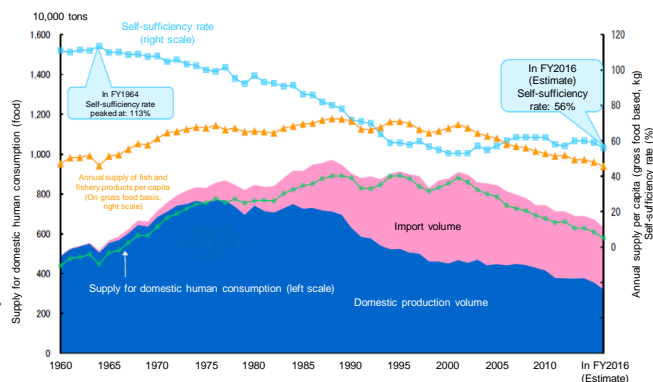
Japan's Production and Consumption Structure of Fish and Fishery Products

< FY2016 (Estimates) >



Source: Food Balance Sheet (the Ministry of Agriculture, Forestry and Fisheries)

Trends in Self-sufficiency Rates of Fish and Fishery Products



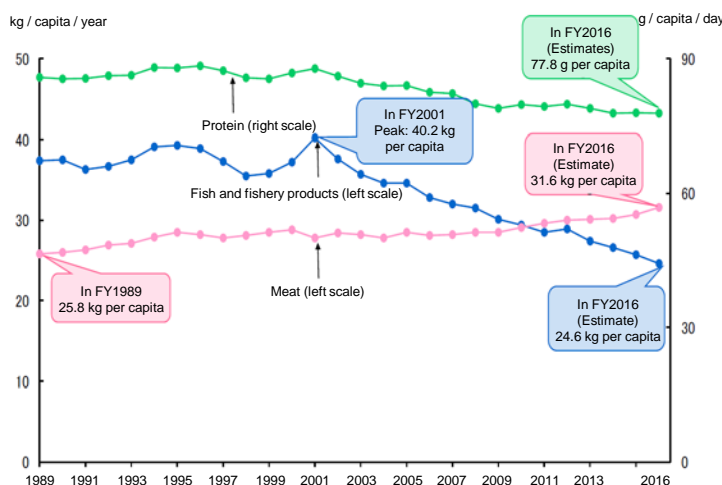
Source: Food Balance Sheet (the Ministry of Agriculture, Forestry and Fisheries)

(2) Status of the Consumption of Fish and Fishery Products

(a) Trends in the Consumption of Fish and Fishery Products and Consumer's Awareness

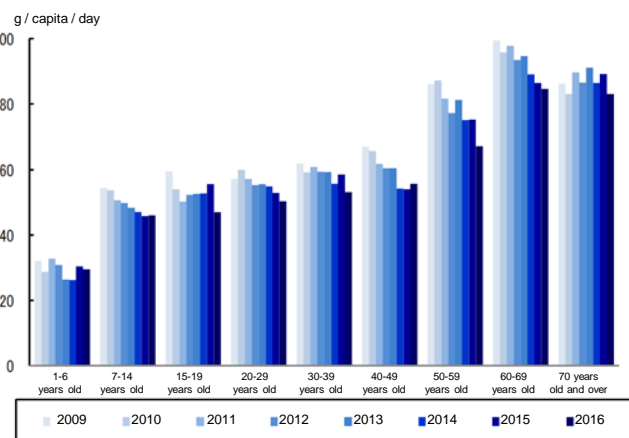
- The annual consumption of fish and fishery products per capita decreased by 1.1 kg from the previous year to 24.6 kg in FY2016 (estimates).
- The fish and fishery product consumption by 49 years old or younger people is lower than the consumption by 50 years old or older people. In addition, the consumption by people in their 50s and 60s is on the decrease, as well.
- The annual spending per household on fresh fish and fishery products has been flat in recent years. It is presumed that customer's buying motivation itself has not been on the decline.
- In a survey on consumers' intake, responses in favor of increasing fish intake exceeded those in favor of increasing meat intake. Furthermore, in a survey on cooking, there was a high number of respondents who wanted their cooking to be as easy as possible, suggesting a preference for simple cooking.

Trends in Annual Per Capita Consumption of Fish and Fish Products and Meat (Net Food) and Daily Per Capita Consumption of Protein



Source: Food Balance Sheet (the Ministry of Agriculture, Forestry and Fisheries)

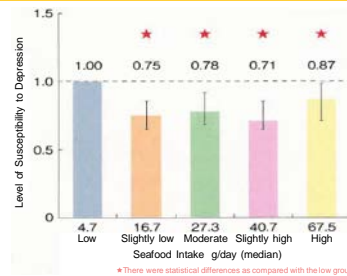
Daily Per Capita Seafood Intake by Age Bracket



Source: Prepared by the Fisheries Agency, based on the the National Health and Nutrition Survey (the Ministry of Ministry of Health, Labour and Welfare)

Column: Eating Fish Makes You Resistant to Depression? (Japan Environment and Children's Study)

The University of Toyama studied into the relationship between the situation of fish eating and depression. This study found that in the group of subjects with a larger intake of fish during pregnancy than the other group whose subjects had not consumed much fish during pregnancy, the number of subjects who suffered depression was less than the number in the latter group. Furthermore, the study also clarified that the relationship between DHA/EPA, which is taken into the body when eating fish, and depression tended to follow the same pattern.



Relationship between Fish Eating and Depression during Late Pregnancy
(Source: University of Toyama)

(b) Efforts to Popularize Gyo Shoku (Fish Eating)

- Since seafood consumption has declined among young generation in Japan, it is important to create opportunities for young people to become familiar with fish diet through school lunches, etc. In recent years, activities to familiarize fish eating have been active; for instance, fishers, etc. themselves visit schools, etc. to give classes.
- Under the "Delight of a Fish-Rich Country" project, in which both public and private sectors cooperate with each other, "Fast Fish", an event in which easy-to-eat and fun-to-serve food products/ways are selected (as of the end of March 2018, 3,322 products), has been held among other events. The National Federation of Fisheries Co-operative Associations has selected and introduced "Pride Fish", which are seafoods that fishers themselves recommend with confidence.
- Most consumers usually purchase fish and fishery products in large retail stores like supermarkets. In some food supermarkets, etc., efforts to expand domestic seafood sales appear to have made some achievements.

Case Example: Fish Eating Promotion Activities Held by Students (Okinawa Prefecture)

The area promotion team of Ishigaki City, Okinawa Prefecture works with students to create advertisements of fish and fishery products and to prepare a map covering the locations of sashimi restaurants (tempura restaurants) that cooperate in the sale of "Okinawa tempura" using local fish and fishery products. Thereby the team drives forward its efforts to encourage young people themselves to promote fish consumption among their generation.



(Photo courtesy: Ishigaki City)

(3) Approaches to Ensuring Information Provision to Consumers and to Protecting Intellectual Property

- Food labeling has been mandatory under the "Food Labeling Act" and comprehensively and centrally implemented since 2015.
- In September 2017, a Cabinet Office Order to partially amend food labeling standards was put into force, which has made it mandatory for each domestically-produced processed food product to have a label displaying the place of origin of its ingredient that accounts for the largest part of the food product in terms of weight (nori seaweed used for onigiri [rice ball] is subject to such labeling requirement irrespective of the proportion of nori seaweed to the onigiri's weight).
- The Marine Eco-Label Certification System has been gradually adopted around the world. In Japan, the Marine Eco-Label Japan (MEL) Council has been implementing the marine eco-label certification.
- 7 fishery products were registered under the Geographical Indication (GI) Protection System, which included "Miyagi Salmon" and "Tagonoura Shirasu (Tagonoura Whitebait)".

Products Registered during FY2017 (Products Related to Fisheries)

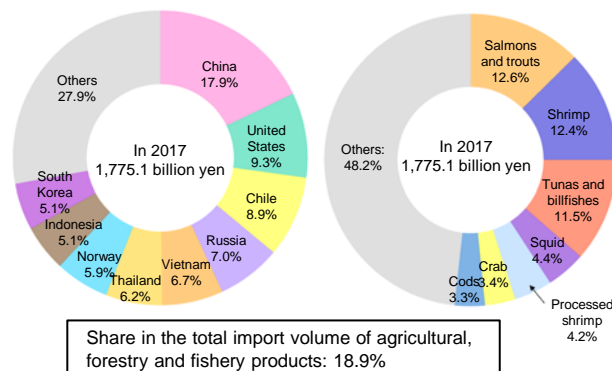
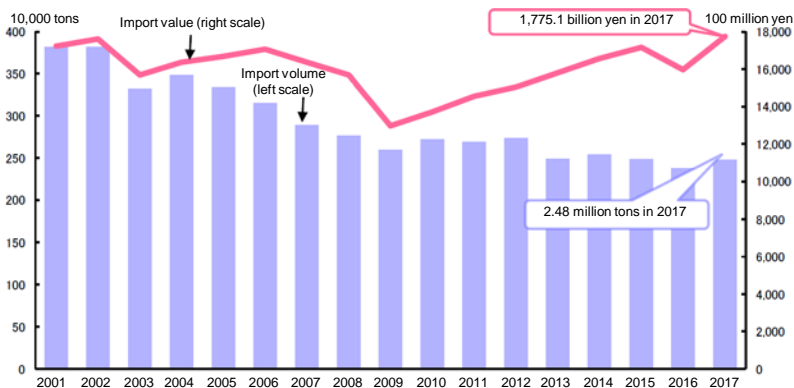
| Registration No. | Name | Photo | Place of Production of Specific Agricultural, Forestry and Fishery Product and Foodstuff | Registration No. | Name | Photo | Place of Production of Specific Agricultural, Forestry and Fishery Product and Foodstuff |
|------------------|--|-------|--|------------------|--|-------|--|
| 31 | Miyagi Salmon | | Ishinomaki City, Onagawa Town, Minamisanriku Town, and Kesennuma City, Miyagi Prefecture | 47 | Iwate Nodamura Araumi Hotate (Iwate Nodamura Scallop) | | Noda Bay, Noda Village, Iwate Prefecture |
| 36 | Tagonoura Shirasu (Tagonoura Whitebait) | | Coast of Tagonoura, Shizuoka Prefecture (Coast of Fuji City, Coast of Numazu City) | 52 | Ogawarako san Yamato Shijimi (Ogawarako Freshwater Clam) | | Tohoku Town (including Lake Ogawara) and Rokkasho Village in Kamikita County, and Misawa City, Aomori Prefecture |
| 45 | Wakasa Obama Kodai Sasazuke (Wakasa Obama Pickled Sea Bream) | | Obama City, Fukui Prefecture | | | | |

(4) Trends in the Trade of Fish and Fishery Products

(a) Import Trends in Fish and Fishery Products

- The import volume of fish and fishery products (on a product weight basis) increased 4% year-on-year to 2.48 million tons in 2017, and the import value increased 11% year-on-year to 1,775.1 billion yen.
- Major import partners are China, the US, Chile and Russia in terms of value.
- Major import items are salmons and trouts, shrimp, and tunas and billfishes in terms of value.

Trends in Import Volume and Value of Fish and Fishery Products

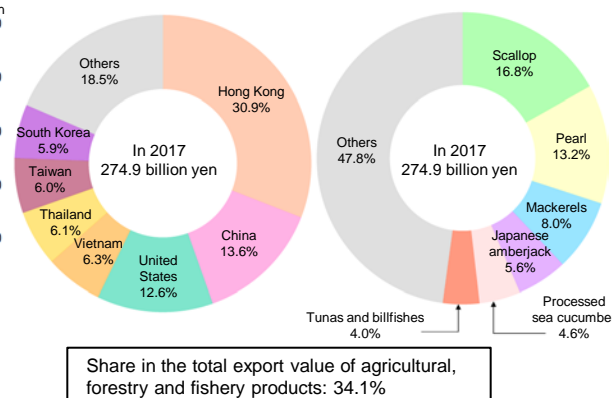
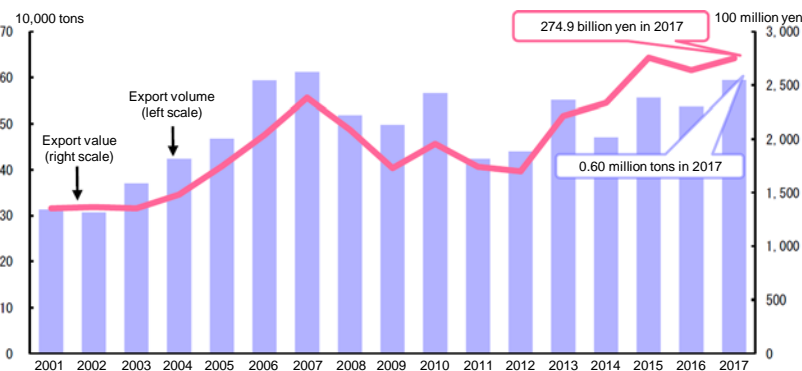


Source: Prepared by the Fisheries Agency, based on the Foreign Trade Statistics (the Ministry of Finance)

(b) Export Trends in Fish and Fishery Products

- The export volume of fish and fishery products (on a product weight basis) increased 11% year-on-year to 600,000 tons in 2017, and the export value also increased 4% year-on-year to 274.9 billion yen.
- Major export partners are Hong Kong, China, and the US in terms of value.
- Major export items are scallop, pearl, etc. in terms of value.
- The "Strategy to Improve Export Performance in Agriculture, Forestry and Fisheries" was compiled in May 2016. According to the strategy, the government intends to improve fishery products' production system with the aim of expanding export, and to improve the export environment in a manner that can address the expansion of overseas markets and that can ensure compliance with the health standards, etc. of export partners. With regard to agricultural, forestry and fishery products and foodstuff, the "Economic Policy to Attain Investment for the Future" compiled in August 2016 sets an export target of 1 trillion yen (350 billion yen for fish and fishery products) for the year 2019.

Trends in Export Volume and Value of Fish and Fishery Products



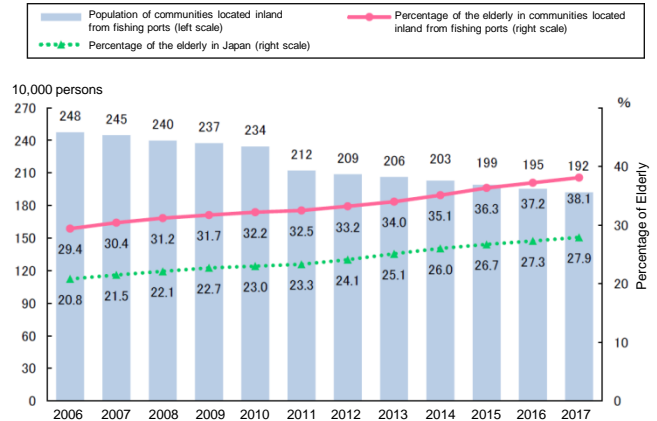
Source: Prepared by the Fisheries Agency, based on the Foreign Trade Statistics (the Ministry of Finance)

Section 5 Development of Safe and Dynamic Fishing Communities

(1) Current Status and Role of Fishing Communities

- Most of fishing communities are situated in locations that favor fishery production but are vulnerable to natural disasters (34% of communities located inland from fishing ports are in peninsular areas, and 19% in isolated island areas). Population is rapidly aging and decreasing (the percentage of the elderly in communities located inland from fishing ports is 38%).
- Fisheries and fishing communities have multiple functionality such as (i) conserving the natural environment, (ii) safeguarding the lives and property of the public, (iii) providing exchange opportunities and (iv) developing and maintaining local communities. Benefits from the multiple functions extend to the public.

Population and Percentage of the Elderly in Communities Located Inland from Fishing Ports



Source: Compiled by the Fisheries Agency, based on the National Census and the Population Estimates (the Ministry of Internal Affairs and Communications)
 Note: The population of communities located inland from fishing ports and their percentages of the elderly (2011-2016) do not include data on three prefectures (Iwate, Miyagi and Fukushima).

Multifunctionality of Fisheries and Fishing Communities

Functions Conserving the Natural Environment

Efforts to remove clam carcasses caused due to abnormal mass mortality, in order to prevent the degradation of tidal flats [Fukushima Pref.]



Efforts to maintain and improve *Zostera marina* beds by both transplanting lateral shoots and sowing seeds [Okayama Pref.]

Efforts to conserve coral reefs by removing coral eaters such as crown-of-thorns starfish [Okinawa Pref.]

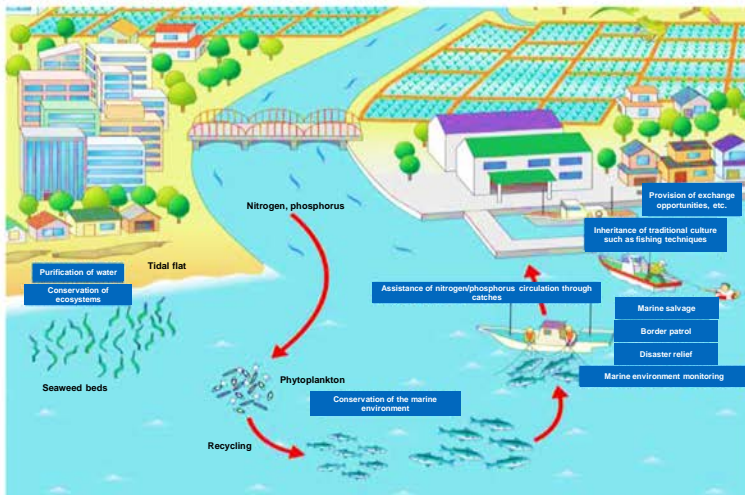


Efforts to install wooden protection fences in front of reed zones in order to prevent decrease and extinction of reed fauna caused by wind, waves, etc. [Ibaraki Pref.]

Efforts to eradicate alien plants including Brazilian waterweed [Aichi Pref.]



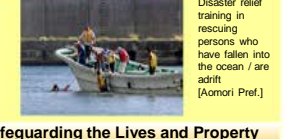
Functions Developing and Maintaining Local Communities



Provision of Exchange Opportunities, etc.



Safeguarding the Lives and Property of the Public



Source: Prepared by the Ministry of Agriculture, Forestry and Fisheries, based on a report by the Science Council of Japan (only data on the fisheries industry and fishing communities are extracted)

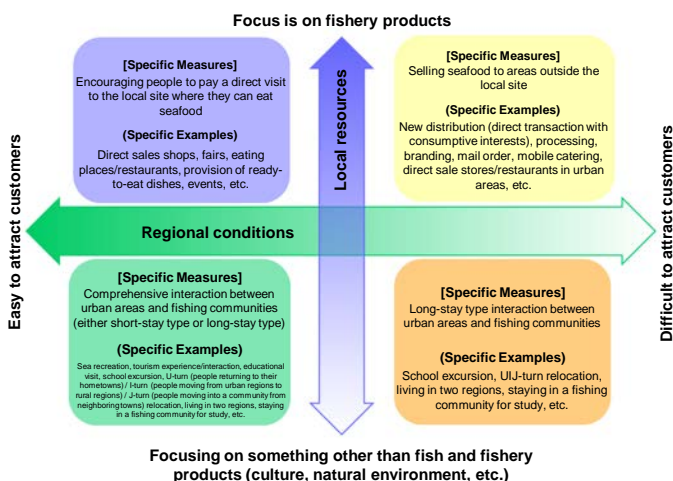
(2) Development of Safe Fishing Communities Where People Can Live in Peace

- Fishing ports and fishing communities are going to require both the improvement of disaster prevention capabilities and the promotion of disaster reduction measures. Multiple protection measures for fishing communities using breakwaters and seawalls, the construction of breakwaters and seawalls that are resistant to tsunami, and the preparation of evacuation routes are promoted.
- In fishing communities, the improvement of living environment is usually lagged behind. The development of fishing communities' roads and drains is promoted.
- Measures against the aging of infrastructures are government-wide issues. The maintenance and renewal of infrastructures in fishing ports and communities is promoted in accordance with plans incorporating measures for preventive maintenance.

(3) Activation of Fishing Communities

- For the activation of fishing communities, it is important to discover local resources in their regions, understand the characteristics of their regions, and on these bases, select specific actions. In some cases, cooperation with relevant industries is important.
- "Seaside Stay" is a type of "Countryside Stay" through which a visitor can enjoy the traditional life experience of a rural community and the exchange with local people in such community, and refers specifically to such experience and exchange in a fishing community. The government supports the implementation of measures concerning contents, such as efforts to polish up community resources as attractive tourist contents, and measures for infrastructures, such as the arrangement of accommodation facilities by utilizing old folk houses, etc.
- Thanks to the efforts of "Seashore Revitalization Plans" and the "Wide-Area Seashore Revitalization Plans", the activation of fishing communities is expected to be accomplished through the promotion of fisheries.

Characteristics of a Fishing Community and Example Actions



Source: (Prepared by the Fisheries Agency, based on the material compiled by the JIFIC (Japanese Institute of Fisheries Infrastructure and Communities))

Case Example: Effort of "Seaside Stay" in the Ieshima Islands, Hyogo Prefecture

Harmonious coexistence and interaction programs using local resources specific to the islands, such as experience-based tourism and island-walking, were developed. Especially, fishery experiences specific to the area, such as the "embarkation on trawl fishing boats", are tourist materials.

In addition, the business of using private fishery households as accommodations, "Seaside Stay", was started to effectively utilize such tourist materials as "nighttime firefly observation" and early morning fishery experience. The introduction of vessels dedicated to various fishery experiences such as "basket trap fishing" has been set forward.



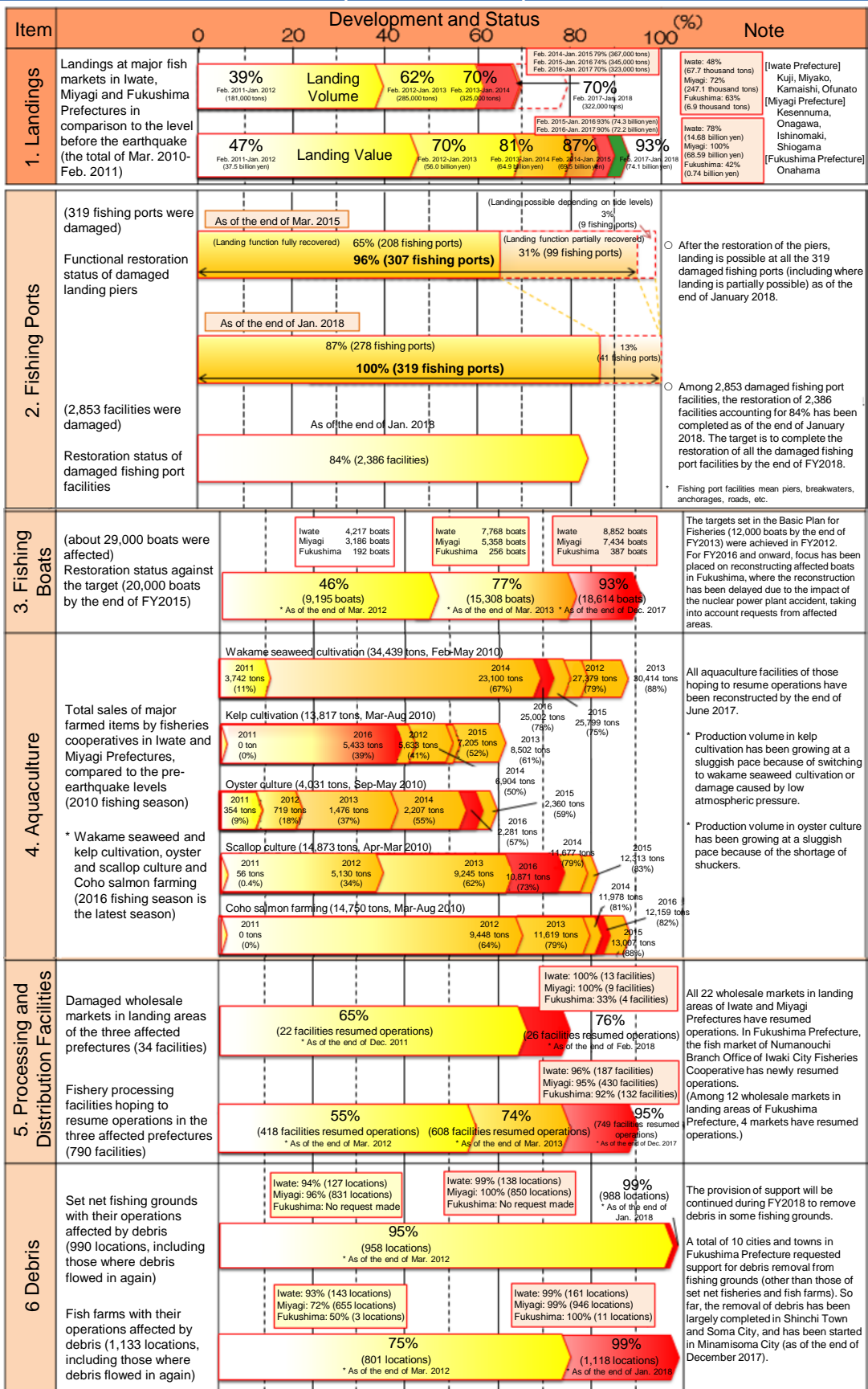
Scene of fisheries observation/experience
(Photo courtesy: Hyogo Prefecture)

Section 6 Reconstruction from the Great East Japan Earthquake

(1) Conditions of the Restoration/Reconstruction from the Earthquake Damage in the Fisheries Industry

- The government continues to make efforts to restore and reconstruct the fisheries industry in the disaster-affected areas.
- For fishing ports that serve as bases for the fisheries industry, high-sanitary-control freight handling areas, earthquake-resistant piers, etc. have been developed.

Summary of Restoration/Reconstruction of Fisheries Industry Following Great East Japan Earthquake (as of March 2018)



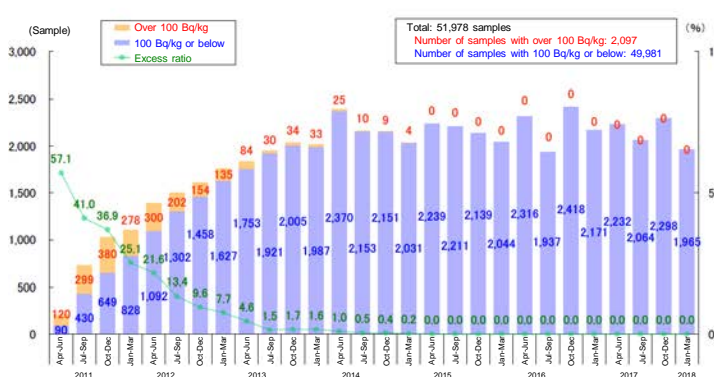
(2) Response to the Impact of the Accident at TEPCO's Fukushima Daiichi Nuclear Power Plant

(a) Monitoring of Radioactive Materials in Fish and Fishery Products and Trial Fishing Operation/Selling off the Coast of Fukushima

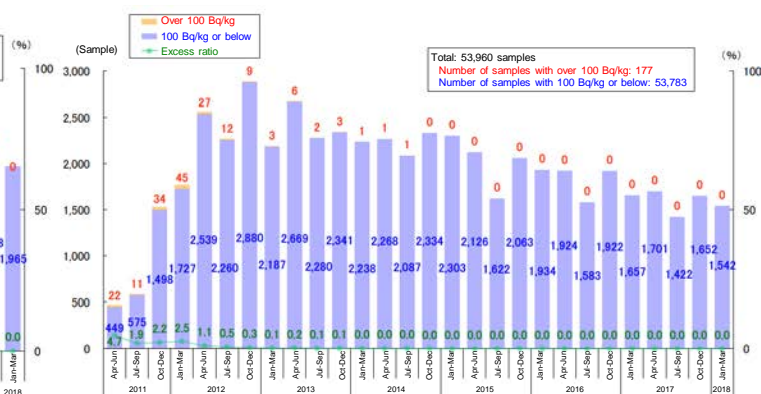
- The government, in cooperation with prefectural governments and fisheries cooperatives concerned, implements monitoring of radioactive materials in fish and fishery products and releases the results.
- In relation to marine species, since April 2015, there have been no samples collected in Fukushima that exceed the standard limits while since September 2014, there have been no samples collected in other prefectures that exceed the standard limits. In relation to freshwater species, only 8 samples collected in Fukushima and 3 samples collected in other prefectures exceeded the standard limits in FY2017.
- After full evaluation of the results of monitoring, trial fishing operation/selling was implemented off the coast of Fukushima. Since April 2017, the number of target species has been expanded to all fish and shellfish (except fish species subject to distribution restriction) and their catches to 3,281 tons (2017). These results are expected to contribute much to full-fledged resumption of fisheries in Fukushima.

Monitoring Results of Radioactive Materials in Fish and Fishery Products (as of the End of March 2018)

<Marine Species Caught in Fukushima>



<Marine Species Caught in Other Prefectures than Fukushima>



Source: The Fisheries Agency

Case Example: Selling through Bidding in Iwaki City's Fish Markets, and Trial Operation of Young Sandlance Fisheries and Green laver (*Monostroma nitidum*) Cultivation

1. Bidding has come back to Iwaki City's Fish Markets (Onahama, Nakoso and Numanouchi)

At the time of commencement of trial fisheries operation and selling, negotiated transactions with local fish dealer associations were adopted. As the number of target species for trial fisheries operation increased and market prices became predictable, bidding gradually came back to each of the markets during the period from April to September 2017.

2. Trial operation of young sandlance fisheries has been implemented. In the Tsukiji Market, it is ranked first in Japan in terms of traded volume and value by production area.

With regard to the traded volume of dried young sandlance (processed food: boiled-dried fish) by production area in the Tsukiji Market during this fishing season (from March to May 2017), the volume produced in Fukushima was 102 tons, ranking first in Japan together with its traded value.

In addition, trial green laver cultivation was started with its shipment to markets starting from February 2018.

This means that all trial operations of coastal fisheries have been commenced.

(b) Sweeping away Unfounded Reputational Damage and Response to Overseas Import Restrictions

- It is true that some consumers still remain suspicious of food produced in Fukushima. Therefore, the Fisheries Agency has continued to monitor radioactive materials in fish and fishery products and to publish the results to consumers in an easy-to-understand manner and its website provides Q&A on radioactive materials and fish/fishery products to ensure that correct information is given to every consumer.
- Monitoring results are communicated to import partners with explanations on the details of monitoring and safety measures, to have import restrictions relaxed or removed. As a result, 26 countries among the 53 countries and regions that had continued to impose ban on fish and fishery product imports from some prefectures completely withdrew their import restrictions by the end of March 2018.
- As for South Korea's import restrictions, the WTO dispute settlement procedures were initiated in 2015. In February 2018, the panel published a report recommending South Korea to rectify its measures in accordance with the WTO/SPS agreements. Japan will proceed with the procedures pursuant to WTO rules while continuing negotiations between the two countries.

Emperor's Cup Award

Takamasa (Representative: Masanori Takahashi) (Onagawa Town, Oshika County, Miyagi Prefecture)

Takamasa supports local producers in the Momonoura area through its production and sale of "Gozen Kamaboko Kaki (processed fish paste with oysters)" whose ingredients include oysters from the area as such oysters are recognized as having an excellent quality. The company is expected to flourish as a leader in reconstructing Onagawa Town in cooperation with other community members.



Prime Minister's Award

Youth and Young Adult Association of Ryori Fisheries Cooperative (Representative: Hideo Odaira) (Ofunato City, Iwate Prefecture)

Re-recognizing the importance of connection with consumers, the Association has constructed a new network with consumers by, among other efforts, issuing "Ryori Fisheries Cooperative's Eating News". The Association is expected to serve as a model for the vitalization of fishing communities.



Agriculture, Forestry, and Fisheries of Japan Promotion Association Chairperson's Award

Suginaga Kamaboko (Representative: Seigo Suginaga) (Nagasaki City, Nagasaki Prefecture)

With Japanese horse mackerel and sardine in Nagasaki as main ingredients, Suginaga Kamaboko developed "Gunkanjima no Megumi (Blessing of Gunkan Island)" placing importance on the traditional taste and texture of processed fish paste that local consumers are fond of. In addition, the company engages in promotional activities for Nagasaki's processed fish paste in cooperation with other processed fish paste producers, etc.



Structure of “FY2018 Fisheries Policy”

Overview

Focus of measures, fiscal measures, tax measures, financial measures, and policy assessment

I Revitalizing Fisheries and Fishing Communities Based on Seashore Revitalization Plan

- Steady conduct of Seashore Revitalization Plans, fostering of human resources, and making maximum use of fishery resources
- Shifting to advanced resource management in Japan and promoting global resource management
- Strengthening the fisheries regulatory system
- Establishing sustainable fisheries and aquaculture
- Developing measures for processing, distribution, consumption, and export
- Comprehensive development of fishing ports, fishing grounds, and fishing communities
- Promoting the demonstration of multifunctionality

II Efforts to Support Revitalization of Fisheries and Fishing Communities

- Strategic promotion of research, studies, and technological development in the fisheries industry
- Strengthening safety measures for fisheries by fishing boat
- Increasing the number of visitors to fishing communities through the promotion of Nagisa Haku (seaside overnight stay)
- Demonstrating the roles and restructuring and improving of fisheries cooperatives organizations
- Supporting fishery management through appropriate loans, credit guarantees, and fisheries insurance systems

III Reconstruction from the Great East Japan Earthquake

- Steady restoration and reconstruction
- Overcoming the impact of the nuclear power plant accident

IV Other Key Measures

- Participating in negotiations over the trade of fish and fishery products
- Compiling and enhancing the use of statistics in line with policy needs

V Requirements for the Comprehensive and Systematic Promotion of the Fisheries Policy

- Promoting measures in an efficient manner through coordination between relevant ministries and agencies
- Management and assessment of the progress of measures
- Implementing measures from a public point of view, taking into account the needs of consumers and the public
- Helping business owners and producers become independent and demonstrate originality and ingenuity
- Taking fiscal measures in an efficient and focused manner
- Deliberating on the reform of fisheries policies