

National Research and Development Agency

Japan Fisheries Research and Education Agency



About FRA

The Japan Fisheries Research and Education Agency (FRA), a national research and development (R&D) organization, conducts various activities to ensure a consistent supply of fishery products and promote sustainable development of the fishery industry.

These objectives are founded on the core premise of promoting R&D, fostering the development of human resources in fisheries, and allowing these outcomes to serve society through the optimization of these achievements.

Following the instructions from the Minister of Agriculture, Forestry, and Fisheries of Japan, the FRA formulated its 5th medium-to-long term plan for 5 years, from FY 2021 to FY 2025.

Based on the aforementioned, the FRA is committed to making the best use of its R&D outcomes by prioritizing research topics, improving the content of fisheries-related education, and developing an optimal organizational structure that effectively and efficiently promotes the foregoing in a synergistic manner. FRA envisions a new future for fisheries based on scientific and technological advances, and will work to contribute to the restoration of Japan's fishing industry through these endeavors.



Issues of Importance for the 5th medium-to-long term Plan

Measures to achieve goals related to maximizing the benefits of R&D and improving the quality of other operations.

1

R&D Business

Prioritize R&D efforts on the tasks listed below and promote them efficiently and effectively.

Important research subject (1)

R&D of marine resources for the sustainable growth of the fishing industry.

- 1 R&D for the sustainable use of marine resources.**
- 2 R&D for the maintenance and management of salmon resources.**

Important research subject (2)

R&D on production technology for the sustainable development of the fishing industry.

Important research subject (3)

R&D for the establishment of new production technology in fisheries and aquaculture.

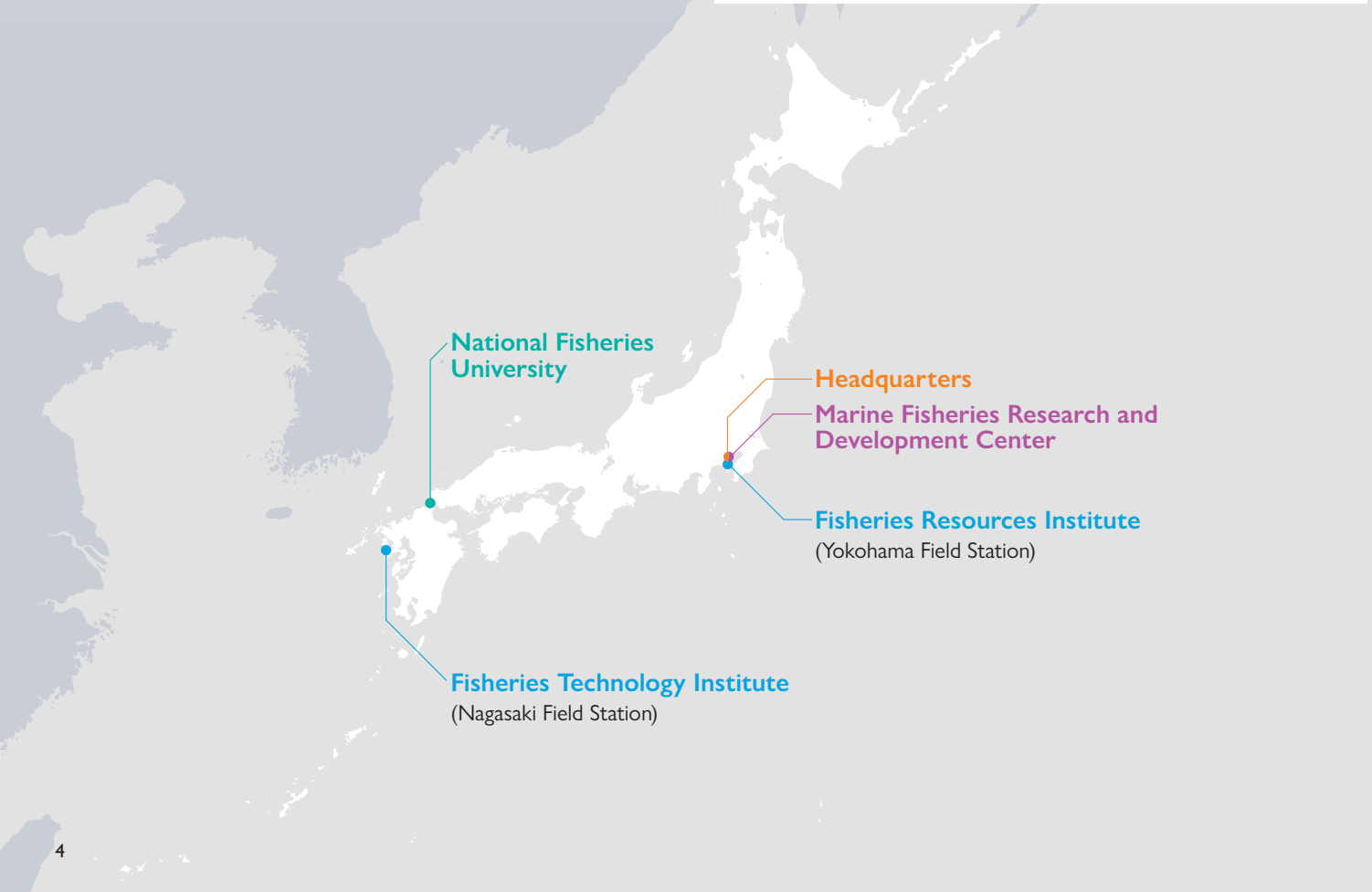
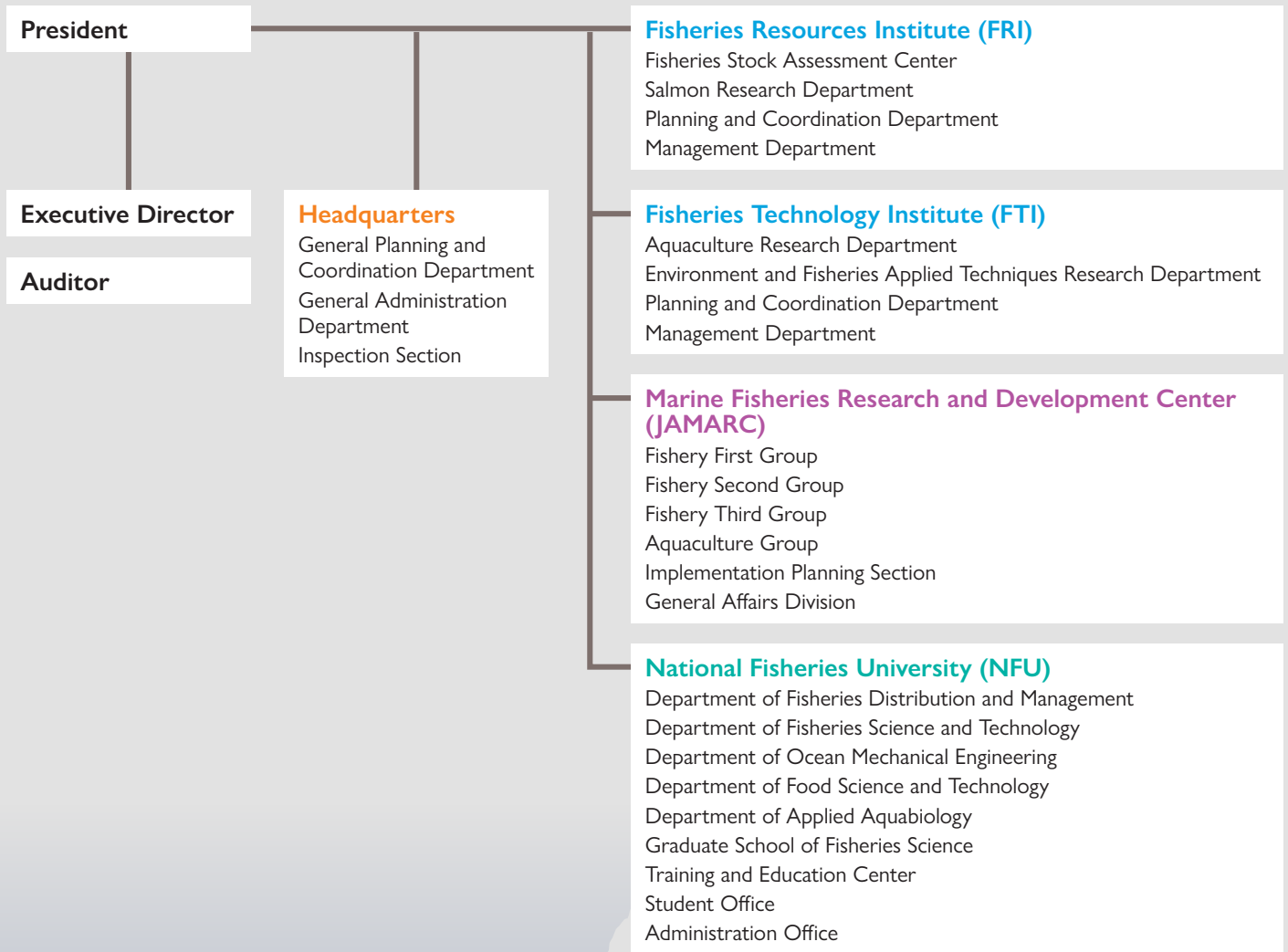
2

Human Resource Development

Regarding the human resource development work undertaken by the Japan Fisheries Research and Education Agency, we will strengthen measures to secure motivated students, expand utilization of research results in education and self-generated income through collaborative efforts with fisheries industry, and advance development of core human resources in fisheries industry through teaching theories, fundamentals and technologies in fisheries science.

- 1 Education of theories, fundamentals and technologies related to fisheries.**
- 2 Maintenance of accreditation as an educational institution.**
- 3 Continuation of education even in the event of large-scale disasters and widespread infectious disease epidemics.**
- 4 Research to be used in education of theories, fundamentals and technologies related to fisheries.**
- 5 Strengthening support for job placement for graduates.**
- 6 Student life support, etc.**
- 7 Expansion of self-generated income, sophistication of educational content, and strengthening measures to secure students.**

Organization



Fisheries Research Vessel and Fisheries Training vessel

The FRA has seven fisheries research vessels and two training vessels.

Fisheries research vessels study ecosystem mechanisms and forecast changes in these mechanisms. They also monitor the current state of the ocean and develop new fishing techniques and equipment.

The fisheries training vessels contribute to practical training, guidance, surveys, and research.



Hokko-maru (Fisheries Research Vessel)
Gross tonnage: 902 tons
Maximum (Max.) passenger load: 37 persons



Wakataka-maru (Fisheries Research Vessel)
Gross tonnage: 692 tons
Max. passenger load: 31 persons



Soyo-maru (Fisheries Research Vessel)
Gross tonnage: 892 tons
Max. passenger load: 36 persons



Shunyo-maru (Fisheries Research Vessel)
Gross tonnage: 887 tons
Max. passenger load: 36 persons



Kotaka-maru (Fisheries Research Vessel)
Gross tonnage: 59 tons
Max. passenger load: 10 persons



Yoko-maru (Fisheries Research Vessel)
Gross tonnage: 692 tons
Max. passenger load: 33 persons



Taka-maru (Fisheries Research Vessel)
Gross tonnage: 61 tons
Max. passenger load: 15 persons



Koyo-maru (Fisheries Training vessel)
Gross tonnage: 2,352 tons
Max. passenger load: 109 persons



Tenyo-maru (Fisheries Training vessel)
Gross tonnage: 995 tons
Max. passenger load: 87 persons

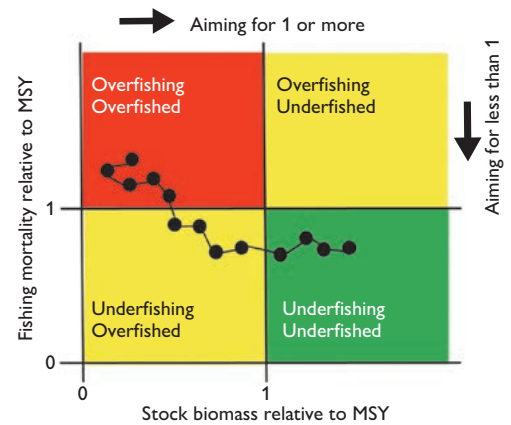
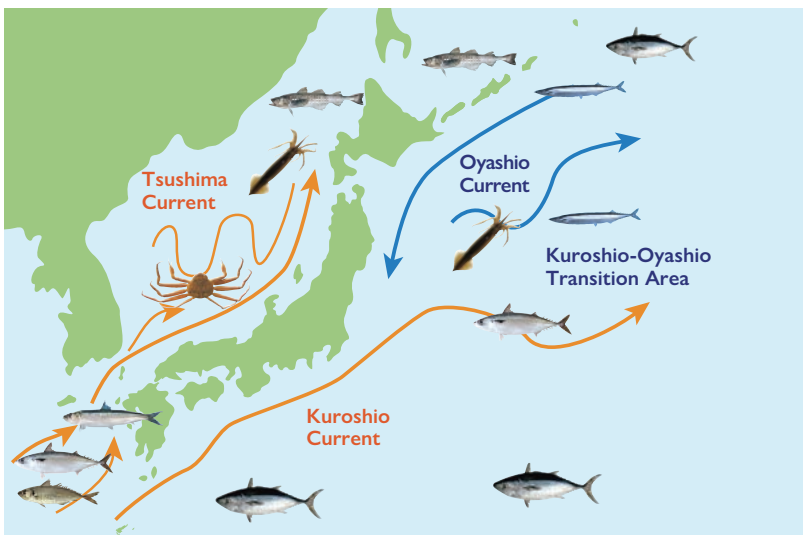
R&D of marine resources for the sustainable development of the fishing industry

Fisheries Stock Assessment Center

We conduct R&D on the stock assessment of fishery resources in the waters surrounding Japan and international fishery resources such as tuna, tuna-like species, and bottom fish caught by Japanese fisheries worldwide. We collaborate with domestic and international organizations to provide advice on optimizing the management of these resources.

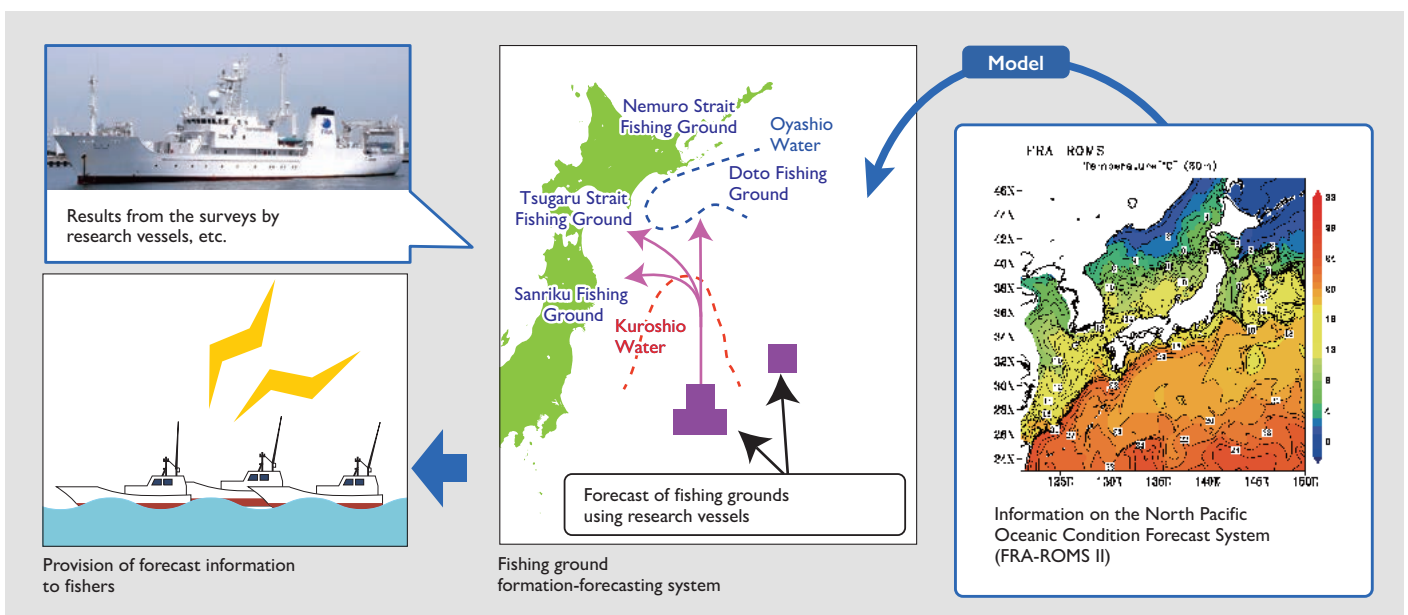
We focus on improving the accuracy of stock assessments and refining management procedures for fish species supplied as seeds. We also conduct R&D from a socio-economic perspective on resource management techniques, including those that examine the impact on the marine ecosystem.

We identify changes in the distribution, migration routes, and abundance of fishery resources in relation to climate change and the marine environment. Furthermore, we improve the accuracy of forecasts of fishing grounds and oceanic conditions by actively using oceanographic data from research vessels, satellites, and field information from fishers. We also provide short-term forecasts of fishing grounds and oceanic conditions using a high-precision ocean dynamics model, in addition to the traditional long-term forecasts of fishing grounds and oceanic conditions.



Kobe plot

Plot showing the results of the stock assessment as the trajectory time and status. These are often shown in relation to the stock biomass capable of producing MSY (BMSY) and fishing mortality capable of producing MSY (FMSY).



R&D on salmon stocks for sustainable salmon fisheries

Salmon Research Department

With the expansion of artificial hatcheries and improved rearing techniques, salmon returns in Japan have largely increased since the 1970s. However, the stocks have declined over the past two decades. The primary responsibility of this department is to contribute to the restoration and the management of salmon stocks in Japan. We conduct various surveys in rivers, coastal

waters, offshore areas, and on the high seas to determine the causes of stock decline and to identify the critical growth stages of salmon that are sensitive to environmental conditions. We also try to enhance the rearing techniques and release strategies of hatchery-reared fry to restore salmon stocks.

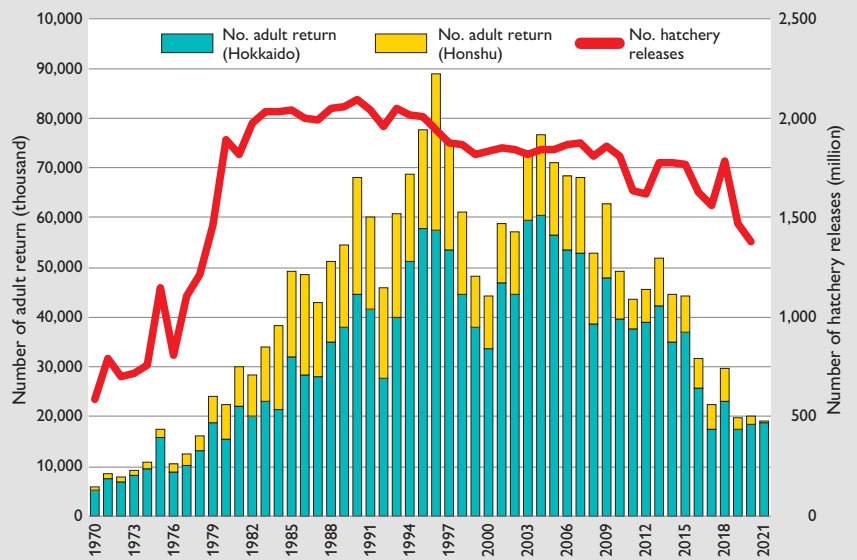
Spawning adult salmon



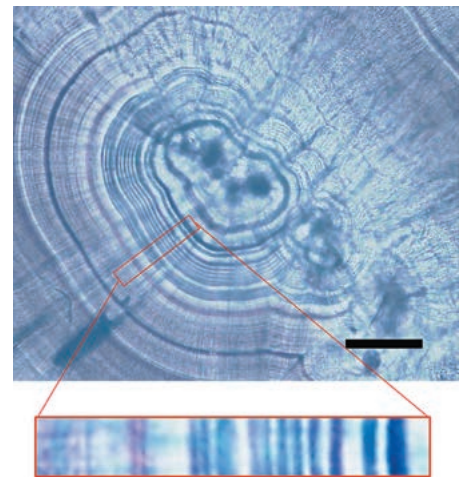
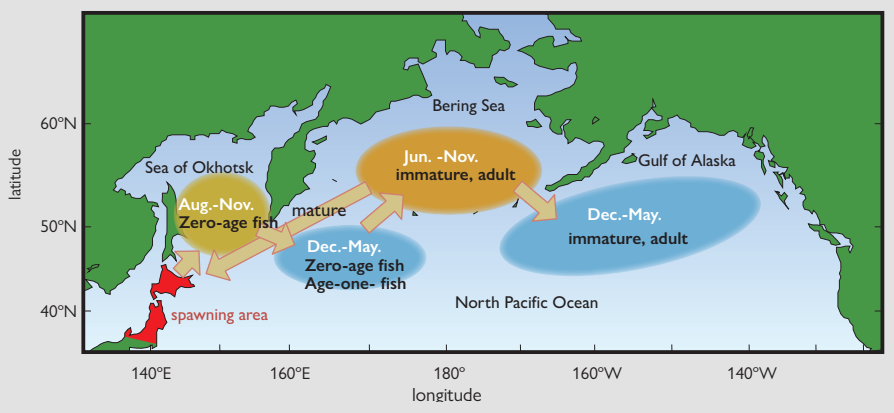
Salmon fry in the river



Number of chum salmon releases and adult returns in Japan



Schematic diagram of chum salmon migration



Sagittal section of the otolith from hatchery reared salmon
Coded bars are thermally marked to identify hatchery, release size, and release date.

Development of production technologies for the sustainable development of the fishery industry

Aquaculture Research Department

For the expansion of the aquaculture industry, we are working on the development of mass seed production technologies for various species, including bluefin tuna and Japanese eel; the

creation of fish/shellfish with characteristics suitable for aquaculture; and the development of technologies for disease prevention, rearing, and stabilizing aquaculture businesses.

Bluefin tuna seedling production

Environment

Spawning without control
 (Water temperature) Spawning (Jun to July)

Early spawning in the tank with environmental control
 (Water temperature) Spawning (Apr to May)

Month (day/night)

Early spawning in the tank (Apr to May) Transfer to the fish cages at the sea Landing and shipment of the fish

Development for glass eel production technique.

Feed made of materials with stable supply.

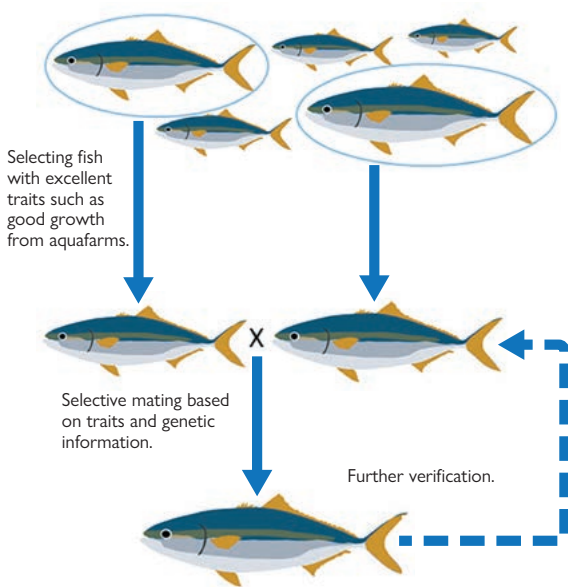
Feeding by an automatic feeder.

Seedlings reared using an automatic feeder.

Development of rearing equipment.
 Transfer of egg collection and larval rearing techniques .

Replacement of wild species with artificial seeds

Breeding of yellowtail



Fish diseases

Characterization of pathogens

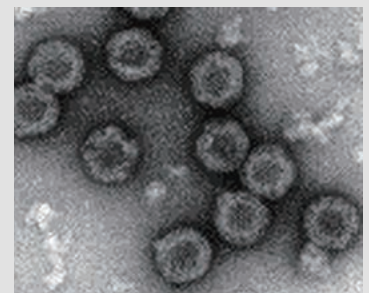
Determination of the cause
 Development of diagnostic methods

Prevention and precautionary measures

Development of prevention methods
 Vaccine Development
 Basic immunological research

International cooperation

Diagnosis of unknown diseases and definite diagnosis of specific diseases as an OIE participant.



Environment and Fisheries Applied Techniques Research Department

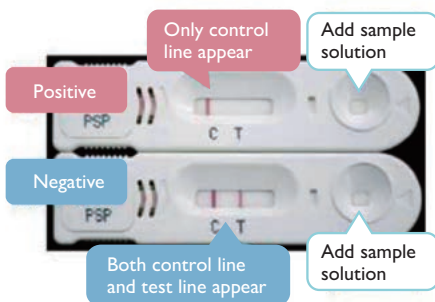
To contribute to the sustainable development of a safe and reliable fishing industry, we explore engineering technologies to improve safety, energy conservation, and efficiency for fishing vessels and industries, restoration and development of fishing grounds, functional development of fishing ports, and development of the underlying socio-economic roles and functions in fishing communities.

To provide safe and reliable seafood products, we have developed several new analytical methods for the analysis of marine toxins and reference materials. Some of these have already been introduced into marine toxin monitoring programs in Japan.

R&D are conducted to support fisheries, stock enhancement, and aquaculture in coastal and inland waters. Understanding the underlying mechanisms that support the biological processes of fishery resources is important to achieve sustainable fisheries; however, coastal and inland ecosystems are located in complex environments that are susceptible to local anthropogenic activities and global climate change.

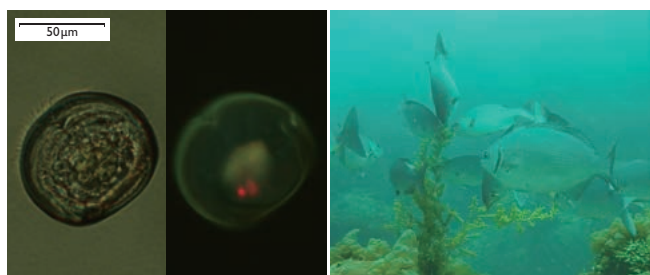
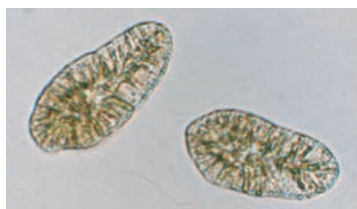
Various attempts are being made in a wide range of areas, including understanding the dynamics of fishery resources in relation to environmental changes, developing environmental restoration and design techniques, and promoting fishing stock enhancement and aquaculture. We aim to contribute to the sustainable development of coastal and inland fisheries by producing and extending scientific output to fishermen and local research institutes.

We conduct research and investigation to create a suitable environment for fishery resources living in coastal areas. Our mission is: 1) to predict red tide and shellfish poisoning outbreaks that threaten the sustainable development of coastal aquaculture; 2) to develop techniques to reduce the damage to fisheries caused by harmful algal blooms and to elucidate the mechanisms for the death of fish and shellfish caused by them; 3) to conduct a survey to grasp the true state of chemical contamination in the coastal area; and 4) to develop techniques to remediate polluted sediments and maintain a healthy marine environment.



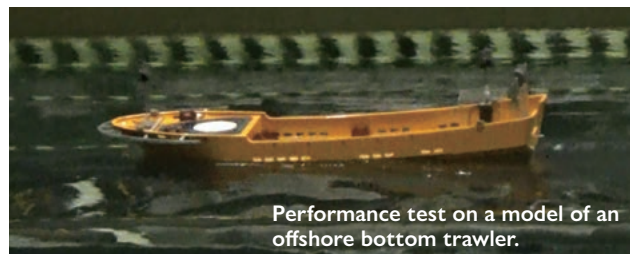
Lateral flow test for Paralytic shellfish toxin

Chattonella spp., a harmful algal species



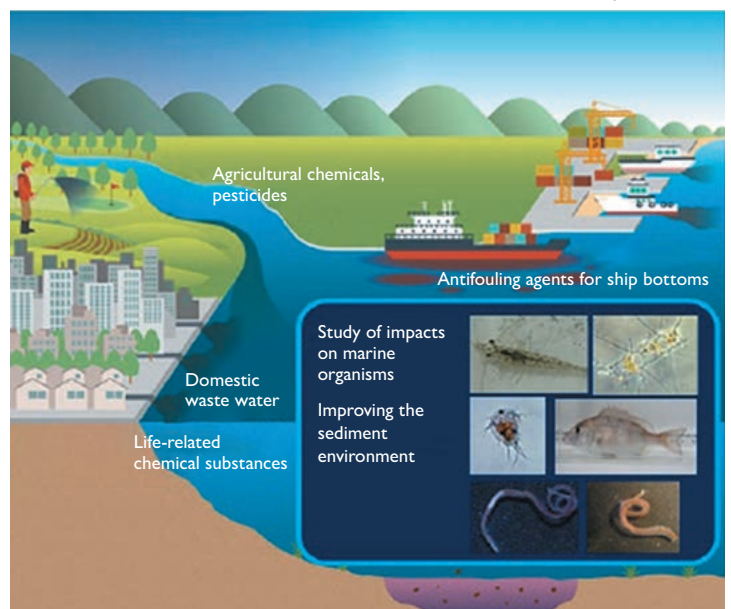
Ingestion of cultured phytoplankton cells (red dots) segregated from Hiroshima Bay by Pacific oyster larvae.

Herbivorous southern drummer feeding on Hijiiki seaweed artificially deployed on a barren ground.



Performance test on a model of an offshore bottom trawler.

Schematic illustration of the tasks of the 'Environmental Chemistry and Ecotoxicology Group' (ecotoxicology of marine organisms, remediation of polluted sediments)



Development and research to establish new production techniques for fisheries and aquaculture.

We conduct empirical research on fishing boats and vessels to carry out actual operations and sales in order to rationalize the development and utilization of fishery resources, with the aim of improving fishing-related technologies.

Offshore trawl fisheries

We aim to maintain stable management by improving fishing gear and efficiency, reducing on-board labor, and improving catch quality while considering productivity improvement, sustainable resource utilization, and energy conservation.



Offshore trawler

Aquaculture of leopard coral grouper and yellowtail

Through the development of commercialization technology for leopard coral grouper aquaculture and the establishment of an annual supply system for elite artificial yellowtail seedlings, we aim to expand the domestic aquaculture industry.



Leopard coral grouper



Yellowtail seedlings

Purse seine fishery on distant waters

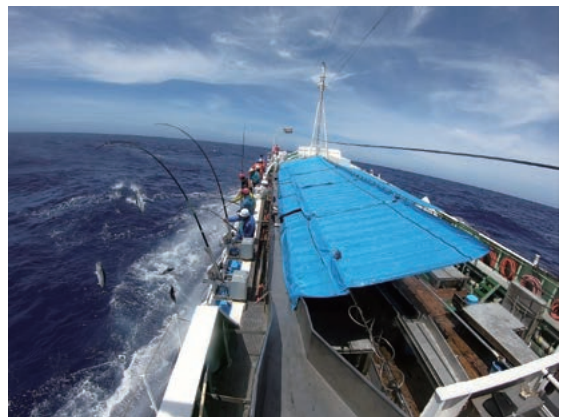
We will improve profitability and achieve sustainability through the development of efficient, energy-saving, and environmentally friendly operating technologies.



Using drones to locate fish school

Skipjack pole-and-line fishery

We aim to achieve stable management and sustainable development by saving energy and costs by using pop-up tags to locate fish schools and by developing automatic fishing machines.



Automatic Fishing Machine

Large set-net fishery

In order to cope with the aging of the crew and secure new crew, we will improve fishing gear and operation, improve distribution and sales, and propose a new business model.



Operation Scenery

Develop human resources to play active role in fisheries and related sectors

(Main roles requested to the Japan Fisheries Research and Education Agency)

Strengthening measures to secure motivated students, expansion of utilization of research results in education and self-generated income, and advancement of development of core human resources in fisheries industry

Education of theories, fundamentals and technologies related to fisheries for human resource development and promotion of research related to the education

(Measures described in the Fifth Med-Long Term plan)

(1) Education of theories, fundamentals and technologies related to fisheries

Sophistication of educational contents based on the challenges faced by the fishery industry and the new direction of the government's fisheries policies, etc.

(2) Maintenance of accreditation as an educational institution

In order to develop active human resources as fisheries experts, we will maintain the certification by the National Institution for Academic Degrees and Quality Enhancement of Higher Education and the certification of engineer education programs by the Japan Accreditation Board for Engineering Education, as well as the registration as a ship officer training facility by the Minister for Land, Infrastructure, and Transport in Japan.

(3) Continuation of education even in the event of large-scale disasters and widespread infectious disease epidemics

Introduction of curriculums utilizing ICT etc. in normal times, and formulation of systems to continue education in crisis times such as parallel use of in-face and online classes

(4) Research to be used in education of theories, fundamentals and technologies related to fisheries

Promotion of underlying research as an institution of higher education

(5) Strengthening support for job placement for graduates

Through enhancing collaboration and cooperation with fisheries-related companies and local governments etc., ensure high-rates in job placement for graduates in fisheries industries, national and local governments and related sectors

(6) Student life support, etc.

Supports for students through advice/instructions covering all the students' life etc.

(7) Expansion of self-generated income, sophistication of educational contents, and strengthening measures to secure students

As well as sophisticate educational contents through collaboration with stake-holding fisheries industries etc., implement appropriate measures to expand self-generated incomes through donations and research funds from companies etc.

Strengthening measures to secure motivated students, etc.

Undergraduate Courses

Department of Fisheries Distribution and Management
 Department of Fisheries Science and Technology
 Department of Ocean Mechanical Engineering
 Department of Food Science and Technology
 Department of Applied Aquabiology

Advanced Courses

Navigation and Fishing Course
 Marine Engineering Course

Graduate School of Fisheries Science

Fisheries Science and Mechanical Engineering
 Resource Management and Food Science



Development of core human resources in fisheries industry

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