R3-3 The workforce and manual work of oyster aquaculture

How far has the workforce of oyster aquaculture decreased, and who carries out manual work such as shucking, and how much of it?

Readers

Fishery cooperatives and local governments (those in charge of fisheries), research institutes, investors and others without specialist knowledge, who want to check in figures how far the workforce of oyster aquaculture has decreased and who carries out manual work such as shucking, and how much of it.

Takeaways

1. Fishery workers in Hiroshima Prefecture fell by 19.7% from 2018 to 2023. In 2023, 50.1% of them were aged 65 or over. Fishery workers are people who did fishery work at sea on 30 days or more in a year. People who only shuck oysters and employed foreign nationals are not counted, and people in fisheries other than oysters are included.
2. Of the individual (household) management entities in Hiroshima Prefecture whose main business is oyster aquaculture, 40.8% have a successor (2023). This is down from 46.7% in 2018, but the prefecture describes it as a higher share than in the other fisheries in the prefecture. For individual management entities nationwide whose main business is oyster aquaculture, the figure is 29.2%. A successor is a person who is expected to become the head of the family's fishery business in the future.
3. In oyster aquaculture in the Seto Inland Sea area (Hyogo, Okayama and Hiroshima), on the average of 17 individual management entities, 79% of working hours in 2024 were work on land. Work on land includes shucking. Wages paid to hired people were 38.1% of expenditure. These are values from before the mass mortality (die-off) of 2025, and fishing income had been increasing from 2021 to 2024.
4. The prefecture states that foreign technical intern trainees carry out the work at sea and the shucking, but it does not give the number of people. According to the notifications by employers, foreign nationals working in fisheries in Hiroshima Prefecture are 22.5% of the foreign nationals working in fisheries nationwide (end of October 2025). People who are employed by processors and the like and shuck oysters are not included in this number. The Technical Intern Training Program will be replaced by the Employment for Skill Development System from April 2027.
5. The research on an automatic shucking device at the prefecture's research institute is at an early stage. The prefecture states that the mechanisation of shucking and the sharing of work have not progressed because they need large capital investment. The prefecture's plan up to fiscal 2030 lists support for demonstrations of mechanisation and of shared work among its measures. We found no source that confirmed the effect of shared workplaces and the like.

After reading

When you record the labour used in oyster aquaculture in your own area, write down for each day the number of people and the hours, separating work at sea from work on land (shucking, the work of removing fouling, and so on), and also note whether the people are family members or hired people, and whether they are foreign nationals.

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1. Key points

- Fishery workers in Hiroshima Prefecture fell by 19.7% from 2018 to 2023. In 2023, 50.1% of them were aged 65 or over. Fishery workers are people who did fishery work at sea on 30 days or more in a year. People who only shuck oysters and employed foreign nationals are not counted, and people in fisheries other than oysters are included. [S1]
- Of the individual (household) management entities in Hiroshima Prefecture whose main business is oyster aquaculture, 40.8% have a successor (2023). This is down from 46.7% in 2018, but the prefecture describes it as a higher share than in the other fisheries in the prefecture. For individual management entities nationwide whose main business is oyster aquaculture, the figure is 29.2%. A successor is a person who is expected to become the head of the family's fishery business in the future. [S1]
- In oyster aquaculture in the Seto Inland Sea area (Hyogo, Okayama and Hiroshima), on the average of 17 individual management entities, 79% of working hours in 2024 were work on land. Work on land includes shucking. Wages paid to hired people were 38.1% of expenditure. These are values from before the mass mortality (die-off) of 2025, and fishing income had been increasing from 2021 to 2024. [S2]
- The prefecture states that foreign technical intern trainees carry out the work at sea and the shucking, but it does not give the number of people. According to the notifications by employers, foreign nationals working in fisheries in Hiroshima Prefecture are 22.5% of the foreign nationals working in fisheries nationwide (end of October 2025). People who are employed by processors and the like and shuck oysters are not included in this number. The Technical Intern Training Program will be replaced by the Employment for Skill Development System from April 2027. [S3, S4, S5]
- The research on an automatic shucking device at the prefecture's research institute is at an early stage. The prefecture states that the mechanisation of shucking and the sharing of work have not progressed because they need large capital investment. The prefecture's plan up to fiscal 2030 lists support for demonstrations of mechanisation and of shared work among its measures. We found no source that confirmed the effect of shared workplaces and the like. [S6, S7]

2. What is happening

Japan: how oysters are farmed

In oyster aquaculture, there is a method of growing oysters hung in the sea and a method of growing them in baskets. A Fisheries Agency document divides the main methods into the hanging method (suika-shiki; a method in which ropes with oysters attached are hung in the sea) and the basket method (single seed), in which oysters are grown one by one in baskets. The hanging method includes the raft type, in which the ropes are hung from a raft, and the longline type (haenawa-shiki), in which they are hung from a long rope fitted with floats. The raft type allows the raft to be moved but is said to be easily damaged and weak against waves, and it is used across Japan, including Hiroshima, Miyagi, Okayama and Hyogo. The longline type is strong against waves and is used in some areas with strong wind and waves, such as Miyagi and Iwate. The basket method tends to give oysters of uniform shape, but because it uses the sea in a flat plane, the production volume is limited, and it is used in some places such as Tokushima and Oita. No breakdown is given of how much is produced by which method (the sources of the table in the document also include web pages that are not official). [S8]

Oyster aquaculture is work that takes more than a year, from collecting seed in summer to shipment from autumn to spring. The Fisheries Agency's check sheet (2026) shows the flow of work in the hanging method as follows. In July to August, oyster larvae drifting in the sea (the young that have hatched from eggs and have not yet attached to an object) are made to attach to scallop shells to collect seed (seed collection [saibyo]). After

seed collection, the oysters pass through a stage in which the spat (small shellfish) are raised, and their growth is deliberately held back until the following spring (March to May) to make sturdy seed (hardening). During that time, the seed oysters (small oysters that are the starting material for aquaculture) are inserted into ropes, and in March to May the spacing between the shells is widened to 20–30 cm. From around June they are hung in the sea in earnest (main hanging), and they are harvested from autumn (around October) onwards. The ways of hardening that are listed include a method using racks (hardening racks), a method of hanging the oysters deep, and a method of bundling the ropes and hanging them densely. In an example in another document of the same Fisheries Agency, seed collection is in May to September of the first year, hardening is in October to March, aquaculture is from April of the second year, and shipment is from October of the third year. A leaflet of Miyagi Prefecture (2019) states that the oysters are landed after about one and a half to 3 years. Oysters are said to spawn in June to August, the larvae to drift for about 2 weeks before attaching to an object, and the oysters to mature in 2–3 years (quoted from other guidelines of the national government). [S8, S9]

A fishery management entity is a household or company that engages in fishing or aquaculture for sale. Among them, those run by a household are called individual management entities, and those run by a company, a fishery cooperative or the like are called group management entities. Shucked meat is the meat with the shell removed. In this paper, the work of breaking open the shell of an oyster to obtain the shucked meat is called shucking or shucked-meat work. Mortality (die-off) is the death of the oysters being grown.

Japan: management entities and workers

Oyster aquaculture management entities are decreasing nationwide. In the Census of Fisheries (a survey of all entities carried out by the Ministry of Agriculture, Forestry and Fisheries every 5 years; as of 1 November), the management entities that engaged in oyster aquaculture (whether or not it was their main business; individuals whose work at sea in the past year was less than 30 days are not included) numbered 2,698 nationwide in 2023. This was 323 (10.7%) fewer than the 3,021 of 2018 (this paper's calculation). The largest numbers are in Miyagi Prefecture with 511, Hokkaido with 400, Hiroshima Prefecture with 286, Iwate Prefecture with 270 and Nagasaki Prefecture with 176. The management entities engaged only in oyster aquaculture numbered 873, which was 32.4% of the total (this paper's calculation). [S1]

The management entities for which oyster aquaculture is the fishery with the largest sales value (below, entities whose main business is oysters) are also decreasing nationwide, and the average sales value per management entity is increasing. There were 1,846 in 2023, 10.7% fewer than the 2,067 of 2018 (this paper's calculation). The average of their sales value (the sales value of all the catch and harvest of the management entity, including consumption tax and excluding consumption by the household itself; it is not the amount for oysters alone) is 24 million yen (19 million yen in 2018). Those with less than 5 million yen numbered 650 (35.2%) and those with 100 million yen or more numbered 64 (3.5%); in 2018 these were 40.9% and 2.2% respectively (the shares are this paper's calculation). The average of the 873 management entities that engage only in oyster aquaculture is 35 million yen, and the average of the 973 management entities that also engage in other fisheries is 15 million yen. The entities in Miyagi Prefecture whose main business is oysters numbered 341 (367 in 2018), of which 7 were group management entities (management entities that are not individuals, such as companies and fishery cooperatives [fishery cooperative associations]). [S1]

Among the entities nationwide whose main business is oysters, small businesses with few people working at sea make up the majority. In the 2023 census, of the 1,672 management entities that had people doing work at sea, 654 (39.1%) were management entities with one person engaged in work at sea (people aged 15 or over who did work at sea on 1 November; for management entities with no work on that day, the people on an ordinary day in the roughly 10 days before it). Those with 4 or fewer people were 81.6%, and the average was 2.9 people (the shares are this paper's calculation; the Fisheries Agency document gives 39% for management entities with one person and more than 80% for those with 4 or fewer). This number of people also includes hired people (the

questionnaire asks about Japanese nationals and foreign nationals separately, and foreign nationals are considered to be included; this paper's judgement). People who do only work on land, such as cleaning shells and shucked-meat work, are not included. The reason why the number of management entities in the table, 1,672, is smaller than 1,846 is not stated. [S8, S1]

More people are involved in work on land than in work at sea. Of the 1,846 entities whose main business is oysters, in the 1,773 management entities that had people doing work on land (including group management entities run as a group, such as companies; the reason why the number of management entities in the table is smaller than 1,846 is not stated), the number of people in the busiest period for work on land averaged 5.0, more than the average of 2.9 for fisheries as a whole (whether people who also do work at sea are included cannot be confirmed, because the text of the definition could not be found). Of the 1,649 individual management entities, in the 1,578 management entities that had people who did only work on land in that period, the number of such people averaged 4.4 (the average for the 55,845 individual management entities in fisheries as a whole that likewise had people who did only work on land is 2.6). When these 1,578 management entities are divided by the number of people who did only work on land, 340 had 1 person, 350 had 2 people, 364 had 3–4 people, 357 had 5–9 people, 155 had 10–19 people, 8 had 20–29 people and 4 had 30–49 people, and none had 50 or more. Those with 4 or fewer numbered 1,054 (66.8%) and those with 10 or more numbered 167 (10.6%). The share of management entities in which only 1 person did only work on land (21.5%) is lower than the value for individual management entities in fisheries as a whole (30,109 of the 55,845 management entities that likewise had people who did only work on land, 53.9%) (the totals and shares are this paper's calculation). The management entities in which the people who did only work on land in that period were both family members and hired people numbered 755, and in 490 of these the hired people outnumbered the family members. The management entities with family members only numbered 805, and the management entities with no people who did only work on land numbered 71. Hired people are considered to include foreign nationals (according to the draft instructions for filling in the questionnaire shown in 2022; we have not checked the final version of the instructions). [S1]

The area of oyster aquaculture nationwide is decreasing, and a little over half of the management entities that engaged in oyster aquaculture have less than 1,000 square metres. The area in 2023 was 5,525,006 square metres, 19.0% less than the 6,820,168 square metres of 2018 (this paper's calculation). The average per management entity is 2,048 square metres. Of the 2,698 management entities that engaged in oyster aquaculture, 1,474 (54.6%) had less than 1,000 square metres and 111 had 10,000 square metres or more (this paper's calculation). The census's explanation of terms does not state how this area is measured (for example, whether it is the area of the rafts). [S1]

Much of the work with oysters does not fall within "fishery workers" in the national statistics. Fishery workers are people aged 15 or over who, in the past year, were engaged for 30 days or more in work at sea in a fishery run by a fishery management entity (the manager and family members, officers, and employed Japanese nationals). Cleaning shellfish and shucked-meat work are classed as work on land, and those days are not counted towards the 30 days. Of the people who are employed and work at sea, only Japanese nationals are counted as fishery workers. The number of foreign nationals is asked in a separate column of the questionnaire, but it is not in the tabulated tables. [S1, S10]

Fishery workers nationwide are decreasing and ageing at the same time. In the Census of Fisheries, they fell from 180,985 in 2013 and 151,701 in 2018 to 121,389 in 2023. They fell by 30,312 (20.0%) in the 5 years from 2018 and by 59,596 (32.9%) in the 10 years from 2013 (this paper's calculation). In 2023, those aged 65 or over numbered 47,529 (39.2%), of whom those aged 75 or over numbered 18,058 (14.9%). Those aged under 40 numbered 21,667 (17.8%) and women numbered 11,632 (9.6%) (the figures for those aged 65 or over and those aged under 40 are numbers that this paper obtained by adding up the numbers in the age classes; the shares are this paper's calculation). The estimate as of 1 November 2025 (the survey of trends in fishery structure;

approximate figures from a sample survey [a survey that selects and examines some of the management entities and estimates the whole], not to be compared directly with the census) was 109,820, down 5,000 (4.4%) from the previous year (the same as in chapter 2 of R1). By form of engagement, the people engaged only in the self-employed fishery of an individual management entity numbered 61,570, the officers of group management entities engaged in fishery numbered 6,920, and employed fishery workers (Japanese nationals who are employed and work at sea) numbered 41,340 (approximate figures of the estimate). Those aged 65 or over numbered 42,460 (38.7%), and the confirmed numbers are due to be published in December 2026. [S1, S10]

The number of people newly entering fisheries has been almost flat over the last few years. According to the fiscal 2025 (Reiwa 7) White Paper on Fisheries (June 2026), the people who newly entered fisheries (new fishery workers) numbered 1,754 nationwide in fiscal 2024, up 1.2% from the 1,733 of the previous fiscal year. In recent years the number has been roughly around 1,700, and the share of those aged 39 or under among them has stayed at about 60–70%. The breakdown for fiscal 2024 is 1,071 people who entered as employees (1,150 in the previous fiscal year) and 591 people who aim to be independent and self-employed (576 in the previous fiscal year) (the sum of the two, 1,662, is smaller than 1,754 [this paper's calculation], and no breakdown of the remainder is given). This number is an estimate by the Fisheries Agency based on surveys by the prefectures, and it is a value for fisheries as a whole. The method of the survey differs from that for the fishery workers above (the census and others), and no value for oyster aquaculture alone is given. [S11]

Among the workers of the entities whose main business is oysters, the share of those aged 65 or over is rather lower than in fisheries as a whole. In the 2023 census, their fishery workers numbered 3,784, of whom those aged 65 or over numbered 1,286 (34.0%, this paper's calculation). The figure for fisheries as a whole is 39.2%. Of the 3,784, employed fishery workers (Japanese nationals who are employed and work at sea) numbered 1,225 and women numbered 682. [S1]

The share of oyster aquaculture entities nationwide that have a successor (a person aged 15 or over who engaged in fishery in the past year and is expected to become the head of his or her own family's fishery business in the future) is higher than in fisheries as a whole and almost the same as the average for marine aquaculture. The individual management entities whose main business is oyster aquaculture numbered 1,649 in 2023, of which 482 (29.2%) had a successor. In 2018 it was 568 of 1,880 (30.2%). The figure for individual management entities in fisheries as a whole is 16.9%, and the average for individual management entities in marine aquaculture is 30.4%. It is a lower value than the 37.9% of scallop aquaculture, the 34.1% of nori (laver) aquaculture, the 40.9% of yellowtail aquaculture and the 30.7% of red sea bream aquaculture (all the shares are this paper's calculation). [S1]

Many foreign nationals work in fisheries and aquaculture. According to the notifications by employers (the Ministry of Health, Labour and Welfare's status of employment of foreign nationals; special permanent residents and some others are not included), 7,081 foreign nationals were working in fisheries nationwide at the end of October 2025 (1,884 establishments). Because the notifications are classified by the industry of the employer, people who are employed by processors or temporary staffing companies and shuck oysters are included not in fisheries but in food manufacturing and other industries. Foreign nationals in the fishery field with the status of residence "Specified Skilled Worker (i)" (a status under which foreign nationals with a certain level of skill work in fields that are short of labour) numbered 4,912 nationwide at the end of June 2026 (preliminary figure). Of these, 2,794 were in "fishery" and 2,118 were in "aquaculture". [S4, S5]

In Pacific oyster aquaculture, technical intern trainees (people accepted under the Technical Intern Training Program [a scheme under which foreign nationals acquire skills in Japanese workplaces]) have numbered a thousand and several hundred (1,176–1,686 people) at each of the eight points in time, the end of March of each year from 2018 to 2025, shown in the document. In the Fisheries Agency's estimate, there were 1,590 in March 2025, which is 78% of the 2,028 trainees in aquaculture (this paper's calculation; the figure displayed in the

graph in the document is 76%). Before that, there were 1,176 in March 2018, 1,471 in March 2019, 1,686 in March 2020, 1,564 in March 2021, 1,332 in March 2022, 1,442 in March 2023 and 1,571 in March 2024. The note in the document states that the value for "H29" [the era year Heisei 29] was estimated from the number of people who passed the technical intern training evaluation examination, and the others from the number of certificates issued by the council (the table has no column for 2017, and this is taken to refer to the value for March 2018; this paper's reading). There are no values by prefecture. In the Ministry of Health, Labour and Welfare's examination standards for Pacific oyster aquaculture work (2017), shucked-meat work is included in the compulsory tasks of the training, and the work of removing fouling organisms is included in the related tasks (we have not checked whether this is still the case). [S5, S12]

The national government regards oyster aquaculture as work that depends on manual labour. The Fisheries Agency states that the income and expenditure of oyster aquaculture management entities vary from year to year but have remained in surplus. On that basis, as a reason why income does not increase greatly even when the scale becomes larger, it cites the fact that the work is labour-intensive (it depends on a large amount of manual labour) and the advantages of scale are hard to obtain (a view based on the trend in the statistics on individual management entities). The fiscal 2025 (Reiwa 7) White Paper on Fisheries (June 2026) gives four reasons for the labour shortage in aquaculture. They are that it is work at sea, that working hours are unstable because of the weather, that workers need to live near the aquaculture site, and that automation and mechanisation have not progressed. The national government's Comprehensive Strategy for Making Aquaculture a Growth Industry (drawn up in 2020, revised in 2021) states that processes such as oyster shucking need human hands and that large-scale mechanisation and labour saving are an issue (according to the Fisheries Agency's 2026 summary document). [S8, S11, S13]

Accidents in fisheries are said to be many, but much of the work of oyster aquaculture lies outside those statistics. The fiscal 2025 (Reiwa 7) White Paper on Fisheries states that the rate of occupational accidents in fisheries is about 4 times the average for all industries on land. The same white paper gives the number of people who fell into the sea from fishing boats in 2025 (excluding those due to accidents to the boat such as collision and capsizing) as 60, of whom 39 were dead or missing (these are values for fishing boats nationwide, not values for the work of oyster aquaculture alone; the scope, such as the size of the boats counted, is not given). In the table on which this is based, the rate for the crew of fishing boats in fiscal 2024 (the number of deaths and injuries with 4 or more days of absence from work, per thousand people) was 10.1, and that for all industries on land (2024) was 2.3 (for fishing boats in fiscal 2022 and 2023 it was 10.8 and 9.7; in the same table, agriculture is 5.6 and forestry is 23.3). This value for fishing boats is a statistic for the boats to which the Mariners Act (a law that sets out the working conditions and other matters of people who work on ships) applies. Boats of less than 5 gross tonnage (a value that expresses the size of a ship), and fishing boats of less than 30 tons with a propulsion engine (an engine or the like) that are used exclusively for demarcated fisheries (aquaculture and the like) and similar purposes, are not included. For this reason, most of the work boats of oyster aquaculture are considered not to be included in these statistics (this paper's view). Accidents on land are included in the statistics under the Labor Standards Act, but those count only employed people. Accidents to the managers of individually run businesses and their family members are included in neither set of statistics. We found no accident rate for aquaculture or for oyster work alone. [S11]

Region (Hiroshima and the Seto Inland Sea): management entities and rafts

Hiroshima Prefecture accounted for 63.6% of the national oyster harvest (weight in shell) in 2024. In autumn 2025 a mass mortality occurred, centred on the Seto Inland Sea, and Hiroshima Prefecture's production in fiscal 2025 was 57% of a normal year (fiscal 2025 is July 2025 to June 2026, converted to shucked meat; a normal year is the average of fiscal 2015–2024; chapter 2 of R3-1). [S14, S3]

The management entities of Hiroshima Prefecture are characterised by being large compared with the country as a whole and by including many companies. In the census, the management entities in Hiroshima Prefecture that engaged in oyster aquaculture numbered 286 in 2023, down 5.0% from 301 in 2018 (the national figure is down 10.7%; the rates of decrease are this paper's calculation). Of these, 241 (84.3%, this paper's calculation) engaged only in oyster aquaculture. The entities whose main business is oysters numbered 264 (287 in 2018), of which 184 were individual management entities (down 12.4% from 210 in 2018, this paper's calculation) and 80 were group management entities such as companies (companies, fishery cooperatives [fishery cooperative associations], fishery production associations, joint management and others) (of which 79 were companies). The share of group management entities is 30.3%, higher than the national 10.7%, and 79 (49%) of the 160 companies nationwide whose main business is oysters are in Hiroshima Prefecture (the shares are this paper's calculation). [S1]

About 80% of the entities in Hiroshima Prefecture whose main business is oysters are concentrated in the four cities of Etajima, Hatsukaichi, Kure and Hiroshima. In the 2023 census (as of 1 November), the 264 by city and town are 61 in Etajima City, 52 in Hatsukaichi City, 50 in Kure City, 47 in Hiroshima City, 18 in Otake City, 14 in Higashihiroshima City, 11 in Saka Town, 5 in Fukuyama City, 3 in Takehara City, 2 in Kaita Town and 1 in Osakikamijima Town, and there are none in Onomichi City and Mihara City. The four cities have 210 (79.5%, this paper's calculation). [S1]

The area of oyster aquaculture in Hiroshima Prefecture is increasing while the national area decreases, and per management entity it is about 4 times the national average. In 2023 it was 2,460,509 square metres, accounting for 44.5% of the national total. It has increased by 12.3% from the 2,191,179 square metres of 2018 (the share and the increase are this paper's calculation). The average per management entity is 8,603 square metres, about 4 times the national average (2,048 square metres). According to the prefecture's summary, the management entities in the prefecture that engaged in oyster aquaculture fell from 606 in 1983 to 286 in 2023. Over the same period, the average aquaculture area widened from 3,290 square metres to 8,603 square metres. [S1]

The management entities that the prefecture counts are also decreasing. According to the survey by the prefecture's Fisheries Division, oyster aquaculture management entities numbered 326 in fiscal 2018, 296 in fiscal 2021, 290 in fiscal 2024 and 288 in fiscal 2025, down 11.7% from fiscal 2018 (this paper's calculation). In fiscal 2025, the western and central parts of the prefecture had 259 and the eastern part of the prefecture had 29. The definition of this way of counting is not given, and the figures cannot be mixed and compared with the census's 286 (management entities that engaged in oyster aquaculture) or 264 (entities whose main business is oysters). [S3]

In the other prefectures of the Seto Inland Sea, the management entities that engaged in oyster aquaculture fell from 144 to 124 in Okayama Prefecture and went from 79 to 83 in Hyogo Prefecture between 2018 and 2023. In the Seto Inland Sea fishery district they went from 716 to 654. The entities in Okayama Prefecture whose main business is oysters have fallen from 143 to 124. [S1]

There are no official statistics on the number of rafts in Hiroshima Prefecture, and there is only the statement "about 10,000 rafts" in a research report. A report of the Hiroshima Prefectural Technology Research Institute (2020) gives the oyster rafts in the aquaculture grounds of the prefecture as about 10,000, but it does not state how or as of when the number was surveyed. A 2009 report of the same institute has the same statement, and this is taken to be a repetition (it is not an independent confirmation; this paper's inference). The prefecture's guidelines require that rafts be marked and that the number of rafts and the number of hanging lines set in the rules on the exercise (the rules by which a fishery cooperative sets how the fishery right is to be used) of the fishery right (a right to engage in fishing or aquaculture in a fixed area of water) be observed, but the total number of rafts is not published. [S3, S6]

The raft commonly used in the prefecture is made by assembling bamboo lengthwise and crosswise, tying it with wire, and fitting expanded polystyrene as floats. According to the same report (2020), after a raft has been used for roughly 5 years, it becomes industrial waste except for part of the expanded polystyrene. On one raft, a little under 700 hanging lines are hung, each made by threading about 35 sets of a scallop shell with oysters attached and a plastic tube (spacer) alternately onto a wire. [S6]

Region (Hiroshima and the Seto Inland Sea): the workforce and manual work

The fishery workforce of Hiroshima Prefecture is ageing more than that of the country as a whole. In the 2023 census, the fishery workers of Hiroshima Prefecture (for all kinds of marine fisheries, not a value for oysters alone) numbered 2,672, down 655 (19.7%) from the 3,327 of 2018 and down 1,331 (33.3%, this paper's calculation) from the 4,003 of 2013. Those aged 65 or over numbered 1,338, which was 50.1% of the total (the national figure is 39.2%; the shares are this paper's calculation). Those aged under 40 numbered 311 (11.6%) and those aged 75 or over numbered 637 (23.8%) (the figure for those aged under 40 is a number that this paper obtained by adding up the numbers in the age classes; the shares are this paper's calculation). Kure City, in the prefecture, had 748, of whom those aged 65 or over numbered 387 (51.7%; the number of people is a number added up by this paper, and the share is this paper's calculation) (both are values for fisheries as a whole, not values for oysters alone). Employed fishery workers numbered 566, which was 21.2% (this paper's calculation). The share of employed fishery workers is 44,873 of 121,389 (37.0%) nationwide and 3,664 of 15,895 (23.1%) in the Seto Inland Sea fishery district (the shares are this paper's calculation). The survey of trends in fishery structure has no values by prefecture; the fishery workers of the Seto Inland Sea fishery district numbered 15,020 in 2025 (approximate figure of the estimate), of whom those aged 65 or over numbered 5,930 (39.5%; the total of the age classes and the share are this paper's calculation; the national figure is 38.7%). The 2,672 people, the decrease of 19.7% and the 748 people of Kure City are the same values as in chapter 2 of R1. [S1, S10]

Oyster aquaculture in Hiroshima Prefecture is a field in which the share of entities with a successor is higher than in the other fisheries in the prefecture. Of the 184 individual management entities whose main business is oyster aquaculture, 75 (40.8%) had a successor. This is down from 98 of 210 (46.7%) in 2018, but the prefecture describes it as the highest share among the classes of management entities in the prefecture. For the individual management entities in the prefecture as a whole, the share with a successor was 13.6%. [S1]

In the individual management entities of oyster aquaculture in the Seto Inland Sea area, about 80% of working hours are work on land, and nearly 40% of expenditure is the wages of hired people (Table 1). We look at oyster aquaculture in the Seto Inland Sea area (the average of 17 management entities in Hyogo, Okayama and Hiroshima; there is no value for Hiroshima Prefecture alone) in the national government's statistical survey of fishery management (individual management entities; January to December 2024). Fishing revenue (the revenue obtained from the fishery) was about 94.26 million yen, fishing expenditure (the expenditure incurred for the fishery) was about 69.78 million yen, and fishing income (the amount left after subtracting expenditure from revenue) was about 24.48 million yen. Within expenditure, hired labour wages (all the wages paid to hired people) were about 26.61 million yen (38.1%), and repair costs (only the cost of repairs to boats, equipment, fishing nets and fishing gear commissioned from shipyards, manufacturers and the like) were about 2.31 million yen (3.3%) (the shares are this paper's calculation). The people engaged in the busiest period averaged 15.3, of whom 12.3 were hired people. Of the total of 25,191 working hours in the year, work on land was 19,894 hours (79.0%), of which 16,044 hours were the hours of hired people (the shares are this paper's calculation). The harvest per management entity in 2024 was 78,375 kg of shucked meat. [S2]

Table 1 Management of the individual management entities of oyster aquaculture in the Seto Inland Sea area (simple average per management entity; 17 management entities in 2024)

Year	Fishing revenue	Fishing expenditure	Fishing income	Share of hired labour wages	Share of re - pair costs	Share of work on land
2021	About 65.67 million yen	About 55.16 million yen	About 10.51 million yen	36.7%	4.3%	78.5%
2022	About 79.02 million yen	About 59.20 million yen	About 19.83 million yen	37.6%	3.1%	78.2%
2023	About 82.66 million yen	About 62.20 million yen	About 20.46 million yen	37.7%	3.7%	78.5%
2024	About 94.26 million yen	About 69.78 million yen	About 24.48 million yen	38.1%	3.3%	79.0%

Note: The Seto Inland Sea area is the main production area of Hyogo, Okayama and Hiroshima, and the period is January to December of each year. The values for 2024 are the simple average of 17 management entities, and no error is given (this paper has not checked the number of management entities for 2021–2023). This paper rounded the table, which is in units of a thousand yen, to the nearest 10,000 yen. The fishing revenue for 2021–2023 is the value obtained by adding the fishing expenditure and the fishing income in the statistics (this paper's calculation). The shares are this paper's calculation; hired labour wages and repair costs are shares of fishing expenditure, and work on land is a share of total working hours (including the hours of planning and management). Repair costs are only the cost of repairs to boats, equipment, fishing nets and fishing gear commissioned from shipyards and the like. Group management entities such as companies, and households with a large income from outside the fishery, are not included. These are values from before the mass mortality of 2025. [S2]

From these statistics, the costs of cleaning off fouling and of measures against fouling cannot be seen separately. Repair costs are only the cost of repairs to boats, equipment, fishing nets and fishing gear commissioned from shipyards, manufacturers and the like, and repairs to aquaculture facilities such as rafts are not written in the definition. The materials used when owners make repairs themselves are included in fishing boat and fishing gear costs (about 1.5 million yen in 2024). The expenditure in 2024 also included seed costs of about 3.29 million yen, fuel costs of about 1.58 million yen and depreciation (the cost of buying equipment spread over the years of use) of about 6.42 million yen (of which about 1.36 million yen was for aquaculture facilities). "Other", whose content is not shown, was about 24.87 million yen (35.6%, this paper's calculation), the largest item after hired labour wages. Work on land includes shucked-meat work, but the hours for each kind of work are not known. Under the definition in the Census of Fisheries, cleaning shells (shellfish cleaning work) is also work on land, so part of the work of removing fouling may also be included in the hours on land (this paper's conjecture). [S1, S2]

These management figures have limits. They cover only individual management entities; the companies and others that make up about 30% of the entities in Hiroshima Prefecture whose main business is oysters are not included, and there is no survey of company management entities in oyster aquaculture. The sample is 17 management entities selected from the 2018 census, and its error is not given. In the average of the five main production areas for oysters (Hokkaido, Sanriku, Tokai, the Seto Inland Sea area and Kyushu) (a weighted average obtained by applying to the values of 53 management entities a weight set for each management entity; the value for the Seto Inland Sea area is a simple average, and the method of calculation differs), fishing income in 2024 was about 10.19 million yen, hired labour wages were 30.9% of fishing expenditure, and repair costs were 4.3% (the shares are this paper's calculation; the standard error rate [a guide to the variability of the estimate] of fishing revenue is 12.6%). 2024 is the year before the mass mortality, and the detailed tables for

2025 are due to be published in March 2027. However, from the survey for 2025, the basis for selecting the management entities to be surveyed changed to the 2023 census, and the way of counting the items included in revenue and expenditure (the method of recording) was also revised, so the values cannot be compared as they are with the values for 2021–2024 in Table 1. [S2]

Hiroshima Prefecture has a little over 20% of the foreign nationals working in fisheries nationwide. According to the notifications by employers, 1,591 foreign nationals were working in fisheries in Hiroshima Prefecture at the end of October 2025 (232 establishments), which was 22.5% of the national total (this paper's calculation). Foreign nationals working in food manufacturing in Hiroshima Prefecture number 5,147 (people who are employed by processors and the like and shuck oysters are included here; there is no value for oyster work alone). Of the foreign nationals in the fishery field with Specified Skilled Worker (i) status, those living in Hiroshima Prefecture numbered 616 at the end of June 2026 (preliminary figure), the largest number after Hokkaido (1,080). Nagasaki Prefecture with 417, Miyagi Prefecture with 259 and Saga Prefecture with 230 follow (the ordering is by this paper). Within the prefecture, there are 193 in Etajima City, 145 in Kure City, 111 in Hatsukaichi City, 73 in Hiroshima City, 42 in Saka Town, 33 in Otake City, 12 in Higashihiroshima City, 5 in Takehara City and 2 in Mihara City (a tabulation by place of residence, not place of work). The breakdown by prefecture into "fishery" and "aquaculture" is not published. [S4, S5]

The prefecture states that labour is short across the whole of oyster aquaculture work and that technical intern trainees carry out the work at sea and the shucking. The prefecture's guidelines for fiscal 2026 state that, in oyster aquaculture in the prefecture, labour is short across the whole of aquaculture work because of the ageing of Japanese workers and other factors. They state that trainees accepted under the Technical Intern Training Program for foreign nationals carry out the aquaculture work at sea and the shucked-meat work in processing plants. They take the view that securing labour will remain difficult in the future, and state that labour saving in the work and improvement of the working environment will be considered. They do not give numbers of people or shares. The prefecture's plan for 2030 also writes that securing labour for shucked-meat work is in a state of dependence on foreign technical intern trainees. [S3, S7]

Most of the oysters of Hiroshima Prefecture are for processing. Of the production of 16,900 tons in fiscal 2024, 11,600 tons (68.6%, this paper's calculation) were for processing (mainly frozen) and 5,300 tons were for the fresh market. Oysters for eating raw are limited to oysters from the sea areas designated by the prefecture (where the most probable number [a statistically estimated number] of coliform bacteria per 100 ml of seawater is 70 or less) and the like. In the prefecture's processing flow, oysters in shell are washed, stored or artificially purified, and then shucked, and the shells are carried to temporary piling sites in the sea and the like. The start date of shipment for fiscal 2025 was decided on 20 October 2025 by the Hiroshima Oyster Production Measures Council, and the prefecture gives the 2025 season as late October 2025 to the end of May 2026. [S3]

Shucking is done in the workplaces of the individual producers in the prefecture. The prefecture's page on oyster shells (February 2026) states that the processing into shucked meat is done in the workplaces of the individual producers, and it estimates that the oyster shells coming out of the workplaces in the prefecture amount to about 200,000 cubic metres a year for the prefecture as a whole. Because fouling organisms and the like are attached to the shells after shucking, they are kept at piling sites in the sea for 3 months or more and then collected as raw material for fertiliser and feed. [S15]

In the statistics on occupational accidents in the fisheries of Hiroshima Prefecture, no value for oysters alone can be found. In the final figures of the Hiroshima Labour Bureau (reports of workers' deaths, injuries and illnesses), the deaths and injuries with 4 or more days of absence from work in the livestock and fisheries industries were 27 in 2022, 26 in 2023, 31 in 2024 and 37 in 2025 (of which 1 death), and they include livestock farming. [S16]

The mass mortality of 2025 is said to have affected the employment of foreign nationals as well, but no figures can be found. The summary of proceedings of the Fisheries Agency's council for the fishery technical intern

training programme (24 December 2025) records a report by JF Zengyoren (the national body of fishery cooperatives) that in Hiroshima, Okayama and Hyogo, where the damage is heavy, the situation is one in which foreign nationals cannot be employed. There is no number of cases, and it is a statement by an industry body. [S12]

In Okayama Prefecture, there were production areas where there were not enough people to shuck oysters in the period when the novel coronavirus spread, and the end of production was delayed. The overview of oyster aquaculture for fiscal 2021 (Reiwa 3) by the research institute of Okayama Prefecture states that, with the spread of the novel coronavirus, it became hard to gather people for shucking work, such as foreign technical intern trainees, and that in some places there were not enough mukiko (people who shuck oysters). It states that, for that reason, there were production areas where the end of production was later than in an ordinary year. It does not state the number of people who were lacking or which production areas these were. The production of Okayama Prefecture in that fiscal year was 3,605 tons of shucked meat (118% of the previous fiscal year), the largest in the past 5 years, and this is not a record that the volume decreased. [S17]

3. Existing measures, and how they are assessed

The measures against the labour shortage are the acceptance of foreign workers, the mechanisation of shucking and the sharing of work, and increasing shipments in shell. The size of their effect has hardly been confirmed. Measures against mortality are dealt with in chapter 3 of R3-1, and measures against fouling organisms in chapter 3 of R3-2.

Acceptance of foreign workers

The acceptance of foreign workers has become the main response to the labour shortage. The prefecture's guidelines write that technical intern trainees carry out the aquaculture work at sea and the shucked-meat work in processing plants. They state that the prefecture will work with the bodies concerned in step with the start, on 1 April 2027, of the Employment for Skill Development System (a new scheme under which foreign nationals work while being trained), which replaces the Technical Intern Training Program. Under the transitional measures at the time the scheme changes (provisions that continue to apply the rules of the previous scheme to the people already under it), people who entered Japan before 1 April 2027 and are in technical intern training on that day can continue technical intern training as they are, and if they meet the conditions they can go on to the next stage of training. If an application for accreditation of the training plan has been made before that day (limited to plans that begin within 3 months of that day), there are also cases in which a person can enter Japan as a technical intern trainee after that day. In both cases the rules of technical intern training apply, and the person cannot move to employment for skill development. Under the national government's operational policy, acceptance in the fishery field (fishery and aquaculture) under employment for skill development is up to 2,600 people in the 2 years from fiscal 2027. For the fishery field of Specified Skilled Worker (i), it is up to 14,800 people in the 5 years from fiscal 2024 (both are operated as upper limits). Dispatch (working while employed by a temporary staffing company) is permitted only in the fields of agriculture and fishery, now under Specified Skilled Worker and from April 2027 under employment for skill development, and it is limited to dispatch businesses in which local governments, fishery cooperatives or the like are involved. [S3, S5]

The national government takes the view that labour in the fishery field will be short even after measures to raise productivity and the like, and it sets the number still lacking after those measures as the expected acceptance of foreign nationals. The operational policy decided by the Cabinet on 23 January 2026 puts the workers in the fishery field (fishery and aquaculture; there are no values for oysters or for Hiroshima Prefecture alone) at 126,000 in fiscal 2022 (it does not state which statistics this is based on), and expects them to fall to 107,300 in fiscal 2028 as elderly people and others leave. From the target for the production of fish and shellfish in fiscal

2032 in the Basic Plan for Fisheries (5.35 million tons) and the actual result for fiscal 2022 (3.48 million tons), it sets the target for fiscal 2028 at 4.6 million tons, estimates the workers needed for that at 170,000, and states that there will be a shortage of about 62,700 people in fiscal 2028. Even if about 45,300 of this is eased by an efficiency gain of 4.8% a year through the handover to younger generations, the use of information technology and so on (equivalent to about 37,000 people by fiscal 2028) and by securing additional human resources within Japan (likewise equivalent to about 8,300 people), a shortage of about 17,400 people is still expected. The policy sets the expected acceptance of foreign nationals in the fishery field as a whole for fiscal 2024–2028 at the same number, 17,400 (the same as the sum of the 14,800 of Specified Skilled Worker (i) and the 2,600 of employment for skill development; this paper's calculation). The policy states that, through the efforts of the government and the industry, production per person in the fishery field rose by 28% in the 10 years from 2012 to 2021 (it does not state which statistics the value is based on). The equipment that the policy gives as examples of measures to raise productivity is automatic fishing machines, feeders (machines that give feed), net-cleaning robots (machines that clean nets) and the like, and no equipment for oyster work is given (this paper's reading). [S5]

After the mortality of 2025, the prefecture's list of support measures (as of 1 April 2026) includes a measure under which technical intern trainees who have become unable to continue their training can work in other occupations for a certain period, up to 28 hours a week. The policy package that the national government put together in December 2025 also includes support for technical intern trainees to change their training employer (both are in chapter 3 of R3-1). The number of changes of training employer is not known (chapter 5). [S18, S19]

Mechanisation and sharing of shucking, and shipment in shell

The research on an automatic shucking device at the prefecture's research institute is at an early stage. The Hiroshima Prefectural Technology Research Institute is researching a device that carries out by machine the work of breaking open the shell of an oyster to obtain the shucked meat (kaki-uchi). The 2025 report is on a prototype of a mechanism that holds oysters in shell down with wires to fix them in place. In the test of breaking the shell, 54 of 60 oysters (90%) could be fixed, and in an additional test in which the spacing of the wires was changed to 50 mm, all could be fixed. However, this is only the first of the three problems that the device needs to solve (the research was in fiscal 2023, and the time of practical use is not stated). There were also oysters for which barnacles attached to the shell broke and the fixing became loose. [S6]

For shared workplaces and automatic shucking machines, the size of the investment is regarded as the barrier. The prefecture's plan for 2030 states that the sharing of shucked-meat work and the introduction of automatic shucking machines have not progressed because these are special equipment and need large capital investment. For shared workplaces and commercially available machines that assist shucking, we found no source that confirmed their effect or how far they have spread (chapter 5). We also found no national government programme for mechanisation limited to oyster shucking. [S6, S7]

Increasing shipments in shell is also regarded as a response to the labour shortage. The prefecture's Fisheries and Marine Technology Center wrote, in the purpose of its research for fiscal 2020, that demand for shucked meat has fallen and that the labour for processing into shucked meat is also short. It states that, for that reason, the need to secure earnings through the shipment of oysters in shell is growing (there are no figures such as numbers of people). [S20]

4. What is changing

Around oyster aquaculture, the environment of the sea, the laws and systems, and the market are changing at the same time, but much of this is at the stage of plans, expectations, provisional arrangements and drafts (as of 3 November 2026). Of the matters dealt with in this chapter, the changes to laws and ordinances that have come

into force are the amendment of the Fishery Act (2020), the amendment of the Food Sanitation Act (fully in force in 2021; on the same day, Hiroshima Prefecture's ordinance on oyster workplaces was abolished), the amendment of the Seto Inland Sea Act (2022), the transfer to the Consumer Affairs Agency of the work of making the specifications and standards for food (2024) and the amendment of the Fishery Disaster Compensation Act (2025 and 2026). The act that reforms technical intern training (in force in April 2027) and the amendment of the Industrial Accident Compensation Insurance Act (the day on which voluntary enrolment ends is to be set by Cabinet Order) have been promulgated, but parts of them are not yet in force. The others are plans, policies and guidance outlines of the national government and the prefecture, voluntary efforts, future schedules and the like.

Changes in the environment of the sea and in the market are dealt with in chapter 4 of R3-1.

Laws and systems

- Promulgated 14 December 2018, in force 1 December 2020: the amended Fishery Act. It abolished the system of an order of priority under which the law decided uniformly to whom a fishery right is to be licensed. The governor must grant a licence to a person who applied within the application period, except in the cases in which the law provides that a licence must not be granted (such as cases where the person lacks eligibility; Article 71, paragraph 1). When there are several applications for the same fishery right, priority is given to an existing holder of a fishery right that has roughly the same position, area and type as the expiring fishery right and who is making "appropriate and effective use" of the fishing ground, and in other cases the licence is granted to the person recognised as contributing most to the development of the fisheries industry of the region (Article 73). The duration of a demarcated fishery right (a right to carry out aquaculture) is 10 years for those specified by ministerial ordinance, such as pearl aquaculture, and 5 years for the others, and the governor can make it shorter in the sea-area fishing ground plan (a plan for fishing grounds that the governor draws up every 5 years) (Article 75). Holders of fishery rights report to the governor on the state of resource management and of the use of the fishing ground (Article 90). [S21]
- 1 June 2021: the amended Food Sanitation Act came fully into force. In principle, all food business operators came to be required to have a plan and records of hygiene control in line with HACCP (pronounced "hasappu" in Japanese; a method of hygiene control in which the processes where hazards are likely to arise are identified, controlled and recorded) (small business operators can simplify this by using the national government's guidance documents). On the same day, the prefectural ordinance that had required a permit for workplaces in Hiroshima Prefecture where oysters are shucked and the like was abolished, and a business licence under the Food Sanitation Act became necessary. [S22]
- 7 June 2021: the latest revision of the "guidance outline on the handling of raw oysters" of Hiroshima Prefecture and the industry. It requires handling businesses, brokers and processing businesses to have a hygiene control plan in line with HACCP that sets out measures against norovirus (a virus that causes food poisoning) and shellfish poison, and daily records of the quantities purchased, processed and shipped. When oysters for eating raw are taken from a raft that has been moved to a sea area outside the designated areas in order to fatten the meat, they are taken after the raft has been returned to a designated sea area and the oysters have been farmed there for 5 days or more. In the season for shipping oysters for eating raw (November to March of the following year), producers' groups and others, under the guidance of the prefecture, divide Hiroshima Bay into eight sea areas and voluntarily test for norovirus once or twice a week (this is not required by law). Oysters from a sea area that tests positive are switched to use for cooking with heat, and are not shipped for eating raw until the next test is negative. [S22]
- 25 March 2022: the current Basic Plan for Fisheries was decided by the Cabinet. It touches on oysters in only one place, where they are given as an example of "fishery products whose exports are expected to expand in the future" within the efforts on exports, and there is no numerical target for oysters alone (this paper's

check). Oysters are not among the strategic aquaculture items (yellowtails, red sea bream, Pacific bluefin tuna, salmon and trout, new fish species such as groupers, scallops, and pearls) of the national government's Comprehensive Strategy for Making Aquaculture a Growth Industry (drawn up in 2020, revised in 2021). [S13]

- 1 April 2022: the amended Seto Inland Sea Act (Act on Special Measures concerning Conservation of the Environment of the Seto Inland Sea) came into force. The governors of the prefectures concerned became able to draw up nutrient management plans and to supply nutrients to some sea areas. The viewpoint of climate change was also added to the basic principles. [S23]
- September 2023: the simultaneous renewal of fishery rights in Hiroshima Prefecture (the Hiroshima sea-area fishing ground plan under Article 62 of the Fishery Act; partly changed on 1 August 2024 and 1 October 2026). The duration of the demarcated fishery rights for oysters (raft hanging type, stake hanging type [a method of hanging from racks assembled on stakes driven into the seabed], and longline hanging type) is "from the date of the licence until 31 August of Reiwa 10", and the next renewal is expected in September 2028 (this paper's estimate). The demarcated fishery rights for oysters in separate volumes 4 and 6 of the plan are 69 of the raft hanging type, 50 of the stake hanging type and 5 of the longline hanging type (these are the numbers in the plan, not the numbers of licences; counted by this paper), and all are group fishery rights managed by fishery cooperatives and the like. In separate volume 5 (the waters of Etajima City, Kure City, Higashihiroshima City and Osakikamijima Town), too, the duration is the same. [S24]
- 1 April 2024: the work of making the specifications and standards for food moved from the Ministry of Health, Labour and Welfare to the Consumer Affairs Agency. The standard for oysters for eating raw is a bacterial count of 50,000 or less per 1 g and a most probable number of E. coli of 230 or less per 100 g, and for shucked oysters for eating raw the most probable number of Vibrio parahaemolyticus (a bacterium that causes food poisoning) is 100 or less per 1 g. Storage is at 10°C or below when chilled and −15°C or below when frozen, and the raw-material oysters are taken from sea areas where the most probable number of coliform bacteria per 100 ml of seawater is 70 or less. [S22]
- 21 June 2024: the act that amends the law on technical intern training (Act No. 60 of Reiwa 6) was promulgated. It changes the Technical Intern Training Program into the Employment for Skill Development System, which starts on 1 April 2027 (not yet in force as of 3 November 2026). The name of the law after amendment is the "Act on the Proper Implementation of Employment for Skill Development of Foreign Nationals and the Protection of Foreign Nationals in Employment for Skill Development", and its purposes include the protection of foreign nationals in employment for skill development. The jobs in which a trainee can go on to Technical Intern Training No. 2 (the second stage of the training) include "scallop and Pacific oyster aquaculture" in aquaculture and "manufacture of processed products for eating raw" in seafood processing, among others. [S5]
- Promulgated 14 May 2025: the amendment of the Fishery Disaster Compensation Act. The abolition of the method under which a fishery cooperative concludes a contract for its members collectively, and other changes, came into force on 1 October 2025, and the creation of "catch and specified aquaculture mutual aid", which merges catch mutual aid and specified aquaculture mutual aid, and other changes, came into force on 1 April 2026. The newly added special clause under which payment is made even for large losses for each aquaculture facility (80% or more of the quantity immediately before the accident) is limited by the Order for Enforcement to the aquaculture of fish grown in net pens (pens enclosed by nets), such as yellowtail (hamachi) and sea bream, and oyster aquaculture is not covered. [S25]
- 23 January 2026: the operational policies for the fishery field under employment for skill development and Specified Skilled Worker were decided by the Cabinet. The expected acceptance (upper limit) is 2,600 people in the 2 years from fiscal 2027 for employment for skill development, and 14,800 people in the 5 years from fiscal 2024 for Specified Skilled Worker (i). The restricted period before a person can change the accepting employer at his or her own wish (transfer) is 1 year for the fishery field (2 years for the food and beverage manufacturing industry). The policy gives the ratio of job offers to applicants (the number of job offers per

job seeker) for aquaculture as 2.07 (fiscal 2024). A new category of "seafood processing" was added to the field of the food and beverage manufacturing industry. [S5]

- 31 March 2026: an administrative notice of the Ministry of Health, Labour and Welfare (a written communication from the national government to local governments and others). It gave notice of points to note which recommend that the voluntary norovirus testing of raw-material oysters for eating raw before shipment be carried out, as far as possible, by a method in line with the international standard (ISO 15216-1:2017) (this is technical advice, not a legal obligation). It cautions that "not detected" does not guarantee that there is no virus. [S22]
- 20 April 2026: the Minister of Agriculture, Forestry and Fisheries consulted the council on the next Basic Plan for Fisheries (a Cabinet decision is aimed for in late March 2027). [S13]
- Promulgated 17 July 2026: the amendment of the Industrial Accident Compensation Insurance Act and other acts (Act No. 60 of Reiwa 8). In individually run fisheries businesses (aquaculture and the like) that regularly use fewer than 5 workers, enrolment in industrial accident compensation insurance is now voluntary, and this treatment is to be abolished. The date of abolition is to be set by Cabinet Order within 5 years of promulgation, and at the council meeting of September 2026 a draft setting it as 1 April 2031 was found "appropriate". The promulgation of this Cabinet Order has not been confirmed as of 3 November 2026. [S16]
- 31 October 2026: Hiroshima Prefecture drew up the "2030 Hiroshima Prefecture Agriculture, Forestry and Fisheries Action Programme" (fiscal 2026–2030) (see the section on the prefecture's plan below). [S7]
- Future schedule: the confirmed values of the 2025 survey of trends in fishery structure (December 2026), the detailed tables of the 2025 statistics on fishery management (March 2027), the next Basic Plan for Fisheries (late March 2027), the start of employment for skill development (1 April 2027), and the expiry of the demarcated fishery rights for oysters (31 August 2028). [S2, S10, S5, S13, S24]

The prefecture's plan

The prefecture's new plan sets the maintenance of production volume as its target. The "2030 Hiroshima Prefecture Agriculture, Forestry and Fisheries Action Programme" (fiscal 2026–2030), drawn up on 31 October 2026, makes "rebuilding a sustainable oyster production and shipment system" one of the pillars for the fisheries industry. The target for oyster production is 17,000 tons in fiscal 2030, a level that keeps the 16,900 tons of fiscal 2024 (the basis of the weight is not written in the plan, but the value for fiscal 2024 is the same as the value converted to shucked meat in the prefecture's guidelines). The prefecture states that the fishing grounds have the capacity to support production of 20,000 tons a year, but that because the effects of rising seawater temperature and of the oligotrophication of the sea (nutrients becoming scarce) are becoming serious, it aims to maintain the present level. The target for production per raft is 2.3 tons (the same as fiscal 2024; the basis of the weight is not written in the plan), and the target for the export volume of oysters is 2,500 tons (1,760 tons in fiscal 2024; the bases of the weight and of the fiscal year are not written). The measures include a review of the density of aquaculture and of the production schedule, a reduction of long (3-year) aquaculture, and support for demonstrations of the mechanisation and sharing of shucked-meat work. [S7]

5. What is not yet known

Things for which there are no figures

- The number of people who shuck oysters (uchiko) and of people hired seasonally, and the number of foreign nationals who work in oyster aquaculture and shucking, could not be found in the official statistics. A research report of the prefecture (2025) contains the statements "shipments of shucked meat are 95% or more" and "nearly 90% of the uchiko workforce depends on technical intern trainees from overseas".

However, the materials on which these are based are not shown, and another document of the same body writes "accounts for 95%" (this paper does not use them as facts). [S6]

- We found no statistics on fishery management for Hiroshima Prefecture alone, no management statistics for the company management entities of oyster aquaculture, and no rate of occupational accidents for aquaculture or oyster work alone. The survey of trends in fishery structure has no values by prefecture. [S2, S10, S11]
- This paper has not looked into official materials showing the wages, working hours, housing and accidents of foreign nationals working in oyster work, or the results of supervision and guidance by the Labour Standards Inspection Offices.
- The effect and spread of shared workplaces and of commercially available machines that assist shucking, the content of the study work on "labour saving in shucked-meat work" that the prefecture is said to have put out to public notice in 2026 (the specification could not be opened), and the effect of the mass mortality of 2025–26 on employment (the numbers of cases of suspension of work, of non-renewal of employment and of changes of training employer) are not known. Whether the Cabinet Order setting the day on which voluntary enrolment in industrial accident compensation insurance ends has been promulgated has also not been confirmed. [S12, S7, S16]

Limits of the comparisons

- The fishery management figures are the simple average of individual management entities in the Seto Inland Sea area (17 management entities in 2024; the numbers for the other years have not been checked), no error is given, companies are not included, and they are values up to 2024 (before the mass mortality). Within work on land, the hours of shucking and of removing fouling cannot be separated. [S2]

Data unfavourable to new fouling measures and labour-saving means

- Oyster aquaculture in Hiroshima Prefecture has been expanding in scale (the average area is about 4 times the national figure, and the area increased by 12% from 2018 to 2023; the increase is this paper's calculation), has many businesses run by companies, and the income of individual management entities in the Seto Inland Sea area had been increasing from 2021 to 2024. Repair costs (only repairs to boats, equipment, fishing nets and fishing gear commissioned from shipyards and the like; repairs to rafts and upkeep done by the owners themselves are not included) are in the range of 3–4% of fishing expenditure (2021–2024 in Table 1; the shares are this paper's calculation). The cost of measures against fouling is not known from these statistics. [S3, S1, S2]
- About 80% of the working hours of individual management entities in the Seto Inland Sea area are work on land, and work at sea is about 20% (5,192 hours and 20.6% in 2024, this paper's calculation). With a method that reduces only the work at sea, there is an upper limit to the labour that can be reduced (this paper's interpretation; however, cleaning shells may also be included in work on land). [S2]
- The share of oyster aquaculture entities in Hiroshima Prefecture with a successor (40.8%) is, according to the prefecture, a higher value than in the other fisheries in the prefecture. The 29.2% of oyster aquaculture nationwide is almost the same as the average for marine aquaculture (30.4%). [S1]
- The acceptance of foreign workers will continue from 2027 onwards under the Employment for Skill Development System, and a new category of seafood processing has also been created (the purposes of the new system also include the protection of foreign nationals in employment for skill development). It cannot be said that the labour shortage leads immediately to a need for mechanisation. The prefecture states that the mechanisation and sharing of shucking have not progressed because they need large capital investment. [S5, S7]

Reliability and the standpoint of the sources

Reliability differs from item to item. Production volume and the census are national statistics, and their reliability can be said to be high (however, 2025 is approximate figures, and the prefecture's values for shucked meat are estimates). The management statistics are also national statistics, but the values for the Seto Inland Sea area are, for 2024, the simple average of 17 management entities with no error given, and their reliability is medium. For the figures on the burden of manual work, reliability is medium, because the definitions of the statistics do not count shucking or foreign nationals.

Care is also needed about the standpoint of the sources. The research on the shucking machine is carried out in cooperation with a company (Sanko Denki).

The publisher of this paper (SeatecHIROSHIMA Ltd.) runs a business that controls fouling by surface treatment of materials, and is in a position that could compete with the existing measures dealt with in this paper. It is also developing a system that identifies the positions of oyster rafts and notifies ships of them. This paper does not deal with the publisher's own technology or results. The "new fouling measures and labour-saving means" in chapter 5 also include the publisher's business. The publisher's relationships with the organisations taken up in this paper are as follows (as of 3 November 2026; based on the information the publisher has made public, the publisher's contracts and records, and the research for this paper). With Hiroshima Prefecture, there is the relationship that the publisher was selected for the prefecture's start-up support programme "HIROSHIMA UNICORN 10" in fiscal 2022 and 2023 (the same as in R2). With Hiroshima University, the publisher has taken part in the university's research hub (JST COI-NEXT) as one company in the consortium since October 2025. Michio Imai, the publisher's co-representative CEO, has served since 1 November 2026 as a researcher (part-time) at a research institute of the university (the institute for the future of the ocean and maritime affairs) (concurrently with his post as the publisher's co-representative CEO). In addition, the publisher joined a joint research project under the Town & Gown initiative of Kure City and Hiroshima University (an initiative in which the city and the university work together) (the research period is October 2025 to August 2026, and the contract was concluded in March 2026). This joint research is funded by a research grant from Kure City, and the publisher received an allocation of research funds from that grant (April 2026). It has also been selected for Kure City's research grant for the second year (from September 2026). The cost of the demonstration work that the publisher commissioned from the partner company in the joint research also includes honoraria to the fishers who helped with the work (2026). This paper does not use the data or results of this joint research. The descriptions of the number of rafts (chapter 2) and of the movement of rafts and the prefecture's monitoring system (chapter 3 of R3-1) are based on public materials. Note that one of the 6 members of the prefecture's expert panel taken up in chapter 2 of R3-1 is a person from Hiroshima University. With Kure City, there is also the relationship that, from June 2021 to April 2025, the publisher was a tenant of the city's incubation facility (a facility that rents rooms to companies that have only recently been founded) and paid the city fees for the use of a room. Of the regions with which the publisher is involved, the figures for Ishikawa Prefecture (Nanao Bay) and Ehime Prefecture are dealt with in R7-A (Nanao Bay) and R7-C (Ehime) of this series and are not included in this paper. Other than the above, there is no relationship between the publisher and the organisations taken up in this paper (national government bodies, research institutes and foundations of the prefecture and cities, fishery cooperatives and fishery mutual aid bodies, the companies named in this paper, and others) that would affect the content of this paper. Relationships here means transactions, funding, joint research, and officers or staff of the publisher concurrently serving as staff or officers of the organisation. This is the publisher's judgement, made after checking the information the publisher has made public, the publisher's contracts and records, and the research for this paper.

6. Sources

We examined materials that had been published by 3 November 2026. We examined mainly national statistics and laws and regulations, materials of the national government and the prefectures, and reports of the research institutes of the prefectures, and we used figures that a separate researcher had checked against the very materials listed as sources (where we used a value that had not been checked, we said so in the text). Among the figures that review articles and national government materials took from other studies, there are some that we have not checked back to the original study, and we marked these as "quoted" in the text. Values read from a figure are marked "read from the figure". Reliability: A = laws and regulations, statistics, and materials of the national government or the prefectures; B = papers, and reports of research institutes that show their methods; C = explanations for the general public, explanations by organisations, and guidance with little description of method; D = press reports.

ID	Source (publisher, year)	Type	Reliability	Chapters used
S1	Ministry of Agriculture, Forestry and Fisheries: Census of Fisheries (for 2023, by class of management entity; by region; oyster aquaculture; people engaged in work at sea; work on land (by fishery ranked top in sales value); work on land (individual management entities); number of people in work on land (individual management entities); successors; fishery workers over the years; fishery workers by sex and age class; fishery workers by own-family fishery only and employed; enrolment in fishery mutual aid (by fishery ranked top in sales value); explanation of terms; and the same tables for 2018); Hiroshima Prefecture: the prefecture's results of the 2023 Census of Fisheries; the prefecture's statistical tables; tables by city and town (in Japanese) (2020–2025)	Statistics	A	Chapters 1, 2, 5
S2	Ministry of Agriculture, Forestry and Fisheries: final figures of the statistical survey of fishery management, survey of individual management entities (summaries: 2021 (Reiwa 3); 2022 (Reiwa 4); 2023 (Reiwa 5); 2024 (Reiwa 6); for 2024 (Reiwa 6), state of operations; expenditure; list of tables); 2025 (Reiwa 7), first report (in Japanese) (2023–2026; for 2024, the value for the Seto Inland Sea area is the simple average of 17 management entities, and the average of the five main production areas is a weighted average)	Statistics	A	Chapters 1, 2, 4, 5
S3	Hiroshima Prefecture: Hiroshima oyster production and shipment guidelines for fiscal 2026 (Reiwa 8) (introduction; production and shipment measures; state of shipments; statistical materials; processing flow; complete version); past editions (fiscal 2020 (Reiwa 2); prefectural assembly material for fiscal 2021 (Reiwa 3); fiscal 2022 (Reiwa 4); fiscal 2023 (Reiwa 5); fiscal 2024 (Reiwa 6); fiscal 2025 (Reiwa 7)) (in Japanese) (2020–2026)	Guidelines	A	Chapters 1–3, 5
S4	Hiroshima Labour Bureau: status of employment of foreign nationals (end of October 2025); Ministry of Health, Labour and Welfare: national tables; announcement (in Japanese) (2026)	Statistics	A	Chapters 1, 2
S5	Immigration Services Agency: number of foreign residents with Specified Skilled Worker status (end of June 2026); table by municipality; outline of the Employment for Skill Development System; Minister of Justice and others: operational policy for the fishery field (2026); Ministry of Health, Labour and Welfare: occupations eligible for transfer to the next stage of technical intern training (2026); examination standards for Pacific oyster aquaculture work (2017); e-Gov: Technical Intern Training Act (the title after amendment is the Employment for Skill Development Act; in force 1 April 2027) (in Japanese)	Scheme	A	Chapters 1–5
S6	Hiroshima Prefectural Technology Research Institute, Western Region Industrial Research Center: development of an oyster aquaculture raft using PE pipes (2020); gripping and fixing mechanism for automatic oyster shucking; research results sheet (in Japanese) (2025; in cooperation with a company)	Report	B	Chapters 1–3, 5

ID	Source (publisher, year)	Type	Reliability	Chapters used
S7	Hiroshima Prefecture: 2030 Hiroshima Prefecture Agriculture, Forestry and Fisheries Action Programme (Chapter 4: fisheries) (in Japanese) (drawn up October 2026)	Plan	A	Chapters 1–5
S8	Fisheries Agency: on the situation surrounding oyster aquaculture (November 2025); check sheet for the proper aquaculture management of Pacific oysters (March 2026) (in Japanese) (explanations for the general public; the sources of the tables include pages that are not official)	Explanatory	C	Chapter 2
S9	Miyagi Prefecture: Miyagi Fisheries Day (oysters) (in Japanese) (2019)	Explanatory	C	Chapter 2
S10	Ministry of Agriculture, Forestry and Fisheries: 2025 (Reiwa 7) survey of trends in fishery structure; outline of the survey (in Japanese) (2026; approximate figures from a sample survey)	Statistics	A	Chapters 2, 4, 5
S11	Fisheries Agency: fiscal 2025 (Reiwa 7) White Paper on Fisheries (special feature; Chapter 2) (2026); e-Gov: Mariners Act; Cabinet Order specifying the scope of fishing boats under the Mariners Act (in Japanese)	White paper	A	Chapters 2, 5
S12	Fisheries Agency: council for the fishery technical intern training programme (materials; summary of proceedings) (in Japanese) (December 2025; the number of trainees is the Fisheries Agency's estimate, and the account of employment is a statement by an industry body)	Material	A	Chapters 2, 5
S13	Fisheries Agency: Basic Plan for Fisheries (2022); materials of the Fisheries Policy Council (consultation; schedule; background) (2026); on the reform of fisheries policy (in Japanese) (July 2026, a summary of the comprehensive strategy)	Plan	A	Chapters 2, 4
S14	Ministry of Agriculture, Forestry and Fisheries: statistics on fishery and aquaculture production (long-term time series, Table 6; final figures for 2024 (Reiwa 6), oysters; the same, sales volume of seed; 2017 (Heisei 29), seed; final figures for each year; 2018 (Heisei 30), by division of sea area; first report for 2025 (Reiwa 7); tables of the first report; outline of the survey) (in Japanese) (2013–2026; 2025 is approximate figures)	Statistics	A	Chapter 2
S15	Hiroshima Prefecture: on the use of oyster shells (February 2026); the state of oyster shell piles and efforts to use the shells (in Japanese) (July 2026, prefectural assembly material)	Material	A	Chapter 2
S16	Ministry of Health, Labour and Welfare: outline of the amendment of the Industrial Accident Compensation Insurance Act and other acts; materials of the subcommittee on industrial accident compensation insurance (2026); Hiroshima Labour Bureau: occurrence of occupational accidents (2025) (in Japanese)	Law	A	Chapters 2, 4, 5
S17	Research Institute for Fisheries Science, Okayama Prefectural Technology Center for Agriculture, Forestry and Fisheries: overview of oyster aquaculture (fiscal 2018; fiscal 2021; fiscal 2024); water quality environment and the growth of Pacific oysters; figures of the results (in Japanese) (2020–2026)	Report	B	Chapter 2
S18	Fisheries Agency and 9 other ministries and agencies: policy package for the damage from oyster mortality due to high water temperature and other causes (in Japanese) (December 2025)	Policy	A	Chapter 3
S19	Hiroshima Prefecture: main support measures for the damage from oyster mortality (as of 1 April 2026); outline of the measures and projects for fiscal 2026 (Reiwa 8) (April 2026; July); matters expected to be proposed (December 2025); Hiroshima Prefectural Assembly: Prefectural Assembly News No. 82 (in Japanese) (2026)	Policy	A	Chapter 3

ID	Source (publisher, year)	Type	Reliability	Chapters used
S20	Hiroshima Prefectural Technology Research Institute, Fisheries and Marine Technology Center: Akashige et al.: mass mortality and water temperature and precipitation (2006); Hirata: the mortality of 2004–06 (2011); annual project reports (fiscal 2014; fiscal 2016; fiscal 2020; fiscal 2024; fiscal 2025; list); list of research reports; follow-up evaluation (2009, self-evaluation); public relations magazine (No. 11; No. 12, 2008); research results on seed collection (2008); technical support (2016) (in Japanese)	Report	B	Chapter 3
S21	e-Gov: Fishery Act (in Japanese) (current, including the 2018 amendment)	Law	A	Chapter 4
S22	Hiroshima Prefecture: hygiene measures for Hiroshima oysters; guidance outline on the handling of raw oysters (2021); Ministry of Health, Labour and Welfare: leaflet on the amendment of the Food Sanitation Act (2021); transfer of the specifications and standards; administrative notice on norovirus testing of raw-material oysters for eating raw (in Japanese) (2026)	Scheme	A	Chapter 4
S23	Ministry of the Environment: outline of the amendment of the Seto Inland Sea Act; announcement of the change to the basic plan; Basic Plan for the Conservation of the Environment of the Seto Inland Sea (in Japanese) (2022)	Law	A	Chapter 4
S24	Hiroshima Prefecture: on the Hiroshima sea-area fishing ground plan and related matters (in Japanese) (separate volumes 4–6, demarcated fishery rights; posted October 2026)	Plan	A	Chapter 4
S25	Fisheries Agency: explanation of fishery mutual aid; outline of the amendment of the Fishery Disaster Compensation Act; safety net building project (2026); House of Representatives: outline of the bill (2025); e-Gov: Fishery Disaster Compensation Act; Order for Enforcement of the same Act (in Japanese)	Scheme	A	Chapter 4

Related materials: R1 The burden of biofouling at sea, R2 Seaweed and seagrass beds and the living things of the sea, R3-1 Oyster mortality (die-off), R3-2 Fouling organisms on oysters, R5-2 How the positions of oyster rafts are communicated, R6 What is changing (why now), R7-A11 The shortage of labour for shucking Noto oysters, R7-A23 The decrease and ageing of fishers in Nanao Bay, R7-B23 The decrease in fishers and crew (the workforce), R7-C24 Uwa Sea: the decrease and ageing of the fishery workforce (based on statistics for the whole prefecture), R7-D23 The decrease and ageing of the fishery workforce in Aichi, I1 List of assessments