

The Spatial Structure of the Fishery in Nakaminato, Ibaraki Prefecture

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Abstract

This paper depicts the spatial structure of the fishery in Nakaminato of Hitachinaka city, Ibaraki Prefecture. The spatial structure consists of an inland space, a marine space and a port space functioning as a node to combine the former two spaces. This paper first analyzed in these the fishing town space (an inland space), the fishing ground space (a marine space) and the fishing port space. Since these spaces are interrelated or combined by the movement of people or materials, we then examined fishers' daily movement. Fisheries in Nakaminato are largely classified into those by the members of the Nakaminato Fishery Co-operative Association and those by fishers from other areas. The value of fish landed by the latter occupies about 70 % of all landed value at the Nakaminato fishing port. Nakaminato Fishery Co-operative Association members are mostly involved in small-scale coastal fishing.

When the pelagic and offshore fisheries prospered before 1970, the fishery of Nakaminato consisted of expanding fishing grounds, the prosperous town space including a fish processing section that depended on local materials, and the energetic port space full of large and small local fishing boats. However, at present, the fish processing section is separated from the local town space and is directly connected to the international economy. With fishing grounds shrinking in size, those along the coast have become important. Local fishers intensively utilize them. This has caused fish resource management problems. On the other hand, recreational activities play an important role in the usage of the port and the fishing grounds. Thus, the fishing space of Nakaminato has changed in accordance with changing times.

INTRODUCTION

The Japanese fishery changed greatly in the 1970s as a result of the reduction of fishing ground with the introduction of the 200 nautical mile (n.m.) economic zone system, the increase in fishery expenditure owing to rising oil price, owing to the fall in the price of fish (Hirasawa, 1980). The 200 n.m. economic zone system that was adopted by the main fishing countries of the world in 1977 has influenced the Japanese fishing industry the most. Although the

Japanese pelagic fishery continued to maintain its importance equal to that at the coastal fishery until the 1980s, its importance drastically deteriorated with the strengthened regulations for the pelagic fishery in the 1990s. Since the UN convention on the law of the sea came into effect in November, 1994, the 200 n.m. economic zone system has been established as an international order, and the management of marine resources and fishery regulations have extended to the high seas (Ono, 1999).

Tasaka (1992) and Imura (1997) discuss the situations of the Japanese fishery from the beginning of the 1980s to the middle of the 1990s and review the geography of fishery in Japan. According to them, the Japanese fishery has changed corresponding to the beginning of 200 n.m. economic zone system. The pelagic fishery declined, and the offshore and coastal fisheries changed dramatically. As a result, fishing regions in Japan have been reorganized. In addition, large-scale fishing companies that amassed much power in the process of technological innovation have had a major influence on the regional fishing economies. At present, geographical studies of the fishing industry do not only analyze the production sector but also give careful considerations to both commodity circulation and consumption sectors.

Part-time fishermen have recently increased in number with the industrialization and urbanization of Japan. In addition, recreational fishing has become more popular among people in metropolitan areas. On the other hand, the fishery itself has suffered from labour shortages. For example, similar to the westward seinc fishery of Nagasaki, the Japanese fishing industry has to depend on low wage foreign labour in order to reduce production costs. At present, fish processing industries commonly employ foreign laborers. Fish processing plants located near fishing ports often use imported fish in order to supplement reduced local fish.

In recent years, aquaculture has become popular because of the deadlock of the coastal fishery and the strengthening regulations for the pelagic fishery. The management of marine resources is an important problem in order to promote sustainable fishing activities. This is related to the UN convention on the law of the sea as mentioned before. While this treaty recognizes the leading rights of coastal countries to fishery resources within the 200 n.m. economic zone, it also obligates them to manage and preserve the fishing resources

adequately.

This paper deals with the fishery in Nakaminato of Hitachinaka city, Ibaraki Prefecture. This port has followed the same management trend as other ports in Japan.

In the Edo era Nakaminato prospered as the mercantile port of the Mito Feudal Clan. At the beginning of the Meiji period, transportation by water became outdated and Nakaminato was switched to a fishing port. Then Nakaminato developed into one of the biggest fishing cities in Ibaraki Prefecture. During World War II, Nakaminato's fishery declined temporarily because of the requisition of fishing boats and fishers and the control of fish distribution. However, the food crisis just after the war encouraged the rehabilitation of its fishing industry, and the facilities of the fishing port of Nakaminato were greatly improved.

Nakaminato's main fishing industry just after World War II was the coastal fishery but then it developed into the offshore fishery and finally into the pelagic fishery. Nakaminato grew to become an eminent fishing base in Ibaraki Prefecture in the 1960s. However, by the time of the oil crisis in 1973 and the beginning of the 200 n.m. area management system in 1977, large-scale fishing vessels rapidly decreased in number, and Nakaminato's pelagic fishing went into decline (Department of Fishery, Hitachinaka City, 1996). Fish processing industries in Nakaminato depended on local fishes, but they have since started rely more on imported fish. The processing industries have also started to depend on foreign labor, which now makes up a considerable part of work force.

Thus, Nakaminato's fishery has followed the same changes as those of all fishing ports in Japan. First, this report examines changes in the fishing industry in Nakaminato and the present situation of the main fishing enterprises of Nakaminato. Then we depict the fishing industry characteristics of Nakaminato from a spatial point of view.

Aono (1953) pointed out that traditional geographical studies of the fishing industry had two foci: fishing villages and fishing grounds. The former studies on fishing villages were more popular. The latter studies on fishing grounds were mainly carried out by specialists or researchers who could utilize research vessels for biological or oceanographic research. Kakimoto (1975) also points out bifocal characteristics of geographical studies of the fishing industry and fishing settlements focusing on residential and production space. While the former studies focused on the social aspects of fishing villages, the latter ones researched fishing grounds, that is, characteristics of the sea, its production capacity, and the economic value of fishing grounds. Most geographical studies of the fishing industry deal with fishing villages or fishing port towns or cities, but few studies focus on fishing grounds (Saito, 1977).

According to Tawa(1997), healthy fishing grounds are needed for fishing villages to continue to exist and they must be analyzed in terms of their close connection with fishing villages. From this standpoint, Tawa has energetically carried out ecological analyses of the utilization of fishing grounds. He has analyzed the temporal and spatial structure of the fishermen's utilization of fishing grounds, the relationships between the natural environment and fishing technologies, the variety of fishing regulations and changes in fishing regions (Tawa, 1983, 1987). However, he could not always succeed in closely linking fishing grounds with fishing villages. This leaves room for future research.

Recently, an approach aiming at the synthetic understanding of the various spaces related to the fishing industry has become the centre of geographers' attention. For example, Osada and others (1991) try to relate coastal villages to their fishing grounds based on their sample studies of Toji and Suzaki hamlets in southern Izu Peninsula. They analyzed the village as

living space, and then considered the adjoining fishing ports, the sea areas connecting the ports to the fishing grounds, and finally they examined the fishing grounds. Hashimura (1996) examines the spatial relationships between fishing grounds, a village and cultivated lands in Nakatoshi Island of Goto Archipelago from the latter half of the 13th century to the latter half of the 15th century. He concluded that each space changed in accordance with other spaces.

Shinohara (1992) carried out intensive studies on the Choshi fishing port in Chiba Prefecture and hypothesizes that the development of the Japanese fishing industry was dependent on the expansion of fishing ports. He points out that the Choshi fishing port consists of three elements: the port itself, fishing grounds and the headquarters of external fishing vessels from other prefectures. Shinohara (1994) also considered the importance of the function of fish distribution, and he concludes that a big fishing port acts as a nodal point to combine three different spaces or stages in the fishing industry: a fishing space, a fish landing and processing space and a fish consumption space. There are few studies on the distribution of fish in Japan because of its complicated structure and the lack of proper data. Tanaka (1982) found that each kind of fish has its special distribution system. Furuta's historical study (1996) examines the regional structure of Japan through the distribution systems of fish fertilizers in the Edo period.

With reference to the above studies, we argue that the fishing region consists of three spaces: fishing port space, fishing ground space and fishing town space. The actors who combine these spaces are fishers who live in the town and work in the fishing port and on the fishing ground. By analyzing the three spaces and fishers' daily activities, we attempt to clarify the regional characteristics of the fishing industry in Nakaminato.

The fishing port space includes wharves,

landings, the office of the fishery co-operative association, refrigerating and freezing facilities, warehouses, fishers' workshops and market places, etc. The fishing ground space consists of fishing grounds for local and external fishing vessels. The fishing town space includes fishers' houses, non-fishers' residences, shops, recreational facilities and fish processing plants, etc. This report does not deal with the fish distribution space because the study area is only within Nakaminato itself. In order to pursue our study, we did interviews with some fishers, made landscape observations, and collected statistics and other data in the city hall and the office of the Nakaminato Fishery Co-operative Association (NFCA). In addition, we collected GPS data to understand the geographical extent of the fishing grounds of each fishing boat.

The study area, Nakaminato, is located on the left hand bank of the Naka River. It has two centers; Nakaminato proper and Hiraiso. The Nakaminato fishing port is the Third Type Fishing Port which is the biggest port in size and is used by vessels from all of Japan. As we mentioned before, Nakaminato developed as the biggest base for pelagic fishing in Ibaraki Prefecture. Although Nakaminato was second to Hasaki in volume of catch, it led Ibaraki Prefecture in terms of value of catch in 1970. However, Nakaminato retreated to the 6th position in terms of volume of catch and in terms of catch value. In 1996, Nakaminato's fish processing industries produced about 34% of quantity and 46% of product value for all of Ibaraki Prefecture.

According to the 1995 Census, the area of Nakaminato was 24.5 km², with a population of 31,930 (9,743 households). The percentage of people working in manufacturing, commerce, and the service sector occupied more than 20% of all industrial sectors respectively, but there were only 1.3% of the population directly involved in the fishery. Still, Nakaminato is blessed with an abundant fishery. The existence of a large-scale port, excellent facilities around

the port and fish processing plants tell us that Nakaminato's fishery is much more important than the figures show.

THE CHANGES IN THE FISHERY OF NAKAMINATO

The characteristics of the fishery in Nakaminato before World War II

In the Edo era, the Nakaminato region flourished as a commercial port city. People living there were mainly involved in long-line fishing and shellfish and seaweed collecting, as well as agriculture. They caught migratory fish species, such as sardine, saury pike, skipjack and tuna, in addition to local fish and shellfish species. At the end of the Edo era, drift net fishing for tuna started in the Hiraiso region, and it became the main fishing method in the Meiji period (Sato, 1974). On the other hand, in the Nakaminato region, lamp net fishing for sardine was introduced from Chiba Prefecture in 1891 and became the centre of the fishery there.

The first fishing port in Nakaminato was completed in 1901. After that, fishing vessels became equipped with engines and grew larger, and fishing grounds expanded. As a result, the catch increased. Seventeen ship owners had large 30 to 40 tonnes fishing vessels in 1926, while 10 ship owners had larger 70 to 90 tonnes vessels in 1940 (Sato, 1974). As ships became larger, they could no longer land at existing ports. For that reason, ship owners in Nakaminato built a new pier (Figure 1-a).

There was an active fishery in Nakaminato just before World War II that was characterized by lamp net fishing for sardine in Nakaminato and drift net fishing for saury pike and tuna in Hiraiso.

The growth of fishing vessel size and the construction of the outer port after World War II

Just after World War II, sardine fishing in Nakaminato went into decline. Although the

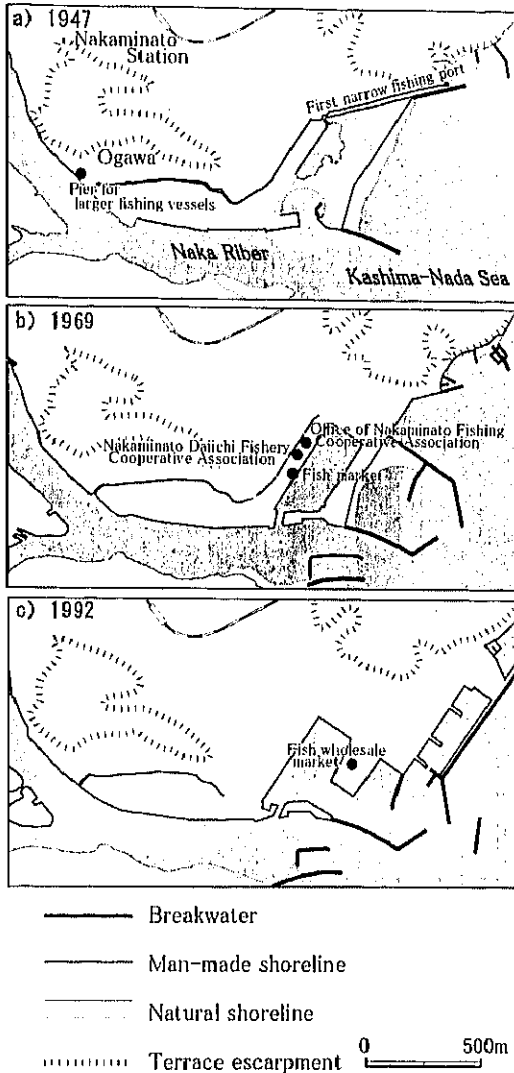


Fig. 1. The changing Nakaminato fishing port
Source: Aerial photographs

catch had been 11,643 tons in 1939, it decreased to 559 tons in 1947 and 181 tons in 1949 (Sato, 1974).

Saury pike fishing replaced sardine fishing in Nakaminato. It involved stick-held dip nets, with fish gathering lamps introduced in 1948. The saury pike catch increased to 4,341 tonnes in 1949 from 607 tonnes in 1939. At the same time, skipjack and tuna fishing also developed.

In 1949, the skipjack and tuna catch increased to 798 tonnes and 221 tonnes respectively from 82 and 32 tonnes in 1939. In short, saury pike, skipjack and tuna fishing by larger vessels symbolized the fishery in Nakaminato just after World War II.

During these rapid changes to the fishery in Nakaminato, a conflict occurred between ship owners of larger fishing vessels and fishers of small fishing boats. The small boat fishers had just joined the Nakaminato fishery cooperative association that had consisted of only ship owners of the larger vessels up to that time. As a result, the association split into two, and the ship owners of the larger vessels launched the Nakaminato Daiichi (first) fishery cooperative association in 1953. Moreover, the ship owners and their crews were at odds over low wages and severe working conditions. The Nakaminato seamen's association was organized in 1960, and it negotiated with the ship owners to improve the working conditions, but the negotiation ended in failure. This failure was one of the reasons why the number of fishers declined in Nakaminato.

Figure 2 indicates the changes in catch from Nakaminato's fishing boats after World War II. Saury pike fishing was at its peak in 1955 with a 39,279 tonnes total catch. However, it continued to decline to 206 tonnes in 1970. One reason for the decline was a sharp fall in the price of fish. Another reason was that pelagic fishing for tuna gained popularity with the increased use of steel vessels. This popularization of steel vessels became an impetus to obtaining much larger fishing vessels. According to Figure 3, the number of fishing vessels in the 20 to 100 tonnes range decreased, while those over 100 tonnes rapidly increased from 1954 to 1963.

To accommodate the larger fishing vessels, expansion of the port started in 1951. It was completed in 1961 and the Nakaminato fishing port became the only base for pelagic fishing in Ibaraki Prefecture. The improved port had a

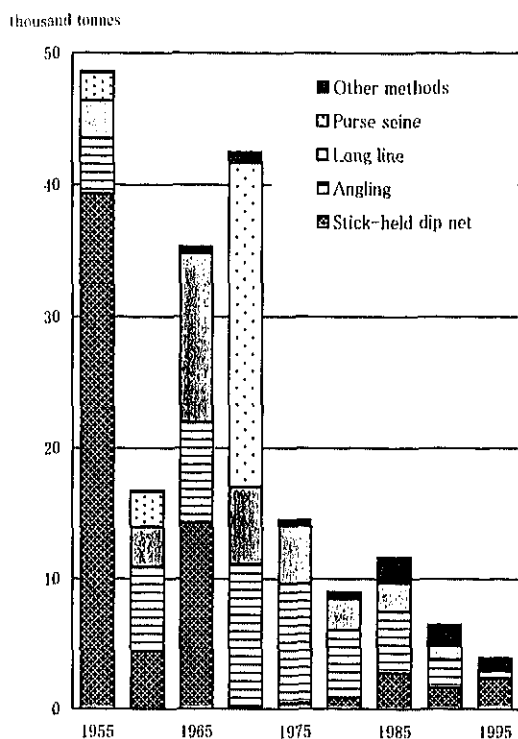


Fig. 2 Changes in quantity of catch by method in Nakaminato

Source: The Statistical Yearbook of Agriculture and Fisheries in Ibaraki Prefecture

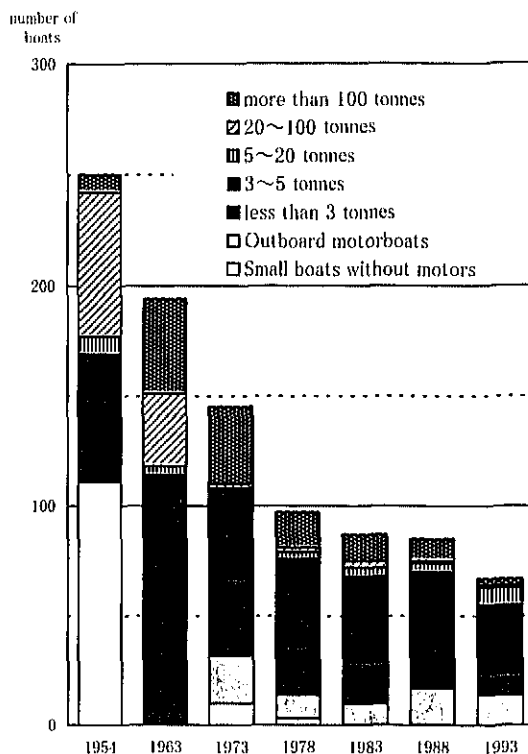


Fig. 3 Changes in the size of fishing boats belonging to the Nakaminato Fishing Co-operative Association

Source: Fishery Census

capacity for vessels over 170 tonnes. However, the existing harbour became too small to accommodate the ever increasing large vessels, so the construction of an outer port started in 1963 and was completed in 1972 (Figure 1-c).

The decline of the offshore and pelagic fisheries and the increasing use of imported fish for processing

The increased use of large steel vessels in the 1960s changed fishing operations in Nakaminato. In place of an offshore fishery using techniques such as pole and lines for skipjack and stick-held dip nets for saury pike, the pelagic fishery for tuna rapidly developed in the post war period. However, pelagic fishing

also declined in the 1970s owing to the following three reasons: the sudden rise in fuel costs due to the 1973 oil crisis, the restriction of 200 n.m. economic zone in 1977, and the sharp fall in the price of fish. Thus, the number of larger fishing vessels decreased greatly after the 1970s (Figure 3). In recent years, coastal fishing, such as trawling, gill netting and angling, have become relatively important in Nakaminato. At the same time, NFCA is involved in fish farming and is trying to invite fish boats belonging to fishery cooperative associations, other than that of Nakaminato, which mainly catch skipjack by pole and line.

In contrast with the declining fishery, the fish processing industry in Nakaminato has expanded greatly since the 1980s (Figure 4).

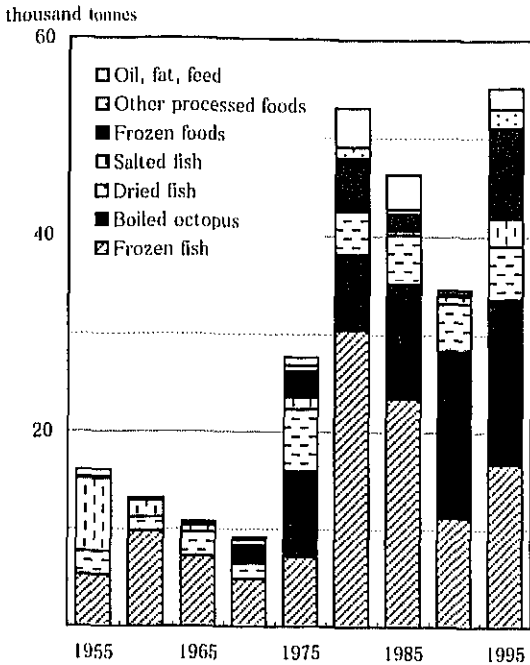


Fig. 4 Changes in output of the fish processing industry in Nakaminato
 Source: The Statistical Yearbook of Agriculture and Fishery in Ibaraki Prefecture

Fish processing in Nakaminato originally involved local fish and shellfish such as the sardine, skipjack, mackerel, saury pike and jack. After 1970, owing to improvements in frozen food transportation, the supply area of fish for processing expanded. This offset the decreased local catch. In the 1980s, some fish processing plants started using imported fish to maintain and expand their operations. Although fish processing in Nakaminato originally had a close relationship to the local fishery, the relationship has become weaker and weaker with the introduction of imported fish.

MAIN FISHING TYPES IN NAKAMINATO

The fishery in Nakaminato mainly includes two types of operations: the pelagic fishery that involves non-resident fishing vessels and the coastal fishery that involves members of NFCA.

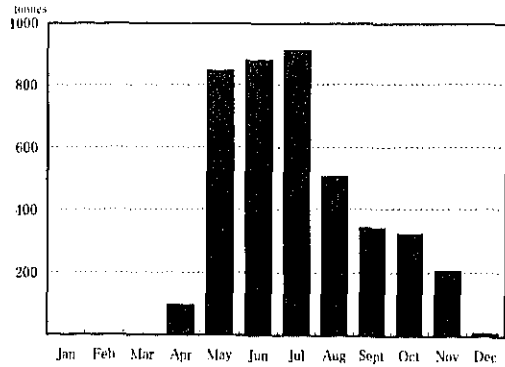


Fig. 5 Monthly landed quantity of the skipjacks, caught with pole and line by non-resident fishing vessels in Nakaminato fishing port (1997)
 Source: Data from the Nakaminato Fishing Co-operative Association

The latter is divided into long line fishing used by large vessels and fishing done by small boats (less than 20 tonnes).

The fishery of non-resident fishing vessels

Nakaminato port has breakwaters, seawalls, and landing facilities. All these facilities enable large offshore fishing vessels to use this port. However, the number of such large vessels owned by NFCA members has decreased drastically. To offset this decrease, a committee was established that consists of members of NFCA, the service companies for non-resident fishing vessels and staff members of Hitachinaka city hall. The committee encourages the fishing vessels belonging to Kochi and other prefectures to land their catch at the Nakaminato port.

In 1997, the non-resident fishing vessels operated pole and line fishing for skipjack, stick-held dip net fishing for saury pike and purse seine fishing. The catch of pole and line fishing for skipjack accounted for more than 90% of the total catch of 260 vessels. Figure 5 shows that the catch of skipjack starts to increase from April and reaches its peak in July.

Table 1 Number of boats and quantity of catch by fishing type in Nakaminato (1997)

	Hiraiso region		Nakaminato region	
	fishing units	catch quantity (tonnes)	fishing units	catch quantity (tonnes)
Ocean-going longline tuna fishing	—	—	—	211
Adjacent sea longline tuna fishing	—	—	—	154
Stick-held dip net saury pike fishing	3	791	—	1923
Drift gill net salmon fishing	—	—	—	272
Trawling	6	227	—	—
Trawling for shrimp	3	19	3	10
Boat seine fishing	6	68	5	56
Gill net fishing	11	7	9	5
Other drift gill net fishing	7	3	13	13
Trolling line fishing	13	14	6	1
Other pole and line fishing	35	16	28	8
Shell fishing	10	6	4	1
Seaweed fishing	—	14	—	—
Basket net (pound cage) fishing	3	63	—	—
Others	24	2	17	3
Total	—	1230	—	2658

Source: The Statistical Yearbook of Agriculture and Fishery in Ibaraki Prefecture

The reason is that the skipjack moves north with the Japan Current in the spring and goes back south in September. Consequently, the fishery of non-resident fishing vessels is strongly affected by the ecology of the skipjack.

Main fishing methods of NFCA fishers

Table 1 shows the number of fishing units and the catch according to fishing methods. It shows that long line fishing for tuna is operated by only one large vessel. Because this fishery has been taken over by large vessels, a fishery for small boats has developed.

In spite of its inefficiency, the ancient form of angling is more popular than net fishing (Table 1). The reason is that even one person can fish this way with simple gear. On the other hand, net fishing has progressively occupied an important position in terms of total volume of catch. Gill net fishing and drift net fishing were introduced in the 1920s (Ibaraki Prefectural Fisheries Experimental Station ed., 1997), and improved so that by 1957 flounder could be caught and by 1982 seabass could be caught.

Another important net fishing is the seine fishing that has been practiced since the 1920s with sailboats or row boats. The seine fishing for whitebait and krill was introduced in the 1980s. This is the main fishing method for small (less than 5 tonnes) fish boats because it can be adapted to various species and can cope with seasonal changes in fishing conditions.

Trawling was introduced in the late 1970s. The catch from trawling is the highest among fishing methods with small boats. This method is operated with 5 to 15 tonnes boats. It enables fishermen to catch flounder, plaice and other fish and allows them to have a stable and secure income. Similarly, the trawling for shrimp, which was introduced in the 1960s, is operated with 5 tonnes vessels. The shrimp caught by this method are used as bait for pole and line fishing, long line fishing and recreational fishing. Such trawling by small boats enables fishers to catch abundant quantities efficiently, but the number of the fishing boats is limited due to resource conservation concerns.

	Kind of member of NFCA	Attributes of household members					Fishing										Value of fish landed 10 million yen																				
		Husband	Wife	Father	Mother	Child	Number of boats owned					Fishing methods operated in 1998																									
							under 2 tonnes	2~5 tonnes	5~13 tonnes	over 15 tonnes	Operating days	Stick-hand dip net	Trawling	Trawling for shrimp	Basket net	Bunt seine		Gill net (cover 3tonners)	Gill net (under 3tonners)	Drift gill net	Pole and line	Abalone	Recreational fishing	Other methods													
Highly specialized type	Reg. ● 60's	▲				●	▲	□			1	1	166	●	●											10	20	30	40	50	60	70	80	90			
	Reg. ● 60's	▲				□	□					1	158	●	●																						
	Reg. ● 60's	▲				×	×					2	130	●	●																						
	Reg. ● 60's	▲		▲	×							1	151	●	●																						
	Reg. ● 60's	▲										1	160																								
	Sub total	6																																			
Advanced mixed type	Reg. ● 50's	▲				□	△				1	188	●	●	●																						
	Reg. ● 60's	▲									1	189		●																							
	Reg. ● 50's	▲									1	210		●	●	●																					
	Reg. ● 50's	▲				□	×	×			1	185		●																							
	Reg. ● 60's	▲				□F			●		1	166		●																							
	Sub total	9																																			
Ordinary mixed type	Reg. ● 70's	▲				●				1	1	164			●	●																					
	Reg. ● 50's	▲				□	□				1	140																									
	Reg. ● 60's	▲				□	□				1	159																									
	Reg. ● 60's	▲				□	□				1	138																									
	Reg. ● 50's					×	×				1	138																									
	Sub total	15																																			
Abalone type	As.											32																									
	As.									1		69																									
	As.											32																									
	As.											28																									
	As.									2		49																									
	Sub total	16																																			
Part-time type	As.										2	67																									
	As.*										2	60																									
	As.*										1	59																									
	Reg.* 60's					×					1	49			●	●																					
	As.*										1	48																									
	Sub total	81																																			
Recreational fishing type	Reg. ● 50's					□					1	1	220																								
	As.											1	97																								
	Reg. ● 70's	▲									1	122																									
	Reg. ●* 60's	▲										128																									
	Reg. ● 60's	▲				□					1	110																									
	Sub total	6																																			
	Total	143																																			

Type of members of NFCA
 Reg. Regular member
 As. Associate member

Attributes of household members
 ● Full-time fisher
 ▲ Fishing assistant on shore
 □ Worker in industry outside of fishing
 □F Worker in fishing-related industry
 × Others
 * Retired crew of pelagic fishing vessel or oil tanker

Fig. 6 Types of the fishers belonging to the Nakaminato Fishing Co-operative Association (1999)
 Source: Data from the Nakaminato Fishing Cooperative Association and interviews
 Note: We set out the top five fishers by type and characteristics of only regular members of the Nakaminato Fishing Cooperative Association

Typifying members of NFCA through the combination of fishing methods and the characteristics of each type

Types of members of NFCA according to the combination of fishing methods

The more a fishing method becomes efficient, the more it needs capital. The number of fishing boats using highly efficient fishing methods, therefore, is less than those using inefficient methods. The smallest number of fishing types is the trawler group. Angling makes up the largest group, and the next largest groups are seine and gill net fishing. Each fishery has differences in terms of the number of necessary workers and the characteristics of fishing boats and fishing grounds. The combination of fishing methods thus forms the characteristics of fishermen and influences their personal behaviour. Consequently, the authors try to typify the members of NFCA using the combination of fishing methods as the main index.

NFCA consisted of 58 regular members and 85 associate members in 1999. The regular members live in the area of former Nakaminato City and go fishing more than 90 days a year. On the other hand, the associate members live

outside former Nakaminato City or go fishing less than 90 days a year. By typifying NFCA members based on the combination of fishing methods they use, they are classified into 6 fishing types as follows (Figure 6).

The first type, named highly specialized fishers, consists of only six fishers with 5 to 15 tonnes boats who employ two fishing techniques such as trawling and basket net fishing for ivory shells. One fisher employs stick-held dip net fishing for saury pike in place of basket net fishing. They operate the trawl fishery from September to June, during the entire open season. They almost all combine trawling with basket net fishing for ivory shells because the closed period for trawling corresponds to the open season for basket net fishing (Figure 7). The fishers' wives assist them at the fishing port. Some wives, children and fathers go fishing together.

The second type of fishers, named advanced mixed, use various kinds of fishing methods with 2 to 5 tonnes vessels. This type of fishers can always catch both migratory and local fish and shellfish, and cope with annual changes in fish resources owing to their ability to make more effective choices while fishing. The main

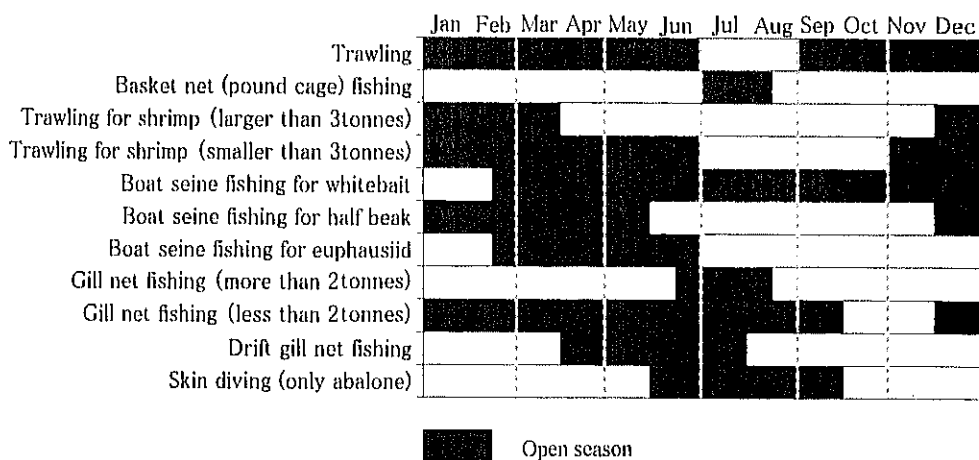


Fig. 7 Open season of the main fisheries in Nakaminato (1999)

Source: Data from Ibaraki Prefecture

fishing methods used are trawling, seine fishing, gill netting, and drift net fishing. These methods have been introduced since the 1960s. In 1955, some fishers started to use basket nets to fish for ivory shells. Their wives assist them at the fishing port, similar to the first type of fishers.

The main fishing methods of the third type of fishers, named ordinary mixed type, are gill net fishing and pole and line fishing. Their fishing methods are older than those of the advanced mixed type fishers. They catch a variety of fish, but the combination of methods is simpler than that of the second type of fishers. The open season for gill net fishing, that is the most important for them, is shorter than another gill net fishing (less than 2 tonnes). The fishers can catch local fish such as flounder, plaice and flathead by operating 3 to 5 tonnes vessels. This type includes six fishers who have special pensions for seamen owing to their experience as crews on pelagic fishing vessels or on oil tankers. Such elderly people own fishing boats weighing less than 2 tons that catch relatively few fish.

The fourth type of fishers is the abalone type. These people mainly skin dive for abalone and fish using pole and line as well. The skin diving fishery is profitable because abalone is expensive. However, the open season for the skin diving fishery is quite short due to regulations for resource conservation. For this reason, most fishermen have second jobs.

The fifth type of fishers is the recreational part-time type fishers. Sixty-four out of 81 fishers have some non-fishing occupations, and their total number of fishing days in a year is less than 10. Sixteen fishers go fishing as one of their recreational activities because they have special pensions for seamen.

The sixth category is the recreational fishing type fishers. Two of them own large 18 to 19 tonnes vessels. These fishers run recreational fishing trips. Their boats are remodelled from fishing boats and include inboard lounges, rest rooms, and seats for customers alongside the

boat.

Originally, the highly specialized type fishers practised a variety of fishing methods. However, in order to become more efficient they started to specialize according to their limitations of labour and capital. On the other hand, the appearance of the recreational fishers is a new phenomenon.

Characteristics of each type of fishers based on case-study examples

The highly specialized type fishers: Fisher A's father started pole and line fishing with his father and uncle after retirement as a fishing chief on a skipjack fishing vessel. Fisher A (in his forties) became a fisher in 1967, and with his father operated a pole and line system to catch mackerel and sea bream, and they also operated a long-line system. Fisher A started to use gill nets and other methods in the 1970s, and started trawling in 1992. He plays a leading role in NFCA today.

He owns a 15 tonnes specialized trawler. The vessel is equipped a variety of instruments on board such as three GPS, an autopilot machine that works with the GPS, four radios, two radar systems, a fish finder and a side thruster. All these instruments help to increase the catch. This multifunctional boat was built in 1997, and he has made many improvements to it.

The advanced mixed type fishers: Fisher B's grand father, father and uncle used a pole and line system to catch sea bream, young yellowtail and octopus and a long line system and rowboats to catch inshore flying fish. Since the outer fishing port of Nakaminato was built, they have tried new fishing methods such as stick-held dip net fishing for saury pike and angling for squid with lamps.

Today, fisher B (in his fifties) owns a 5 tonnes boat and with his father and an employee is involved in seining, trawling, basket net fishing for ivory shells and gill net fishing for flounder and young yellowtail. At the port, his wife and mother help them land the fish and

mend tears in the nets.

The seine fishing produces the largest catch, but this method has a disadvantage in terms of a sharp annual change in the catch. The other fishing methods, such as trawling and basket net fishing for ivory shells, make up for losses accrued from seining. By using a fish finder when seining, the fishers can catch icefish every month, whitebait in spring and autumn and lant in spring. The fishing grounds of the seine fishing are areas shallower than 15m in spring and 50m in autumn in the vicinity of the mouth of the Naka River.

The ordinary mixed type fishers: Fisher C (in his sixties) was a director of the Hiraiso Fishing Cooperative Association, and even now he plays the leading role in NFCA. He owns a 5 tonnes vessel equipped with a fish finder, a GPS, radar, three radios and an autopilot. He mainly operates gill nets for flounder during the entire open season from June 10 to September 30. In addition, he also uses drift nets and is involved in seine fishing for halfbeak and trolling for skipjack and flounder. The autopilot is used to operate the trolling line off the Boso and Izu Peninsulas.

The recreational fishing type fishers: Fisher D (in his forties) and two employees mainly operated a 5 tonnes seine boat up to 1970. He started to run a recreational fishing business in 1970. He bought a plastic 10 tonnes boat in 1974, and since then the recreational fishing business has gradually become the main source of his income. He specialized in recreational fishing in 1985. He started using the rooms on the second floor of his house as accommodation for customers, and new lodging for anglers was constructed next to his house in 1989. However, the new lodging is not used at present because the customers only go on one day trips. Recreational fishing is more profitable than commercial fishing because the fishers can work on their own.

He bought a new 19 tonnes vessel in 1996, that has radar, a fish finder and a GPS. He also

owns a 4.9 tonnes boat to catch shrimp as bait for his customers to use.

The abalone type fishers: Fisher E (in his seventies) has skin dived for abalone from a 0.6 tonnes boat since he was 17 years old. Fishers can also skin dive for sea urchins and oysters in May and June. He also uses drift nets to catch young yellowtail in April and May and long lines for sea bream from May through July.

The abalone fishers' association consists of 16 male members because only the eldest sons of residents in Hiraiso Town could join. However, today, whoever lives in Hitachinaka City can join the association. Some of the members are second generation of abalone fishermen, but most members operate the skin diving fishery as their second job. Their main occupation is not fishing but, for example, lorry or taxi drivers or service engineers. The reason why the skin diving fishery is in decline is that the water temperature near Nakaminato is cooler than that of the Boso peninsula that is the most famous place for this fishery.

THE SPATIAL COMPONENTS OF THE FISHERY IN NAKAMINATO

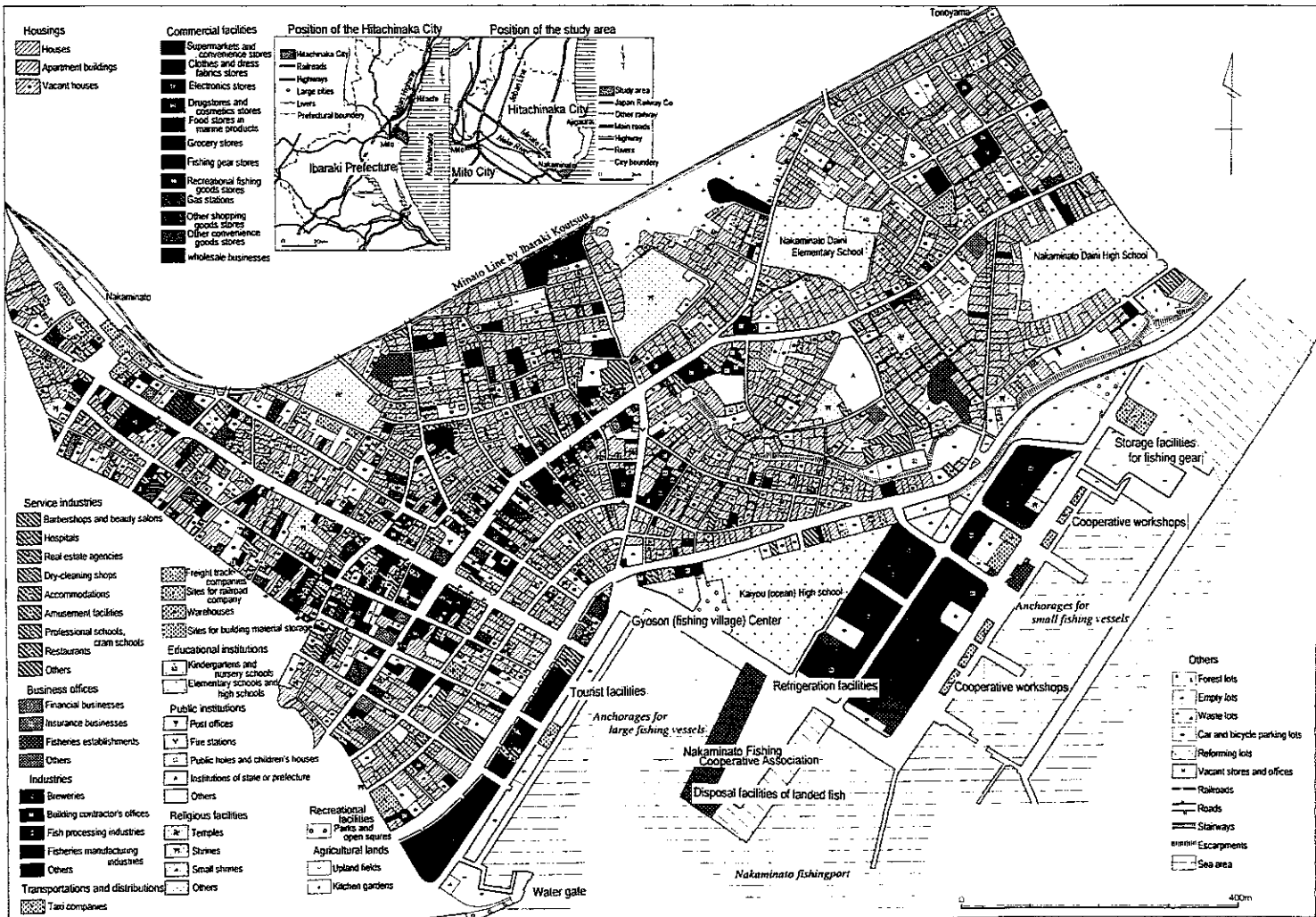
Nakaminato port facilities

The facilities were constructed between 1951 and 1999, and consist of breakwaters, anchorages, fish cleaning facilities, refrigeration equipments and storage facilities for fishing gear (Figure 8).

Nakaminato port was first constructed as a fishing port on the Naka River and it had two functions: as a river port and as a sea port. However, anchorages were often buried by earth and sand from the Naka River. For that reason, in 1990, a water gate was constructed up between the port and the river.

Nakaminato port has facilities for offshore and pelagic fish. Large and small fishing vessels anchor there. That is, there are two kinds of anchorages according to boat size. One is for large fishing vessels that are from other fishing ports, and another is for small fishing boats that

Fig. 8 Land use in the central part of Nakaminato (1998)



belong to NFCA. There are four storage facilities for fishing gear and six workshops owned by NFCA for local fishers. As fishers in Nakaminato have introduced many kinds of fishing methods and gear, the storage facilities have tended to be insufficient. The temporary facilities in the Hiraiso fishing port make up for this deficiency.

Refrigeration facilities in the port are used for freezing tuna caught by non-resident fishing vessels and for preserving fish for the local fish processing industry and fish dealers.

Nakaminato town space

Central town area of Nakaminato

Figure 8 shows that commercial and service industries are concentrated between Nakaminato station and the fishing port. Such industries are private or family managed businesses, and there are many parking lots in the central town area. Although this area is a central district of the fishing town, many vacant shops, houses and spaces exist in it. Almost all of the vacancies in Ushikubo and Wadamachi district were once pelagic fishing crews' houses. As the pelagic fishery declined and the residents moved to the plateau, this area went into decline in terms of population and businesses.

Shops and restaurants dealing with marine products are scattered in the central area, and some of them that cater to tourists are concentrated around the fishing port. In addition, there are businesses related to the fishery that locate near the fishing port: there are fish packing plants, ice plants, shops dealing with fishing gear and banking facilities.

Tourist facilities

Nowadays, fish dealers, sushi shops and tenants dealing with marine products are located side by side in the old fish market. This area is becoming tourist area.

Fish storage facilities and an office of NFCA have been located there since the 1960s. In 1983, a fish dealer started its business at the

place of an old storage facility. After the old fish market and NFCA moved out in 1995, a sushi bar, a restaurant and shops dealing with marine products were built in succession. In 1998, a promenade was arranged in front of these shops. In 1999, there was one fish shop with a sushi bar, two fish shops with restaurants and a sushi restaurant. Consequently, many tourists visit this area for dining and shopping.

A shopping mall managed by the Fish Processing Co-operative Association was built in 1995. The mall covers 1084m². It consists of six shops managed by fish processing factories and three restaurants. These tenants collaborate with travel agents to encourage tourists to visit the mall.

As mentioned above, previous fish market and storage facilities were re-oriented toward tourists. This is an example of a fishing port that adapted its function to the increasing demands of tourism.

Fish processing facilities

Initially the fish processing industry in Nakaminato developed with small factories that were scattered in town areas around the Nakaminato and Hiraiso regions. However, in the town area, people worried that the stench and the discharge from the processing factories was leading to a deteriorating residential environment. Thus, an antipollution law was established in 1967. In addition, since 1968 it has been the duty of each factory to set up a purification system to deal with the drainage. Therefore, Nakaminato City planned for the construction of the "Nakaminato fish processing industrial park". In 1973, a public corporation set up by Nakaminato City purchased wasteland and paddy fields in Sawameki district, located halfway between the Nakaminato and Hiraiso regions, and constructed the industrial park. In the park there are refrigeration facilities, equipment to purify the waste water and factories producing fish meal for common use.

In 1999, nineteen factories operated in this

area. The number of employees working in the factories is from 40 to 50 on average. 65% of the employees are female workers commuting from Hitachinaka City, Naka Town, Ibaraki Town, Oarai Town and Tokai Village. 15% of them are immigrants of Japanese descent who came from Brazil or Peru. In 1998, 750 of these mostly immigrants worked primarily in this industrial park.

The distribution of fish processing factories: Figure 9 indicates the distribution of fish processing factories by product items and the number of employees. In 1999, 52 processing factories existed in Nakaminato. These factories can be roughly classified into four types: factories processing boiled octopus or shishamo smelt in the industrial park, factories processing many kinds of fish such as jack and saury pike in the industrial park, large factories processing boiled octopus or shrimp outside of the industrial park, and small factories processing many kinds of fish in the central town.

Factory A, an example of the first type, processes boiled octopus in the industrial park. At one time, factory A was located in Kaimoncho district and processed opened and dried saury pike and small dried sardines. In 1965, this factory started to process octopus that was supplied from the local district. After that, in 1977, it tried to introduce octopus that was caught in the offing of West Africa to use in processing. Since then, factory A mainly deals with boiled octopus and squid. As the boiler that had been used for small dried sardines could be reused for boiled octopus, and the price of octopus to be used in processed fish was low, factory A was able to convert to the present operation. In 1999, the places providing fish for factory A to process were West Africa and the Sea of Japan for octopus, and Argentina and California for squid. Factory A sells its products mostly to mass-retail outlets and supermarkets.

Factory B, the second type of processing

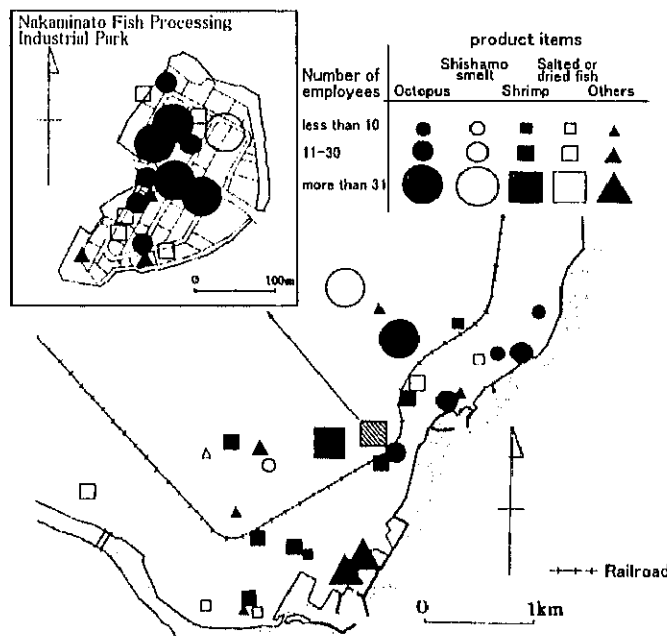


Fig. 9 Distribution of fish processing plants (1998)

Source: Data from the Nakaminato Fish Processing Industry Co-operative Association

plant, produced many kinds of opened and dried fish in the industrial park. This factory was located in Yahata-cho district and processed small dried sardines, dried and smoked bonito and opened and dried saury pike. At that time, the local district provided the fish. Since the 1960s, factory B has processed herring from Russia and atka mackerel from Rebun Island in Hokkaido. In 1999, factory B processed about 15 kinds of fish. The main customers are supermarkets and Japanese bar chains. Unlike other factories, factory B can use flexible techniques to meet customers' demands.

Factory C, the third type, produces boiled octopus and boiled and packed shrimp in Hiraiso region. This factory covers a huge area of 1.2ha, and it has its own refrigeration equipment and waste water purification system. The octopus comes mainly from West Africa and the shrimp comes from the Middle East and Indonesia. The main customers are mass-retail

outlets and supermarkets.

The forth example, factory D mainly processes opened saury pike, jack and atka mackerel in the central town of Nakaminato. There are eight employees, including four family members. This factory has operated in the present site since 1942. Similar to factory B, this factory emphasizes flexible techniques to meet the customers' demands. In addition, factory D uses domestic fish that costs more than imported fish.

As mentioned above, although the fish processing industry in Nakaminato depended on local fish at one time, processing is now focused on imported fish. In this situation, each factory specializes in accordance with its own management size. Large factories collaborate with large fish enterprises and process boiled octopus, shishamo smelt and freeze-dried food. On the other hand, small factories process opened fish —much of it valuable fish— using

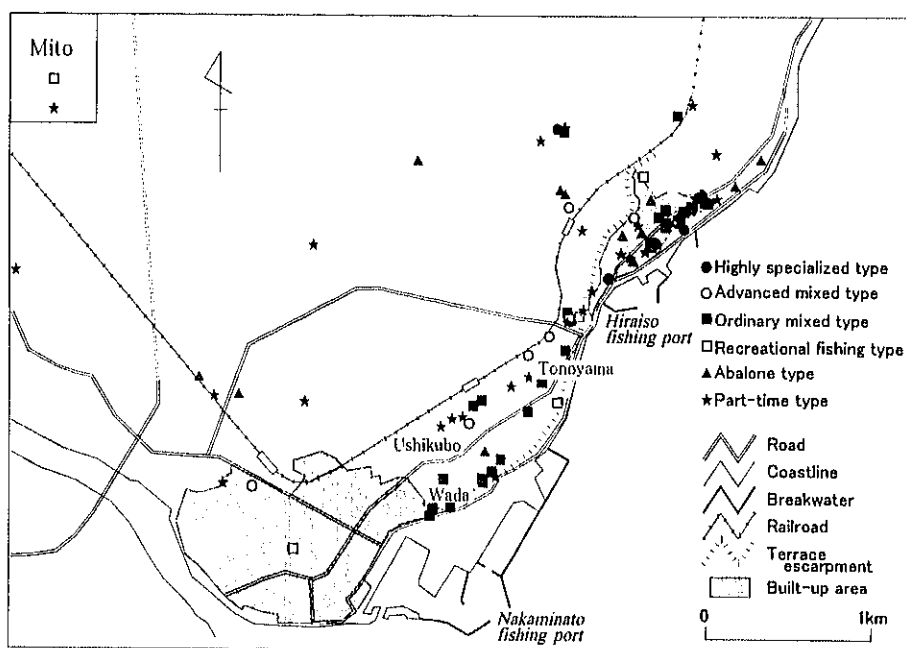


Fig. 10 Distribution of the Nakaminato Fishing Co-operative Association members' residences by fishers types (1998)

Source: Data from the Nakaminato Fishing Co-operative Association and interviews

flexible techniques.

The distribution of fishing households

Figure 10 shows the distribution of them in Nakaminato. Most of fishers' houses are located along the coast, especially around Hiraiso fishing port. According to our classification of fishers, highly specialized type fishers concentrate near Hiraiso fishing port. The advanced mixed type, the recreational fishing type and the ordinary mixed type tend to concentrate along the coast, similar to the highly specialized type. The abalone fishing type and the recreational part-time fishers are widely scattered throughout the district.

Figure 11 shows the operating days of the fishers in Nakaminato. The fishers who work the most are concentrated in the Hiraiso-cho and Tonoyama-cho districts near Hiraiso fishing

port. The farther a fishers lives from the port, the fewer the days he or she tends to work. The total value of a fishers' annual catch is strongly related to the number of his or her operating days.

Most of the fishers in Nakaminato live near Hiraiso fishing port. These fishers belong to the old Hiraiso fishery cooperative association and use Hiraiso fishing port for moorage and to land their fish. However, recently most fish boats have been docked in Nakaminato fishing port. In addition, there are storage facilities for fishing gear and cooperative workshops in the port. Most fishers commute to the port.

In the past fishers felt it important to live near the port so that they did not have to carry their fishing gear far. Today, fishers do not need to live as close to the port anymore with the motorization and the specialization of the port's

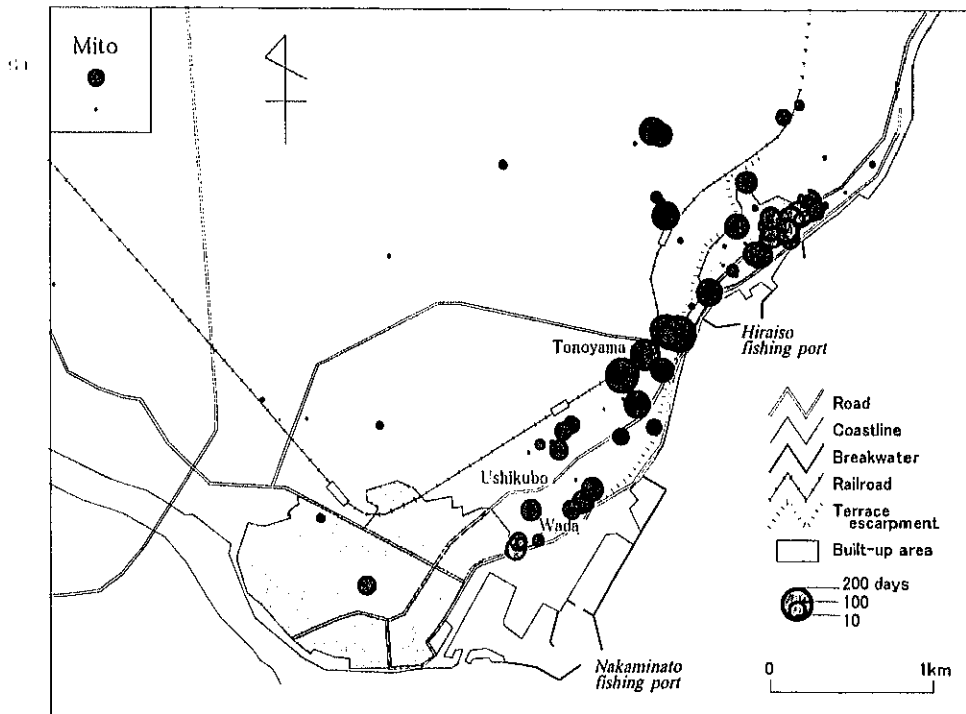


Fig. 11 Distribution of the Nakaminato Fishing Co-operative Association members' residences by annual operating days (1998)

Source: Data from the Nakaminato Fishing Co-operative Association

functions.

The Nakaminato fishing grounds

The fishing grounds of non-resident fishing vessels

As previously mentioned the most typical fishing method of the non-resident fishing vessels is pole and line fishing. Figure 12 shows that the headquarters of skipjack fishing vessels are mainly Kochi, Shizuoka, Mie and Miyazaki Prefectures. The reason why they land their fish at Nakaminato port is that skipjack migrate with the Japan Current passes Nakaminato twice a year. Moreover, Nakaminato is close to markets in the Tokyo Metropolitan Area.

Non-resident fishing vessels from Shizuoka Prefecture land most of their fish at Kesenuma fishing port in Miyagi Prefecture seven or eight times a year. They land their fish two or three times a year at Nakaminato port. On May 24, 1999, a skipjack fishing vessel landed its skipjack catch at Nakaminato even though it caught the skipjack only five hours away from Kesenuma fishing port. The reason why it came to Nakaminato port is that the broker there paid the highest price in all of Ibaraki for its skipjack. Non-resident fishing vessels thus

choose their destination port based on the port facilities and local market price.

Fishing grounds of NFCA members

Tawa (1983) described the fishing grounds of the pole and line fishery using an ecological approach. Although he displayed the fishing grounds using a schematic diagram, it is not clear where exactly the fishing grounds are. This chapter addresses three questions. First, where exactly are the fishing grounds? Second, what are the characteristics of today's fishing grounds? Finally, are the fishing grounds related to the behaviour of the fishermen? The following section will describe the fishing grounds of the sample fishers.

The highly specialized fishers: Fisher A operates a trawling and basket net fishery for ivory shells. Figure 13 shows the distribution of the fishing grounds where he trawls. The fishing grounds are in the offshore area of 50 to 100m in depth. From the offshore area of Kashimanada he moves north to Hitachi during the open season. The majority of bottom sediments of the fishing grounds are sandy. He can avoid damaging his nets on rocks by locating the rocks in advance using a GPS

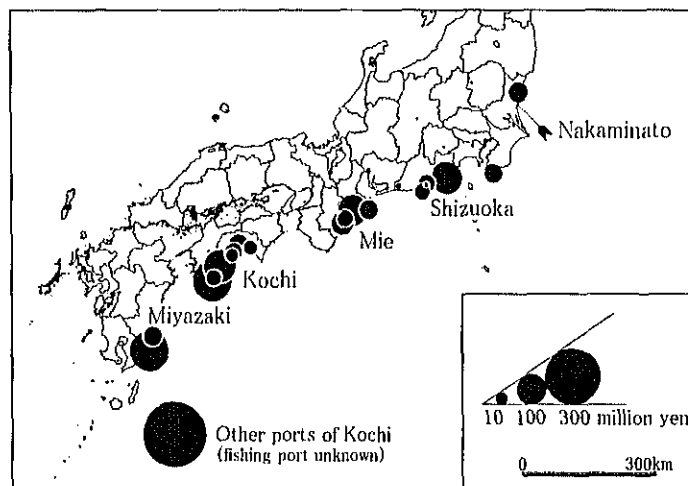


Fig. 12 Headquarters of skipjack fishing vessels and value landed at Nakaminato port (1998)

Source: Data from the Nakaminato Fishing Co-operative Association

system. Locating the rocks on the fishing grounds is critical for having a successful operation.

In January and February, fisher A trawls for mud dabs and seabass at sandy areas at a depth of 50 to 60m. From March to June he also catches flounder, mud dabs and crabs at other sandy areas around rocks in 50 to 60m of water. In September and October he catches fish such as flatheads and scampi shrimp in 50 to 100m of water. From November, the fishing ground is expanded, and the depth ranges from 50 to 150m. Fisher A needs to cover a large area in

response to the ecology of small seasonal migratory fish. During the winter season, he does not depend on GPS data for octopus and squid fishing because octopus and squid are migratory fish moving along the coast with the cold current. He also catches young flounder. Fisher A obtains a stable catch by trawling.

Fish conservation has become an issue with trawling. Therefore, fishers do not trawl on Sundays and Wednesdays. Such an agreement does not only give the fishers a rest, but also prevents over-fishing. In addition, Ibaraki Prefecture limits the number of trawlers. TAC

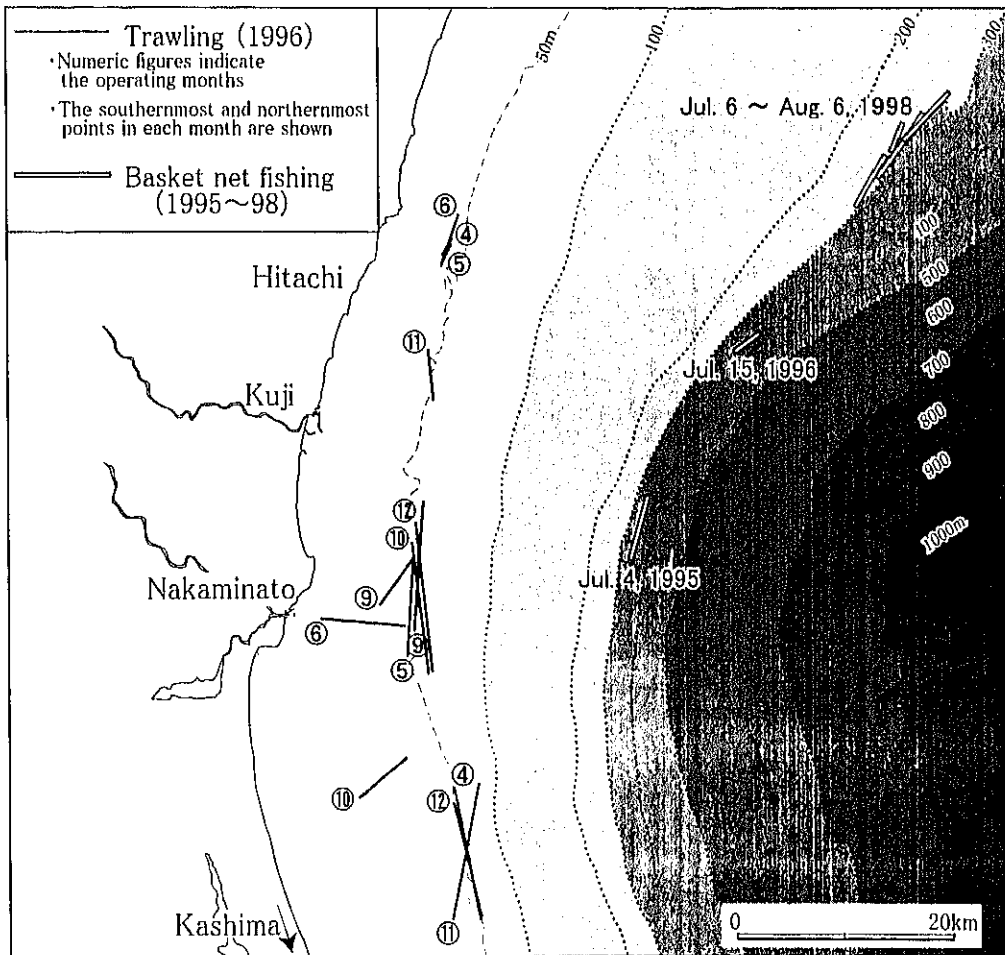


Fig. 13 Fishing grounds of trawlers and basket net fishers

Source: Data from two fishers' boats with GPS

(Total Allowable Catch system) that was enacted in 1997 by the United Nations Convention on the Law of the Sea helps to conserve the queen crab and common squid that are caught by trawling. The TAC system also helps to conserve the saury pike that is caught by stick-held dip net.

Fisher A had used a variety of fishing techniques but he chose to focus on trawling and basket net fishing. The fact that he invested much capital in his fishing boat, gear and instruments enables him to operate efficiently on large fishing grounds. He catches more migratory fish than local fish. Consequently, he operates a highly advanced fishery that depends on local resources.

The advanced mixed type fishers: fisher B fishes for ivory shells using basket nets. The ivory shells live on the slope of the continental shelf at a depth of 200 to 300m. In Nakaminato, basket net fishing for ivory shells was introduced in 1995. Fisher B spent 2.5 million yen (approximately US\$20,000) as an initial investment and has been in operation since 1995. There is a resource conservation agreement that limits the number of operating days (maximum 15) and the open season (only July and August). In spite of such limitations, he earns 7 million yen (US\$56,000) from fishing every year.

Basket net fishing gear consists of three 3,600m ropes, each with 150 baskets. The ropes are placed parallel to the coastline on the ocean bottom. Figure 13 shows the position of the ropes. The position of the ropes shifts northward to the offshore area near the boundary between Ibaraki and Fukushima Prefecture. Live ivory shells tend to be decreasing in number because it is easy for fishers to catch them since they live in a narrow band of 200 to 300m in depth.

Since the basket net fishery started, the depletion of the ivory shells has become a serious problem. Ibaraki Prefecture limits the number of fishing boats and the size of shells

caught. Fishermen must release young small shells. In addition, an agreement has been formed among all fishermen operating the basket nets in Ibaraki. The agreement limits the number of operating days to three days a week and the catch to less than 1600kg a day. This agreement has two purposes: to conserve the resource and to prevent competition for fishing grounds.

The ordinary mixed type fishers: Fisher C uses a variety of fishing methods. His main methods are gill netting and pole and line fishing. He catches migratory fish such as yellowtail, skipjack and bluefin tuna in spite of the dramatic change in the annual catch of these migratory fish.

The drift net fishery for young yellowtail starts in mid-April. Fishing for yellowtail is sometimes extremely lucrative for him.

He trolls for skipjack and bluefin tuna in the spring and autumn. While he is fishing in the offshore area of Hachijojima Island and Izu Peninsula in spring, he is based in Katsuura fishing port and Chikura fishing port in Chiba Prefecture. He trolls till October at the latest. Over only two months he earns five million yen (US\$40,000).

The flounder fishing grounds for trolling in Ibaraki Prefecture are offshore in 10 to 60m of water. He trolls for flounder here from January to March.

The recreational fishing type fishers: The fishing grounds of fisher D are in the offshore area between Kashimanada and Hitachi City. The fish caught differ according to season. These recreational fishers compete with ordinary fishers for the same fish resources. However, both fisheries have different seasons.

Customers come from Saitama, Tochigi, Tokyo and Kanagawa Prefectures. There are over 200 recreational fishing days a year because customers come on weekdays as well as weekends.

The abalone type fishers: The abalone type fishers' grounds are in the foreshore area, 200 to

300m from the coastline of Hiraiso settlement. Being rocky, this area supplies the best habitat for abalone, oyster and sea-urchin.

This foreshore area is in danger of becoming depleted by over-fishing. Therefore, since 1967 artificially hatched abalone has been released by Ibaraki Prefecture officials. In 1995, the Ibaraki Sea-Farming Association was established in Kashima City to grow abalone, flounder, seabass, clams and other fish and shellfish. Members of the Association of Abalone Fishermen in Nakaminato purchase young abalone from the Ibaraki Sea-Farming Association and plant them on the fishing grounds.

THE LIFESTYLES OF FISHERMEN IN NAKAMINATO

This chapter analyzes the annual fishing operations and daily routines of fishers in Nakaminato. This analysis helps one understand

the geography of Nakaminato in terms of fishing.

The highly specialized type fishers

Figure 14 indicates the annual fishing operations of five fishers. Fisher A trawls from September to June and fishes with basket nets from July 1 to August 10.

Figure 15 indicates the daily routine of fisherman A when trawling. He leaves Nakaminato fishing port at 4 p.m. with his father, and they arrive at the fishing grounds about 5 p.m. First, they put the fishing net into the sea using a hydraulic reel. Second, they operate the fishing boat by GPS and autopilot for two hours while dragging the net. Finally, they pull up the net from the sea. This process is repeated about four or five times in a day. They return to the port the next morning. Then fisher A, his father and his wife land the fish and shellfish, sort them and prepare for the auction

fisher	fishing methods	Jan.	Feb.	Mar.	Apl.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	caught species
A	trawling						→			←				flounder
	basket net fishing							↔						ivory shell
B	trawling	→											←	prawn
	boat seine fishing				↔					↔				whitebait
	basket net fishing							↔						ivory shell
	drift gill net fishing				↔									sea bass
	trolling line fishing										↔			skipjack
C	trolling line fishing	↔												flounder
	boat seine fishing		↔											halibut
	drift gill net fishing				↔									young yellowtail
	gill net fishing						↔							flounder
	trolling line fishing											↔		skipjack
D	daytime fishing						→						←	sea bream
	night-time fishing							↔					↔	purple squid
E	skin diving						↔							sea urchin
	skin diving								↔					abalone

Fig. 14 The annual operation schedules of sample fishers in Nakaminato (1998)

Source: Interviews

starting at 10:30 a.m. Fisher A goes home at 10:30 a.m. while his wife attends the auction. He sleeps from 11 a.m. to 3:30 p.m., then goes to the port again.

During the trawling season fisher A does not work from Saturday afternoon to Sunday morning and Tuesday afternoon to Wednesday morning. On holidays, he sometimes goes to a hot spring with his father or he repairs his fishing gear and nets at the port with his wife.

The advanced mixed type fishers

Figure 14 shows how fisher B introduces various fishing methods according to different seasonal and fishing conditions throughout the year. He mainly trawls from December to March, seines from April to June and September to November, and fishes with basket nets in July and August. Moreover, he drift net fishes for sea basses and young yellowtail from April to June, and trolls for skipjack and bluefin tuna in October and November. In addition, he sometimes gills nets and fishes with pole and

line, too.

Figure 16 shows the daily routine of fisher B while basket net fishing. His routine is carried out at midnight like trawling. Fisherman B gets up at 9 p.m. and leaves Nakaminato fishing port at 11 p.m. He arrives at the fishing ground about 1:30 a.m. and pulls up three ropes. It takes three hours to pull a rope up. Thus he finishes the work about 11 a.m. and returns to the port at 2 p.m. Then he prepares for the next day of fishing with his wife until 3 p.m. After that, they take a break and drink tea in the common workshop in the port.

From 5 p.m. they pack the ivory shells in ice and load them onto their truck in preparation for their trip to Choshi market the next day. They go home about 5:30 p.m. and go to bed about 10 p.m. Then they get up at 5 a.m. the next morning and drive to Choshi market, reaching there by 7:30 a.m. After returning home, fisher B has a nap, then goes fishing at night again. Fisher B therefore fishes once every two days because the operation is limited to three times a week, and he sends his catch to Choshi market.

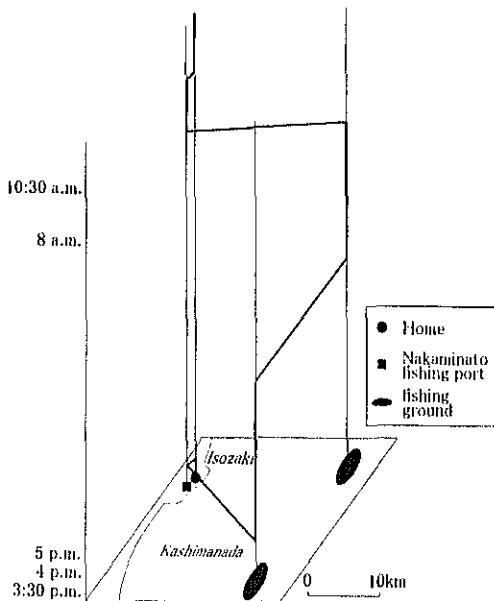


Fig. 15 The daily path of fisher A who operates a trawler fishing boat (1999)
Source: Interviews

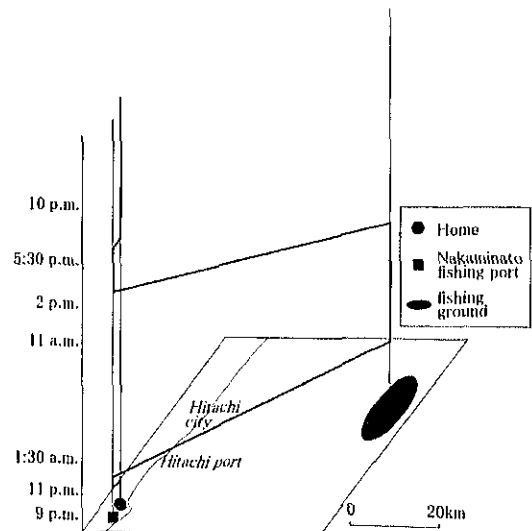


Fig. 16 The daily path of fisher B who operates a basket net fishing boat (1999)
Source: Interviews

The ordinary mixed type fishers

Fisher C also introduces different fishing methods (Figure 14). He trolls from January to February. From the end of February to the middle of April, he seines for halfbeak. He also uses a drift net for sea bass, young yellowtail and ribbonfish from the middle of April till June 10. Then he gill nets for flounder from June 10 to the end of August. From October to December, he trolls for skipjack. He is away during this period and stays in Katsuura or Chikura.

Figure 17 indicates the daily path of fisher C who mainly gill nets for flounder. He leaves Nakaminato fishing port at 3 p.m., arrives at the fishing ground at 4 p.m. and sets up his net. After that, he goes home and sleeps. At 2 a.m. he gets up and goes to the fishing ground again. Starting at 4:30 a.m. he pulls the fishing net up for two hours. He returns to the port about 7 a.m. and checks his fishing gear with his wife and an employee at the common workshop. After work, they have lunch in the common

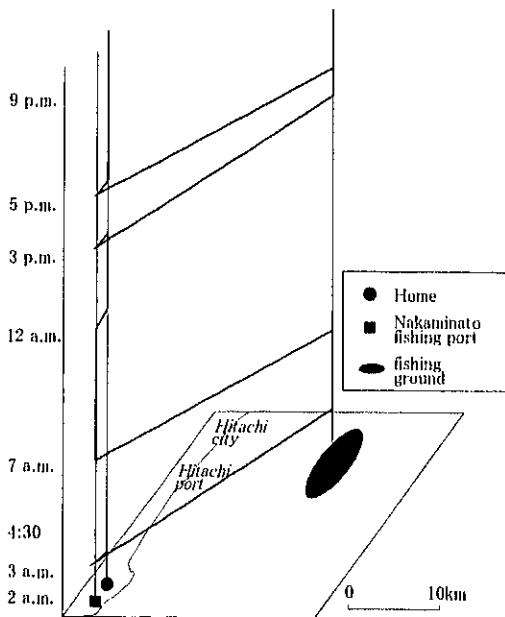


Fig. 17 The daily path of fisher C who operates a gill net fishing boat (1999)

Source: Interviews

workshop, and then fisher C goes home and takes a nap until 3 p.m. His wife goes to work part-time in a fish processing factory.

The recreational type fishermen

The annual operation of fisher D consists of two periods: day-time and night time fishing. During the day-time fishing period, fisher D fishes for sea bream from January to the middle of March, for mud dab till the middle of May, and for jack and black rock fish till the end of June. On the other hand, common squid and purple squid are mainly caught during the night fishing period from the end of June till November. In June and November, fisher D operates both day-time fishing and night-time fishing as he makes the transition from one type of fishing to the other.

Figures 18 and 19 indicate the daily routine of fisher D during the day-time fishing period and the night-time period respectively. While daytime fishing, fisher D gets up by 5 a.m. and leaves Nakaminato port at 5:30. While the customers fish for sea bream, fisher D offers his help and occasionally moves the boat to find the best fishing location. The customers fish until about 1 p.m. At about 2 p.m. he goes back to the port where he examines the vessel and fishing instruments and talks with staff members of NFCA until 4 p.m. A few days a week after 3 p.m., he sometimes goes fishing to catch bait. He usually gets to sleep between 9 and 12 p.m.

When night-time fishing (see Figure 19), fisher D gets up about 9 a.m. and does not start work until 5 p.m. He takes his customers out until midnight, after which time it is prohibited to fish according to a fishery agreement. He goes back to the port by 1 a.m. at the latest and examines the vessel and the fishing gear until 1:30, and then he goes home and sleeps.

The abalone fishing type fishers

The sea urchin fishing season is from May 22 to the end of July, and the abalone season is

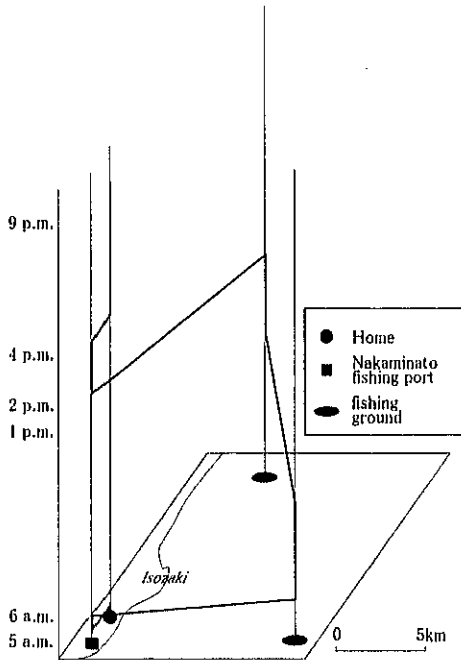


Fig. 18 The daily path of fisher D, day-time fishing (1999)
Source: Interviews

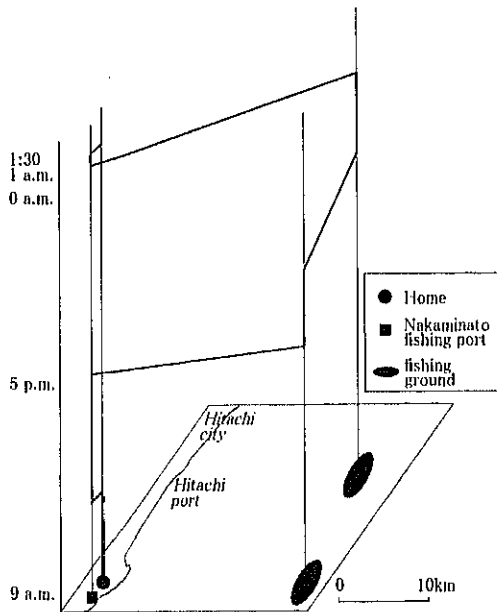


Fig. 19 The daily path of fisher D, night-time fishing (1999)
Source: Interviews

June to September (Figure 14). The number of allowed fishing days to catch sea urchin or abalone is both about 15. Fisher E also sometimes fishes with drift nets from April to May and long line fishes from May to July. Moreover, he may work as a truck driver or as a repairman.

Figure 20 describes fisher E's schedule on the day he catches abalone. He gets up 7:30 a.m., and at about 8 a.m. he meets his fellow fishers in Hiraiso port to discuss whether they will go fishing that day or not. If they decide to go fishing, he goes home and prepares for fishing. At 9 a.m. he gets back to the port and goes fishing. At 4 p.m. he returns to the port and goes home soon after. His fellow fishers also follow the same pattern.

The characteristics of the fishers' lifestyles in Nakaminato

The previous sections have emphasized how the lifestyles of the fishers in Nakaminato are so different and how they dramatically change their daily schedules throughout the year. The

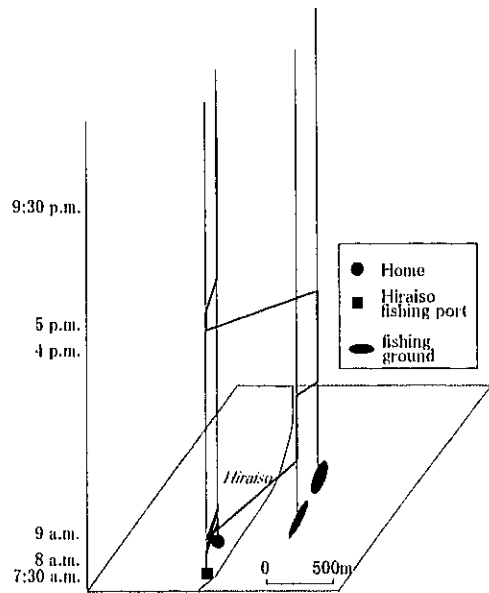


Fig. 20 The daily path of fisher E who catches abalone (1999)
Source: Interviews

main reason for these diverse lifestyles is the variety of fish species that they catch.

Nakaminato is located where the cold current and the warm current meet, and where many different kinds of fish migrate to every season. In addition, there are abundant local fish and shellfish near Nakaminato. Fishers in Nakaminato operate all year round by selecting the fish species they want to catch according to the seasonal fishing condition. For each fish species the fishers determine the best fishing methods, the fishing ground, the operating time, and they even plan their meal and sleeping times around their fishing schedule. As fisher B and C have used a variety of fishing methods, they frequently change their daily schedules and work space according to the ecology of fish species that they catch.

The reason for leading such adaptable lifestyles in time and space is that each fisher operates alone or with his or her family. Their fishing vessels are equipped with some high-tech fishing instruments such as fish finders, autopilots and GPSs. By making full use of this technology, the fishers can work alone. This adaptable type of operation, using advanced machines, helps to ensure that individual fishers can catch fish during different fishing conditions throughout the year.

It seems that the fishing port is the base of daily life for fishers in Nakaminato. The port functions not only as a transition place that links their home as a sleeping place and fishing grounds as a work place but also as place where they do various daily activities. At the port the fishers prepare the fish for auction and for shipping to market. They also examine and maintain their fishing vessels and instruments and check and repair their fishing nets even on holidays. Moreover, at the port fisher B and C have meals or drink tea and fisher D enjoys talking with his friends.

On the other hand, the fishing port only functions as a transition place for fisher E owing to the following three reasons. First, only

fisher E makes use of Hiraiso fishing port, which is small and has few facilities. Second, collecting shellfish does not require much fishing gear. Finally, as the fishing port is very close to his home, he can come and go many times a day.

The above-mentioned distinction between fisher E and the other fishers is a result of the different spatial relations between their homes and fishing port. For fisher A through D, the distance from the fishing port to their houses is about 2km on average, so they commute by car. This differs from the situation of the former fishing village that located near a fishing port. Once fishers go to the port, they do not return home unless they finish all their work, including fishing and other tasks that they do at the port. For that reason, the port and their homes are recognized as separate spaces with distinct functions. On the other hand, because fisher E's house is so close to Hiraiso fishing port, the two places function as a continuous space.

In order to catch a wide variety of fish and shellfish without any restraints in time and space in Nakaminato, the fishers have introduced diverse fishing methods and some advanced equipment. Also, Nakaminato fishing port has multiple functions with warehouses for fishing gear and common workshops. For those reasons, Nakaminato fishing port has become an indispensable place for the fishers' daily life.

CONCLUSION: THE STRUCTURE OF FISHERY SPACE IN NAKAMINATO

In general the fishery space consists of an inland space, a marine space and a port space functioning as a node to combine the former two spaces. This paper first analyzed separately the fishing town space (an inland space), the fishing ground space (a marine space) and the fishing port space. Because these spaces are interrelated by the movement of people or materials, we then examined the fishers' daily movements. Through both analyses we have described the spatial structure of the fishery

space in Nakaminato (Figure 21).

Nakaminato is blessed with abundant fish resources, including various kinds of bottom and shellfish living along the coast and migratory fish that are attracted to the area where the cold and warm currents meet. Nakaminato prospered as a mercantile port of the Mito Feudal Clan, and then it was successfully switched into a fishing port using

the former port facilities and the accumulation of capital in the Edo era. Fishers or capitalists in Nakaminato introduced large-scale motor fishing vessels to catch offshore migratory fish such as tuna, bonito and sardine.

Fish processing industries used much of the fish caught by the large fishing vessels. However, in the 1970s, they soon became dependent largely on imported fish, including

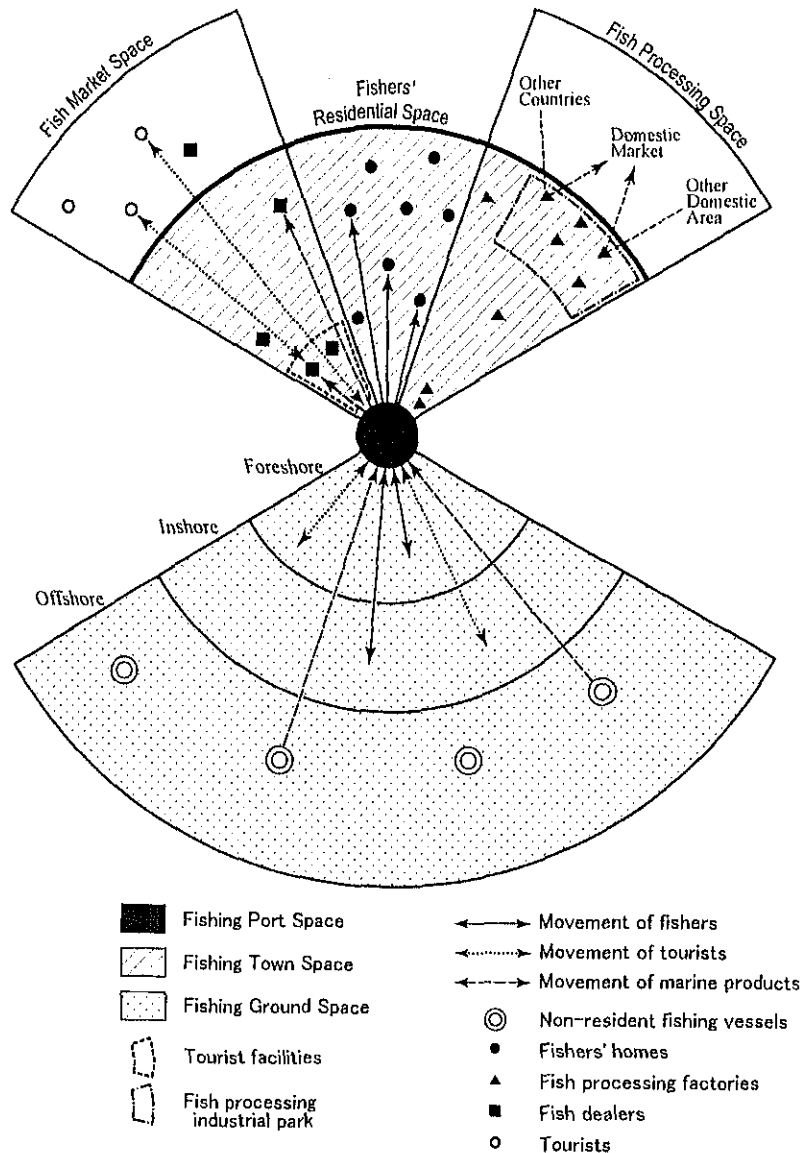


Fig. 21 The spatial structure of the fishery in Nakaminato (1999)

octopus from West Africa, because the amount of locally landed fish decreased drastically owing to the introduction of the 200 n.m. economic zone system and the oil crisis. Some large companies specialized in processing specific imported fish and shipped their products to supermarkets and wholesale traders. Small-scale fish processing factories produced small quantities of many kinds of products using both local and imported fish. Present fish processing industries employ many immigrant and foreign labourers in addition to local people. This means that the fish processing section that was one of the important elements of the local town space has been separated and directly connected to the international fish marketing system an example of globalization.

The fishing industry in Nakaminato is largely classified into one group composed of members from NFCA and one group composed of fishers from other areas. The value of fish landed by the latter group is about 70 % of all landed value at the Nakaminato port. Fishing vessels from western Japan, including Kochi Prefecture, land their catches there because the port has modern and efficient facilities, many wholesalers, and it is accessible to the excellent skipjack fishing grounds and large markets.

Members of NFCA are involved mostly in small-scale fishing along the coast. This fishing has become relatively important in place of the large-scale offshore and pelagic fishing that some local people do. The Nakaminato fishers usually go to the port by car and then go fishing. They land their fish at the port and repair their nets and tools at their workshops located in the port area. In this way the port functions as a nodal point for their daily movement. The movement patterns vary depending on each fisherman.

The highly specialized type fishers are involved in trawling and basket net fishing. They work for long hours at night and have a monotonous daily routine. This lifestyle is possible owing to rationalized fishing that uses

advanced equipment and modern boats. Their fishing grounds extend over the slopes of the continental shelf. Since the fish and shellfish that are caught by the highly specialized type fishers do not grow quickly and require much time to recover, the size of the fishing ground must be extensive. Because both the advanced and ordinary mixed type fishers are involved in various types of fishing, their fishing grounds vary depending on individuals. The advanced mixed type fishermen are involved in basket net fishing on the slopes of the continental shelf and sometimes transport their fish to Choshi port using their own vehicle. Therefore, their work space becomes very large. On the other hand, the ordinary mixed type fishers, who mainly depend on gill net fishing, fish within a relatively small area. The fishing ground of the abalone fishers is a small area along the coast with Hiraiso port as a base. Their daily routine is quite monotonous. The fishers who run recreational fishing charters for tourists create a new use for fishing grounds. In this way, each fishing type has its specific area of fishing. As a result, the fishing grounds of Nakaminato are extensively used both horizontally and vertically, and careful fish resource management is necessary at present and in the future.

Nakaminato port functions as a place for fish landing, fish storage, supplying fuel and other materials, and maintaining vessels and fishing tools. In addition, it also supplies various types of services, and it acts as a meeting place for people. For the members of NFCA, the port is not just a place they pass through while working, it also plays an important role as a node in daily life. In addition, facilities such as fish shops, restaurants and sushi bars constructed on the site of storage houses have attracted many tourists from the Tokyo Metropolitan area. In other words, the hinterland of the port has expanded greatly.

When the pelagic and offshore fisheries prospered before 1970, the fishery space of

Nakaminato consisted of widespread fishing grounds, a prosperous town space, including a fish processing section that depended on local materials, and an energetic port space that harboured large and small local fishing boats. However, at present, the fish processing section is separated from the local town space and is directly connected to the global economy. As fishing grounds shrink, those remaining along the coast become more important. Local fishers intensively use them. This has resulted in fish resource management problems. On the other hand, recreational activities play an important role in the use of the port and the fishing grounds. In this way the fishery space of Nakaminato has changed in accordance with the changing fishery industry.

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Photo 1 Nakaminato fishing port and landed fish (October, 1998)



Photo 2 A pole and line fishing vessel for skipjack from Kochi Prefecture (May, 1999)



Photo 3 An ordinary mixed type fisher's boat (May, 1999)



Photo 4 A recreational fishing boat for anglers (May, 1999)



Photo 5 Abalone type fishers (May, 1999)



Photo 6 Landscape of Nakaminato central town area (May, 1999)



Photo 7 Workers boiling octopus in a fish processing factory (May, 1999)



Photo 8 A fish dealer who sells marine products in the old fish market (May, 1999)