

Archives

FISHERIES AND MARINE SERVICE

Translation Series No. 2978

Ocurrences of edible shellfish (bivalves) in Norwegian coastal waters
(with a section on marine gastropods)

by Kristian Fredrik Wiborg, and Björn Böhle

Original title: Forekomster av Matnyttige Skjell (Muslinger i Norske
Kystfarvann (Med et Tillegg om Sjøsnegler),

From: Fiskets Gang (Fisheries Migration), 54(9) : 149-161

Translated by the Translation Bureau (PMJ)
Multilingual Services Division
Department of the Secretary of State of Canada

Department of the Environment
Fisheries and Marine Service
Biological Station
St. John's, Nfld

1974

34 pages typescript

DEPARTMENT OF THE SECRETARY OF STATE
 TRANSLATION BUREAU
 MULTILINGUAL SERVICES
 DIVISION



SECRETARIAT D'ÉTAT
 BUREAU DES TRADUCTIONS
 DIVISION DES SERVICES
 MULTILINGUES

F.R.B 2978

TRANSLATED FROM - TRADUCTION DE
 INTO - EN
 Norwegian English

AUTHOR - AUTEUR

Kristian Fredrik Wiborg and Björn Böhle

TITLE IN ENGLISH - TITRE ANGLAIS

Occurrences of edible shellfish (bivalves) in Norwegian coastal waters
 (with a section on marine gastropods)

TITLE IN FOREIGN LANGUAGE (TRANSLITERATE FOREIGN CHARACTERS)
 TITRE EN LANGUE ÉTRANGÈRE (TRANSCRIRE EN CARACTÈRES ROMAINS)

Forekomster av matnyttige skjell (muslinger) i Norske Kystfarvann
 (Med et tillegg om sjøsnegler)

REFERENCE IN FOREIGN LANGUAGE (NAME OF BOOK OR PUBLICATION) IN FULL. TRANSLITERATE FOREIGN CHARACTERS.
 RÉFÉRENCE EN LANGUE ÉTRANGÈRE (NOM DU LIVRE OU PUBLICATION), AU COMPLET, TRANSCRIRE EN CARACTÈRES ROMAINS.

Fiskets Gang

REFERENCE IN ENGLISH - RÉFÉRENCE EN ANGLAIS

Progress of Fisheries

PUBLISHER - ÉDITEUR	DATE OF PUBLICATION DATE DE PUBLICATION			PAGE NUMBERS IN ORIGINAL NUMÉROS DES PAGES DANS L'ORIGINAL
	Norwegian Directorate of Fisheries	YEAR ANNÉE	VOLUME	ISSUE NO. NUMÉRO
PLACE OF PUBLICATION LIEU DE PUBLICATION				NUMBER OF TYPED PAGES NOMBRE DE PAGES DACTYLOGRAPHIÉES
Bergen	1968	54	9	34

REQUESTING DEPARTMENT
 MINISTÈRE-CLIENT Environment

TRANSLATION BUREAU NO.
 NOTRE DOSSIER N° 784428

BRANCH OR DIVISION
 DIRECTION OU DIVISION Fisheries Service

TRANSLATOR (INITIALS)
 TRADUCTEUR (INITIALES) PLJ

PERSON REQUESTING
 DEMANDÉ PAR Allan T. Reid

YOUR NUMBER
 VOTRE DOSSIER N°

DATE OF REQUEST
 DATE DE LA DEMANDE 28-02-74

URGENT
 THE SECRETARY OF STATE
 Ottawa, Ontario



CLIENT'S NO. N ^o DU CLIENT	DEPARTMENT MINISTÈRE	DIVISION/BRANCH DIVISION/DIRECTION	CITY VILLE
	Environment	Fisheries Service	Ottawa, Ont.
BUREAU NO. N ^o DU BUREAU	LANGUAGE LANGUE	TRANSLATOR (INITIALS) TRADUCTEUR (INITIALES)	
734428	Norwegian	PMJ	MAR 20 1974

Occurrences of edible shellfish (bivalves) in Norwegian coastal waters
(with a section on marine gastropods)

Forekomster av matnyttige skjell (muslinger) i Norske Kystfarvann
(Med et tillegg om sjøsnegler)

by

Kristian Fredrik Wiborg and Björn Böhle
Norwegian Institute for Marine Research

Fiskets Gang 54(9): 149-161 (Feb. 29, 1968)

Continued from No. 8

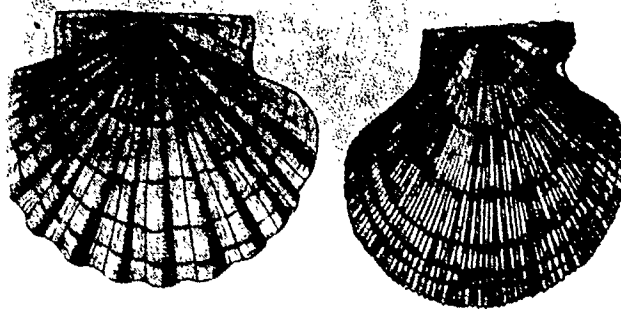


Fig. 12. Scallop (*Pecten maximus*), 14 cm (left).
Iceland or Arctic scallop, *Chlamys islandica*, 8 cm (right).

Scallop, *Pecten maximus* (L.)

The valves are different shapes; the left or upper valve almost flat, the bottom one cupped. Both shells have 15-16 wide ribs (Fig. 12). The scallop can be up to 17 cm wide. It grows relatively quickly and reaches a length of 10 cm in 4-5 years, but the growth rate decreases considerably with increasing age. The scallop is bisexual.

A 10 cm wide scallop weighs about 175 g, a 15 cm scallop ca. 450 g. The edible part of the shellfish forms about 20% of the total weight.

The scallop lives on sand, gravel or rocky bottom in depths of 50-60 m, preferably where there is some current in the water. It is found along the Norwegian Coast from the Oslo Fjord up to and including Vesterålen, according to available information. Surveys with an echo sounder have shown that it is difficult to find larger areas that are suitable for dragging for scallops. As a rule the bottom is either rough or overgrown with seaweed and kelp, which will fill the drag in a short time. The only way large quantities can be obtained is by the use of Scuba divers. Scallops have been found in the outer Oslo Fjord, at Jomfruland, Risør, along the Sörland Coast, in the Bergen area and at Möre. The distribution is very uneven; in some areas groups of from 10-100 individuals can be found in concentrations up to 2-3 per m² alternating with longer distances without any. Up to a couple of hundred scallops per diver per day have been taken. In one single area as many as 20,000 scallops have been taken, according to unconfirmed reports. It is still a question as to whether or not such a fishery can be carried out profitably

in competition with imported, frozen scallops unless considerably higher prices can be realized for the fresh product.

The recruitment rate of young scallops in the areas where they occur is unknown.

Iceland or Arctic Scallop, *Chlamys islandica* (L.)

The shells are fan shaped with radial ribs (Fig. 12). The color varies from greyish green to red or yellow, occasionally with deeper colored concentric rings. The underside usually has cleaner and lighter colors. The inside of the shell is white or colored. The male scallops contain white milt, the females reddish-orange roe. The rims vary from almost black to light grey.

The Iceland scallop can be up to 11 cm long, but is usually only 7-8 cm. It grows slowly, rarely more than 10 mm per year. Scallops of a size useable for food are therefore at least 5-6 years old. The weights of whole animals vary from 25 g for 6 cm length up to 110-140 g for 10 cm.

The useable parts of the scallop, muscle and gonad, weigh from 5 g to ca. 30 g.

The Iceland scallop is a cold water species that occurs chiefly in Northern Norway, from Beiaren to South Varanger in fjords with shallow sills (inlets). Individuals are also found further south. In the Østerbø Lake (Sk 251)* a sidearm to the Sogne fjord, live scallops have been jigged near the bottom of the fjord. In the Trondheims fjord a rich scallop area occurred west of Tautra ca. 40 years ago, but experimental dragging in 1963 was negative.

p.150

* Sk = sjökart = coastal chart no. (Translator's note)

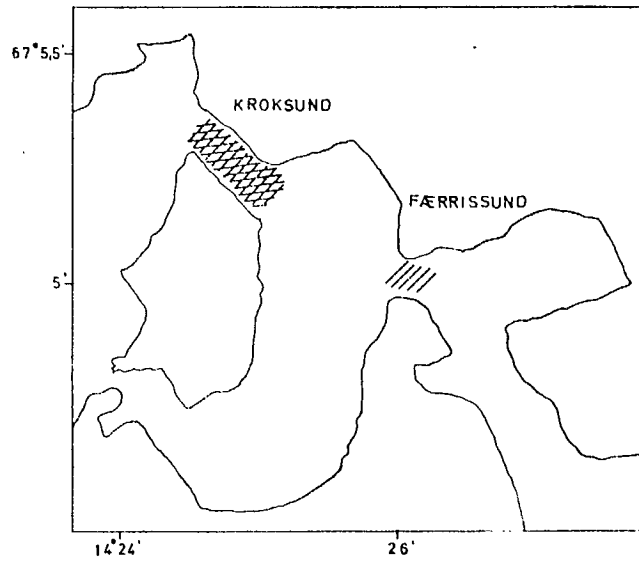


Fig. 13. Iceland scallop beds in Beiaren.
Cross-hatched area: richer concentrations.

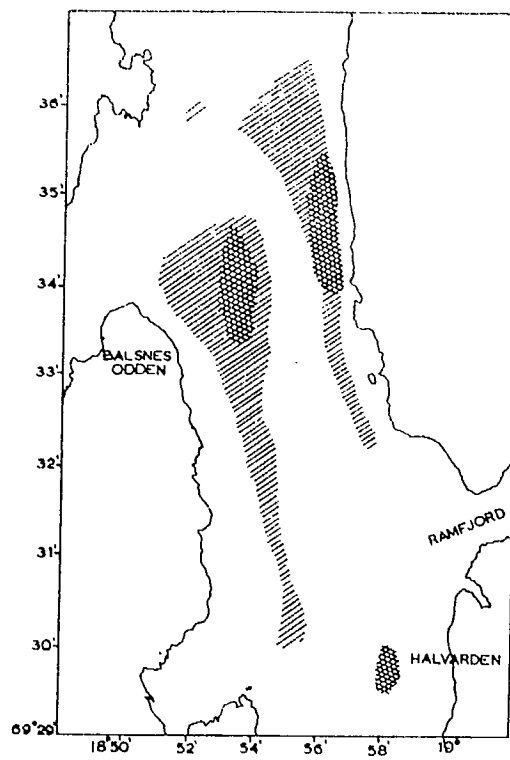


Fig. 14. Iceland scallop areas in Balsfjord.
Cross-hatched area: dense concentrations.

In Kroksund in Beiaren (Sk 226) (Fig. 13) there is a bed at a depth of ca. 40 meters, which is approximately 900 m long and a maximum of 150 m wide. The stock is estimated to be 1-1 1/2 million individuals with a total weight of 50-75 tons. The shells are relatively large, 7-9 cm, and are probably ca. 10 years old and older. There are few small scallops. In 1967 the shells had almost the same length distribution as in 1963 and it is assumed that the stock has accumulated. Single individuals have been found in Ferrissund and Kyllingsund, and also in Misvarfjord past the Saltstraum. In Raftsund and Ingelsfjord (Sk 69) a few single individuals are found on rough bottom, 25-40 m and deeper. In the bottom of Strømmen on Andørja (Sk 80) scallops are found in such shallow water that they have been caught on a jig.

In the outer part of the Balsfjord near Tromsø, there is a very large bed in 30-45 m water that has been harvested for bait. The size of the stock is very variable, and certain parts of the area have in some years been devoid of the shellfish. An attempt to quantitatively evaluate the area was carried out in 1967. There were large differences between the densities from place to place (Fig. 14). Curator E. Brun at Tromsø Museum has been diving in several areas and both photographed and counted the animals (Fig. 15). There was a maximum concentration of over 50 scallops per m². With a drag made according to British specifications with an opening of 100 x 35 cm, at least 500 scallops can be taken in such an area in one minute. Nearby Brun found a belt with starfish (*Asterias rubens*) in an area of ca. 150 m x 10 m (Fig. 16). Areas with Iceland scallops that earlier had been assumed to have disappeared due to changes in the environment, for instance too high temperatures, could possibly have been decimated by starfish predation.

A few individuals are found in sounds and fjords north of Tromsø, and an exploitable concentration in the narrowest part of Andamsfjord (Fig. 17) at a depth of 35-45 m. The bottom consists of shell-sand, partly covered with algae and barnacles. Some of the shells are large, up to 10 cm, with good growth and quality (Wiborg 1962). There are up to 20 scallops per m², few empty shells, but considerable growth of algae and barnacles (Fig. 18).



Fig. 15. Iceland scallops at 32 m depth in Balsfjord. Photo E. Brun.



Fig. 16. Starfish (*Asterias rubens*) near the Iceland scallop beds in Balsfjord. Photo E. Brun.

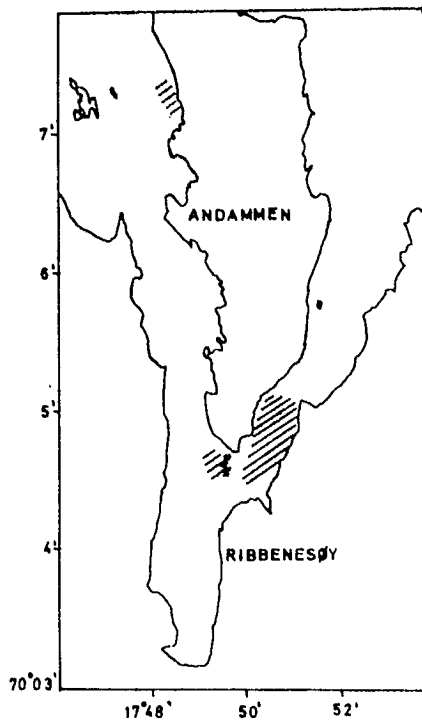


Fig. 17. Iceland scallop beds in Andamsfjord.

In Ullsfjord (Fig. 19) there are several concentrations, the largest just inside the sill, but up to 80% of the catch consists of empty shells and the live animals are small, maximum 5-6 cm.

A good area is located in Indre Kvaenangen (Fig. 20) which is exploited to a certain extent, mostly for bait. The exploitation rate has been low since the stock had the same size distribution both in 1963 and 1967 with 80% of the shells being 55-75 mm. Empty shells had the same size distribution as the live shells.



Fig. 18. Iceland scallop beds at 35 m depth in Andamsfjord. Photo E. Brun.

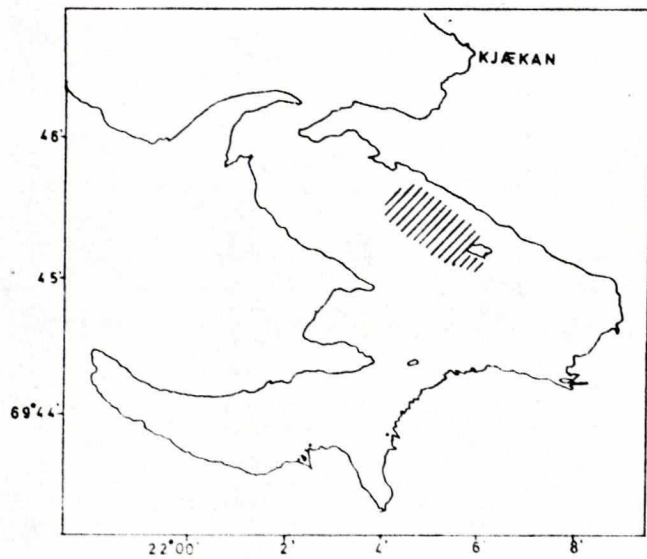


Fig. 20. Iceland scallop beds in Inner Kvaenangen.

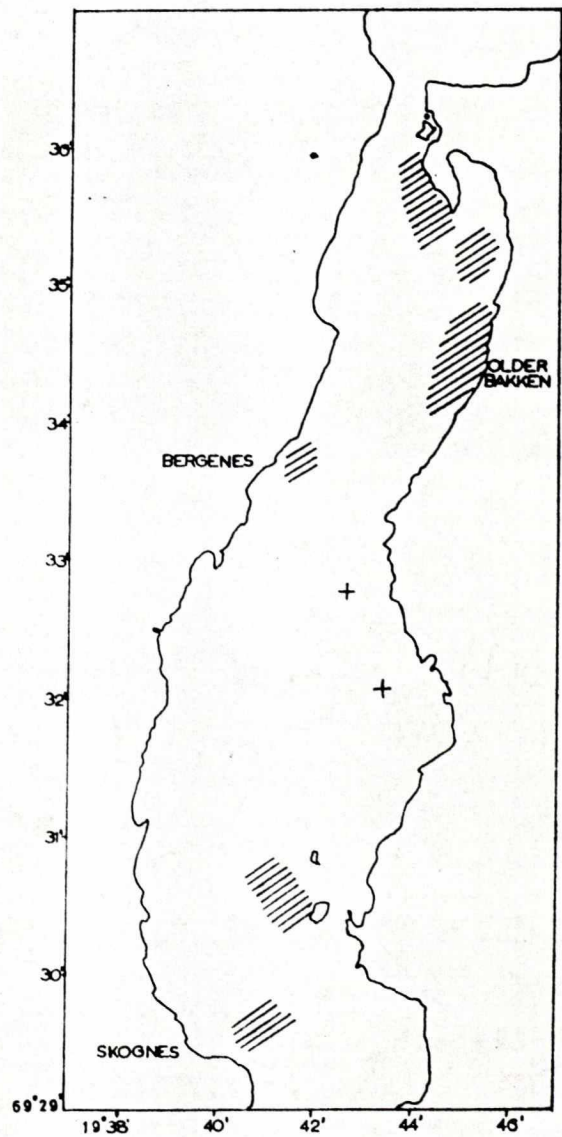


Fig. 19. Iceland scallop beds in Ullsfjord.

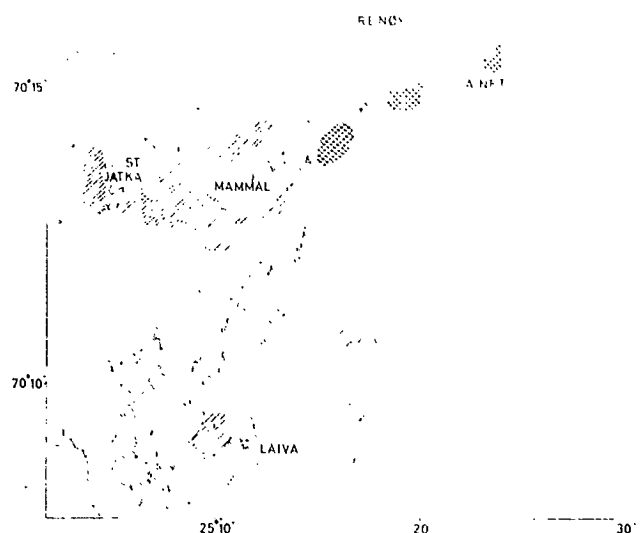


Fig. 21. Iceland scallop beds in Porsangerfjord.
Cross-hatched areas: richer beds.

A few scallops have been taken in Lille Kjerringfjord (Sk 98), but the bottom is rough and not very suitable for dragging.

Several beds with quite dense concentrations can be found in Roddenessjöen at the bottom of Porsangerfjord (Fig. 21). The best beds are located northeast of Renöy, followed by areas in the sounds south and southwest of the island where the animals are smaller. The bottom conditions are variable from sand and mud to rock and gravel and the depths range from 35-60 m. The temperature at the bottom is very low; in the summer from -0.5 to $+1^{\circ}\text{C}$.

The inner part of Kongsfjord (Fig. 22) is separated from the outer part by a sill at 4-5 m depth. A small bed at 25 m depth is located some distance inside with shell sizes ranging up to 11 cm, and 80% of the

scallops measure over 8 cm. The bottom temperatures in May are 3.5-4.5°C.

In Sörvaranger there are smaller beds in Korsfjord and Strømmen at the outlet of Kjölfjord at 25-35 m depth (Fig. 23). The scallops show good growth, but are subject to heavy predation by starfish. The dragging conditions are at times difficult, with large rocks half buried in the mud.

There are possibilities for smaller concentrations of Iceland scallop in two side fjords near the bottom of Tanafjord (Sk 110), Smalfjord and Leirpollen. Both have sills near the inlets at 18 and 11 m depths, respectively.

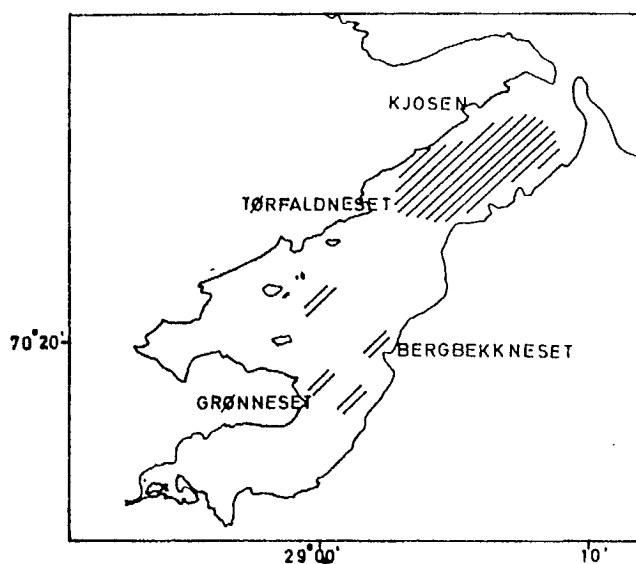


Fig. 22. Iceland scallop beds in Kongsfjord.

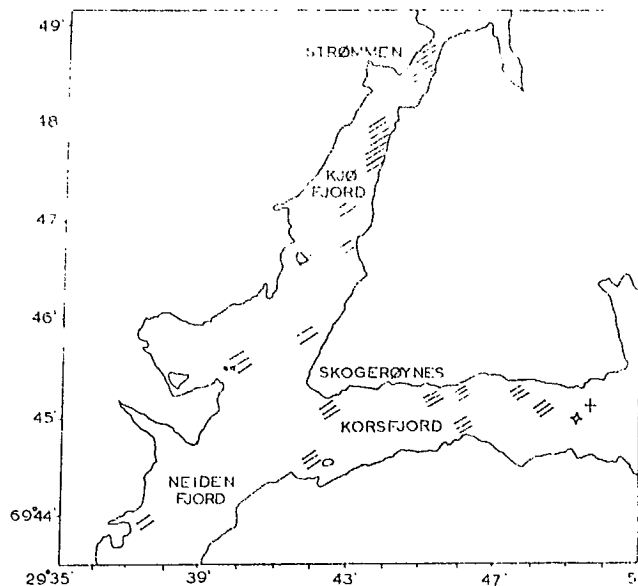


Fig. 23. Iceland scallop beds in Sor-Varanger.

Soft Shell Clam, *Mya arenaria* (L.)

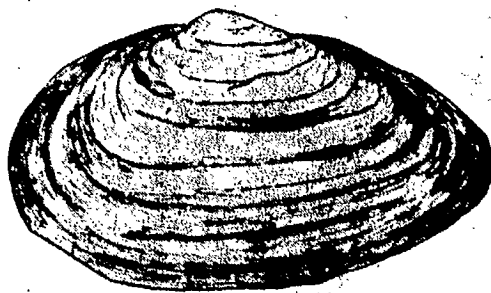


Fig. 24. Soft shell clam,
Mya arenaria, 8 cm.

The shells are elliptical (Fig. 24), greyish to chalk white with concentric stripes and gapping a little towards the back. The back part of the mantle extends to a long double tube (siphon) covered with tough, brown skin. The soft shelled clam is found buried in sand or

mud from the high water mark down to 6-7 m, but is also very rarely found lying directly on the bottom. It grows to about 10 cm in length; the usual is 6-8 cm. Clams measuring 6 cm weigh 25-40 g, 8 cm 60-80 g, 10 cm 120-135 g. The edible part totals 20-25% of the weight. The quality is best in the warm months. Soft shelled clams can be found along the whole coast of Norway, but only a few places in larger quantities. Many large intertidal areas, especially in western and northern Norway are completely without clams or have small isolated stocks. Most of these areas can consist of shell sand or mud, occasionally with dense populations of sand worms (*Arenicola marina*). A typical example can be found beyond Askvoll in Sogn. The bottom consists of tough, soft clay, with a limited growth of eelgrass and a few cockles. Near the edges of this intertidal area, below Askvoll church, the bottom material is gravel and sand, and some soft shelled clams can be found there. Similar conditions have been found in other fjords in western Norway. In some areas the clams live in tough clay. On some beaches only quantities of empty shells, possibly sub-fossile, can be found. All concentrations of soft shelled clams are found in protected areas, in the bottom of bays and fjords near the outlets of rivers and brooks, preferably where the substrate contains organic material in the form of wood, humus or from other sources. The clams are found partly under the deepest low water mark, down to 5-6 m. The number of clams per m² is usually 5-25, but can go up to 100 or more. Up to 3000 clams per m², having a shell size of 20-40 mm, were found in Langesundsfjord in 1964.

Beds that can possibly be utilized are found in the Sognefjord area at Esefjord, Fimreite and Kaupanger; also in Gloppefjord at

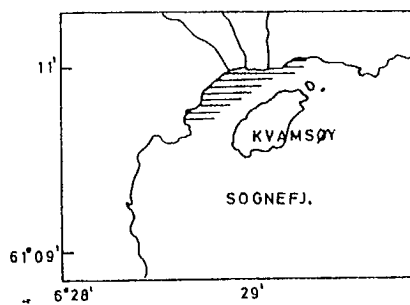


Fig. 25. Soft shelled clam beds at Kvamsøy in Sognefjord.

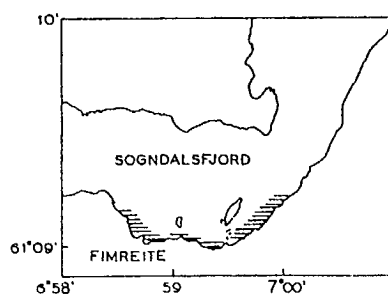


Fig. 26. Soft shelled clam beds at Fimreite in Sogndalsfjord.

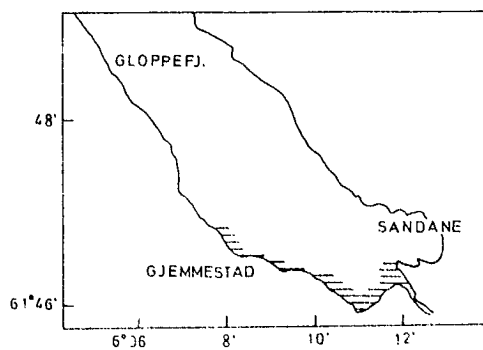


Fig. 27. Soft shelled clam beds at Sandane in Gloppefjord.

Sandane (Fig. 4 and 5, 25, 26, 27). The clams are found in tough clay in all these areas, and harvesting gear should operate hydraulically by removing the clay with a stream of water so that the shells are not broken.

Cockle, *Cerastoderma edule* (L.) and *C. lamarcki* Reeve.

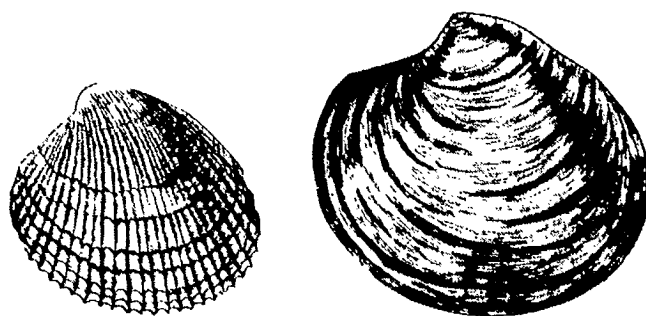


Fig. 28. Cockle, *Cerastoderma edule*, 5 cm (left)
Ocean Quahog, *Arctica islandica*, 8 cm (right).

The shells are thick, off-center elongated, strongly cupped and heart shaped (Fig. 28); the color is white with brownish edges. The two species are very similar, but *C. lamarcki* prefer brackish water. The cockle is usually 3-4 cm long, but can be up to 6 cm. In western Norway they grow 10-15 mm per year, judging from the growth zones; 4-5 cm shells are 4-6 years old. The quality is best in the summer months. The cockle lives on sandy bottom, from the beach down to a couple of meters depth. It is often buried just under the surface but can also lie directly on the bottom. An iron rake is a useful tool for harvesting this shellfish.

The cockle can be found along the whole of the Norwegian Coast, but is not particularly plentiful. The areas where any quantities have been found are:

- Sk 3: Oslofjord; Rambergbukten,
Sk 6: The inside of Jomfruland and at Risör,
Sk 16: Gannsfjord, Boganesbukta - numerous small cockles in 1964,
Sk 20: Hillestadvågen - many small shells,
Sk 21: Mjeldviken, Foldnesvågen,
Sk 23: Askøy; Jodleviken,
Sk 24: Fensfjord at Håvarden and Rote,
Sk 39: Fillan; Vågen, Fjeldvaerøy; Barmfjord at Dunet, Balfjord; bays around Molde,
Sk 213: Gloppefjord: Sandane,
Sk 221: Inner Trondheimsfjord; around Tautra,
Sk 44: Lysöysund, Skråfjorden, Törrhoggvågen,
Sk 45: Bratjaerfjord inside Auneholmen,
Sk 51: Kjellfjord, Årsetfjorden,
Sk 65: Saltfjorden: Valeosen, Godöyströmmen,
Sk 106: Vesterbotn to Abba, outlet of Børs River,
Sk 115: Varangerfjorden: Maeskfjord, Nesseby, Karlbotn,
Sk 116: The bottom of Bugöyfjord and Neidenfjord.

Ocean or Mahogany Quahog, *Arctica islandica* (L.)

The ocean quahog has thick, almost round shells which are strongly cupped (Fig. 28). They are covered by a membrane which is light brown in young quahogs and almost black in older individuals. The ocean quahog can be up to 12 cm long, but the usual size is 8-9 cm.

It is one of our most common shellfish. It usually lives buried in mud and sand so that only the short siphons show on the surface, but can occasionally lie on the bottom. The ocean quahog can be found from the tidal zone and deeper, usually at 5-25 m, but also in considerably deeper water. In this country it has so far only been used for bait since the meat is quite tough, but the nutritional value is as high as in other shellfish and the flavor quite good. In the United States the ocean

quahog has been used ground or chopped for chowder. Freezing or canning trials in Norway have so far not been successful.

Ocean quahogs can be found many places in the same areas as horse mussels, often in large quantities, especially from Vestlandet northward to Troms and Finnmark. On the outside of Tustna in Møre, up to 1500 quahogs per day have been taken with plow and tackle. Many quahogs have also been dug on the northwest side of Averøy and on the east and north sides of Smöla. Other good beds are located in Vattlestrømmen south of Bergen, in fjords in Lofoten and Vesterålen, around Bjarkøy in Andfjorden and at Söröya in Finnmark. Otherwise refer to the list below:

- Sk 21: Vattlestrømmen, Tyssøy,
- Sk 23: Rong, Misje,
- Sk 24: Risnes,
- Sk 212: Kvammen in Sunnfjord,
- Sk 251: Båroy, Husøy,
- Sk 35: Vevang, Averöya, north side
- Sk 36: Tustna, outside, Smöla, east side
- Sk 38: Hemnskjell,
- Sk 220: Ansnes,
- Sk 40: Smöla, north side, Nordvikja,
- Sk 41: Nordfröya, Mausundvaer, Vadsöysund,
- Sk 42: Gjesingen,
- Sk 44: Froøyene,
- Sk 45: Jössund,
- Sk 57: Skålvaer,
- Sk 65: Våg in Steigen,
- Sk 69: Toppsundet,
- Sk 70: Röst, between islands,
- Sk 72: Reine, Kirkefjord,
- Sk 74: Steinsfjorden,

- Sk 75: Laukvik,
- Sk 76: Sortland, Jennestad,
- Sk 79-80: Bjarkøy,
- Sk 81-82: Bleik,
- Sk 85: Senja, Straumsnes, Hamm,
- Sk 87: Tromsødistriktet,
- Sk 90: Kvaenangen,
- Sk 99: Gåshopen, outside the inlet, around Sörøya,
- Sk 110: Inner Tanafjord.

The following species of shellfish have not been surveyed but they occur in various areas along the coast according to available reports. They are all edible and tasty, but are either too few in numbers or too difficult to gather in large enough quantities with the usual harvesting gear.

"Nest Shell," *Mantellum hians* (Gmelin)

The shells are white, up to 3 cm, elongated with radial ribs and are gaping at both ends (Fig. 29). The mantle is orange red with tentacles that protrude way outside the shell. *Mantellum* builds a kind of nest of grains of sand and similar material which is stuck together to a large lump with the animal in the middle. It is common on sandy bottom and hard bottom in Norwegian waters and can, for instance, be found in sounds and bays in the Bergen area, Hardangerfjord and near Hestholmene in Bømlafjord. *Mantellum* has a flavor similar to shrimp.

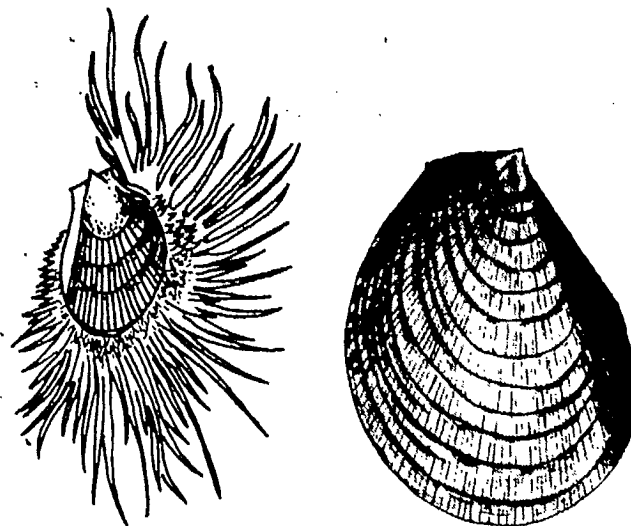


Fig. 29. "Nest shell," *Mantellum hians*. The shell is 3 cm across (left).
"Lima shell," *Acesta excavata*, 15 cm (right).

"Lima Shell", *Acesta excavata* (Fabr.)

The shape of the shell is similar to *Mantellum* (Fig. 29) but is much bigger, usually 15-17 cm and can be up to 20-25 cm. It seldom lives in shallower water than 100 m, most often deeper. It is often fastened to steep underwater mountain sides, for instance on the sides of several of our deep fjords: in the Hardangerfjord near Jonanes and Straumastein, at Kvitsoy, in Osterfjord and in Herdlafjord. In the Trondheimsfjord they can be quite numerous in some areas, for instance outside Gjeitenesset and in Skarnsundet. *Acesta* are also found on Traena Bank (66°09'N, 10°15'E) together with corals ("sea trees"), and shrimp fishermen in Lofoten and Vesterålen have found them in their catch. *Acesta* is a good edible shellfish and can possibly become an exclusive delicacy.

"Gold Shell", *Venerupis pullastra* (Montagu), *V. decussatus* (L.),
V. edulis (Chemnitz), *V. aureus* (Gmelin).

One of these species (*V. aureus*) (Fig. 30) has been given the name "gold shell." The shape of the shell is somewhat similar to the soft shelled clam. The shells are thick, elongated, up to 7 cm long with concentric stripes. The color is grayish white or yellowish white, often with red spots and bands that form zig-zag shaped patterns. The foot is strong and has a byssus gland. The other *Venerupis* species all resemble *V. aureus* but are more elongated. Since all the species live buried, often under the lowest low tide level and no special explorations have been made for them, it is possible that they are more common than earlier assumed. These are species that were very plentiful in Scandinavia about 6-7000 years ago and were eaten in large quantities by people in those days. The archeologists have named this period after these shells (Tapes period). There are not many left today but the species can be found in the intertidal zone and in shallow water in Vestlandet.

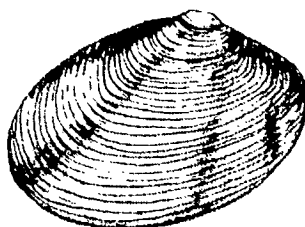


Fig. 30. "Gold shell," *Venerupis aureus*, 5 cm.

Hydraulic harvesters where the sand is washed off with a jet of water and the shells screened out (as recommended for soft shelled clams) must be used in order to obtain a reliable picture of distribution and quantities.

Razor Clam, *Ensis* sp. (L.).

There are seven species of *Ensis* in European waters according to Van Urk (1964) and of these at least three in Norwegian waters, namely *E. siliqua* (L.), *E. minor* (Chenu), and *E. arcuatus* (Jeffreys). The shells are elongated like a knife blade, slightly curved and covered with a brownish membrane (Fig. 31). The foot is strong and can be



Fig. 31. Razor clam, *Ensis* sp., 13 cm.

extended quite far. Razor clams can be up to 21 cm long. They are found along the whole Norwegian coast, and are buried in sand or mixed mud from the lowest low water mark to 30 m depth or more, most often in 6-10 m depth. The clams are found in a vertical position in the bottom with the front end downwards; the other end barely shows, and they can dig themselves deeper if disturbed.

Empty shells of the razor clams are often found on the bottom in relatively shallow water. Live shells are difficult to spot but are revealed by small rectangular openings in the bottom. Live razor clams have been found for instance in Bildöstrømmen and Vattlestrømmen outside Bergen, at Mongstad, Fensfjorden and in Moldefjord at Stad. Razor clams are very good food clams. Larger clams are a little tough and are most suitable when chopped. They are eaten in southern countries under the name sea asparagus.

Edible Marine Gastropods.

No surveys of edible gastropods have been carried out, but we probably have quite large stocks of three species that are used extensively for food abroad: common periwinkle, *Littorina littorea* L., common Northern (edible or waved) whelk, *Buccinum undatum* L., and a type of limpet, *Patella vulgata* L.

The common periwinkle, *Littorina littorea* L., (Fig. 32) is conical with 7-8 spiral cords and pointed top up to 3 1/2 cm high.



Fig. 32. Periwinkle, *Littorina littorea*, 3 cm (left), common Northern waved whelk, *Buccinum undatum*, 5 cm (middle), limpet var. ("elbow shell"), *Patella vulgata*, height 4 cm (right).

The color varies somewhat, most often gray-black with darker stripes. The periwinkle is common all along the Norwegian coast from the tidal zone to 15 m. It tolerates brackish water well and can survive out of water for some time without ill effects. In many places periwinkles gather in dense clumps in the upper end of the intertidal zone (for instance in Duseviken near Stavanger).

Periwinkles are commonly used as food or snacks, for instance in Great Britain and France.

The whelk, *Buccinum undatum* (L.) (Fig. 32) has spiral cords, yellowish-white color, but is often overgrown with algae or organisms so that it appears darker. The foot is large and muscular. The whelk cannot tolerate being out of water and is mostly found in somewhat deeper water but can occasionally move up to the tidal zone. There are considerable quantities of whelks in Norwegian waters, according to available reports, and they often go in traps and eat the bait off longlines set on the bottom.

In Great Britain the fishery for whelks yielded 1.6 million kg in 1965 with a landed value of 1.2 million kroner (ca. \$200,000). They are fished with traps (pots) baited with fish, crushed shellfish or crabs both close to shore and up to 18 naut. miles from the coast by boats up to 50 feet. Belgia, Holland and Germany fish whelks to a smaller extent.

In England the whelks are usually cooked as soon as they are brought ashore in net bags that hold ca. 16-17 kg. The bags are dropped in boiling seawater and cooked for 5-12 min. from the time the water boils again. They are then cooled in baskets and again packed in bags. The whelks are occasionally removed from the shell before being transported or placed in refrigerated storage.

In France the whelks are used in soups or eaten cooked in vinegar.

Limpet ("elbow shell"), *Patella vulgata* L. (Fig. 32). The shell is conical, grey or yellowish-white with round or elongated opening, occasionally with radial stripes, and can be up to 6 cm high. The limpet is fastened to rocks with the help of a suction cup. They can be found

everywhere along the coast where the water is sufficiently salty but not far into the fjords. They usually live in such shallow water that they are dry at low tide. In southern countries, *Patella* is eaten to a certain extent and suitable products could probably be obtained by proper treatment.

We would here like to thank all those who have contributed information (among others, officers and crew on the research vessels "Peder Rønnestad," "G.M. Dannevig," "Gunnar Knudsen," "Asterias," and "Harry Borthen").

Special thanks are extended to scientists and others who have worked as frogmen, amanuensis P. Svendsen, cand. mag. S. Bakke, curator E. Brun and engineer S. Sivertsen, and also to laboratory assistant K. Hansen, who has participated in many of the cruises and has drawn pictures of shells, and Mrs. A. Nödtvedt for map drawing and typing.

SUMMARY

1. The report deals with the distribution of bivalve molluscs of commercial value in Norwegian coastal waters. It is based on investigations during cruises, questionnaires, personal information from fishermen and others, and on literature data, and is mainly intended as a guide in the shellfish industry.
2. The common mussel, *Mytilus edulis* (L.), is found along most of the coast, major beds being located in sheltered waters in the Oslofjord and along the coast between Stavanger and Ålesund. Farther northwards extensive beds get more and more scarce; dense populations are often only found on piers of wooden construction, the lower poles of which may be covered with mussels.

3. The horse mussel, *Modiolus modiolus* (L.), is apparently more abundant than the common mussel, but more difficult to locate, because it lives in deeper water. It was previously used quite extensively as bait. Major populations are not found along the eastern and southern shores. The southernmost beds fished commercially are located in fjords in the Stavanger area. The Bergen district has been of great importance for nearly a hundred years. Extensive beds are found in coastal waters all the way northwards to Northcape and even farther eastwards, but the fishery has mainly been limited to sheltered sounds and the inner parts of the fjords.
4. The scallop, *Pecten maximus* (L.), is of little importance commercially, mainly because the bottom conditions are generally very unfavourable for dredging. The species seems however to be common in some fjords on the west coast, as a fair number of scallops have been collected by aqualung divers, especially in the Bergen—Kristiansund area. The distribution is very patchy, areas with 1—2 specimens per square metre alternating with long stretches void of scallops.
5. The Iceland or arctic scallop, *Chlamys islandica* (L.) is found in Northern Norway in fjords with cold bottom water. Beds of commercial importance are located e.g. near Tromsø and in the Inner Porsanger Fjord. Densities may reach 60 scallops per m², while nearby spots are void of scallops because of an intense predation by starfish.
6. The soft shell clam, *Mya arenaria* (L.), is found all along the coast, but only in few places in commercial quantities. The largest beds are located in some fjords on the west coast on beaches with clay deposits of glacial origin. Other beaches with sand or shelly sand have only small patches of clams. The maximum density is usually 5—25 m², more seldom 100 or more.
7. The cockle, *Cerastoderma edule* (L.), is also common but nowhere with beds of any size.
8. The ocean or mahogany quahog, *Arctica islandica* (L.), is very common on the west coast and northwards to Finnmark in depths of 5—25 m or more. It has been fished commercially for bait.
9. Other edible bivalves, e.g. *Mantellum hians*, *Acosta excavata*, *Ensis* sp. and various species of *Venerupis* (*Lapes*), occur in moderate quantities but are not taken commercially.
10. Of marine gastropods, *Littorina littorea*, *Buccinum undatum*, and *Patella vulgata* are probably sufficiently abundant to support a fishery on a small scale.

Literature

LITTERATUR

- BJERKAN, P. 1910. Om Blaaskjæl og Blaaskjælavl. *Norsk Fisk Tid* 29: 383—385, 419—428.
- 1911. Forsøgsfiske efter Oskjæl i Stroget Flekkefjord—Stavanger. *Norsk Fisk Tid* 30: 342—350.
- BÖHLE, B. 1965. Undersøkelser av blåskjell (*Mytilus edulis*) i Oslofjorden. *Fiskets Gang* 51: 388—394.
- ERIKSEN, O. og LILLESKARE, J. 1903. Nye Skjælbanker. *Norsk Fisk Tid* 22: 407—411.
- LARSEN, S. 1965. Rapport for M/S «Bambi» R—24—SL vedr. skjellgravning i Rogaland og Hordaland. Rapport til Fiskeridirektøren: 1—4 [maskinskr.]
- URDAHL, A. O. 1913. Om forekomstene av orskjæl og skjælfisket i Trondhjemsfjorden. *Norsk Fisk Tid* 32: 312—315.
- VAN URK, R. M. 1964. The genus *Ensis* in Europe. *Basteria* 28 (1—2): 13—44.
- WIBORG, K. F. 1946. Undersøkelser over oskjellet (*Modiola modiolus* (L.)). Alminnelig biologi, vekst og økonomisk betydning. *FiskDir. Skr. Ser. HavUnders.* 8 (5): 1—85.
- 1962. Haneskjellet (*Chlamys islandica* (O. E. Müller)) og dets utbredelse i noen nordnorske fjorder. *Fiskets Gang* 48: 161—164.
- Bjerkan, P. 1910. On mussels and mussel cultivation. *Norsk Fisk Tid* 29: 383-385, 419-428.
- 1911. Experimental fishing for horse mussels in the area Flekkefjord-Stavanger. *Norsk Fisk Tid* 30:342-350.
- Böhle, B. 1965. Studies on mussels (*Mytilus edulis*) in the Oslofjord. *Fiskets Gang* 51: 388-394.
- Eriksen, O. and Lilleskare, J. 1903. New shellfish beds. *Norsk Fisk Tid* 22: 407-411.
- Larsen, S. 1965. Report for M/S "Bambi" R-24-SL regarding shellfish digging in Rogaland and Hordaland. Report to the Director of Fisheries: 1-4 (typed).
- Urdahl, A.O. 1913. On the stocks of horse mussel and the shellfish fishery in the Trondhjemsfjord. *Norsk Fisk Tid* 32: 312-315.
- Van Urk, R.M. 1964. The genus *Ensis* in Europe. *Basteria* 28 (1-2): 13-44.
- Wiborg, K.F. 1946. Studies on the horse mussel (*Modiola modiolus* L.)) common biology, growth and economic importance. *Fisk Dir. Skr. Ser. Havunders* 8(5): 1-85.

Wiborg, K.F. 1962. The Iceland scallop (*Chlamys islandica* (O.E. Muller)) and its distribution in some Northern Norway fjords. *Fiskets Gang* 48: 161-164.

.....

Areas with concentrations of mussels in Norwegian coastal waters arranged geographically according to coastal charts.
Larger beds are in italics.

*Steder med forekomster av blåskjell i norske kystfarvann, ordnet geografisk etter sjøkartene.
Storre felter er kursivert.*

- Sk 4: *Oslo havn, Konglungen, Haslum, Nordstrand—Nesoddtangen, Nærnes.*
- Sk 3: *Torøy, Furuholmen, Småskjær, Haraldstangen, Ertvikskjær, Ramvikholmen, Bjerkoy skjærene, Langøya, Ramsholmen, Steinkloss, Langeskjær, Bjerkoy, Aroysund, Mel-somvik.*
- Sk 5: Langangsfjorden: Kultene, Bukkoy, Morefjorden.
- Sk 6: Jomfruland, innsiden, og mellom øyene innenfor. *Skarholmen.* Jomfruland, inside and between the islands inside.
Herøyfjorden: *Saltvæven, Soppekilen.*
Sondeledfjorden: *Oymoen, Blesviken.*
Sandnesfjorden: *Sønningsdalen, Laget.*
- Sk 7: Nipekilen, Dybvåg, Snarsund, *Borøyvågen,* Kvastadkilen, Ulevåg, *Veskilen, Salterodstrømmen, Hovekilen.*
- Sk 8: Vigkilen, innenfor Strandfjord Vågsnes i Vigkilen, inside Strandfjord...
Norholmskilen, Kalvellfjorden.
- Sk 9: Isefjellfjorden: Brosund, Kjøstveitkilen.
Toppdalsfjorden: *Strømmen, Selskjærene.*
- Sk 10: Trysfjord, Hølen, Langeneskilen, Hartmarkpollen, Skjeipstadfjorden, Grønsfjorden, Flatstadbukten (*Flekkfjord*).
- Sk 11: Strømmen, Farsund kaien, *Oen* (Heiastranden), Lysgdalsfjord, Drangsfjord.
- Sk 12: Regelørd, Sveigeholmene, Pollen vest for The bay west of Lista.
Lista.
- Sk 13: Løgrepollen.
- Sk 14: Gaunsfjorden: *Bogansbukten, Ytre Ardalsfjord, Sørskår, Kværholmene, Ersvik.*

- Sk 15: Jøsenfjorden: *Bårberg*. Tyssefjorden: *Tyssebotn*. *Bogsund*. *Jelsa kai*. *Madlastovågen*. *Økstrafjorden*. Sandsfjorden: (Straumbergneset). Hylsfjorden. Nedstrand: *Leirangssøyla*, *Hindrevåg*. *Skjoldsfjorden*. *Skjoldastrømmen*. Jelsa wharf.
- Sk 17: Førlandsfjorden: *Strømmen*, *Haugevågen* (Torvastad).
- Sk 19: *Viksefjorden innerst*. Ålfjord: *Kvalvåg*, *Uågavåg*, *Ervesvåg*, *Haraldseidvåg*, *Fordespollen*. *Bømlo*: *Tjongspollen*, *Røyksundkanalen*, *Kulseidkanalen*, *Strømfjorden*, *Øklandsvåg*, *Innværffjorden*, *Stangevåg*. *Stord*: *Sagvåg*, *Dåfjorden*, *Hellandsfjorden*. Viksefjord, inner part.
- Sk 20: Ølen. *Hillestadvågen*. *Bløkkeberholmen*. *Sunde kai*.
- Sk 117—118: Hardangerfjorden generelt. *Mundheim*, *Rosendal*, *Kalvasund*, *Uskedalen*, *Nordheim-sund*, *Framnes kai*, *Herlandsholmene*, *Bruvikneset*.
- Sk 22: Samnangerfjorden: *Borøysund*, *Nymark*.
- Sk 21: *Heiamarkpollen*. *Strøno*—*Halgjem*. *Fjellspollen nord*. *Bildøystømmen*. *Arefjordpollen*. *Grimseidpollen*. *Kviturvikpollen*. *Nordåsvannet*, sørlige og ytre deler. Nordåsvannet, southern and outer parts.
- Sk 23: *Byfjordens vestre del*: *Kvarven*—*Drotningvik*. Western part of Byfjord
- Sk 119: Nordlige del av *Breidvik*—*Eidsvågsnes*, *Eidsvågen*, *Tertnesvågen*, *Ervik*. *Askøy*: *Strømsnesholmene*, *Berlandsundet*, *Fauskangerpollen*, *Hustrevik*, *Kråkåsvåg*, *Juvik*, *Tveitevågen*, *Kolavåg*. *Lindåsbassenget*. Lindås basin.
- Fensfjorden innerst*: *Austfjorden*, *Vågane*, *Æsvåg*, *Eidsfjord*: *Rossnesvåg*.
- Sk 119: *Arnavågen*, *Hjelmåsvåg*, *Lonevåg*.
- Sk 24: *Masfjorden*: *Matre*, *Hope*. *Skjellsund*. *Risnes*. *Eivindvik*—*Gulafjorden*. *Gulafjorden*. *Midttun*, innløpet til *pollen*. *Nordgulvåg*. *Eidsfjorden*. *Austgulfjorden* til og med *Hantveitholmene*. *Midttun*, inlet to pond. *Austgulfjord* up to and including *Hantveitholmene*.
- Sk 251: *Leinvik*. *Ikjefjorden innerst*. (Fuglesetfjorden. yngel på redskap). *Østerbøvatn*, *innløpet*. *Finnafjord*—*Sognefjord* (skjellbren). Inner part of *Ikjefjord*. (Fuglesetfjord, mussel spat on equipment). *Østerbøvatn*, inlet
- Sk 252: *Arnafjord*. *Indrefjord*. *Kvamsøy*. *Balestrand kai*. *Hella kai*. *Esefjorden*. *Utlefjord kai*. *Sogndal*, *brokarrene*. *Fimreite* (yngel). *Kaupanger kai*. *Saltskjellneset*. *kai* = wharf. *Sogndal*, bridge supports. *Fimreite* (spat)

- Sk 124: *Gudvangen*, tvers av kaien, 2 m under lavvann.
 Gudvangen, across the wharf, 2 m under low water line.
- Sk 25: Hagefjord: Innenfor Gylta, Hagen. Skifjorden, smale delen.
 Skifjord, narrow part.
- Sk 212: Dalsfjorden: *Uårdal kai*. Vefringfjorden: Vefring, Redalsgrend.
 Førdefjorden: *Førde kai*. *Erdal kai*, *Naustdal*.
 Høydalsfjord, Osstruben, Ekefjorden: ved kirken, Pollen.
 Ekefjord: near church
 Norddalsfjord: *Haukå*, *Vikene*, utløpet av Norddalselven.
 Vikene, outlet of Norddals River
- Sk 27: Midtgulen: under anleggskai og i små elveutløp.
 Vindspollen innerst. Midtgulen—*Nordgulen*.
 Berlepollen.
 Midtgulen: under construction wharf and in small river outlets.
- Sk 30: Sandsøy, dyrkningsmuligheter.
 Sandsøy, possibilities for cultivation.
- Sk 213: Ålfotenfjorden: Ålfoten, Ålfoten løkt, Askevik. *Hyenfjorden*. Gloppefjorden, Sandane.
- Sk 29: Skavøypollen. Sørpollen.
- Sk 213: Voldafjorden. Austfjorden: Førde, Hundenes, Årsetodden, Kilspollen, Ørstenfjorden kai.
- Sk 216: Hareide. Borgundfjorden, Ellingsøyfjorden, Stavsetfjorden, Skodjeviken, Grytefjorden, Tenfjorden, Eidsviken, Samsfjorden, Vestrefjorden, Vatnefjorden.
- Sk 217, 33: Rakvåg. Flatevågen. Isfjorden: *Åndalsnes kai*. Malmefjorden.
- Sk 219, 35: Sandblåstvågen, Kvisvik. Kristviken: *Strømsvågen* (nedlagt østerspoll).
 Foldfjorden.
 Strømsvågen (abandoned oyster pond).
- Sk 36: Vestsmøla: *Hopen* (Hjelberg).
- Sk 38: Åstfjorden, Verrafjorden, Stavøy, Hopen.
- Sk 220: *Rissa*. Åsfjorden: Hoplevågen.
- Sk 221: *Uerrabotn*, Venneshavn, Leinesvågen, Galgsøya, Naustvoll, Borgenfjorden.
 Levanger: *Eidsbotn*.
- Sk 39: Hitra: Barmfjorden. Fjeldværøy: Vågen.
- Sk 43: Jøssund: Balfjord.
- Sk 44: Åfjorden: Monstad kai.
- Sk 45: Bratjærfjorden. Osen.
- Sk 47: Bangsund kai.
- Sk 48: Sørråsa, Risø/Ramsvik. Rørvik kai.
 Nordsalten: Fjærbotn.
- Sk 51: Horsfjordbotnet. Årsandøy kai.

- Sk 53: Berg kai.
 Sk 55: Vistenfjorden: *Aursletten* og andre elve-
 utløp, *Visten kai*. Aursletten and other river outlets. p.159
 Sk 57: Sandnessjøen kai.
 Sk 60: Ranenfjorden: *Nauthaugen kai*.
 Sk 65: Skjerstadvfjorden: *Kodvåg*.
 Sk 69: Øksfjorden, innerst. innerst = inner part
 Sk 73: *Erikstadvfjorden*, innløpet.
 Sk 73/75: *Alstadpollen*, innerst. *Uatnfjorden*.
 Sk 76: Eidsfjorden: *Skagen kai*.
 Sk 90: *Kjækan kai*, *Jøkelfjord kai*. *Tverrfjord*.
 Sk 99: *Gåshopen*.
 Repparfjord, fjærer og kaier.
 SR294: *Syltefjord*.
 Sk115: *Langfjord*.

*Steder med forekomster av oskjell langs norskekysten
 ordnet geografisk etter sjøkartene.*

Østlandet

- Sk 4: *Sydspissen av Furuholmen*, «*Båtmannskaret*». Southern tip of Furuholmen
 Sk 3: *Hortensområdet*, ved *Apenes*.
 Sk 6: *Innsiden av Jomfruland*, og vest av *Strå-*
holmen. Inside Jomfruland and west of Stråholmen.

Rogaland

- Sk 13: *Egerøysundet*, fra *Nysundet* til *Asperøy*.
Egersundet, nordlige del, *Midbøvågen*. Vest-
 siden av *Vesterøy*.
 Sk 16: *Hafrsfjord* til *Prestaskjær*, *Haga* og *Hagøy*.
Sømsøyene. *Kvitings-* og *Gauselholmene*.
Sundalandsstrømmen på *V. Bokn*.
 Sk205: *Lysefjorden* fra *Vik* og innover, rundt *Bergs-*
holmen og på begge sider av fjorden ut mot
 . *Forsand*.
 Jøsenfjorden.
 Sk 15: *Sandsfjorden*: ved *Sand*, *Ropeide*, *Otøya*,
Marvik. *Hylsfjorden*: ved *Vanvik* og på
 begge sider innover fjorden. *Hylsfjord*: at Vanvik and on both sides of the
 fjord further in.
 Sk 17: *Karmsundet*: Ved *Selen*, *Bjørnsholmen*, *Stut-*
øy, *buktene* innenfor *Stutøy* og sør for *Ny-*
gård.
 Viksefjord, ytre del. *Stutøy*, the bays inside *Stutøy* and south of *Nygård*
 Mylstrevåg. *Viksefjord*, outer part.

Hordaland

- Sk 19: Ved *Rutsoy*, fra *Skatemulen* innover *Grind-*
heimsvågen. *Hellandstrømmen*.
 Sk118: *Hardangerfjorden*: *Varaldsoy*, *Osafjorden*:
Bagnsvikene, *Bangsnes*, *Brunnen*, *Bruravik*.
Bu, *Furebergnes*, *Hellebergstrand*, *Hjeltnes*.
Nesheimhamrane, *Raudestein*.
 Eidfjorden
 Sorfjorden

- Sk 21: Bjørøygavlen, Bjørøyholmen, Katleflu, Lekstranes. Steinsundholmene. Vetlestrømmen. Vonfluen.
- Sk 23: Askøy: Askehavn, Det Naue, Florvåg, Frommereid, Hanøy, Hauglandsosen, Hauglandsøy, Hjelteskjær, Horsøy, Kolavåg, Skjersholmen, Småveren, Straumsnesholmene, Tveitevåg, Vardøy, Ådlandsvik. Radøy—Lindås: Alverstrømmen, Bakkastrømmen, Bruknappen, Grunnasundet, Grunnstrømmen, Fosnesstrømmen, Lindåsbassenget, Nordangervåg, Radøysundet, Spjøtøystømmen.
- Sk 119: Osterfjorden—Sørfjorden: Askenes, Bernestangen, Breistein, Drangøy, Eide, Eidsfjord, Elvik, Fjeldskålnes, Fossen, Fyllingsnes, Gammersvik, Gjetremsholmene, Haukøy, Heimvik, Hellenes, Hjelmås, Hoshovde, Hylkje, Kallestadsundet, Kalandsfluen, Klepsvåg, Klubben, Kvamsholmen, Kvastadnes, Kvitstein, Lonevågen, Mofjorden, Molvik, Radøy, Raknesholmene, Rossavika, Salhus, Sandal, Sollien, Stamnes, Stavenes, Stokkenes, Svenheimsholmene, Teisteberget, Trolsviken, Ulfsnesøy, Vaksdal, Vasloen, Åsneset.

Sogn og Fjordane

- Sk 24: Byrknesøyområdet, Risnes innenfor broen. Solund. Steinsund.
- Sk 251: Sognefjorden, ytre del: Koldingsnes, Kyrkjebø, Lifjorden, Måren.
- Sk 252: Sognefjorden, indre del: Amla, Balestrand, Eitorn, Feios, Frønningen, Gullbergnes, Hanavik, Kvamsøy, Leikanger, Slinde, Stokkebø, Tingastad, Vangsnes, Vik.
Sidefjordene: Sogndalsfjord: Fardal, Norum, Sogndal, Vinesholmene. Grunner i utløpet av fjorden.
Aurlandsfjord: Undredal. Nærøyfjord: Holmagrunnen, Otnesviken, Stolsgrunnen. Lærdalsfjord. Ardalsfjord. Lysterfjord. Arna-fjord: Indrefjord. Fjærlandsfjord: Fjærland.
- Sk 212: Flekkefjordens munning.
- Sk 27: Midtgulen: innerst, utfor elveutløpet. Vindspollen. Berlepollen. Fordepollen, indre del. Straumshamn.
- Sk 213: Hvenfjorden: Holme (dypt vann) utfor Marså.
- Sk 29: Skavøypollen. Moldefjord.

Risnes, inside the bridge.

Shallows near the outlet of the fjord.

The mouth of Flekkefjord.

Midtgulen: inside, outside the river mouth.

Holme (deep water) outside Marså

Møre og Romsdal

- Sk 215: Geirangerfjorden.
- Sk 216: Norvasundet. Ellingsøvfjorden

- Sk217: (33). Tresfjorden ytterst: Flatevågen. Otterøya, Rakvåg, ved utløpet av pollen. Near the outlet of the pond.
- Sk 35: Flatssetsundet ved Flatsetøy. Hjertvik ved Kårvåg. Averøya, nordvestsiden. Ekkilsøysundet. Sandsfjorden.
- Sk 219, 36 og 40: Ved Aspøya, Sundalsfjorden innersi: Bøfjorden, Hammesfjorden, Surendalstjorden, Skålvikfjorden, Skjellsundet, (Kråksundet) på Tustern, Valsøyfjorden. Smøla: Anskottet, Båtmannsholmen, Bomuldskjær, Daumannsholmen, Drabolten, Eindraget, Elungøy, Flatøy, Fugloy, Gardsøy, Grønskjær, Havreøy, Henningsholmene, Hestøy, Høy, Jøen (nordsiden), Kalandsundene, Kalvøy, Kalvøysundet, Karifluene, Karlsholm, Klakkastrømmene, Klakkavågen, Krabholmen, Kråkvær, Kvaløy—Råkholmen, Kvenholmen, Kvistvågstrømmen, Langlåten, Leikua, Leirvikstrømmen, Lillestrømmen, Lyngholmene vest, Masterholm, Monsøy vest, Monsøysvæet, Måsdraget, Odderøy, Okseklakken, Rangstrømmen, Ringsøy, Sandskjær, Sengsdraget, Skarvholmen, Skjølbergvågen øvre, Skjellskjærene, Skrubbholmen øst, Steinsvær, Storstrømmen, Strømmene, Svanøy vest, Svelungøy, Svetangen vest, Tjernøy, Tranøy øst, mellom Store og Lille Tranøy, Trollskjær nord, Ullmyrholmen.
- Sk 39, 41: Sørfrøya: Flatvalsundet, Mausundvær. Vadsøysund. Nordfrøya: Froan.
- Sk 38: Hevnefjorden. Åstfjorden. Imsterfjorden, ved Hemskejel.
- Sk220: Trondheimsfjorden ytre: Byneset—Trolla, Billedholmen, Ekne, Finsvik, Furuholmen, Gjertnes, Hasselvik, Holmberget, Hommelvik, Hosøy, Langstein, Orkdalsøy, Rissa, Røberg, Saltøy, Skarnholmen, Stjørdalsfjorden, Storholmen, Vevangfluene, Åsfjord, Åsholmen.
- Sk221: Trondheimsfjorden indre: Folladalen, Frøset, Hestøy, Hustad, Høy, indre og ytre, Innerøylandet, Lensvika, Letnesskjærene, Låtra nordsiden, Malme, Rambergholmen, Saltvikhamn, Sjømyrgrunnen, Skjevikkbukten, Vaggen, Venes.
- Sk 43: Eliasskjær, Garten, Tyvholmen. Storfosna: Beian, Lyngholmråsa, Fitholmen, Nordlandsneset, Sandholmene, Maltsekken, Kråkongen. Skjørnfjorden: Sørfjorden: Bessholmene, Grønnskjærene, Grønnskjærflua, Grønnskjærgrunnen, Harøya, Hulsund, Karvik-

grunnen, Kråkholmen, Kråkholinfluene, Sagøy, Sandøy, Steilesteinene.

Skjörnfjorden nordre del: Fluier og grunner utover til Østråt.

Skjörnfjorden sørlige del: Fevåg, Frengsbukten.

Bjugnfjorden: Bjugnskjærene, Hellemskjærene, Lysbotnflua, Uthaug.

Sk 44: Froøyane: Nordbuan, Sauøy, Stokkøy—Tarva—Storfosna.

Sk 45: Jössund, generelt.

Sk 46: Flatanger, generelt.

Sk 48: Ved Rørvik: Flerøy, Haugøy, Kirkesundet, Kjerringholmen, Lund—Kråkøysund, Lundringsviken, Markedsundet, Marøya, Nordøy, Nærøysandvik, Nærøstrand, Steinsøy, Svinøy, Tveitøy.

Sk 224: Foldereidfjorden: Fra Kvalbakskjæret til Lassemo. Middagsviken, Fjærstrømmen, Ramfjordstrømmen, Remmastrømmen.

Sk 51: Simlebotnet, Kollstraumen.

Nordland

Sk 55: Indre Visten, sundet innenfor Kvalvågen, Sandvær.

Sk 56: Alstahaugøyene, Brødholmen, Finland, Gåsholmen, Gåsvær, Jyllingene, Kyrhaug, Kjerholmen, Kvenholmen, Langøy, Lånan, Rosøy, Skjerjegård, Skotsvær, Steinsvær, Sørvær, Tjøttaøyene, Ytre Tjøtta, Herøy. Søla utenfor Vega.

Söla outside Vega.

Sk 57: Leirfjord, langs alle kyster og grunner.

Sk 59: Dønnes, Lurøy, Nesna, Nordvik, generelt.

Sk 60: Ranenfjorden: Utskarpen.

Sk 62: Lurøy, generelt.

Sk 63: Meløy, generelt.

Sk 64: Gildeskål, generelt.

Sk 65: Bodø, Skjerstad og Sørfold, generelt. Åselistrømmen.

Sk 66: Leiranger (Leines), generelt.

Sk 67: Innerst i Skottsfjorden. Ved Nordskott.

Sk 68: Steigen, Hamarøy generelt. Kaldvågen.

Sk 230: Skjomen. Efjorden. Ankenes generelt.

Sk 69: Ingelsfjord og Lonkanfjord i Raftsund. Øksfjorden i Lofoten.

Sk 73: Vågan, Svolvær, generelt.

Sk 76: Hadsel, Øksnes, Bjørnskinn, generelt.

Sk 78: Malnesfjorden, Skarvågen.

Sk 77: Tjeldsund, Ramsund.

Troms

Sk 77: Innløpet til Gratangsbotn.

Sk 79: Elgsnes, Grøtavær, Kvæfjord, Sundsvoll-sundet.

Northern part of Skjörnfjord: shallows and rocks out to Østråt.

Skjörnfjord, southern part

Leirfjord, along all coasts and shallows.

- Sk 80: Engenes sørsiden, Tømmervik. Sagfjorden.
 Sk 82: Selfjorden.
 Sk 84: Lenvik, Malangen, generelt. Tennskjær.
 Sk 85: Berg, generelt. Hamn i Senja.
 Sk 87: Tromsø, Tromsøysund, generelt.
 Sk 89: Burøysund.
 Sk 90: Kvænangen, særlig i innløpene til ytre og indre Kvænangen.
 Tverrfjord.

p.161

Kvaenangen, especially in the inlets to outer and inner Kvaenangen.

Finnmark

- Sk 99: Malangskjeften—Hekkingen, Sommarøy og nordover, holmer og skjær. Gåshopen.
 Sk 110: Indre Tanafjord. Innløpet til Kongsfjord.
 Sk 115: Bussesundet. Vardø. Varangerfjorden, innerst.

Sommarøy and northwards, small islands and rocks.

Steder med forekomster av sandskjell langs norskekysten ordnet geografisk etter sjøkartene.

Areas with concentrations of soft shell clams along the Norwegian Coast arranged geographically according to the coastal charts.

Større forekomster er kursivert.

Greater concentrations in italics.

- Sk 4: Utløpet av Åroselven, under laveste lavvann.
 Sk 3: Storskjær.
 Før i tiden sandskjell i Son.
 Utsiden av Jeløya fra en meters dyp og nedover, 10/m², store.
 Eløya, (Larkollen) fra en meters dyp og nedover, 5/m².
 Taralden (Kurerfjorden). Enkeltvis på sørvestsiden.
 Sk 5: Langesundsfjorden, innenfor Björköholmen, opptil 3 000/m² i 1964, men små, 20—40 mm. Rapporter om skjell på nordøstsiden av Mølen og i Krokshavn ved Langesund.
 Sk 6: Kragerøområdet: Kjøbmannsfjorden og en bukt ved Kjerringholmen.
 Nordsiden av Risør. Løkvik i Sandnesfjorden.
 Sk 7: Tromøya: Hovekilen, enkeltvis.
 Rundt Flosterøya i små bukter, til dels store skjell.
 Sk 8: Lillesand: rapport om store skjell i tre bukter.
 Minimale forekomster mellom Kristiansand S og Bergen.
 Sk 21: Milde, sør for Bergen.

Outlet of Åros River, under lowest low water mark.

Earlier there were soft shell clams in Son. Outside Jeløya from one meter depth and down, 10/m², large.
 Eløya (Larkollen) from 1 m depth and down, 5/m².
 Taralden (Kurerfjorden). Singly on the southwest side.

Langesundsfjord, inside Björköholmen, up to 3000/m² in 1964, but small, 20-40 mm. Reports on clams on the northeast side of Mølen and in Krokshavn near Langesund.

Kragerö area: Kjøbmannsfjorden and a bay near Kjerringholmen.
 North side of Risør.

Hovekilen, singly.
 Around Flosterøya in small bays, partly large clams.

Lillesand: reports on large clams in three bays.

Minimal concentrations between Kristian sand S and Bergen.

Milde, south of Bergen.

- Sk 22: Samnangerfjorden. Rapport om skjell i Eikelandosen. Reports on clams in Eikelandosen.
- Sk 23: Fensfjorden: Ved Rote og Selvåg, enkeltvis. singles
- Sk 24: Masfjorden: Ved Matre, Haugsdal og Balmersvåg, Eivindvik, Eidsbotn.
- Sk 252: Sognefjorden: *Kvamsøy*, utenfor et sagbruk. *Esefjorden*. Opptil 300/m², tørrlagt ved lav fjære. Kvamsøy, outside a sawmill. *Esefjorden*. Up to 300/m², dry at low tide.
- Kaupanger. Utfør elveosen på vestsiden; 10—20, opptil 60/m². Areal: 30 × 100 m. side; Skjell på 65—85 mm. Shell size 65-85 mm.
- Fimreite*: Stor fjære med meget seig leire. 50—100/m², mest 45—70 mm. *Fimreite*: Large intertidal zone with very tough clay.
- Sk 26 (212): Askvoll: Nedenfor kirken fjære med sand og grov grus på ca. 10 000 m². Skjell spredt og i flekker. Størrelse 65—90, opptil 100 mm. Askvoll: Below the church zone with sand and coarse gravel of ca. 10,000 m². Clams scattered and in clumps. Size 65-90, up to 100 mm.
- Sk 213: Flekkefjorden, i buktene. Flekkefjorden, in bays.
- Gloppefjorden: *Sandane*, to fjærer, tilsammen 60—200 × 1 800 m; seig leire. 30 og mer pr. m². Størrelse 250—90 mm. Gloppefjorden: *Sandane*, two intertidal zones, total of 60-200 x 1800 m; touch clay. 30 and more per m². Size 25-90 mm.
- Nordfjordeid, ved elveutløpet. Nordfjordeid, at river outlet.
- Sk 214: Skavøypollen ved Måløy. Enkeltvis i en bukt. Singles in a bay.
- Sk 29: Moldefjord innenfor Stad. Enkeltvis.
- Sk 213: Austfjorden ved Førde. Enkeltvis.
- Sk 30: Sandsøy, ytre havn, enkeltvis.
- Sk 39: Hitra: Leirvåg sør for Fillan, 25/m². Fjeldværøy, innerst i Vågen, 25/m².
- Sk 43: Balfjord innenfor Jössund. Smal stripe av fjæren, ca. 100 m, opptil 250/m². Balfjord inside Jössund. Narrow strip of beach, ca. 100 m, up to 250/m².
- Lysøy, i skjellsand med bløt blåleire under. Lysøy, in shell sand with soft blue clay underneath.
- Sk 45: Bratjaerfjorden innenfor Auneholmen. Grus og blåleire, enkeltvis. Bratjaerfjorden beyond Auneholmen. Gravel and blue clay, singles.
- Osen: Viken, grus og småstein, 20/m².
- Sk 47: Bangsund, fjærene omkring, enkeltvis.
- Sk 51: Åretfjord, i grus med blåleire under. Åretfjord, in gravel with blue clay underneath.
- Sk 224: Vassås, i fin sand. Vassås, in fine sand.
- Sk 53: Vistenfjorden. Enkeltvis i en fjære. Vistenfjorden: singles in intertidal zone.
- Sk 60: Namsenfjorden. Rapporter om skjell, ikke lokalisert. Namsenfjorden. Reports on clams, not localized.
- Sk 65: Bodø: Sandfjærer sør for byen. Bodø: sandy zones south of city.
- Saltfjorden: Valleosen, sand og rød leire. 20—40/m². Saltfjorden: Valleosen, sand and red clay, 20-40/m².
- Godøystrommen: bukter i nærheten. Godøystrommen: bays nearby.
- Skjærstadfjorden: Kodvåg, lite felt, 10/m². Kodvåg, small area, 10/m².
- Sk 73:75: Alstadpollen, innerst i en smal stripe. Alstadpollen, inner part, in a small strip.
- Sk 84: Malangen ytterst, Hillesøy. Gammel rapport om en forekomst av sandskjell som ble nytt til agn. Malangen, outermost part, Hillesøy. Old report on a concentration of soft shell clams that were used for bait.