

FISHERIES RESEARCH BOARD OF CANADA

Translation Series No. 2412

Commerce seaweeds of the Shantarskie Islands'
coastal waters

by O.S. Rybakov

Original title: Promyslovye vodorosli pribrezhnykh vod
Shantarskikh ostrovov

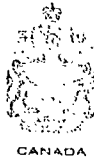
From: Izvestiya Tikhookeanskogo Nauchno-Issledovatel'skogo
Instituta Rybnogo Khozyaistva i Okeanografii (TINRO)
(Proceedings of the Pacific Scientific Research
Institute of Marine Fisheries and Oceanography)
75 : 160-164, 1971.

Translated by the Translation Bureau (NDA)
Foreign Languages Division
Department of the Secretary of State of Canada

Department of the Environment
Fisheries Research Board of Canada
Biological Station
St. John's, Nfld.

1973

13 pages typescript



CANADA

 TRANSLATED FROM - TRADUCTION DE
 Russian INTO - EN English

 AUTHOR - AUTEUR
 O.S. Rybakov

 TITLE IN ENGLISH - TITRE ANGLAIS
 Commercial seaweeds of the
 Shantarskie Islands' coastal waters

 TITLE IN FOREIGN LANGUAGE (TRANSLITERATE FOREIGN CHARACTERS)
 TITRE EN LANGUE ÉTRANGÈRE (TRANSCRIRE EN CARACTÈRES ROMAINS)
 Promyslovye vodorosli pribrezhnykh vod
 Shantarskikh ostrovov

 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.
 "IZVESTIYA". Tikhookeanskii Nauchno-Issledovatel'skii Institut
 Rybnogo Khozyaistva i Okeanografii (TINRO)

 REFERENCE IN ENGLISH - RÉFÉRENCE EN ANGLAIS
 "IZVESTIYA" of TINRO
 (Pacific Fisheries and Oceanographic Research Institute)

PUBLISHER - ÉDITEUR (TINRO)	DATE OF PUBLICATION DATE DE PUBLICATION			PAGE NUMBERS IN ORIGINAL NUMÉROS DES PAGES DANS L'ORIGINAL 160 - 164
	YEAR ANNÉE	VOLUME	ISSUE NO. NUMÉRO	
PLACE OF PUBLICATION LIEU DE PUBLICATION Vladivostok, U.S.S.R.	1971	75	-	NUMBER OF TYPED PAGES NOMBRE DE PAGES DACTYLOGRAPHIÉES 13

REQUESTING DEPARTMENT / MINISTÈRE-CLIENT Environment TRANSLATION BUREAU NO. / NOTRE DOSSIER NO. 143595

BRANCH OR DIVISION / DIRECTION OU DIVISION Biological Station, St John's TRANSLATOR (INITIALS) / TRADUCTEUR (INITIALES) N.Da.

PERSON REQUESTING / DEMANDÉ PAR Dr. Shaw

YOUR NUMBER / VOTRE DOSSIER NO.

DATE OF REQUEST / DATE DE LA DEMANDE Oct. 1, 1972

 UNEDITED TRANSLATION
 For information only
 TRADUCTION NON REVISEE
 Information seulement



CLIENT'S NO. N ^o DU CLIENT	DEPARTMENT MINISTÈRE	DIVISION/BRANCH DIVISION/DIRECTION	CITY VILLE
	Environment	Biological Station	St. John's
BUREAU NO. N ^o DU BUREAU	LANGUAGE LANGUE	TRANSLATOR (INITIALS) TRADUCTEUR (INITIALES)	
143595	Russian	N.Da.	FEB - 4 1973

"Izvestiya" (Communications) of the TINRO (The Pacific
Fisheries and Oceanographic Research Institute)
Vol. 75; Vladivostok, 1971

Board of editors: Kizevetter, I. V. (editor-in chief);
Ayushin, B. N.; Vedenskii, A. P.; Levanidov, I. P.;
Novikov, N. P.; Piskunov; I. A.; Kun, M. S.; Kucheryavenko, E.B.

COMMERCIAL SEaweEDS OF THE
SHANTARSKIE ISLANDS' COASTAL WATERS

UNEDITED TRANSLATION
For information only
By O. S. Rybakov (Sakh-TINRO)
TRADUCTION NON REVISEE
Information seulement

At present, national economy organizations are
seriously considering the utilization of aquatic vegetable
resources by various branches of industry and agriculture.
Exploring benthonic vegetation in the seas of the Soviet
Union, increasing the knowledge of available seaweed re-
sources, and organizing a national seaweed economy have

(160)*

* Numbers in the right-hand margin indicate the corres-
ponding pages in the original.

acquired great importance. This publication deals with the results of explorations concerned with the distribution and evaluation of commercial seaweed resources in the coastal waters of the Shantarskie Islands in August, 1965 and August — September, 1966.

To date, the seaweeds of the Shantarskie Islands were little studied. Only data describing particular districts of these islands are found in the literature. (Zaks, 1929; Zinova, 1930 and 1954). A complete survey of the variety of species, distribution and available resources of commercial seaweeds at the Shantarskie Islands did not exist until now.

In our work we used generally accepted methods. Sampling areas (of 1 square meter) were used to determine the biomass of low density commercial seaweed beds.

The available crop was calculated from the average biomass of seaweeds, the width of the beds, their density and the length of the shore line. During both working periods more than 400 diving stations were used.

The Shantarskie Islands are located in the southwestern part of the Okhotsk Sea, to the north of the Gulf of Akademii and the Gulf of Tugurskii. They consist of four large islands: the Bol'shoi Shantar, Feklistova, Malyi Shantar, Belichii and several other much smaller islands (see the Fig.). The research was carried out only in the coastal waters of the large islands.

The results of the research showed that the distribution of commercial seaweeds in the coastal waters of the Shantarskie Islands was irregular in both respects-- by species and by biomass. Three species were found in commercial quantities near the Shantarskie Islands:

Laminaria gurjanovae A. Zin., L. digitata (Huds.) Lam. and Lessonia laminarioides Post. et Rupr.

Bol'shoi Shantar Island is the largest of the group of Shantarskie Islands. The richest commercial seaweed resources of this island are in Yakshina Bay.

From Cape Filippa, on the southern part of Bol'shoi Shantar Island and not reaching Cape Raduzhnyi, the commercial seaweeds are represented by a single species: L. gurjanovae, disregarding the occurrence of single plants of Lessonia laminarioides and Laminaria digitata. (161)

By its morphological structure, Laminaria gurjanovae belongs to the saccharine group however, it differs from all other species of Laminaria of this group in a number of characteristics. The basic distinction is the dual nature of the lamina of a second year commercial specimen. The lower part of the lamina is shaped like a narrow wedge, rough, with smooth, slightly wavy margins while the upper part is widened, very thin, with a very wavy folded margin. Basically, the sporangia are formed only on the thin part of the blade, most of the thicker part remaining sterile. The habitat of L. gurjanovae is most often the sublittoral zone at 15m in depth and occasionally deeper.

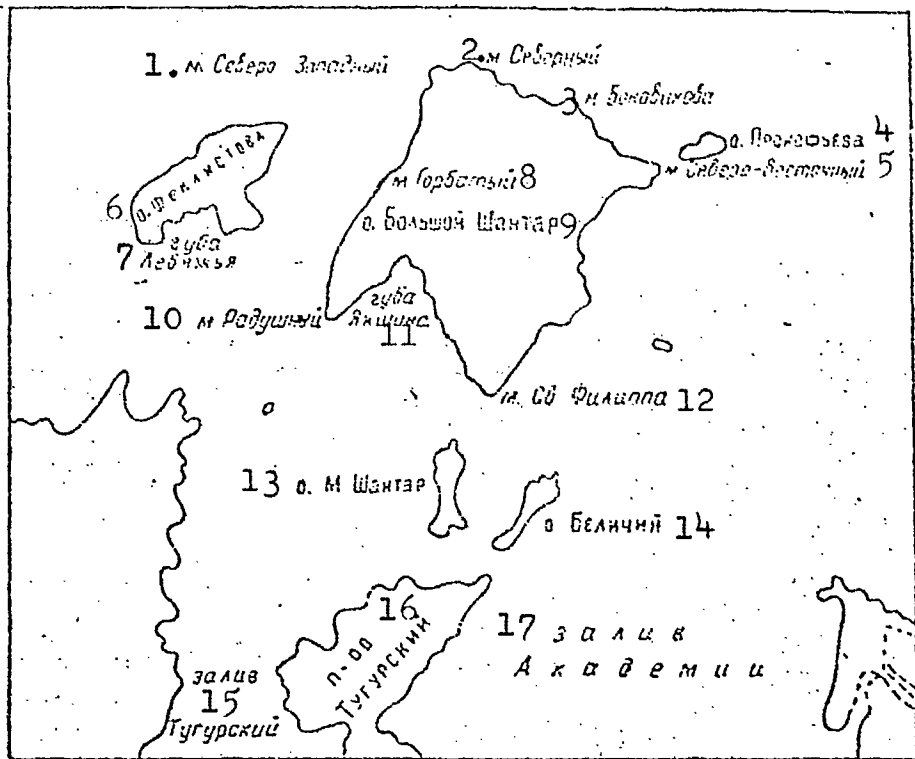


Рис. Шантарские острова (схематическая карта)

Fig. Shantarskie Islands (schematic map)

1-Northwestern Cape; 2-Northern Cape; 3-Cape Bokovikova; 4-Prokofieva Island; 5-Northeastern Cape; 6-Feklistova Island; 7-Lebyazhya Cove; 8-Cape Gorbatyi; 9-Bol'shoi Shantar Island; 10-Cape Raduzhnyi; 11-Yakshina Cove; 12-Cape Filippa; 13-Malvi Shantar Island; 14-Belichii Island; 15-Gulf of Tugurskii; 16-Tugurskii Peninsula; 17-Gulf of Akademii.

In the region of Cape Filippa L. gurjanovae grows at a depth of 4 to 6 m. The beds on the average are 600 m wide with 80% coverage. This indicates a considerable density. The biomass reaches 14.4 kg. per sq. m.

Further in towards the top of the cove the beds are located at depths of 1 to 14 m and their width reaches 1,200 m. However, the biomass in this region is several

times smaller. Towards Cape Raduzhnyi another commercial species, L. digitata makes its appearance. Considering the morphology of its lamina, this species belongs to the group of laminaria with cleaved laminas. L. digitata grows in the sublittoral zone at depths of 3 to 15m. Its biomass, compared with that of L. gurjanovae, is very low and is only 0.5 kg per sq. m.

Closer to Cape Raduzhnyi the same situation as at Cape Filippa prevails. The widths of the L. gurjanovae beds decrease to less than 500 m; in contrast the biomass increases more than four times reaching 9.2 kg per sq. m. There is no L. digitata in this district. Generally, more than half of the commercial seaweed resources in this region are located in the coastal districts of the promontories despite the small areas which they represent in comparison to the remaining shore line of the bay. Here, the water circulation is better and moreover, these sectors are not subject to dilution with fresh water. (162)

From Cape Raduzhnyi to Cape Severo-Zapadnyi the commercial seaweed beds, particularly of L. gurjanovae, extend along the whole shoreline of the island at depths of 2.5 to 11 m. At the breast of Cape Gorbatiyi beds of L. digitata occur under 11 to 12 m of water however, their biomass is small and growth on the beds is sparse. The biomass of L. gurjanovae along the western shore is fairly regular, from 2.6 to 5.8 kg per sq. m. It increases at the capes but here the width of the beds decreases.

The northeastern shore is the only sector in the Shantarskie Islands where L. gurjanovae is absent. Two commercial species do grow here: L. digitata, with which we are already familiar, and a new species, Lessonia laminarioides. The blades of L. laminarioides plants are bush-like, reaching a height of up to 150 cm. The blades are 100 to 150 cm long and 10 to 20 cm wide with narrow, wedge-shaped bases and rounded upper parts. Along the northeastern shore, Lessonia laminarioides grows at a depth of 1 to 2 m in beds 50 m wide. These beds extend beyond Cape Severnyi on the southeastern side. The rather narrow width of the beds is compensated for by a high growth density, the average being over 80%. Here, the biomass of Lessonia laminarioides is 0.8 kg per sq. m.

Laminaria digitata extends along the whole coast line except for a sector southeast of Cape Bokovikova where seaweeds do not grow.

The absence of L. gurjanovae along the northeastern coast is difficult to explain at the present time. Probably the low current velocity exerts some influence as decreased water circulation has a destructive effect on the oxygen metabolism of seaweeds (Guryanova, Zaks, Ushakov, 1925).

Along the eastern and southeastern shores of Bol'shoi Shantar Island, all three of the above commercial seaweeds, Laminaria gurjanovae, Laminaria digitata, and Lessonia laminarioides, are present.

It is certain that Laminaria gurjanovae plays the decisive role in building the biomass. Whenever this species is present it contributes the major part of the seaweed resource. The total seaweed resource of Bol'shoi Shantar Island amounts to 1,862,000 centners*) wet weight and the amount per km of shoreline is 7,000 centners. The abundance is highest at Yakshina Cove, 1,811,000 centners and the western shore where there is 14,400 centners per km of shoreline. Feklistova Island is the second largest of the Shantarskie Islands. Of all the commercial seaweeds only L. gurjanovae grows in Lebyazhei Cove. Its biomass varies from 1.8 to 2.6 kg/sq. m. Because of the shallowness of Lebyazhei Cove, the growth of seaweeds is sparse. Here, the L. gurjanovae grows at a depth of 0.5 to 12 m, forming beds up to 3500 m wide with 30 to 60% coverage. Thus, in spite of the rather low biomass, the standing crop of commercial seaweeds in Lebyazhei Cove represents 2/3 of the whole amount at Feklistova Island. Along the open southern shore, the width of L. gurjanovae beds decreases to 100 to 250 m. The main commercial seaweed on the northwestern and eastern shores of Feklistova Island is again L. gurjanovae. Along the northern shore, the dominant seaweed is L. digitata, the abundance of which is twice that of L. gurjanovae.

*) 1 centner = 100kg (translators note)

On the whole, the total resource of commercial macrophytes of Feklistova Island is estimated to be 993,000 centners and their quantities per km of shore line reaches 7,200 centners. The most abundant regions (918,000 centners) are located on the southern shore, the open shore, (163) Lebyazhyi Cove and the northwestern region where the resource is approximately 10,000 centners per km of shore line.

The Belichii and Malyi Shantar Islands are situated between the Tugurskii Peninsula and Bol'shoi Shantar Island. The commercial seaweed resources in the coastal waters of both islands are represented by the three species of macrophytes but here again L. gurjanovae dominates.

The regions where the abundance of commercial seaweeds is greatest are the southern and eastern shores of Malyi Shantar Island and the northwestern shore of Belichii Island. Here the resources are 400,000 centners and 70,000 centners respectively.

During the exploration of the Shantarskie Islands the following species of densely growing red seaweeds were frequently encountered: the lamellate kelps-Crossocarpus lamuticus Rupr., Turnerella mertensiana (Post. et Rupr.) Schmitz, Rhodymenia pertusa (Post et Rupr.) J. Ag. and others; bushy seaweeds-Odanthalia, Ptilota and Halosaccion, Tichocarpus crinitus (Gmel.) Rupr., Chondrus crispus (L.) Lyngb. and Ahnfeltia.

Of the lamellate seaweeds, the species of the genus Odonthalia are distributed fairly uniformly throughout the coastal waters of the Shantarskie Islands. Most often, they grow at a depth of 7 to 13 m. Tichocarpus prefers coves while the various species of Ptilota grow along the open shores where their habitat is the meso- and upper sublittoral zones at a depth of 2 to 5 m.

Halosaccion grows in the littoral zone. Chondrus grows in the littoral and sublittoral zones, descending to depths of 15 m.

Ahnfeltia occurred in small numbers (only the attached form) at Cape Filippa, along the western shore of Bol'shoi Shantar Island, in Lebyazhei Cove, at Feklistova Island, at Malyi Shantar (the northwestern cape) and at Belichii Island (southern extremity of the northwestern shore).

In conclusion, let us consider the results of the explorations carried out in 1966. The results of two-year explorations showed that the commercial macrophytes are subject to annual variations. The resource of brown seaweeds reached approximately 600,000 centners in 1966 (the forecast was one million). The processes of growth and sporogenesis were somewhat delayed. In August 1965, half the thallami examined were covered with clusters of sporangia but in 1966, sporogenesis was observed only in the second decade of September. The weight and thickness

of the thalli were considerably below those of the previous year. Naturally, the biomass was also smaller as well as the density and width of the beds. Consequently, the total resource was smaller.

In 1966, in the area of Shantarskie Islands, four new species of commercial brown seaweeds (for this region) were discovered: Cystoseira geminatum (Ag.) J. G. Ag., Desmarestia viridis (Müll.) Lam., Agarum cribrosum Bory and Alaria sp. Their total stock amounted to approximately 50,000 centners.

The frequency of occurrence of red seaweeds was either higher than or on the same level as in 1965 and only as isolated cases was a decrease in the percent occurrence noticed twice. Despite the fact that red seaweeds are practically endemic, their biomass is insignificant and does not exceed 1 kg per sq. m. On the average it is 200 g per sq. m.

In 1966, attached Ahnfeltia was also discovered in new regions along the northwestern and eastern shores of Feklistova Island, in Yakshina Cove, along the northeastern shore of Bol'shoi Shantar Island, in Abrek Cove of Malyi Shantar Island and along its open southern shore. However, its biomass did not exceed 400 g. per sq. m. Summing up the previous statements, the following conclusions can be made.

The exploration data establishes that the coastal waters of the Shantarskie Islands are characterized by the presence of rich beds of Laminaria type commercial seaweeds. However, their distribution is irregular. Their main mass, independent of periodic fluctuations in the beds of commercial age, is confined to the following regions: Bol'shoi Shantar Island-Yakshina Bay and western shore; Feklistova Island-Lebyazhya Bay, the open part of the southern shore and the northwestern shore; Malyi Shantar Island-southern and eastern shores and Belichii-northwestern shore.

The commercial seaweed resource in these regions represents 90% of the total resource of the Shantarskie Islands and varies within the limits of 1.2 million centners and 3.2 million centners (omitting abnormal years).

Thus, the large resource of Laminariaceae in the area of the Shantarskie Islands can be used as a basis for the establishment of a seaweed industry with mechanized harvesting. The best time for harvesting the kelp is August because, in September, sporogenesis is completed. The blade length and thickness decreases. This results in a considerable loss of weight by the thallus while in August, most of the blades are sterile. Among the commercial macrophytes, L. gurjanovae dominates. It represents 90% of the total resource in the regions recommended for commercial harvesting.

The red seaweeds are significant in this area. Therefore, it is advisable to continue the search for seaweeds, which contain agar-like substances, in this and other inshore regions of the Okhotsk Sea. However, for such a peculiar group of plants as the red seaweeds are, the research timetables as scheduled in 1965 and 1966 were insufficient.

To determine the red seaweed resources in regions of massive growth, it is necessary to perform more detailed, thorough sampling because these seaweeds do not form beds covering large areas and there is need for a narrower network of stations. The necessity for this kind of work arises mainly from the fact that the red seaweeds are good raw materials for the production of agar and agar-like substances, the shortage of which is so acutely felt by the economy of our country.

References

- 1) Gur'yanova E.F., Zaks I. G. and Ushakov T. V. Rab. M.B.S. Len. obshch. estest oispytatelei 1, 1925. (Littoral zone of the Gulf of Kola (preliminary communication). Studies of Leningrad's Society of Naturalists).
- 2) Zaks I.G.K. Izv. T.O.N.S., T. 3, Vyp. 2, 1929. (Contribution to the knowledge of benthonic communities of the Shantar Sea. Communications of the Pacific Ocean Scientific Council, Vol. 3, issue 2).

3) Zinova E.S. Tr. Len. obshch. estestvoispytatelei t. IX. vyp.3, 1930. (Seaweeds of the Okhotsk Sea from the shores of Bol'shoi Shantar Island. Trudy of the Leningrad's Society of Naturalists).

4) Zinova E. S. Tr. Botan. in-ta AN S.S.S.R. Ser. 2. vyp. 9, 1954. (Seaweeds of the Okhotsk Sea. Trudy of the Botanical Institute of the Academy of Sciences of the U.S.S.R.

ЛИТЕРАТУРА

1. Гурьянова Е. Ф., Закс Н. Г. и Ушаков Т. В. Литораль Кольского залива (предварительное сообщение). Раб. МБС. Лен. общ. естествоиспытателей. 1, 1925.
2. Закс Н. Г. К познанию донных сообществ Шантарского моря. Изв. ТОИС, т. 3, вып. 2, 1929.
3. Зинова Е. С. Водоросли Охотского моря с побережий Большого Шантарского острова. Тр. Лен. общ. естествоиспытателей. т. IX, вып. 3, 1930.
4. Зинова Е. С. Водоросли Охотского моря. Тр. Ботан. ин-та АН СССР. Сер. 2, вып. 9, 1954.