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Commercial characteristics of the growth of laminaria off the shores of the Shantar Islands

by A.V. Potekhina

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Commercial characteristics of the growth of Laminaria off the shores of the Shantar Islands

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by

A. V. Potekhina

Algological studies in the Sea of Okhotsk were begun in the middle 139*
of the last century, beginning with A.F. Middendorf's visit in 1844 to the southwestern coast of this basin. His collections formed the basis for the first work on seaweeds of the Okhotsk Sea by F.I. Ruprecht (1850), which describes 57 species: 11 green species, 26 red ones and 20 brown species. In 1890 F.B. Kjellman published a book in which he, in contrast to Ruprecht's view, demonstrates the similarity of the algal flora of the Okhotsk and Bering Seas.

Research work in the Okhotsk Sea was resumed in 1925 in connection with the intensive economic development of the Far East. In 1927 I.G. Zaks (1929) conducted a detailed study of the seaweeds of Yakshin Bay (Bol'shoi Shantar island). It was on the basis of these collections that E.S. Zinova in 1928 and 1930 determined the species composition and character of the flora of the Okhotsk Sea. Later this same investigator (1954), on the basis of data by Middendorf, Zaks and by others, made a systematic review of the

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* The numbers in the right-hand margin indicate page numbers of the original (Tr.).

species composition of the algae of this basin. In 1930 Zaks organized and led an expedition to the Sea of Okhotsk for the purpose of investigating the distribution and extent of growth of Laminaria. The expedition consisted of 6 teams who conducted research in the most typical areas along the Okhotsk coast. After correlating the data of this expedition, G.I. Gail (1931) gave a general description of the marine vegetation and its reserves available in the Okhotsk Sea. In 1957 N.M. Selitskaya collected algae in the littoral zone of Yakshin Bay. This material was used by V.B. Vozzhinskaya (1970) to describe the littoral vegetation of this area. In 1965 and 1966 a member of the Sakhalin section of TINRO, O.S. Rybakov (1971), conducted a study of brown and red algae off the shores of the Shantar Islands.

Our algological studies in the Shantar Islands area were conducted from 10 July to 4 September, 1971 (see figure). Our study included an examination of the algal strip of this area: a determination of the species composition of macrophytes, identification of commercial species and of the largest concentration of algae, areas and reserves.

The northwestern area of the Sea of Okhotsk has a severe climate. However, a combination of a series of factors--strong tidal currents along /140
with constant local currents, which contribute to a good mixture and rapid water exchange, as well as wide strips of rocky and pebbly shallow water--create favorable conditions around the Shantar Islands for algal growth. The width of the algae beds in this area varies from 100 to 600 m, widening in the bays (Yakshin, Lebyazh') into broad, commercially significant, fields up to 3,000 m in width. At the capes and off the western shore of Bol'shoi Shantar Island and the eastern shore of Feklistov Island there are narrow reefy growths with a width of not more than 100 m. This area is noted for strong tidal currents having a speed of 2.2 m/sec. In areas with moveable bottom soil or decreased salinity the algae are intermittent.

a-Bol'shoi Shantar island;
b-Maly Shantar isl.
c-Belichii isl.
d-Feklistov isl.
e-Yakshin Bay;
f-Cape Raduzhnyi;
g-Cape Zapadnyi;
h-Cape Severo-Vostochnyi;
i-Cape Kusov;
j-Cape Belyi;
k-Tugurskii Bay.
l-Cape Gorbatyi.

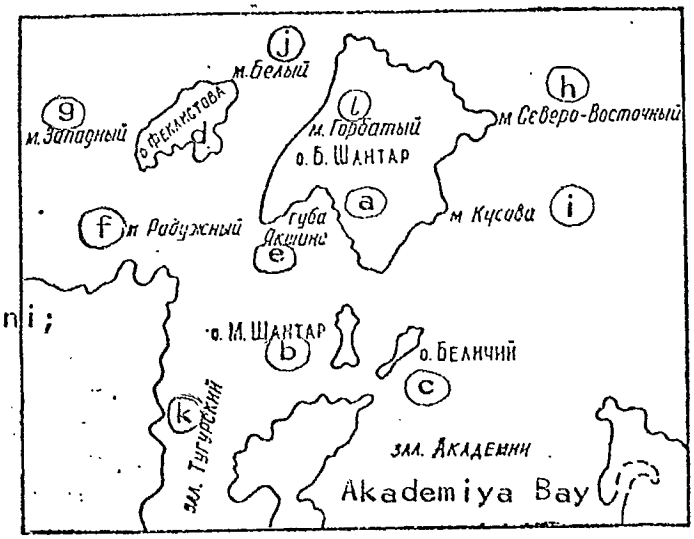

Схема района работ у берегов Шантарских островов

Work area around Shantar Islands

The Laminaria growth around the Shantar Islands basically has a mosaic character, the main representatives being Lam. gurjanovae, Lessonia laminarioides, Alaria marginata, Lam. appressirhiza, Lam. inclinatorhiza, Cystoseira crassipes f. geminata. Laminaria gurjanovae is the most abundant species in the area under discussion; it occurs along open shores among other large seaweeds and prefers semienclosed bays and inlets and places with very little current where it forms extensive growths, displacing all other competing Laminaria. Laminaria begin to grow from the lower littoral to a depth of 25 m (optimal depth 2--10 m). It has long laminae (1.5--8.5 m) with a width of 35--70 cm and a thickness of 1--1.5 mm and a long (up to 15 cm), thin stalk. The Laminaria gurjanovae along the south Sakhalin coast is considerably smaller and has a "sickly appearance" (Sarochan, 1969). In view of their distributional character, we differentiated the Laminaria into 2 groups: mixed Laminaria and Laminaria gurjanovae, and we calculated the reserves for each group (see Table).

Stocks of Laminaria algae in the area of the Shantar islands (in centners of raw weight)

Запасы ламинариевых водорослей в районе Шантарских островов (в ц сырого веса)

A	Заросли ламинарии гурьяновой					B	Смешанные заросли				
	участок (1)	площадь, га (2)	средн. покр., % (3)	средн. биомасса, кг/м² (4)	запасы (5)	участок (1)	площадь, га (2)	средн. покр., % (3)	средн. биомасса, кг/м² (4)	запасы (5)
Bol'shoi Shantar isl. О. Большой Шантар										
Yakshin Bay	Губа Якшина	450	60	9,5	400 000	Губа Якшина (a)	10	30	5,0	5 000
Cape Kusov	Мыс Кусова	200	55	30,0	600 000	Губа Якшина, (b) (восточный берег)	300	50	10,0	300 000
Cape Three Brothers / Cape Gorbatyi	Мыс Три Брата — мыс. Горбатый	50	55	9,0	45 000	Мыс Плоский — (c) мыс Крутой (d)	80	50	10,0	80 000
						Мыс Радужный (e)	7	30	7,5	5 000
	Всего total	700	—	—	1 045 000	Всего total	397	—	—	390 000
Feklistov isl. О. Феклистова										
Engel'ma Bay	Бух. Энгельма —					Мыс. Поворотный — (f)				
Sobolev Bay	бух. Соболева	100	40	10	100 000	мыс Белый (g)	30	35	5,5	17 000
Rosseta Bay	Бух. Россета	90	40	19	170 000	Сев. мыса Западного (h)	20	40	6,5	13 000
Cape Vkhodnoi / Cape Zapadnyi	Мыс Входной — мыс Западный	30	40	10	30 000					
	Всего total	220	—	—	300 000	Всего total	50	—	—	30 000
Maly Shantar and Belichii islands О-ва Малый Шантар, Беличий										
Lagernaya Bay	Бух. Лагерная —					Мыс. Успения — (i)				
Cape Yugo-Zapadnyi	мыс Юго-Западный,					мыс Гайковского (j)	200	50	8,0	160 000
Abrek Bay	бух. Абрек	270	45	14	370 000	Мыс Обрывистый — (k)				
						мыс Крутой (l)	65	45	16,0	100 000
	Всего total	270	—	—	370 000	Всего total	265	—	—	260 000

A- L. gurjanovae; B- mixed Laminaria;
1-section; 2-area (ha); 3-average algal cover (%); 4-average biomass (kg/m^2); 5-stocks;

a-Yakshin Bay; b-Yakshin Bay(east shore); c-Cape Plosky; d-Cape Krutoi; e-Cape Raduzhnyi; f-Cape Povorotnyi; g-Cape Bely; h-north of Cape Zapadnyi; i-Cape Uspenie; j-Cape Gaikovsky; k-Cape Obryvistyi; l-Cape Krutoi.

Near Bol'shoi Shantar Island we identified 3 areas with Laminaria gurjanovae.

In the section of Cape of Three Brothers--Cape Gorbatyi and in /142
Yakshin Bay the Laminaria are equally thick, with a width of 100 m on the west shore. In Yakshin Bay Laminaria occur throughout the upper Bay area at a depth of 2 to 6 m. The third section is situated in a bay south of Cape Kusov. Here the seaweeds stretch for up to two miles with a width of 1,000 m; they are distributed at a depth of from 3.5 to 11 m and differ from those of the previous sections by their larger sizes. The thallus reaches an average length of 425 cm, a width of 59.4 cm and a thickness of 1.3 mm and it weighs an average of 1.6 kg.

Near Bol'shoi Shantar Island there are 4 sections with mixed Laminaria thickets:

On a section near Cape Raduzhnyi the brown algae beds contain Lessonia, L. gurjanovae and Alaria. The thickets are narrow (average 50 m) and shallow with an estimated cover area not exceeding 30%. The brown algae in the second section 14 miles in length occur along the east shore of Yakshin Bay from Cape Skalistyi to Cape Filipp. Here they are discontinuous but they appear again on the east shore of Bol'shoi Shantar island up to Cape Gorelyi. These algae include Lessonia and Laminaria gurjanovae, and near Cape Filipp Alaria appear also. The algae species composition between Cape Filipp and Cape Gorelyi varies somewhat. The dominant species at a depth of 2 to 5 m are Alaria and Lessonia, and at a depth of 5 to 8 m the Lessonia are replaced by Laminaria appressoria. The average width of the thickets does not exceed 250 m. South of Cape Skalistyi there are thickets with a width of 300--500 m but they narrow sharply to 50 m toward Cape Filipp, and at the eastern shore of the island the thickets do not exceed 100 m in

width. In the area between Cape Plosky and Cape Krutoi there is a five-mile stretch of mixed algae down to a depth of 7 m consisting of Alaria Lessonia, Laminaria appressoria, and the dominant species down to a depth of 18 m are Agarum and Laminaria inclinatoriza. The width of the economically significant seaweeds varies from 50 to 400 m. Along the west shore of Yakshin Bay brown algae stretch for a distance of 2.5 miles at a width of 100 m. Laminaria gurjanovae, as a background seaweed, occurs to a depth of 8 m. At a depth of 2--5 m the genera Alaria and Lessonia predominate as well. A mosaic distribution of algae occurs along the north shore of Bol'shoi Shantar Island from Cape Nagornykh to Cape Severo-Vostochnyi. It is difficult to identify the dominant species in this area. The environment in the first level is created by Alaria, cystoid seaweeds, Agarum and Laminaria appressoria.

Feklistov island is the second-largest in the Shantar group of islands. Here the area richest in seaweeds is that of Lebyazh' Bay where only L. gurjanovae occurs. A large area of shallow water in Lebyazh' Bay extends the seaweed area. The bay contains three inlets: Engel'm, Sobolev and Rosseta inlets. On the west shore of Engel'm inlet seaweeds occur rarely. But the middle part of the Bay and the area along the east shore at a depth of 4--12 m are filled with Laminaria gurjanovae. These algae occur in a strip with a maximum width of 1,000--1,500 m but it sharply narrows to 200--500 m toward Cape Krasnyi and continues along the west shore of Sobolev Bay. An area of 90 ha covered with thickets of Laminaria gurjanovae was discovered in the center of Rosseta inlet at a depth of 2--12 m. This field of thickets stretches toward Sukhotin island and continues as a narrow strip 70--100 m in width. At the south shore of Feklistov island the Laminaria thickets occur in a strip 70--150 m in width up to Cape Zapadnyi, becoming interrupted at the capes. These seaweeds are as dense as those /143

mentioned previously. Laminaria gurjanovae, Lessonia, Alaria and Laminaria appressoria occur at a depth of 0.5--10 m between Capes Povorotnyi and Cape Belyi on the east shore of Feklistov island and on the west shore of the island as well. These seaweeds are distributed mosaically, forming mixed thickets with an average width of up to 50 m. The seaweeds in these areas have a uniform density, an average biomass varying within 5.5--6.5 kg/m^2 and cover 35--40% of the sea bottom. The thickets on the east shore occur over an area of 30 ha with estimated reserves of 17,000 centners [In the USSR 1 centner=100 kg , Tr.] , and those on the west shore spread over an area of 20 ha with reserves of 13,000 centners.

Maly Shantar and Belichii islands are located to the south of Bol'shoi Shantar island. The economically significant seaweed thickets in the coastal waters of both islands consist of 5 species. Laminaria gurjanovae grows on the west and south shores of Maly Shantar island and in the center of Abrek Bay. The width of the thickets varies from 100 to 600 m and they occur to a depth of 9 m.

Mixed thickets of Laminaria consisting mainly of Laminaria appressoria, Laminaria inklinatoriza, Alaria, Laminaria gurjanovae and Agarum occur between Cape Uspenie and Cape Gaikovsky (east shore) at a depth of 10 m. The width of the thickets in this area varies from 300 to 500 m.

Mixed thickets consisting of Laminaria gurjanovae, Laminaria appressoria, Alaria and Lessonia occur along the coast of Belichii island. At Cape Obryvistyi, before reaching Cape Yuzhnyi, these thickets have a gap and then continue again at the southeast shore up to Cape Krutoi. These seaweeds occur to a depth of 8--10 m and at a width varying from 100 to 200 m.

These studies have established that the area around the Shantar islands contains large reserves of Laminaria seaweeds. Total stocks of

Laminaria gurjanovae in this area amount to about 1.7 million centners for an area of 1,200 ha. The total Laminaria stocks (mixed thickets) are estimated to be 680,000 centners for an area of about 700 ha.

The economically significant thickets of Laminaria gurjanovae are concentrated around Bol'shoi Shantar island in Yakshin Bay, in a bay situated south of Cape Kusov, in the area between Cape of Three Brothers and Cape Gorbatyi, in Lebyazh Bay and at the southwest shore of Feklistov island. Around Maly Shantar island Laminaria thickets occur on the west shore and in Abrek Bay.

References

1. Vozzhinskaya,V.B. and N.M. Selitskaya(Vishnevskaya). Seaweeds along the coast of Bol'shoi Shantar island (Sea of Okhotsk). Proceedings: USSR Acad. Sci. Publ. by "Nauka," Moscow, 1970.

2. Gail, G.I. Raw materials for the iodine industry of the Far East. Publ. in "Rybnoe khozyaistvo Dal'nego Vostoka," nos.3--4, Vladivostok, 1931.

3. Zaks, I.G. Benthic assemblages around the Shantar islands. Proceedings: TONS*, vol.11, issue 5, Vladivostok, 1929.

4. Zinova, E.S. Sea kale (Laminaria) and other seaweeds with economic significance. Proceedings: TONS, vol.1, issue 1, Vladivostok, 1928.

5. _____. Seaweeds of the Okhotsk Sea and coastal areas of Bol'shoi Shantar Island. Proceedings: Leningrad Society of Naturalists, vol.9, issue 3, Leningrad, 1930.

6. Zinova, E.S. Seaweeds of the Sea of Okhotsk. In the book: "Spore Plants." Proc. Botanical Institute of the USSR Acad. Sci., Series 11, issue 9, Leningrad, 1954.

7. Rybakov, O.S. Economically significant seaweeds of the coastal waters of the Shantar islands. Proc. TINRO, vol.75, Vladivostok, 1971.

8. Sarochan, V.F. The biology, ecology, distribution and reserves of Laminaria joponica Aresch and some other Laminaria species along the coastal areas of South Sakhalin and the Kuril Islands. Dissertation

*Revisor's note. Although no standard expansion of this abbreviation is available, the context suggests "Pacific Ocean Scientific Council".

Abstract, Vladivostok, 1969.

9. Kjellman, F.B. Relationships of the floras of the Bering Sea and of the Sea of Okhotsk. Botanisches Centralblatt, vol.41, no.6, 7. Cassel, 1890.

10. Ruprecht, F.J. Seaweeds of the Sea of Okhotsk. Publ. in: A. Th. V. Middendorf, "Siberian Voyage", vol. 1, Th. 2., 1850.

ЛИТЕРАТУРА

1. Возжинская В. Б., Селицкая (Вишневская) Н. М. 1970. Морская растительность прибрежья о. Большой Шантар (Охотское море). Тр. АН СССР, «Наука», М.

2. Гайл Г. Н. 1931. Сырьевые ресурсы йодовой промышленности ДВК. «Рыбное хозяйство Дальнего Востока», № 3—4, Владивосток.

3. Зенкевич Л. А. 1929. К познанию донных сообществ Шантарского моря. Изв. ТОНС, т. II, вып. 5, Владивосток.

4. Зинова Е. С. 1928. Морская капуста (Laminaria) и другие водоросли, имеющие промысловое значение. Изв. ТОНС, т. 1, вып. 1, Владивосток.

5. Зинова Е. С. 1930. Водоросли Охотского моря с побережий большого Шантарского острова. Тр. Ленингр. об-ва естествоиспыт., т. 9, вып. 3, Л.

6. Зинова Е. С. 1954. Водоросли Охотского моря. В кн. «Споровые растения». Тр. Ботан. институт. АН СССР, серия II, вып. 9, Л.

7. Рыбаков О. С. 1971. Промысловые водоросли прибрежных вод Шантарских островов. Изв. ТИНРО, т. 75, Владивосток.

8. Сарочан В. Ф. 1969. Биология, экология, распределение и запасы ламинарии японской (Laminaria japonica Aresch) и некоторых других видов ламинарий у берегов Южного Сахалина и Малой Курильской гряды. Автореферат дисс. Владивосток.

9. Kjellman F. B. 1890. Ueber die Beziehungen des Flora des Bering-Meéres zu der Ochotskischen Meeres. Bot. Centrbl. Cassel, Bd. 41. No 6, 7.

10. Ruprecht F. J. 1850. Tange des Ochotskischen Meeres. In: A. Th. V. Middendorf "Sibirischen Reise", Bd. I, Th. 2.