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RESOURCES AND STRUCTURE OF HORSEMUSSEL *MODIOLUS KURILENSIS* SETTLEMENTS IN PETER THE GREAT BAY (THE SEA OF JAPAN)

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Modiolus kurilensis F. R. Bernard, 1983 (Mollusca, Bivalvia) can be found in Peter the Great Bay (the Sea of Japan) both on soft and hard substrates, often together with the mussel *Crenomytilus grayanus* (Dunker, 1853); it is a promising commercial species. This mollusc is a by-catch when catching *C. grayanus*. The aim of the work was to assess *M. kurilensis* resources and settlement structure in Peter the Great Bay. The research was carried out in 2007–2018 by scuba-diving methods of hydrobiological research at the depths of down to 20 m. In total, the data were analyzed for 2,409 stations; *M. kurilensis* was found at 308 stations. Sampled molluscs were measured and weighed. The material was processed statistically and cartographically; the mean biomass and distribution density of *M. kurilensis* settlements were calculated. In total, 870 horsemussels were analyzed for studying the settlement structure. The following indicators were estimated: index of settling (ratio of the abundance of juvenile molluscs with a shell length of 1–30 mm (spat, yearlings) to the abundance of adults with a shell length of > 50 mm); index of maturation (ratio of the abundance of pre-reproductive molluscs with a shell length of 35–50 mm to the abundance of adults with a shell length of > 50 mm); index of replenishment of the commercial stock (ratio of the abundance of molluscs with a shell length of 95–100 mm (recruits) to the abundance of molluscs of commercial length of > 100 mm). The state of *M. kurilensis* population in Peter the Great Bay is stable: the ratio of molluscs of non-commercial length varies 52 to 86 % in most settlements, which indicates active natural reproduction and regular replenishment of the benthic part over many years. Replenishment of settlements with settling of both spat and yearlings depends on the presence of pelagic larvae in the plankton, while replenishment of the mature molluscs depends on favorable conditions for juvenile survival. In 2007–2018, the mean values of the indices of settling and maturation in *M. kurilensis* settlements in Peter the Great Bay were of (0.18 ± 0.07) and (0.05 ± 0.01), respectively. *M. kurilensis* resources are estimated at 27.1 thousand tons, and the commercial stock – at 16.4 thousand tons. The annual replenishment of the commercial stock of *M. kurilensis* in Peter the Great Bay is possible in a volume of more than 3 thousand tons. The mean value of the index of replenishment of the commercial stock is of (0.21 ± 0.03).

Keywords: horsemussel, *Modiolus kurilensis*, resources, commercial stock, settlement structure, replenishment, Peter the Great Bay, Sea of Japan

The bivalve mollusc *Modiolus kurilensis* F. R. Bernard, 1983 (Mytilidae) is a common representative of the upper sublittoral epifauna. It is distributed from the Yellow Sea to Peter the Great Bay, off the southwestern Sakhalin, from the northern Japanese archipelago to the Commander Islands, and off the Kamchatka coast. This eurytopic species is found on both soft and hard substrates, often together with the mussel *Crenomytilus grayanus* (Dunker, 1853) (Sedova & Sokolenko, 2018a, b, c ; Selin, 2018a ; Selin et al., 1991). The molluscs have an attached lifestyle, and they form aggregations (druses and "brushes"); singletons are found as well.

M. kurilensis is a promising commercial species; currently, it is a by-catch when catching *C. grayanus* off the Primorye coast (Gavrilova & Zhembrovskiy, 2000 ; Razin, 1934 ; Sedova, 2020 ; Sedova & Sokolenko, 2019a). Catches are not differentiated, since these two species are similar in shell morphology and comparable in size and taste (Vekhova, 2013). Compared to *C. grayanus*, horsemussels are characterized by a lighter shell and a relatively higher soft tissue content.

To date, there is no literature material on *M. kurilensis* resources in Peter the Great Bay; there are only some data on the composition of aggregations and biology of the species in its certain areas: in Posyet, Amur, Vostok, and Nakhodka bays, as well as in the Putyatin Island water area (Vekhova, 2013 ; Galysheva & Yakovleva, 2007 ; Sedova & Sokolenko, 2018a ; Selin, 2018a, b ; Selin & Ponurovsky, 1981 ; Selin et al., 1991).

The aim of the research is to assess *M. kurilensis* settlement structure and resources in Peter the Great Bay (the Sea of Japan).

MATERIAL AND METHODS

The research was carried out in Peter the Great Bay on the RV "Ubezhdenny" of the Base of Research Fleet of the Pacific branch of Russian Federal Research Institute of Fisheries and Oceanography in the summer-autumn periods of 2007–2018. Data on mollusc spatial distribution and abundance were obtained by standard scuba-diving methods of hydrobiological research at the depths of down to 20 m (Sedova & Sokolenko, 2019a). GIS MapInfo Pro software was used to prepare cartographic material. The research was planned based on the analysis of the data on the distribution of commercial invertebrates obtained by us earlier, during monitoring in Peter the Great Bay.

Most diving stations were surveyed in transects perpendicular to the shoreline, at a distance of 200–500 m (depending on the shoreline orography and the nature of bottom sediments). In each transect, 2 to 10 stations were surveyed, considering both depth changes and underwater landscape boundaries. On large areas of relatively flat seabed of the bay basins, a regular grid of stations was used.

In total, 2,409 stations along the entire shoreline were surveyed in Peter the Great Bay (spots on the map with no marked diving stations are specially protected areas, mariculture plantations, and port water areas; there, research was not carried out) (Fig. 1, Table 1). *M. kurilensis* was recorded at 308 stations (about 13 % of their total number).

In dense settlements, mollusc samples were collected at the station from three frames with an area of 1 m^2 each, located randomly in close proximity to each other. In sparse settlements, the transect method was used to estimate mollusc abundance: a diver examined a certain seabed area, counting and periodically sampling molluscs in visual range. The druses were cut off with a dive knife, trying to preserve their integrity. On the research vessel, the druses were sorted out, and the horsemussels were counted, including spat, if available.

Shell length of 1,186 specimens was measured with a caliper with an accuracy of 1 mm; total live weight of every individual was determined by weighing with an accuracy of 0.1 g.

After material statistical and cartographic processing, averaged data on the density and biomass of settlements were obtained. The calculation of horsemussel total biomass and abundance was carried out by Voronoi tessellation (Thiessen polygons), taking into account bathymetric ranges and boundaries of underwater landscapes (Sedova & Sokolenko, 2019a).

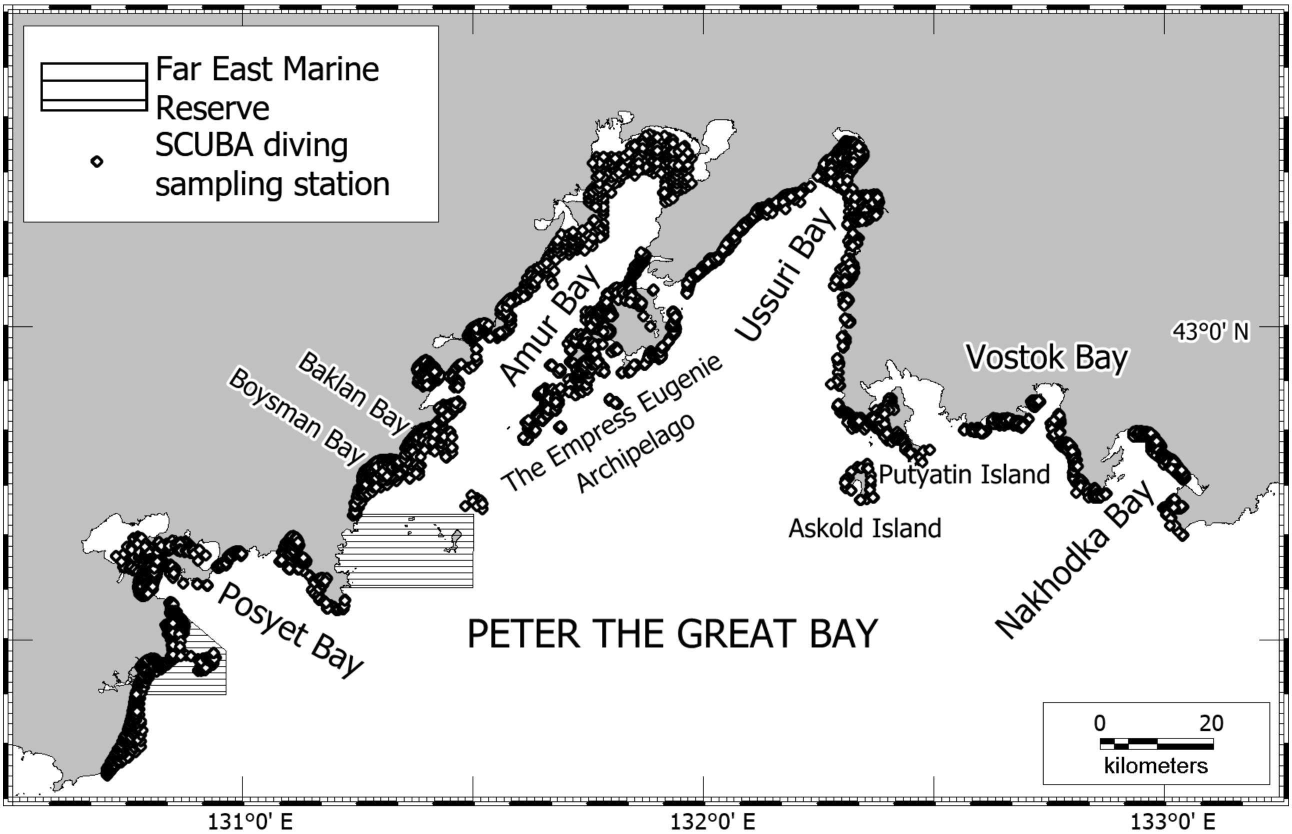

Fig. 1. Map of the area of research and sampling in Peter the Great Bay (the Sea of Japan)

Table 1. Number of stations surveyed in Peter the Great Bay

Area of research	Year	Number of diving stations investigated	Number of stations, where horsemussel was found	Total sample, specimens
Southwestern Peter the Great Bay	2007	290	14	40*
Posyet Bay	2015	172	53	236*
	2016	166	27	85
Boisman Bay	2014	294	13	17
Baklan Bay	2016	127	11	61
Amur Bay	2009	426	52	72
	2016	83	24	110*
Empress Eugénie Archipelago water area	2016	27	6	67
	2017	171	62	369*
Ussuri Bay	2018	230	21	62*
Putyatin Island water area	2007	63	8	14
Askold Island water area	2017	48	0	0
Eastern Peter the Great Bay	2012	312	17	53*
In total		**2,409**	**308**	**1,186**

Note: * – sample was used to analyze *M. kurilensis* settlement structure.

To study the settlement structure, 870 *M. kurilensis* specimens were analyzed. The structure of horsemussel settlements in the Boisman Bay and Putyatin Island water area was not considered due to the non-representativeness of the samples (Table 1). In the samples from the Baklan Bay, juveniles of 4–36 mm prevailed (95 %), while in the Askold Island water area, horsemussels were not recorded. The settlement structure in the Amur Bay and Empress Eugénie Archipelago water area was analyzed using research data of recent years; in the Posyet Bay, the analysis was based on the results of surveys of 2015 (Table 1).

M. kurilensis indices of settling and maturation were determined by the methods previously used for *C. grayanus* (Vigman, 1983 ; Vigman & Kutishchev, 1979 ; Gavrilova, 2002 ; Sedova & Sokolenko, 2019b). Considering minor differences in *M. kurilensis* and *C. grayanus* growth in the first years of life (Vekhova, 2013), the rate of replenishment of horsemussel settlements by settling juveniles (index of settling, IS) was determined as the ratio of the abundance of molluscs with a shell length of 1–30 mm (spat, yearlings) to the abundance of adults with a shell length of > 50 mm. The rate of replenishment of the mature part of the aggregations (index of maturation, IM) was calculated as the ratio of the abundance of pre-reproductive molluscs with a shell length of 35–50 mm to the abundance of adults with a shell length of > 50 mm.

According to various sources, a horsemussel reaches its commercial length (100 mm) in the age of 9 to 18 years, and the growth of mussels since 15 years is of 1–2 mm·year^{-1} (Vekhova, 2013 ; Selin & Ponurovsky, 1981 ; Selin et al., 1991). Therefore, the replenishment of the commercial stock was determined by the ratio of the abundance of molluscs ranging in length 95 to 100 mm (recruits), most of which will replenish the commercial stock in a year, to the abundance of individuals of the commercial length.

Statistical processing of the material obtained was carried out using the Statistica and Microsoft Excel software (mean values of the indices were established, as well as the error of the mean at a significance level of 5 %).

RESULTS AND DISCUSSION

Distribution and resources. For *M. kurilensis*, protected areas of the seabed, with a predominance of soft sediments, are favorable; in spots with active hydrodynamics, horsemussel is rare (Vekhova, 2013 ; Selin, 2018a ; Selin et al., 1991 ; Rees et al., 2008). In Peter the Great Bay, at the depths of down to 20 m, *M. kurilensis* is widespread, but its abundance varies significantly in different areas (Fig. 2). Horsemussel druses, both together with *C. grayanus* and monospecific, occupy significant areas (8.1–10.6 km^2) in Posyet and Ussuri bays, as well as in the Empress Eugénie Archipelago water area, with the widest distribution (36.0 km^2) in the Amur Bay (Table 2).

The highest values of the mean density of settlements (6.6–8.8 ind.·m^{-2}) and biomass (384–510 g·m^{-2}) were recorded in the Posyet, Amur, and Ussuri bays; the maximum values were registered in the Amur Bay settlements (100 ind.·m^{-2} and 8000 g·m^{-2}). In other areas, the abundance estimates were significantly lower (Table 2). In the Askold Island coastal area (spot with high hydrodynamics), *M. kurilensis* was not noted, which is likely to be due to environmental conditions, that are unsuitable for the species. In 2001–2005, the density of horsemussel settlements in eastern Peter the Great Bay (the Vostok and Nakhodka bays) varied 0.5 to 50 ind.·m^{-2} (Galysheva & Yakovleva, 2007).

M. kurilensis resources in Peter the Great Bay are estimated at 27.1 thousand tons, with most of them (66.8 %) recorded in the Amur Bay (Fig. 2, Table 2).

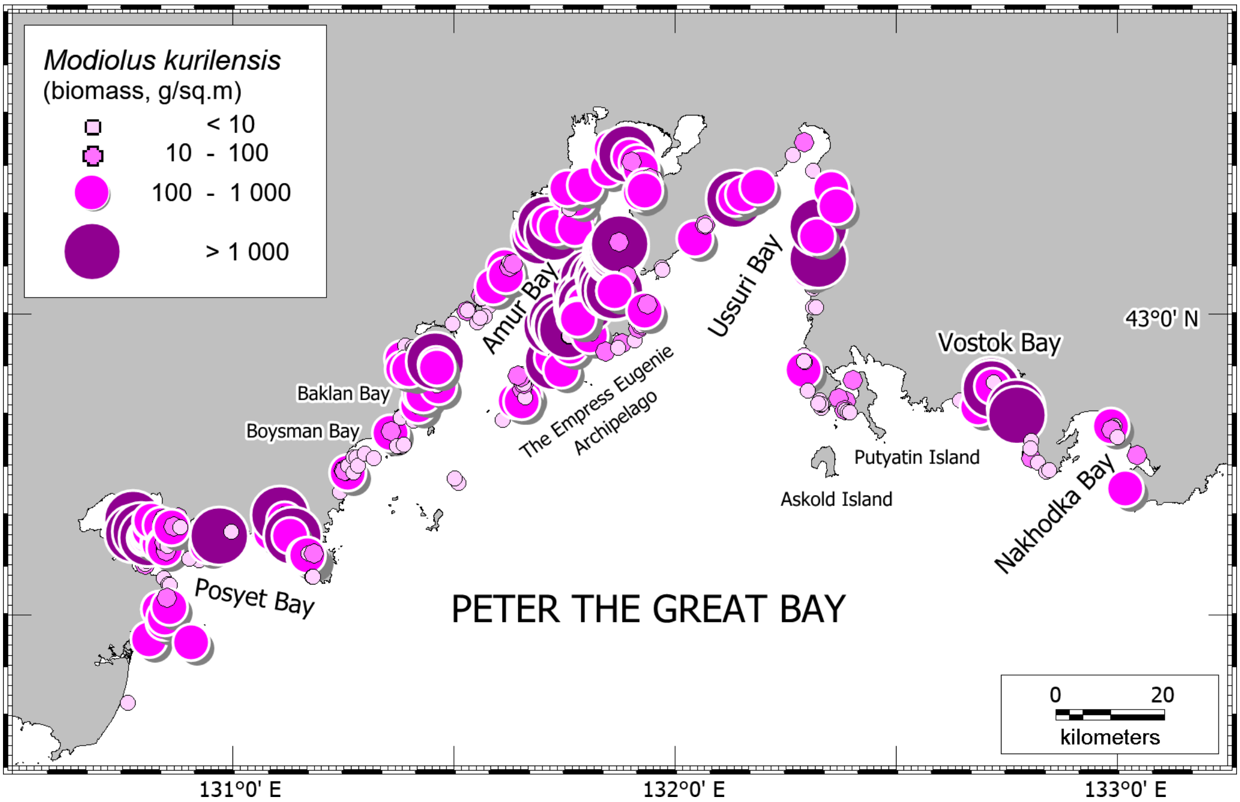

Fig. 2. *M. kurilensis* biomass distribution in Peter the Great Bay

Table 2. *M. kurilensis* biostatistical characteristics and resources in Peter the Great Bay

Locality and year	Area, km^2	Depth, m	Mean density, ind.·m^{-2}	Maximum density, ind.·m^{-2}	Mean biomass, g·m^{-2}	Maximum biomass, g·m^{-2}	Resources	
							thousand ind.	tons
1	0.9	1–15	0.5 ± 0.1	2	62 ± 16	230	249	34.7
2	8.1	1–20	6.7 ± 2.0	84	384 ± 131	5048	29322	2065.0
3	2.6	2–20	1.1 ± 0.5	15	32 ± 22	600	1554	108.6
4	36.0	1–18	8.8 ± 2.7	100	468 ± 179	8000	412134	18 116.0
5	10.6	1.4–19	2.8 ± 0.8	44	258 ± 62	3120	60396	4489.9
6	9.0	1.8–20	6.6 ± 2.3	40	510 ± 152	2360	20208	1678.7
7	0.8	9–19	0.03 ± 0.02	0.1	4 ± 2	13	36	5.5
8	1.7	2–19	3.6 ± 1.1	39	249 ± 78	3018	7566	614.2
In total	69.7	1–20					**531465**	**27112.6**

Note: 1 – southwestern Peter the Great Bay (2007); 2 – the Posyet Bay (2015–2016); 3 – the Boisman Bay (2014) and Baklan Bay (2016); 4 – the Amur Bay (2009, 2016); 5 – the Empress Eugénie Archipelago water area (2016–2017); 6 – the Ussuri Bay (2018); 7 – the Putyatin Island water area (2007); 8 – eastern Peter the Great Bay (2012).

Settlement structure. In our samples, *M. kurilensis* shell length varied 5 to 163 mm, and the individual weight varied 0.03 to 330 g (Table 3). In southwestern Peter the Great Bay, the maximum mean lengths of mollusc were recorded, and the ratio of non-commercial stock (individuals with a shell length of < 100 mm) was of 47.5 % (Table 4). In other horsemussel settlements, the ratio of non-commercial stock exceeded 72.7 %, which affected the mean shell length: it varied 69.0 to 82.5 mm (Table 3).

The mean individual size of commercial mussels varied as follows: shell length – from 110.3 mm (the Amur Bay) to 125.1 mm (Ussuri Bay), individual weight – from 160 g (the Posyet Bay and the Empress Eugénie Archipelago water area) to 241 g (the Ussuri Bay) (Table 3).

In different areas of Peter the Great Bay, *M. kurilensis* settlement structure differs. Over the research period, the ratio of juveniles of < 30 mm varied from 2.5 % (southwestern Peter the Great Bay) to 28.0 % (the Posyet Bay) (Table 4). In the Ussuri Bay, juveniles of < 50 mm were not registered. It might have been due to the timing of the research: it was carried out October to November 2018, while in other areas – from the second half of July to the early September. In different areas of Peter the Great Bay, the index of settling (IS) varied 0.03 to 0.42 (Table 3). The ratio of pre-reproductive juveniles in all areas, except for the Ussuri Bay, varied 2.5 to 7.5 %, and the index of maturation (IM) varied 0.03 to 0.11 (Tables 3, 4). The ratio of adult molluscs (with a shell length of > 50 mm) in all settlements was significant: from 67.4 % in the Posyet Bay to 100 % in the Ussuri Bay.

Table 3. *M. kurilensis* indicators, as well as indices of settling (IS), maturation (IM), and replenishment of the commercial stock (IRC) of horsemussel settlements (in brackets, ranges of values are given)

Locality and year	All molluscs		Molluscs of commercial length		IS	IM	IRC
	Mean shell length, mm	Mean individual weight, g	Mean shell length, mm	Mean individual weight, g			
1	101.1 ± 4.1 (27–163)	145 ± 12 (3–330)	119.5 ± 3.5 (100–163)	199 ± 14 (120–330)	0.03	0.03	0.19
2	69.0 ± 2.5 (5–133)	70 ± 4 (0.03–304)	111.5 ± 1.1 (100–133)	160 ± 6 (94–304)	0.42	0.05	0.30
3	72.2 ± 3.3 (11–131)	76 ± 6 (0.3–302)	110.3 ± 1.5 (100–131)	162 ± 8 (100–302)	0.29	0.06	0.13
4	80.3 ± 1.5 (10–137)	82 ± 3 (0.1–321)	111.5 ± 0.9 (100–137)	160 ± 5 (70–321)	0.09	0.06	0.30
5	82.5 ± 2.5 (59–143)	89 ± 9 (31–311)	125.1 ± 2.5 (120–143)	241 ± 16 (173–311)	0	0	0.11
6	73.6 ± 4.6 (20–123)	76 ± 10 (1–270)	115.9 ± 1.7 (105–123)	198 ± 13 (118–270)	0.27	0.11	0.25

Note: 1 – southwestern Peter the Great Bay (2007); 2 – the Posyet Bay (2015); 3 – the Amur Bay (2016); 4 – the Empress Eugénie Archipelago water area (2017); 5 – the Ussuri Bay (2018); 6 – eastern Peter the Great Bay (2012).

Table 4. Ratio of size groups in *M. kurilensis* settlements (frequency of occurrence, %)

Locality (year of research)	Shell length, mm					
	1–30	35–50	> 50	95–100	> 100	< 100
Southwestern Peter the Great Bay (2007)	2.5	2.5	95.0	10.0	52.5	47.5
Posyet Bay (2015)	28.0	3.4	67.4	6.8	22.9	77.1
Amur Bay (2016)	20.9	4.5	72.7	3.6	27.3	72.7
Empress Eugénie Archipelago area (2017)	7.9	5.7	83.2	7.3	24.4	75.6
Ussuri Bay (2018)	0	0	100.0	1.6	14.5	85.5
Eastern Peter the Great Bay (2012)	18.9	7.5	69.8	5.6	22.7	77.3

Note. Shell length: 1–30 mm – spat and yearlings; 35–50 mm – pre-reproductive molluscs; > 50 mm – adults; 95–100 mm – recruits; > 100 mm – molluscs of commercial length; < 100 mm – molluscs of non-commercial length.

The ratio of individuals of the commercial length varied 14.5 % in the Ussuri Bay to 52.5 % in southwestern Peter the Great Bay [(27.4 ± 5.3) % on average in the bay] (Table 4). Taking into account these values and horsemussel total abundance in Peter the Great Bay (Table 2), it can be concluded that the abundance of molluscs of the commercial length is of 145.6 million ind. Considering the minimum mean weight of horsemussel of the commercial length [(112.5 ± 14.2) g], calculated based on the total abundance of analyzed individuals in the surveyed aggregations, the commercial stock was of (16.4 ± 2.0) thousand tons.

The ratio of recruits in *M. kurilensis* settlements varied 1.6 % in the Ussuri Bay to 10.0 % in southwestern Peter the Great Bay (Table 4). The index of replenishment of the commercial stock (ICR) varied 0.11 to 0.30 (Table 3). Its highest value was recorded in 2015 in the Posyet Bay and in 2017 in the Empress Eugénie Archipelago water area, and the lowest one was registered in the Ussuri Bay in 2018. The mean ICR value in the Peter the Great Bay for different years was of (0.21 ± 0.03). Thus, the annual replenishment of the commercial stock of *M. kurilensis* in Peter the Great Bay can reach 3.4 thousand tons (21 % of the commercial stock of 16.4 thousand tons).

The study of *M. kurilensis* settlement structure in certain areas of Peter the Great Bay in different years showed as follows: despite several differences, the ratio of the non-commercial stock exceeds 70 % of the total abundance of horsemussel in almost all settlements (Table 4). The replenishment of the benthic part of a mollusc population occurs regularly over many years resulting from pelagic larvae settling in bottom settlements of adults (mainly *M. kurilensis* and *C. grayanus*) on their byssus filaments (Selin, 2018a, b ; Lindenbaum et al., 2008 ; Tsuchiya, 2002).

According to the literature data, the individual fecundity of *M. kurilensis* is about 1–2 million eggs (Mikulich & Rodin, 1963), which is significantly lower than that of *C. grayanus* [15–20 million eggs (Markovskaya, 1952)]. Reproductive maturation and spawning period of the mollusc in Peter the Great Bay vary depending on environmental conditions. In plankton, larvae are found June to October, at a seawater temperature of +17…+22 °C. When reaching a size of 300 μm, larvae settle on the shells of adult mytilids, fixing with byssus filaments; there, their further growth takes place (Evseev & Kolotukhina, 2008 ; Selin, 2018a).

In southwestern Peter the Great Bay, *M. kurilensis* pelagic larvae were recorded in August (Kolotukhina et al., 2015), and in the Posyet Bay – June to September, with a density of 70–250 ind.·m^{-3} in different years (Radovets & Khristoforova, 2008). In the Amur Bay, they were found June to September, with a maximum density in July (in the upper bay area – 865 ind.·m^{-3}; in the open bay area – 825 ind.·m^{-3}) (Kulikova et al., 2014). In the upper Ussuri Bay area, *M. kurilensis* pelagic larvae were registered July to October, with a maximum density in October (210 ind.·m^{-3}); in the open bay area, they were noted August to October, with a low density (Kulikova et al., 2013). In the Vostok Bay, pelagic larvae were recorded August to September, with the maximum concentration in early August (703 ind.·m^{-3}) (Radovets & Khristoforova, 2008).

The presence of juveniles (shell length up to 30 mm) in horsemussel settlements can indicate the intensity of larvae settling in the previous year. Over the research period, the lowest settling intensity was recorded in 2017 in the Ussuri Bay and in 2006 in southwestern Peter the Great Bay, while the highest settling intensity was registered in 2014 in the Posyet Bay (Table 4). Thereunder, in different years and areas, the index of settling (IS) of *M. kurilensis* juveniles varied considerably (Table 3), averaging (0.18 ± 0.07). In *C. grayanus* populations under similar conditions, the mean IS value (Sedova & Sokolenko, 2019b) was more than 3 times higher, which is likely to result from a higher density of *C. grayanus* populations.

When horsemussel larvae settle in *C. grayanus* druses or mixed druses, horsemussel juveniles often die since they cannot compete with molluscs of the upper druse layer and with *C. grayanus* juveniles (Kutishchev & Gogolev, 1983). The survival rate of settled juveniles is affected not only by their positions in the druse, which ensures a proper filtering activity of molluscs, but by the level of the substrate siltation and hydrodynamic and hydrological conditions (Avdeeva-Markovskaya, 1979 ; Vigman, 1983 ; Selin, 2018a). Moreover, mollusc juveniles can be devoured by various predators: starfish, crustaceans, and fish. Individuals with a shell length of 62–130 mm predominate in the lower druse layer, whereas settled juveniles are concentrated in the central layer, which protects them from predators and promotes survival (Selin, 2018a, b ; Dinesen & Morton, 2014 ; Lindenbaum et al., 2008).

Over the research period, the highest value of the index of maturation (IM) was registered for *M. kurilensis* settlement in eastern Peter the Great Bay (Table 3). This indicates as follows: within 3–4 years *prior* to IM calculation, the most favorable conditions for the successful growth of juveniles were formed in this area. The mean value for *M. kurilensis* in Peter the Great Bay was of (0.05 ± 0.01). In the same years, the mean value of IM in *C. grayanus* settlements was of (0.25 ± 0.05) (Sedova & Sokolenko, 2019b), which is 5 times higher than in *M. kurilensis* settlements and results from the lower survival rate of *M. kurilensis* juveniles.

For Peter the Great Bay, the ratio of the commercial stock of *M. kurilensis* settlements was of (27.4 ± 5.3) % (Table 4); for *C. grayanus* settlements, it was of (34.0 ± 4.8) % in the same period (Sedova & Sokolenko, 2019b). The mean value of the replenishment of the commercial stock of *M. kurilensis*, equal to (0.21 ± 0.03), was almost at the same level as the value for *C. grayanus* settlements – (0.17 ± 0.04) (Sedova & Sokolenko, 2019b). As noted above, the annual replenishment of the commercial stock of *M. kurilensis* in Peter the Great Bay is possible in a volume of more than 3 thousand tons. However, neither commercial nor natural mortality of molluscs is taken into account (which can result from unfavorable abiotic conditions and anthropogenic load), though they may make their own adjustments. For comparison, the data on the possible annual replenishment of the commercial stock of *C. grayanus* in Peter the Great Bay is presented. With the current state of the commercial stock (32.6 thousand tons), it is estimated at 5 thousand tons (Sedova & Sokolenko, 2019b).

Conclusion. The state of *M. kurilensis* population in Peter the Great Bay in 2007–2018 was stable. In most settlements, the ratio of individuals of non-commercial length varied 52.5 to 85.5 %, which indicates the ongoing processes of active natural reproduction and regular replenishment of the benthic part over many years.

Replenishment of *M. kurilensis* settlements with settling juveniles depends on the presence of pelagic larvae in the plankton, while replenishment of the mature part depends on favorable conditions for juvenile survival. In 2007–2018, the mean values of the indices of settling and maturation in *M. kurilensis* settlements in Peter the Great Bay were of (0.18 ± 0.07) and (0.05 ± 0.01), respectively.

M. kurilensis resources are estimated at 27.1 thousand tons, and the commercial stock – at 16.4 thousand tons. The annual replenishment of the commercial stock of *M. kurilensis* settlements in Peter the Great Bay is possible in a volume of more than 3 thousand tons. The mean value of the index of the commercial stock replenishment is of (0.21 ± 0.03).

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РЕСУРСЫ И СОСТАВ ПОСЕЛЕНИЙ МОДИОЛУСА КУРИЛЬСКОГО *MODIOLUS KURILENSIS* В ЗАЛИВЕ ПЕТРА ВЕЛИКОГО (ЯПОНСКОЕ МОРЕ)

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Модиолус курильский *Modiolus kurilensis* F. R. Bernard, 1983 (Mollusca, Bivalvia) — двустворчатый моллюск семейства Mytilidae; он встречается в заливе Петра Великого (Японское море) на мягких и твёрдых субстратах, зачастую совместно с мидией Грея *Crenomytilus grayanus* (Dunker, 1853), и является перспективным промысловым видом. Его добывают в качестве прилова при добыче *C. grayanus*. Цель работы — оценить ресурсы и состав поселений *M. kurilensis* в заливе Петра Великого. Исследования проводили в 2007–2018 гг. с применением стандартных водолазных гидробиологических методов, изучая глубины до 20 м. Выполнено 2409 станций, модиолус обнаружен на 308 из них. Собранных моллюсков измеряли и взвешивали. В результате статистической и картографической обработки материала получены усреднённые данные о плотности и биомассе поселений *M. kurilensis*. Для изучения состава поселений модиолуса проанализировано 870 экз. Определяли следующие параметры: показатель оседания молоди (отношение численности молоди размером 1–30 мм (сеголетки, годовики) к числу взрослых особей с длиной раковины более 50 мм); показатель созревания (отношение численности молодых моллюсков препрепродуктивного возраста (35–50 мм) к числу взрослых особей с длиной раковины более 50 мм); пополнение промысловой части поселений (отношение рекрутов (95–100 мм) к числу особей промыслового размера с длиной раковины > 100 мм). Состояние популяции *M. kurilensis* в заливе Петра Великого стабильно: доля особей непромыслового размера в разных поселениях варьирует от 52 до 86 %, что свидетельствует об активном естественном воспроизводстве и регулярном пополнении бентосной части популяции на протяжении многих лет. Пополнение поселений оседающей молодью зависит от наличия пелагических личинок в планктоне, а их половозрелой части — от благоприятных условий для выживания молоди. Средние значения показателей оседания и созревания в поселениях *M. kurilensis* в заливе Петра Великого в 2007–2018 гг. составляли (0,18 ± 0,07) и (0,05 ± 0,01) соответственно. Ресурсы *M. kurilensis* оценены в 27,1 тыс. т, а промысловый запас — в 16,4 тыс. т. Ежегодное пополнение промысловой части поселений *M. kurilensis* в заливе Петра Великого возможно в объёме более 3 тыс. т. Среднее значение показателя пополнения промысловой части — (0,21 ± 0,03).

Ключевые слова: модиолус курильский, *Modiolus kurilensis*, ресурсы, промысловый запас, состав поселений, пополнение, залив Петра Великого, Японское море