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Report and Discussion on Progress in FY2007 and Future Plan
of
Joint Study on Hanasaki Crab*

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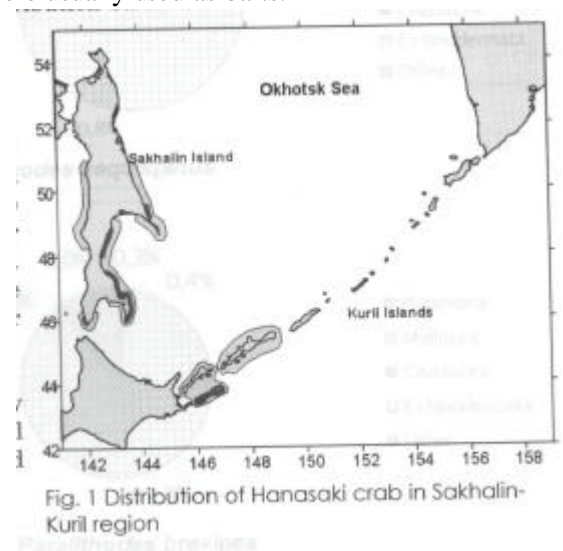
The resources of Far Eastern *Lithodes* are in a depressive condition during more than 10 years. Their abundance appeared to be at the lowest level. The larval surveys prove a low reproduction of these crabs at the contemporary stage. A single crab species retaining its commercial importance is a spiny or Hanasaki crab (*Paralithodes brevipes*). The basic local groupings of this species along the eastern Sakhalin Island have been described in different years. Its aggregation near Terpeniya Peninsula was studied fragmentarily. However, during the resource surveys in 2005 and 2006 we succeeded in collecting biostatistic material, which was enough for qualitative and quantitative assessment of Hanasaki crab stocks in this region. The archive and published information was used for a comparative analysis of the obtained data.

The primary materials were collected along the eastern coast of Terpeniya Peninsula. Japanese crab pots were used as a sampling gear. Materials were collected in the spring-summer period. We have performed 640 settings-lifting of pot arrays. In total, 2676 individuals of Hanasaki crab were sampled and analyzed, 176 females were examined, and absolute and relative fecundity was determined. Since 30 May to 10 June 2006, additionally to standard biostatistic assessment, we have performed the works on tagging Hanasaki crab in the area between Sinyavin Bay and Cape Povorotniy. In total, 512 commercial-sized and non commercial males and females were tagged by drawing ordinal number on carapaces using the indelible paint.

Sampling was performed in the depth range between 10 and 40 m. The fishing vessel of the RS (RSh) class was used for sampling. Standard conical crab pots (Japanese style) were used as a sampling gear. Their meshes were 6x6 and 4x4 cm! lower diameter of a pot was 135 cm, upper diameter 69 cm, inlet 58 cm, and height 60 cm. Fresh-frozen fish (pink salmon, herring and others) were usually used as baits.

On the whole, two main factors affect a distribution structure of Hanasaki crab. They are a composition of grounds and a temperature regime of the area /2, 3/. The ground composition is the most important for juveniles. The temperature regime has a greater influence on istribution of the large matured specimens. The juvenile Hanasaki crabs (carapace length 5"50 mm) inhabit the sites of the upper sublittoral and lower littoral zones with the intensive algal cover. When juveniles grow up to 50 mm in the carapace width, they begin to move deeper choosing stony and rocky sites of the coast.

Due to geomorphological (biotopic) diversity of the coastal zone of Sakhalin and Kuril Islands, Hanasaki crab was distributed



widely within the Sakhalin Region (Fig. 1).

Water temperature distribution over the surface is very diverse in summer (from - 1° to 6°C in June and from 2°C to 15°C in August). In winter, the water surface layers are cooled up to -1.5 - -1.8°C almost everywhere. The mean salinity of seawater is 3032‰ at the surface along the southeastern coast.

Distribution

During the recent years, surveys have been conducted all over the coastal area of southeastern Sakhalin from Cape Terpeniya to Cape Aniva. Within this area we can distinguish several sites where the amateur and small-scale commercial fishery has been put into practice (Fig. 1). These sites embrace the coastal area adjacent to Makarovskiy, Dolinsky, and Korsakovskiy administrative districts. Mainly, this is a zone along the southeastern Sakhalin coast. A special attention is paid to the colonies of Hanasaki crab near the southern Kuril Islands. After a continuous closure, the commercial fishery of Hanasaki crab will be possible in this region in the nearest future. We think that the resource status has changed so much that the fishery opening for small (in the beginning) numbers will not negatively affect a further recovery of this population. Within the works on enlarging our knowledge in Hanasaki crab stock status along the eastern coast of Terpeniya Peninsula in 2005 and 2006, the stable abundant colonies of this crab species were found in this region (Fig. 2). Near the capes, Hanasaki crab formed denser colonies during all the observation period. In the southern part of the study region (Sinyavin Bay) the highest density of Hanasaki crab was recorded on the southern side and southeastern side of Cape Terpeniya. No aggregations of Hanasaki crab were found between Lodochny Isthmus and Cape Bellingsgauzen. This is the difference between surveys conducted in 2006 and 2005.

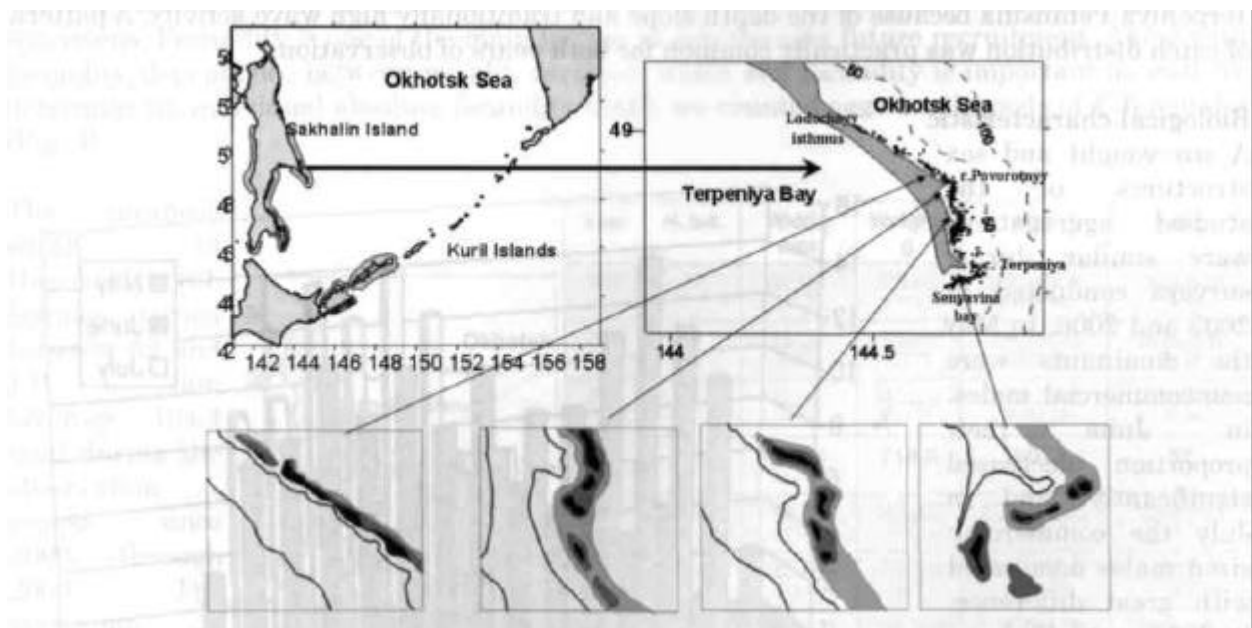


Fig. 2 Distribution of Hanasaki crab (commercial-sized males), 2006

In both years of observation the highest catches of Hanasaki crab were recorded in the third decade of June (16 ind./pot along Cape Zhukovskiy and 20.3 ind./pot along Cape Svyatoy). The maximal catches were observed at the isobaths of 8-10 m. Perhaps, the highest concentrations of Hanasaki crab between mid June and mid July occur at depths less than 8 m, but in our case they were inaccessible for performing trap stations from the vessel.

On the whole, a catch per unit effort was 2.5 ind./pot for commercial-sized males during the survey period (Table 1). Females occurred sporadically in catches. The mean catch per unit effort for non-commercial males was 0.07 ind./pot.

Table 1. Catch dynamics of commercial-sized Hanasaki crab males along the eastern coast of Terpeniya Peninsula in 2006

Period	Catch per pot (ind./pot)			stations
	average	MIN	MAX	
3 rd decade of May	1.92	0.3	4.45	66
1 st decade of June	1.86	0.24	3.57	99
2 nd decade of June	1.67	0	3.72	92
3 rd decade of June	3.26	0	20.32	94
1 st decade of July	4.0	0.18	11.96	72
2 nd decade of July	2.44	0.24	7.76	37
Total	2.5	0	20.32	460

When characterizing the catch distribution by depths, we can note that trap stations at depths between 30 and 40 m showed the occurrence of single large males of Hanasaki crab. The number of Hanasaki crabs increased with the decrease in depth. In the 3rd decade of May - 2nd decade of June the maximum catches were recorded at depths between 12 and 18 m. The results of trap stations, performed in the 3rd decade of June - 2nd decade of July, prove the Hanasaki crab approaches to the coastal zone at depths less than 10 m. It is practically impossible to assess the catches at depths less than 10 m in such area as the eastern coast of Terpeniya Peninsula because of the depth slope and traditionally high wave activity. A pattern of catch distribution was practically common for both years of observation.

Biological characteristic

A size-weight and sex structures of the studied aggregations were similar during surveys conducted in 2005 and 2006. In May, the dominants were non-commercial males; in June their proportion decreased significantly; and in July the commercial-sized males dominated with great difference. In 2006, until 15 June, the carapace length of Hanasaki crab males ranged between 73 and 164 mm (average 114.1 mm), and width between 82 and 178 mm (average 132.7 mm). Since 15 through

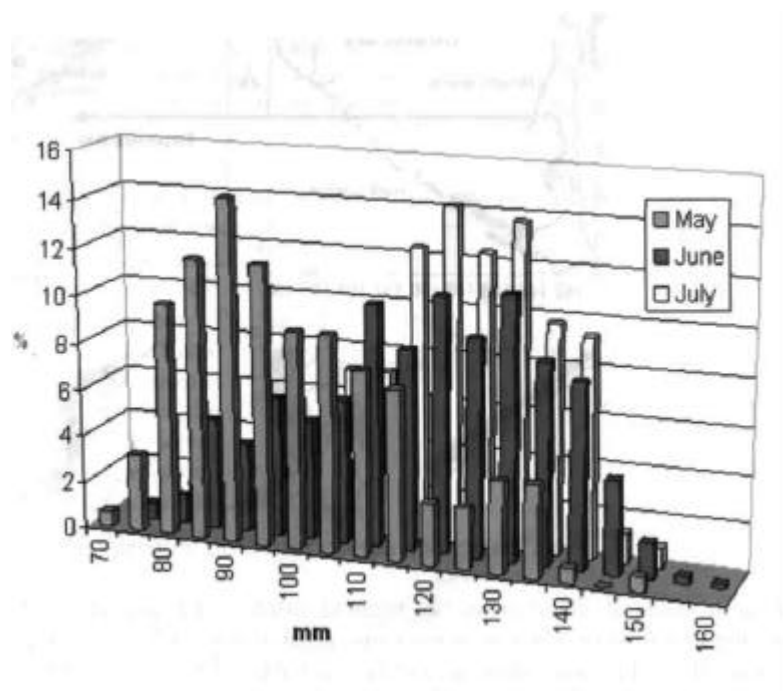


Fig. 3. Size dynamics of Hanasaki crab males along the eastern coast of Terpeniya Peninsula in 2006

30 July, the carapace length of Hanasaki crab males ranged between 77 and 152 mm (average 123.9 mm), and width between 87. and 178 mm (average 144.1 mm). Since 1 through 15 July, the length ranged between 75 and 152 mm (average 121.9 mm), and width between 86 and 183 mm (average 141.1 mm). On the whole, the mean sizes of carapace of the Hanasaki crab males were 117.4 mm in length and 136.3 mm in width during the study period.

Until 15 June, the weight of Hanasaki crab males ranged between 310 and 3530 g (average 1574 g). Since 15 through 30 June, the mean weight of males increased by 385 g and constituted 1959 g, under the range of 430-3690 g. In July, the weight of Hanasaki crab males ranged between 480 and 3940 g (average 1870 g). On the whole, the mean weight of males was 1701 g.

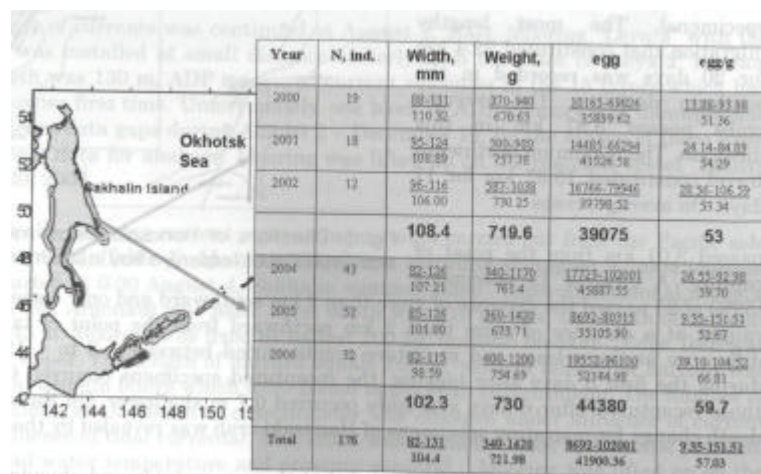
As the mean size and weight of Hanasaki crab males, the mean height of chela increased respectively from 53.6 mm in late May - early June to 61.2 mm in the second half of June and decreased to 59.4 mm in July. The maximum height of chela was 85 mm, being recorded in July.

The most males (91.1%) were at the molting stage 3.2 during the total study period. Until 15 June, 7% of males were at the molting stage 4. Since 15 through 30 June, the percentage content of males at the molting stage 4 declined up to 0.7%. After the 1st of July, the number of specimens at stage 4 increased significantly and reached 17.2%. Judging from the fact that proportion of males at stage 4 increases, their molting takes place mainly in late July - early August. The same timing of Hanasaki crab molting is observed along the northern coast of the Okhotsk Sea.

Fecundity

Formation of commercial stock of Hanasaki crab population along the eastern coast of Sakhalin Island is a result of interaction of three processes: reproduction, growth and loss of specimens. Fecundity is one of the main factors in determining future recruitment. Along with fecundity, dependence between weight, carapace width and fecundity is important as well. To determine an individual absolute fecundity (IAF), we counted eggs on pleopods of 176 females (Fig. 4).

The carapace width of Hanasaki crab females varied between 82 and 131 mm (average 104.4 mm) during the observation period since 2000 through 2006. The maximum width was recorded in 2000 and minimum in 2004 and 2006. The weight of females varied between 340



and 1420 g (average 721.98 g). The maximum weight was recorded in 2005, and minimum in 2004.

During the period of 2000-2006, the individual absolute fecundity (IAF) of Hanasaki crab females varied widely from 8692 to 102001 eggs. The maximum number of eggs was recorded in 2004, and minimum in 2005. The mean individual absolute fecundity of Hanasaki crab along the eastern Sakhalin coast appeared to be 41900.36 eggs for the period of 2000-2006. As a rule, a wider and heavier female had more eggs.

A relative fecundity (RF) is the number of eggs per 1 g of a female weight. The relative fecundity during surveys varied from 9.35 to 151.51 eggs per 1 g with the mean value of 57.03 eggs/g. The maximum relative fecundity was recorded in 2005, and minimum was recorded in 2005 as well.

Tagging

The results of tagging performed till 15 July showed that 38 specimens of 512 were recaptured, including 3 tagged crabs recaptured twice, and one tagged non-commercial male, which was released by a seaman without registering the ordinal number.

The interval between tagging and recapture varied from 1 to 26 days after tagging. 46% of tagged specimens were recaptured during the first 5 days.

The results of study show (Fig. 5) that there is a trend of southward migration for Hanasaki crab (67.5% of tagged specimens). Only one specimen remained immovable, which was caught in 5 days at the same place. There was also observed a northward migration of Hanasaki crab, but it was less intensive (30% of tagged specimens). The most lengthy migration that constituted 22.4 km for 20 days was recorded in the southern direction. On average, crabs passed 5.97 km in this direction. The maximum northward travel constituted 15.37 km for 17 days. On average, crabs passed 3.01 km from the point of capture. A total of 13 specimens (52%) of 25 passed the distance of more than 2 km southward and only 5 specimens of 11 were caught at a distance of more than 2 km northward from the point of tagging. The depth difference at the release and recapture points varied between + 8 to - 12 m.

On average, during the first 5 days after tagging, the recaptured specimens occurred 0.5 m deeper, and those recaptured after 6 days and more occurred 0.7 m shallower. On the whole, no trend of depth change for migrating specimens of Hanasaki crab was revealed by the results of tagging.

Thus, the results of surveys have showed that there is a stable and abundant Hanasaki crab colony along the eastern coast of Terpeniya Peninsula.

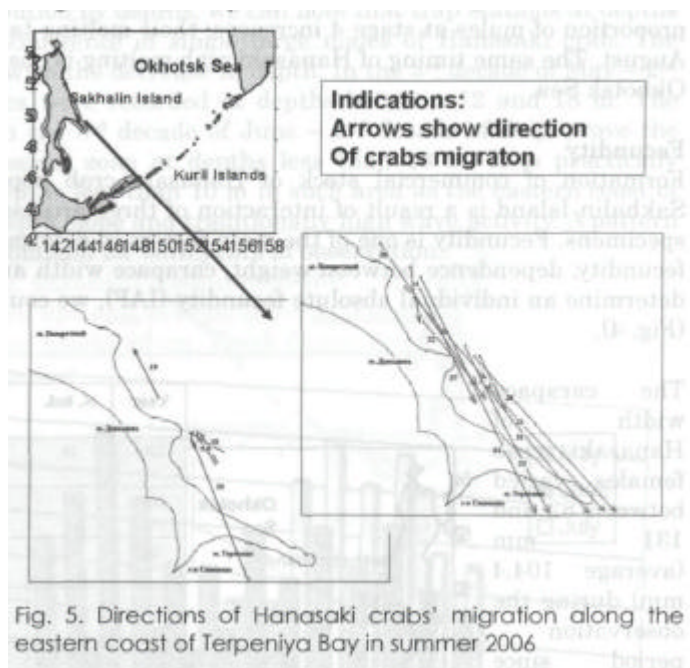


Fig. 5. Directions of Hanasaki crabs' migration along the eastern coast of Terpeniya Bay in summer 2006