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BRIEF COMMUNICATIONS

On Catches of Low-Latitude Fish at Sakhalin Coast in Summer 2014

A. Ya. Velikanov[a, *], I. A. Biryukov[a], and S. S. Makeyev[b]

[a] *Sakhalin Research Institute of Fishery and Oceanography—SakhNIRO, ul. Komsomol'skaya 196, Yuzhno-Sakhalinsk, 693023 Russia*

[b] *Sakhalin Basin Management Board for Fishery and Preservation of the Water Biological Resources—SakhalinRybVod, ul. Emel'yanova 43-a, Yuzhno-Sakhalinsk, 693006 Russia*

**e-mail: a.velikanov@sakhniro.ru*

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Abstract—In summer 2014, catches of three tropical and subtropical fish species were registered at Sakhalin coast. The Japanese sea bass *Lateolabrax japonicus* was detected at Sakhalin coast for the first time, while the Japanese amberjack *Seriola quinqueradiata* was first detected in the Sea of Okhotsk waters sweeping the Sakhalin coast. The catch of the great white shark *Carcharodon carcharias* is the second confirmed case of this fish occurrence near the Sakhalin coast for the last 10 years.

Keywords: Japanese sea bass (*Lateolabrax japonicus*), Japanese amberjack (*Seriola quinqueradiata*), great white shark (*Carcharodon carcharias*), migrations, Sakhalin

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Sea-water areas surrounding the southern part of Sakhalin Island are under the active influence of the warm currents of the Kuroshio system, such as the Tsushima current and the Soya current (Leonov, 1960). The pelagic zone of this region is considered to belong, in contrast to the main area of the Sea of Okhotsk, to the low-boreal Japanese province (Parin, 1968; Nesis, 1982; Shuntov, 1985). The specific geographical location and oceanological conditions of the region under study results in its sea fish fauna being formed not only by the north-boreal and south-boreal species but also by the regularly migrating fish of the tropical and subtropical systems. In addition to the high-numbered and fluctuating sup-tropical species, such as *Sardinops melanostictus,* Japanese anchovy *Engraulis japonicus,* Pacific saury *Cololabis saira,* chub mackerel *Scomber japonicus*, the low-numbered and even rare fish from the southern latitudes also occur from time to time near the Sakhalin coast (Taranets, 1937; Rumyantsev, 1947a; Probatov, 1951; Lindberg, 1959; Darda, 1968; Zver'kova and Shvetsov, 1975; Yaremenko and Budaeva, 1977; Dudarev and Kenya, 1986; Blagoderov, 1993; Velikanov, 2001, 2003, 2004; Velikanov and Stominok, 2004).

At the beginning of the 21st century, many migrants from the southern latitudes began to be captured near the Sakhalin coast during the summer months. The data on the catches of the south-latitude fish at the Sakhalin coast during the years from 2000 to 2005 were summarized by Velikanov (2006). In this work, a supposition was made that the migrations of the subtropical fish to the Sakhalin coast would keep on, rendering it highly possible that the fish species list provided in the work would be further enlarged. The results of the observations of the south-latitude fish appearances near the Sakhalin coast during the years 2006–2013 supported this supposition in a full measure. During the 10 years that have passed after the publication of the above-mentioned work, the representatives of the subtropical and tropical fish fauna have been mention each year in the captures obtained using different fishing gear both at the western coast and at the eastern coast of the Sakhalin Island. As an example, we may mention here the capture in the Sakhalin coastal waters of such fish as the dorado (*Coryphaena hippurus*), great white shark (*Carcharodon carcharias*), purple puffer (*Takifugu porphyreus*), Far Eastern sardine *(Sardinops melanostictus)*, and other species (Velikanov, 2010a, 2010b; Poltev and Koinov, 2011; Velikanov et al., 2012; Poltev, 2012).

The appearance of thermophilic fish at the Sakhalin coast was also observed in summer 2014. The current communication provides the data on the detection and capture of another three south-latitude fish species that are rare in the waters of the Sea of Japan and the Sea of Okhotsk surrounding Sakhalin or have been never known previously to occur in this region.

Japanese sea bass *Lateolabrax japonicas*. At the beginning of the third decade of July 2014, a single individual of the Japanese sea bass got enmeshed approximately 30 km upstream the estuary of the Lyu-

toga River falling in to the Aniva Bay, the most southern of the large sea bays of the Sakhalin Island. The third author of the current communication determined that the countable and plastic feature values for the caught fish fully corresponded with the species-specific feature values for the Japanese sea bass (Lindberg and Krasyukova, 1969). The captured sea bass was further brought to SakhNIRO for more detailed analysis and the assessment of the fish biological state.

Countable features: *D* XII 13, A III 8, ll 84, sp.br. 23. Maxillary bone extends past vertical line leveled with posterior end of eye. Absolute body length 4.4 times maximum body depth. Head length 3.2 times caudal peduncle depth. Number of scales in row from lateral line to start of anal fin 18. No scales present at ventral side of lower jaw. Operculum edge between two spines without defined emargination. Ventral fins light-colored. Scales ctenoid. Tongue smooth. Dark spots on back that indicate that caught sea bass individual of juvenile age.

Total length (*TL*) of the obtained sea bass individual 54.3 cm, length according to Smitt (*FL*) 51.3 cm, standard length 48.0 cm. Total weight 1333 g, trunk weight 1194 g. Individual was male with gonads at second stage of maturation. Heart weight 3.4 g, liver weight 6.8 g. Much fat deposited on internal organs, fat content rated 4 points. Stomach fullness rated 2 points. Stomach contained one piece of semidigested fish with length of 12–13 cm, probably, a representative of smelts or anchovies.

Japanese sea bass belongs to the low-boreal subtropical sub-Asian fish species. Its areal extends to the South China Sea, the East China Sea, the Yellow Sea, and the Sea of Japan, as well as to the waters of the Pacific Ocean surrounding Japan (Lindberg and Krasyukova, 1969; Masuda et al., 1984; Sokolovskii et al., 2007, 2009; Froese and Pauly, 2012). There are some indications on this species' occurrence in the southern part of the Sea of Okhotsk near the northern coast of Hokkaido (Nagasawa and Torisawa, 1991; Borets, 2000; Mizushima and Torisawa, 2005).

In Russian territorial waters, this species was registered at the coast of South Primorye, in particular, in Peter the Great Bay (Sobol harbor; Strelok strait; Tumannaya, Razdol'naya, and Barabashevka river estuaries; Vostok Bay; and Kievka Harbor), as well as in the North Primorye waters, in particular, around the Samarga River mouth (47°10′ N) (Soldatov and Lindberg, 1930; Ivankov and Ivankova, 1998; Barabanshchikov and Magomedov, 2002; Novikov et al., 2002; Kolpakov et al., 2005; Sokolovsky et al., 2007, 2009; Parin et al., 2014). This species is rare in Russian territorial waters of the Sea of Japan. The latest catches of the sexually mature individuals date back to the years 2003–2004 (Kolpakov et al., 2005; Sokolovsky et al., 2007).

Japanese sea bass has never been registered previously at the Sakhalin coast, which means that its catch in the summer 2014, which is discussed here, is the first confirmed fact of this species being detected in the region under study. The site at which the fish was caught at Sakhalin coast is 10–15 nautical miles to the south than the North Primorye coast. However, all recent findings indicate that, in the 21st century, the sea bass expands higher northward in the Russian territorial waters of the Far East seas than it did in the 20th century. That the fish was caught immediately in the river is not at all an unordinary case. For example, in Japan and China, this species is quite often caught in the rivers (*FishBase*..., 2012), which is characteristic of the sexually nonmature fish. It may be supposed that the sea bass could enter Aniva Bay into which Lyutoga River falls drifting across the sea areas from the Japan coast of the Sea of Japan or the Pacific Ocean, through La Perouse Strait or the Kurile straits. However, it remains unclear what made this individual reenter fresh waters after leaving the sea.

Japanese amberjack *Seriola quinqeradiata*. In late August 2014, a large rudderfish individual was caught near the northern coast of Aniva Bay (in the proximities of the Peschanskoye settlement, 46°40' N). By its general exterior, body shape, and the quantitative feature values, the fish was identified as a Japanese amberjack. In 2014, media communicated reports of amateur fishermen of different rudderfish species, including the Japanese amberjack, being repeatedly caught in recent years at the western coast of the Sakhalin Island. These migrants from the south occurred as a by-catch of salmon fishing, as well as a target for sport fishing. Frequent captures of the rudderfish were registered near Kholmsk (47°00′ N), and single captures, more northward at the coast near Uglegorsk (49°00′ N) (Masu salmon of the herring size, 2014). Among others, in early October 2014, the captures of several Japanese amberjack individuals were registered to the south from the above-mentioned sites, namely near Moneron Island abeam Nevel'sk (46°40′ N) (Sakhalin–Kurils Fishery Club, 2015). This information was supported by the snapshots, and it was noted that the length of the rudderfish individuals caught by the amateur fisherman reached 50 cm. Larger individuals of the rudderfish caught at the Sakhalin coast began appearing from time to time in the local shops as frozen fish products.

In late September 2014, Japanese amberjack started to be harvested near the Southern Kuril Islands, in the water area of the Sea of Okhotsk shelf in the Russian zone of Kunashir Strait. In particular, this fish species occurred for two days in the captures of the stab nets set at the depths from 100 m to 210 m to harvest the arabesque greenling *Pleurogrammus azonus* (44°02′ N–44°05′ N, 145°30′ E–145°34′ E). A total of 17 large pelagic fish individuals, which were subsequently identified as the Japanese amberjack according to their exterior and certain species-specific features have been captured (Lindberg and Krasyukova, 1969; Masuda et al., 1984). On completion of mea-

surements, the *FL* of the captured fish varied from 76 cm to 86 cm, average *FL* of 80.4 cm. According to the available data (*Promyslovye*..., 2006), the captured fish were sexually mature individuals, apparently from 4 to 6 years old, which migrated to the region of fishing to feed. According to the information obtained from Japanese fishermen, to capture an adult individual of this species in Kunashir Strait is not an uncommon case at present; however, the presence of these fish is more typical for the waters near the Hokkaido coast.

The Japanese amberjack is a low-boreal, subtropical sub-Asian species. Its habitation areal includes the Sea of Japan and the East China Sea, the western part of the North Pacific Ocean from the Japanese Archipelago to the Hawaii Islands in the East and to Taiwan in the South (Lindberg and Krasyukova, 1969; Masuda et al., 1984; Sokolovsky et al., 2007; *FishBase*..., 2012). The species is also known in the southern part of the Sea of Okhotsk, near the northern coast of Hokkaido (Ueno, 1971; Nagasawa and Torisawa, 1991; Mizushima and Torisawa, 2005). The main habitation regions are located in the tropical and subtropical waters surrounding the Japanese Islands and the neighboring water areas.

In the Russian territorial waters of the Sea of Japan, this species repeatedly occurs along the continental coast, in Peter the Great Bay, at the North Primorye Coast, and up to Chikhachev Bay (De Kastri); along the island coast, it expands to the south of Sakhalin Island in the north (Probatov, 1951; Lindberg and Krasyukova, 1969; Ivankov and Ivankova, 1998; Kolpakov, 2007; Sokolovsky et al., 2007, 2009; Balanov, 2008; Parin et al., 2014). This fish is also known in the Pacific waters washing the Southern Kuril Islands (Borets, 2000; *Promyslovye*..., 2006). So far, no data on the catches of the Japanese amberjack in the southern part of the Sea of Okhotsk, at the Sakhalin coast, including Aniva Bay, have been reported. Therefore, the capture of this fish in Aniva Bay in 2014 is the first confirmed case of the Japanese amberjack detection in the indicated region of the Sea of Okhotsk. The amberjack being caught at the southwestern Sakhalin coast and the Southern Kurils coast in summer and autumn 2014 provide support to the phenomenon of the periodic migrations of this species to these latitudes. At the same time, it should be noted that this fish species is extremely rare near the Sakhalin coast, as opposed to the Primorye coast. In particular, the last time when it appeared at the southwestern Sakhalin coast was apparently as far as in the 1930s–1940s (Lindberg and Krasyukova, 1969), while it was observed in the 1940s, in the 1980s, in the 1990s, and in the early 2000s at the Primorye coast (Rumyantsev, 1947b; Ivankov and Ivankova, 1998; Balanov, 2008). In the first half of the 1950s, the Japanese amberjack was even fished out in the waters of the Primorye region as an important by-catch of mackerel fishing using the purse seine (Primorye fish—*Seriola quinqueradiata* Temminch et Schlegel, 1842, 2003).

Great white shark *Carcharodon carcharias*. According to the on-line reports from media (Sakhalin fishermen have caught a great white shark, 2014; Great white shark allegedly caught in the Russian Far East—August 2014, 2014), on August 27, 2014, a great white shark was caught at the southwestern coast of Aniva Bay near cape Krilyon, the southernmost point of Sakhalin Island. As the witnesses said, the shark got meshed in the netting of the fish trap set at the distance of about 300 m from the shore. We have in our possession a video record that documents how the shark was brought from the sea to the foreshore by a track cross-country vehicle. The frame-by-frame playback of this video allowed us to declare that the obtained fish in fact belongs to the white shark species of the Lamnidae family. This can be confirmed by the many features which are characteristic of this fish species, namely, the size and shape of the body, the color of the back, sides (dark-grey), and belly (bright white), the caudal fin shape (sickle-shaped, crescent), the size and the triangular shape of the teeth on the jaws.

In the local fishermen's opinion, the length of the caught shark reached 5 m, while the body weight was more than one ton. What could be seen on the video record, in particular the comparison of the shark length and the height of a man when in close proximity to each other, allowed to consider that the indicated total length of the caught shark individual is quite close to the actual one. The great white shark with such body length may have the body weight of up to 1000–1200 kg (Casey and Pratt, 1985; Velikanov, 2010a). Judging by the absence of pterygopods, it was a female, whose belly was unusually bulgy, or laterally inflated. The latter may indicate that the shark's stomach contained a large amount of the food swallowed a short time ago (for example, ringed seal, or other), or the abdominal cavity contained yet unborn younglings (embryos), one female shark being able to bear up to 6–10 of them (Christiansen et al., 2014). There is known a case of a newly born white shark youngling with the body length of 126 cm having been caught in the Russian territorial waters, namely Peter the Great Bay in the proximity of Popov Island, in late September (Dolganov, 2012).

The discussed case is the second confirmed case of the great white shark capture at the Sakhalin coast in the current century. The first catch took place in July 2007, also in Aniva Bay, but 30 nautical miles northwards, in the proximity of the Uryum River (Velikanov, 2010a). It is highly likely that the shark that was caught at the southwestern coast of Sakhalin in the early 1950s was also the great white shark (Velikanov, 2010a; Dolganov, 2012), which was incorrectly identified at the time (Probatov, 1952).

The great white shark is a rare species in the Russian Far East waters. However, it should not be left unmentioned that, in recent years, this shark is more frequently detected in the Sea of Japan and in the

southern part of the Sea of Okhotsk. For example, during the almost entire 20th century, only two cases of the great white shark being caught in the indicated regions have been revealed (southwestern Sakhalin—1951; Possiet Bay—1983), while from the year 1999 on, four such cases have already been registered (Olga Bay, Peter the Great Bay, and Aniva Bay).

Since the beginning of the 21st century, the migrations of many fish species from their southern habitation areals to the waters of the Sea of Okhotsk and the Sea of Japan surrounding Sakhalin are observed every year (Gudkov, 2010; Velikanov, 2006, 2010a, 2010b; Velikanov and Mukhametov, 2011; Velikanov et al., 2012; Poltev, 2012). The new catches of the subtropical fish in summer 2014 give evidence of the continuing entries of the thermophilic fish species from the southern latitudes into the waters surrounding Sakhalin. Along with that previously detected, a new fish species, the Japanese sea bass, was registered in the Sakhalin Island near-shore waters, while the Japanese amberjack was for the first time detected in the waters of the Sea of Okhotsk sweeping the island. It, thus, appears that the list of migrants from the south keeps growing.

Similar penetrations of tropical and subtropical fish take place to the northwestern part of the Sea of Japan as well (Ivankov et al., 2001; Kolpakov and Barabanshchikov, 2001; Kolpakov N.V. and Kolpakov E.V., 2002; Barabanshchikov, 2003; Izmyatinskii and Kim, 2003; Kolpakov, 2003, 2007; Antonenko et al., 2004; Sokolovskii et al., 2004). It seems evident that numerous captures and findings of the tropical and subtropical fish in the colder northern regions in the course of the last two decades fall within the framework of a general phenomenon of the increasing northward migrations of the thermophilic fish within the western part of the Pacific region. This phenomenon is likely to be determined by the significant changes of the climate and oceanologic conditions in the 1990s–2000s. In particular, strong positive correlation has been revealed between the surface water temperatures in the Sea of Japan and the Japanese amberjack haul and the tendency for the increased yields of this fish, as well as for its expansion northwards, that were detected in recent years (Tian et al., 2011).

There certainly still remain many issues concerning the migrations of the subtropical fish into the colder, but yet more productive waters of the Gulf of Tatary and into the Sea of Okhotsk, to the East Sakhalin coast. For example, the migration routes to the northern parts of the habitation areal for certain fish species in certain years. These issues, as well as many others, will be addressed in the course of further focused research involving among others the active ship observations.

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