

Okha Comprehensive FIP Workplan – Action 7:

Demonstrate that the Management Strategy aimed at protecting ETP species is effective PI 2.3.1, 2.3.2

KALUGA

In the literary sources we can find information that the feeding area of Kaluga is very extensive. It turned out that Kaluga belongs to euryhaline species living in areas with a salinity of 0 – 32 ‰. The "freshwater" part of its range covers the Amur basin from the estuary to the upper reaches. Upon reaching a body length of about 100 cm and the age of 8-9 years, Kaluga goes to the "sea" feeding. Its modern "sea" area covers the waters of the Sea of Okhotsk and the Sea of Japan - from southern Primorye to the western coast of the Kamchatka Peninsula (Koshelev et al., 2012a). Cases of Kaluga trapping have been described in sublittoral areas at depths of tens of meters at a considerable distance from the mouth of the Amur River and from the Amur Estuary (Koshelev et al., 2012a; Koshelev et al., 2013).

In the Amur Estuary, Kaluga uses most of its water area for feeding, concentrating in the coastal area of its western mainland. Particularly dense aggregations of Kaluga were observed near the Puir (222 fish / km²) and Uarke (196 fish / km²) capes (Fig. 1). One of the main factors influencing the distribution of Kaluga in the Amur Estuary is salinity, since the large aggregation of Kaluga was observed in desalinated areas with a salinity of 5-20 ‰. Apparently, the concentration of Kaluga in certain areas of the Amur Estuary is directly influenced by the volume of the Amur River runoff.

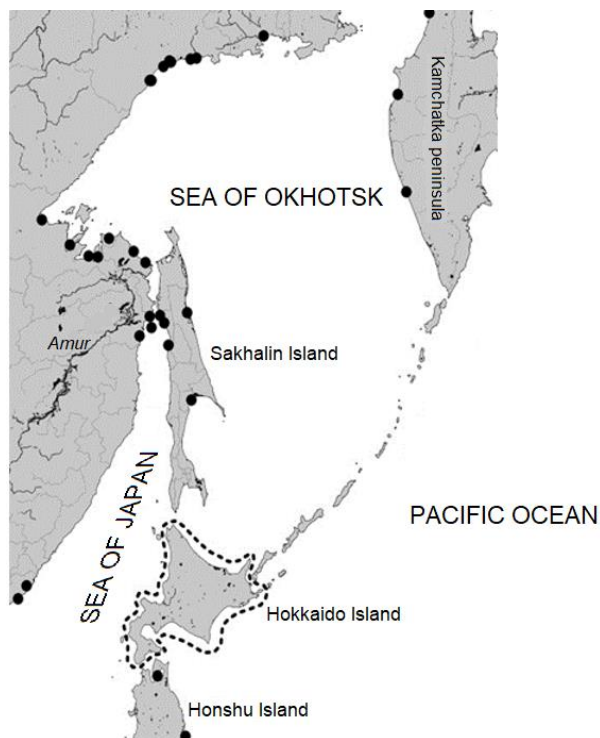


Fig. 1. Schematic map of the places where Kaluga and Amur Sturgeon were captured for 1943-2011 (Koshelev et al., 2012a)



Fig. 2. Areas of net installation during Pink and Chum Salmon fishing in 2021

Based on these data, it can be confidently stated that the coastal areas where the Okha and Rybnovskii Losos companies are fishing (Fig. 2) constitute a tiny part of the Kaluga distribution area.

Their length and age roughly correspond to the following:

- the fish up to 1 m long have an age of 8+, 9+

- the fish from 1 m to 2 m long are aged from 9+ to 27+, 28+
- the fish from 2 m to 3 m long are aged from 27+ to 46+
- the fish aged 55+ had a length of 3.2 m.

At the same time, the average size calculated for 169 fish caught during scientific research in 2011 was 128.8 cm (Table 2).

Table 2. Sizes (body length FL, cm and weight M, kg) of Kaluga (169 fish) caught during research work in the Amur Estuary in 2011 (Koshelev et al., 2016)

Length, average FL, cm	128.8
Length, max and min FL, cm	67.0 – 233.0
Weight, average M, kg	21.04
Weight, max and min M, kg	2.0 – 134.0

According to studies carried out in 2005-2008, when the AU length reaches 150-155 cm and the body weight reaches 25-28 kg, Kaluga becomes sexually mature. By this time, its age is 18-21 years old (Koshelev, Ruban, 2012 b). Mature Kaluga (FL more than 160 cm), previously found both in the Amur River and in the Amur Estuary, in 2011 were observed only in the Amur Estuary.

The individual absolute fecundity of Kaluga averages 492.7 ± 14.36 thousand eggs.

The number of Kaluga in the lower Amur River and in the Amur Estuary was estimated at 345.1 thousand fish, and the biomass - at 7110.9 tons.

The instantaneous mortality rate (Z), calculated based on the results of the 2011 work for fish over 13 years old, was lower in the Amur Estuary (0.233) than in the lower reaches of the Amur River (0.348).

Sturgeon entry into Pacific salmon fishing gear is not a violation. This is a natural phenomenon, since their feeding and spawning migration routes pass through the Sakhalin Gulf and the Amur Estuary.

The only effective measure for sturgeon conservation is the observance of the current Fishing Regulations regarding the release of protected fish from fishing gear into the habitat.

Currently, extensive comprehensive research on the "Fish of the Amur River" has been launched, including studies of Kaluga and Amur Sturgeon feeding in the Amur Estuary. The tasks of scientific works include the assessment of the biological state, the number and distribution of the feeding and spawning parts of the Kaluga and Amur Sturgeon populations in the areas of the middle and lower Amur and Amur Estuary (size, weight, age and sex composition), as well as an assessment of the effectiveness of artificial reproduction of Kaluga and Amur Sturgeon on the basis of determining (by morphology and genetics) the proportion of juveniles of hatchery origin. It is expected that the first information on the results of the work will appear in early 2022 at the reporting session of the Khabarovsk branch of TINRO.

TAIMEN

Sakhalin Taimen *Parahucho perryi* (Brevoort) is endemic to the Russian Far East, it is the largest salmon fish. Sakhalin Taimen is a narrow-range species with a natural small number, which is the natural state of a large predator in the trophic pyramid of the river basin. Over a long period of evolution, the range of this species did not expand beyond the boundaries of the Sea of Japan due to the peculiarities of its biology: taimen prefers to migrate from fresh waters no further than estuaries and near-estuarine seashore. The waters of oceanic (increased) salinity are the significant obstacle for it (Zolotukhin S.F.). As a rule, in the sea it stays directly near the coast, preferring areas with shallow depths and the presence of underwater vegetation.

A prerequisite for the habitation of Sakhalin Taimen in the river is the presence of sections of a braided river channel with a slight slope, and on the coast - the presence of large bays or

estuaries. Brackish-water lakes and tributaries of desalinated sea bays are favorable for marine feeding of this species. Consequently, it will avoid "pink salmon" rivers, i.e. with a straight channel, with a significant slope and flowing directly into the sea (Zolotukhin, 2021).

The main stages of the Sakhalin Taimen reproduction are associated with fresh river waters. Spawning doesn't happen every year. Immediately after spawning, the taimen migrate to the lower reaches of the rivers or return to the sea for feeding. Sakhalin Taimen eggs are incubated for about a month. Larval fish do not migrate in the upper reaches of rivers, but immediately arrive in the area of a braided channel, replete with channels, bays and outlets of cold under-channel waters and a wide variety of food. Having quickly overtaken in growth the juveniles of graylings, redfins, sculpins and smelt, juveniles of Sakhalin Taimen get the diverse food spectrum. Juvenile taimens in the first summer of their life in shallow waters feed on benthos and land-dwelling insects drifting in the water. The older juveniles choose areas with a very weak current in small channels, under sunken trees, in backwaters or oxbows, where they lead a predatory lifestyle, adopting the behavioral strategy of an "ambush predator". The distribution of immature taimens in rivers coincides with the boundaries of the habitat of lamprey, minnow, and redfin, which are their food base (Zolotukhin, 2021).

Migrations of Sakhalin Taimen in the sea are not inherent in all specimens, but depend on their physiological state in rivers of different lengths. It is known that the largest rivers in its range are 200–350 km long. It is in such rivers that specimens more often demonstrate a river way of life, and a small proportion of fish go into the sea. This fact was noted as a result of a standard analysis of the ratio of calcium and strontium (Ca-Sr) in otoliths. Taimens inhabiting small rivers, especially if they flow into lagoons or brackish lakes, often leave for sea feeding (Zolotukhin, 2021).

Based on the research data of the Sakhalin Taimen in the rivers of various regions (Sakhalin Island, Khabarovsk Region, Hokkaido Island), it was concluded that this species has three ecological forms throughout its range:

1. Anadromous – with marine migration limited to estuaries and coastal shelves in close proximity to natal river mouths.
2. Adfluvial (river form) – with migration contained entirely within fresh waters typically in large river systems or in reservoirs cut off by dams.
3. Amphidromous (lagoon form) – with migration in river limited to brackish waters of estuaries.

The age of the fish, typical for the first migration to the sea, varies widely from two years to ten (or more) years. Anadromous groups, however, migrate no further than estuaries or several kilometers from the mouths of rivers. The frequency of reproduction and the success of homing are crucial for determining the reproductive strategy of salmon that spawn several times in their lives. For Sakhalin Taimen, the average frequency of sequential return of mature pairs to their former spawning sites was 69.5%, which is the highest rate ever recorded for repeatedly spawning salmon fish. The highest sequential rates of return to the place of the previous spawning were among large parents (Zolotukhin S.F., 2021).

The number and frequency of occurrence of Sakhalin Taimen has always been relatively small, which is quite natural if we take into account the ecological niche occupied by these species, i.e. the top of the food pyramid. Sakhalin Taimen belongs to the so-called K-selected species, which have a low growth rate and late maturation. Absolute fecundity increases in older females (Zolotukhin et al., 2000).

The modern idea of the Sakhalin Taimen area is shown in Fig. 4. The expert estimate of the total number of spawners for all Hokkaido rivers is 2,000 fish, for all Sakhalin rivers – about 10,000 fish. According to the Khabarovsk branch of TINRO, the number of specimens with a body length of more than 40 cm for the rivers of the Tatar Strait coast of the Khabarovsk region is 8,000 fish (Zolotukhin, 2021).

There is information that in the northern part of Sakhalin Island, the Sakhalin Taimen lives in the Viakhtu, Tyk and Lakh rivers flowing through the territory of the Alexandrovsk-Sakhalinsky

District, as well as in the Dagi River (Nogliksky District). Within the Okhinskii District we are considering, taimen was found in the Langry River. According to Sergey Zolotukhin's expert assessment, most likely the taimen does not spawn in this river, since there is not a single known case of finding spawning nests or juveniles of Sakhalin Taimen in this river. Most likely, its specimens, which are periodically caught by amateur fishermen or poachers in this river, are only accidental migrants.

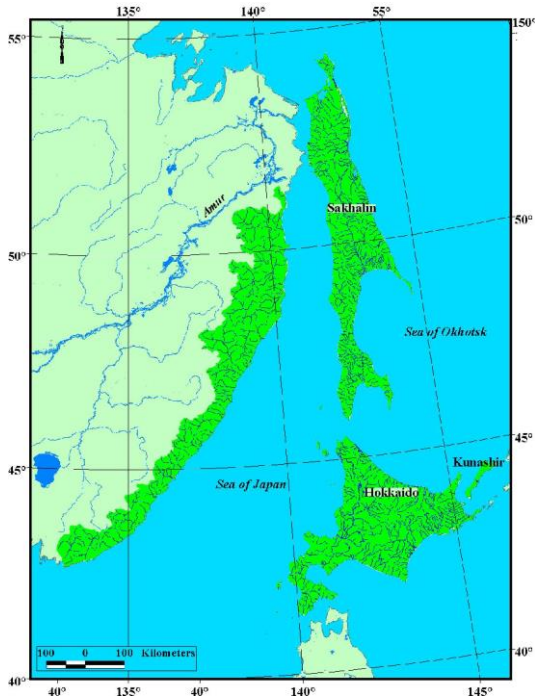


Fig. 4. Sakhalin Taimen range (Zolotukhin et al., 2008)

Sakhalin Taimen is a protected species. Due to its biological characteristics (it is characterized by slow growth of adults, multiple spawning, significant age and body size for the first maturation), this species is very vulnerable, first of all, in relation to irrational fishing.

Sakhalin Taimen is listed in the Red Data Book of the International Union for Conservation of Nature (IUCN) in the Critically Endangered category (A4abcd), and issues of international trade in this species are controlled by the CITES organization. It is classified as "in critical condition".

In Russia, it is listed in the Red Data Book of the Russian Federation. According to the List of Wildlife Objects, approved by Order No. 162 of the Ministry of Natural Resources of the Russian Federation dated March 24, 2020, the Sakhalin Taimen *Parahucho perryi* (populations of Primorye and the Sakhalin Region) has the following statuses:

Rarity status category: 1 - Endangered.

Endangered status category: E - Endangered.

The category of the priority degree of environmental measures taken and planned for adoption is the 1st priority. The immediate adoption of comprehensive measures is required, including "the development and implementation of the conservation strategy and/or a program for the restoration (reintroduction) of the animal world object and action plans."

The new changes made to the Red Data Book of the Russian Federation in 2020 mean that a person who wants to catch or kill the Sakhalin Taimen will not be held administratively liable, as it was before, but already criminally liable. Up to imprisonment for up to 4 years.

Sakhalin Taimen is listed in several regional Red Data Books in most areas of its range: in Primorye, in the Sakhalin Region and in Japan. Only in the Khabarovsk Region this species has sufficient numbers and has a favorable habitat, therefore it is not included in the regional Red Data Book, and sports and amateur fishing is allowed there according to the "catch and release" system (Zolotukhin, 2021).

According to the information collected during the period of the remote independent audit within the framework of the FIP (March-April 2021), as well as during the personal visit to the salmon fishery of the Okha and Rybnovskii Losos companies and the annual audit of the FIP (September 2021), the fishermen of the companies did not have a single violation of the law regarding the illegal fishing for Sakhalin Taimen. Also, during the consultations, all local experts noted that the facts of the Sakhalin Taimen entering the coastal salmon fishing gear (trap nets) have never been noted over the observation period of more than 20 years. Apparently, this is due to the fact that taimens, when leaving rivers, prefer sea coastal areas with shallow depths, having underwater vegetation and rich in food resources (juveniles of smelts, redfins, sculpins, etc.). Pink Salmon and Chum Salmon, as a rule, avoid such areas during their spawning migrations. Accordingly, fishermen do not place their fishing gear where there is no salmon. Vitaly Nikitin, head of the SakhNIRO laboratory, spoke about this in his interview with the Rybak Sakhalina newspaper:

“Journalist's question: There is an opinion that the decrease in the taimen population is mainly influenced by its by-catch during the Pacific salmon fishing with coastal trap-nets and fish counting weirs in river fishing parcels.

Vitaly Nikitin: SakhNIRO specialists are not inclined to share this point of view. I admit that there are single (accidental) captures, but their value is incommensurably less than the volume of catch in amateur fishing. In addition, it should be taken into account that only a very numerically small marine ecological form of taimen can get into the net. However, fish of this form do not make long migrations to the sea, but stick to certain areas on rocky-pebble plateaus with thickets of aquatic vegetation, on which, as a rule, fishing nets are not installed. This significantly reduces the potential danger of frequent by-catch of taimen.” (Newspaper "Rybak Sakhalina" No. 23 dated June 14, 2012; the author of the publication is G. Yurgin).

Thus, salmon fishing in coastal marine areas and the habitats of the Sakhalin Taimen in the coastal area are geographically delimited and do not overlap. All the authors say that this is possible, but only theoretically. There are no facts confirming the overlap of taimen feeding sites and salmon fishing gear locations. The absence of facts of the Sakhalin Taimen's accidental entry into the net is also confirmed by the data collected by the company's employees and shown in Table 1. Okha Ltd. and Rybnovskii Losos Ltd. do not fish in the rivers, therefore, the companies do not have any impact on the taimen inhabiting the rivers.

Summing up the collected information, we can say that the salmon fishery of the Okha and Rybnovskii Losos companies does not affect the protected populations of Kaluga and Sakhalin Taimen.

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Sergey Makeev's website "Sakhalin Taimen in the XXI century": <https://www.sakhtaimen.ru/ru/news/128/>

Website of the non-profit environmental organization - "Russian Salmon" Association:
<https://ru.russiansalmon.org/news/petitsiya-protiv-varvorskogo-promysla-amurskoj-kety/>
News website: <https://fishnews.ru/rubric/gazeta-ryibak-sahalina/5539>

Consultations held:

1. Sergey Zolotukhin, PhD in Biological sciences, author of many books and publications on fish biology, including Sakhalin Taimen and Amur sturgeons.
2. Oleg Grizhebovsky, fish biologist of the Okha Ichthyology Department (Sakhalinrybvod) with more than 25 years of experience in working and observing local rivers.
3. Sergey Makeev, fish biologist of the Aniva Ichthyology Department (Sakhalinrybvod) with many years of experience and participation in various environmental programs, activist of the Sakhalin Taimen conservation movement in the Sakhalin Region, administrator of the Sakhalin Taimen in the 21st Century website.

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