

## Action 8: ETP species information

**Action Goal: Demonstrate obtaining relevant information to support management of the assessment unit and determine the impact of enhancement activities on ETP species.**

### PI 2.3.3

The Sakhalin Taimen is still paid attention by public organizations and Sakhalin enthusiasts such as Sergei Makeev. Sergei's website - <https://sakhTaimen.ru/ru/news/category/2/> - is not only an aggregator of news, events or new publications about Taimen, but also an extensive library of Russian, English and even Japanese publications. In his article titled "On the current state and the need to take urgent measures to preserve the Sakhalin Taimen," he asserts that the Government of the Russian Federation has made the decision to establish a dedicated section within the Ministry of Natural Resources and Ecology. This section will focus on rare fish species and prioritize conservation measures, preparing conservation strategies for these species. Sakhalin Taimen has been included in this list of species.

Initially, according to some literary and examination data, it was found that Sakhalin Taimen *Parahucho perryi Brevoort* is found in Kunashir. Collection, study and analysis of available scientific and literary data on the biology and reproduction of Sakhalin Taimen is performed on an ongoing basis within the FIP Workplan. Articles published annually in Russian and foreign scientific journals are reviewed. Several scientific papers were published in 2023.

For example, Barabanshchikov with co-authors conducted a study on the status of Sakhalin Taimen populations in the North-East of Primorsky Krai and proposed an action plan for the conservation and restoration of the species in this region (Barabanshchikov et al., 2023). Oleg Zelennikov conducted a separate study in the Lebedinoe Lake (Iturup Island) and captured Taimen of different age groups (Zelennikov and Semyonov, 2023). The "Fishing" magazine published an article by Matthew Sloat, "What the Taimen Said: An Urgent Call for Conservation of the World's Largest Salmonids", summarizes five species of Taimen in the genera *Hucho* and *Parahucho* and shows a map of their ranges. The most important methods for species conservation are increasing public responsibility, recognition of the species' importance and developing the catch-and-release principle in sport and recreational (amateur) fishing.

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Salmon fishing is mainly focused on fish that perform spawning migration, the characteristics of which are easily predictable. The timing of migration and location of spawning grounds are well-known. Therefore, fishing is very clearly localized in time and space: in coastal areas Pink Salmon fishing takes place in July-September, Chum Salmon fishing occurs in September-November. The main fishing gear is a trap net. Bycatch during such fishing is minimal. Since Russian legislation provides for heavy fines and other punitive measures for catching Taimen, fishermen visually determine the presence of these species in the catch when transferring fish from seines to sailboats (kungas) and release them into the sea in case of accidental catch.

The company PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd. (YKRK) pays great attention to the preservation of Kunashir Sakhalin Taimen. In order to meet Action 8, in April 2022, the company developed an Action Plan aimed at providing information supporting the assessment of the status of populations of ETP species for the years 2022-2026 (Action 8 of the FIP Work Plan) (hereinafter – the Plan); an extensive amount of work on this topic was financed. The document provides for several activities, which are being successfully implemented as of February 01, 2024.

The plan included expeditionary work on the Kunashir Island, collecting data on the presence or absence of Taimen in the island's water bodies, the presence/absence of degradation of its habitats, as well as the impact of amateur and commercial fishing on this species. The work was carried out by Sergei Zolotukhin, who is one of the leading Russian experts on Taimen (Fig. 1).

Sergei conducted extensive research, including the study of archival and literary data of Russian scientists, archival data of Japanese scientists, and also carried out expeditionary work on Kunashir in May 2023. That time he interviewed all stakeholder's representatives, including

employees of the Kurilsky Nature Reserve (Fig. 2) and the Ichthyology Department of SakhRybVod (Fig. 3), as well as amateur fishermen and commercial fishermen living in this island.



Fig. 1. Sergei Zolotukhin during the expedition in Kunashir. May 2023.



Fig. 2. Sergei Zolotukhin (in the center) and employees of the Kurilsky Nature Reserve



Fig. 3. Meeting with Dmitry Pastukhov, the chief fish breeder of the Lagunnoye Lake Salmon Hatchery



Fig. 4. Meeting with the head of the local Ichthyology Department of SakhRybVod



Fig. 5. Meeting with Vitaly Ustenko, the executive director of PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd. (YKRK)

Based on the field work results, a detailed report was compiled. The chapters 1-5 of this report are archival and theoretical in nature. Chapters 6-8 are factual and analytical. This research report also contains conclusions and recommendations for YKRK.

In Chapter 1, **Limnological studies in the lakes of Kunashir Island**, the Author provides rare historical information about research conducted on Kunashir Island by Japanese biologists in 1934-1935. Those investigations aimed to explore new territories for economic development and collected data on various aspects, including:

- Morphology of some lakes, their depths and areas;
- Rivers flowing into and flowing out of the lakes;
- Physical & chemical studies: water and air temperature, water quality indicators;
- Biological research: zoo - and phytoplankton, algae, fish and other animals.

Japanese biologists mentioned (almost 100 years ago) the habitat of Sakhalin Taimen on Kunashir Island both on the coast of the Sea of Okhotsk and on the coast of the Pacific Ocean.

The Author also presents more recent data from Russian researchers (Pichugin, Sidorov, 2005) concerning Kunashir Island's lakes (see Table 1.5 in the original text of the report).

Based on materials from limnological studies of Japanese and Russian biologists, Zolotukhin writes that “Japanese hydrochemical data can be used as an argument in favor of the assertion that some lakes, even those where Sakhalin Taimen have been observed, can serve only as a transit spot, rather than a feeding ground. Other lakes, including the Serebryanoye Lake, are shallow and highly productive. Here, water is heated and mixed together with the entire water column, without stratification. Such shallow lakes have quite favorable hydrochemical conditions for the Sakhalin Taimen.”

**In Chapter 2, Ecological requirements for the habitats in adjacent areas of Kunashir** the Author provides information about the Sakhalin Taimen’s habitats and concludes: “seeing that on Kunashir Island the rivers are small in length, and the Sakhalin Taimen were caught in the mouths of the rivers flowing into the sea, it can be assumed that this area is inhabited by *the anadromous form of the Sakhalin Taimen*”.

The distribution of Sakhalin Taimen on Kunashir is associated with the competitive relations with other salmon species, for example, Whitespotted Char. Water temperature becomes a very significant factor due to the limited habitats. At 12-13°C, Dolly Varden Trout dominate in numbers, at 14-16°C, White spotted Char predominates. In the summer in such cool lakes (for example, Peschanoye Lake, Kunashir Island), the ecological niche of Sakhalin Taimen is occupied by Whitespotted Char. At higher temperatures, both Whitespotted Char and Dolly Varden Trout are absent from water bodies. Sakhalin Taimen inhabits water systems that contain large shallow lakes, where the temperature in summer reaches 18-20°C. Feeding immature Taimen juveniles at the age of 3+-5+ years remain in these lakes. Thus, the warm lakes on the Kunashir and Iturup Islands eliminate competition among salmon, and this ensures the survival of the relict Sakhalin Taimen. As environmental conditions change, the ratios of species, the strength of competition between them, and much more will also change. Therefore, there is no evidence of the existence of Taimen populations of the “one watercourse – one population” type..

The data on the biology and high level of homing of the Sakhalin Taimen confirm that this species are focused on limited migratory activity, using the same sections of rivers for reproduction, which defines the species as a K-strategist. “In the conditions of Kunashir Island, these characteristics of the Sakhalin Taimen will manifest at least in the fact that the list of watercourses and lakes visited by this species is limited; and we can say with confidence that if the Sakhalin Taimen has never been recorded in certain basins, that means they have no conditions either for feeding or for reproduction. And vice versa, if the Sakhalin Taimen was observed in certain basins, that means you can find its feeding grounds and (or) spawning tributaries here.”

Next, the Author provides data on the Taimen’s life strategies and behavior at different ages in the Serebryanoye Lake, Serebryanka River and its tributaries.

**In Chapter 4 Population groups of Sakhalin Taimen on Kunashir Island**, Sergei describes and analyzes various factors: the life strategy of Taimen, competition with other species and ecological factors, as well as genetic research data. The most important information in this chapter is exactly genetics. The Author cites research on this topic: “According to Lev Zhivotovsky with co-authors, degree of genetic differences (Fst) of the Sakhalin Taimen in the Valentiny Lake (Kunashir), Sarufutsu (Hokkaido), and Aniva Bay (southern Sakhalin) rivers are about 0.11, which is a relatively high value. However, this value is smaller than Fst between the populations of Kunashir and Iturup (0.23 - 0.31): this difference is large.” And he concludes: “that the genetic structure of the Sakhalin Taimen is formed by **highly differentiated local populations in individual water bodies with possible micro-geographical differentiation in the individual spawning streams and tributaries of rivers and lakes.**”

Sergei also writes: “As for the Kunashir Island, the researchers note that “...unfortunately, it is difficult to say with confidence about the populations of Hokkaido and Kunashir – there are only two data samples (one sample per island), which tend towards the heterogeneous group of southern Sakhalin, given their geographical proximity.” And “Thus, the authors of genetic studies admit that **the population groups of Kunashir Island** (their number is still unknown), as the closest to Hokkaido, **are part of a single population within the boundaries of southern Sakhalin and northern Hokkaido.** Taimen of Iturup Island, according to geneticists, belongs to a different population group.”

Sergei also emphasizes: "One can not but notice the difference in the terminology used by the authors of genetic studies of the Sakhalin Taimen in the Kuril Islands: groups, groupings, local populations, population groups, and even populations." For this reason, he proposes to “conventionally consider that Kunashir Island is inhabited **by population groups of the Sakhalin Taimen from the once common ancient population group of Kunashir, Hokkaido and southern Sakhalin islands.**”

**In Chapter 5 Information on the impact of fishing**, the Author highlights the absence of literary data regarding cases of catching Taimen with the fishing gears for Chum Salmon and Pink



Salmon both on Kunashir Island and on the Japanese island of Hokkaido. Therefore, he collected his own survey data, and the results of this research presented in Chapter 6.

**In Chapter 6 Field Research**, Sergei tells in detail about his own expedition to Kunashir Island, which took place in May 2023. Serebryanoye Lake and its tributaries were carefully studied. The research was carried out on May 14 and May 16, 2023. All parts were examined: stretches, riffles, and pits. They also took photos of landscapes and sections of the channel (Fig. 6.2-6.7 in Zolotukhin's report). The fish species in each sampling were identified, and the number of specimens was counted and entered in the field diary (Tables 6.1-6.5 in Zolotukhin's report).



Figure 6.1 Schematic map of the examined water bodies: Lake Serebryanoye, Serebryanka River and its tributaries

Sergei provides detailed data on the ichthyofauna composition, the sizes of the sites where scientific fishing was carried out, as well as data on the capture of young Sakhalin Taimen on each tributary entering Serebryanoye Lake. He also calculates the average Taimen density in these tributaries: "During the examination of three watercourses, known as spawning streams in the Serebryanoye Lake basin, the following data on the average density of Sakhalin Taimen juveniles were obtained:

$0.02+0.032+0.048 / 3 = \mathbf{0.033 \text{ fish/ sq.m.}}$  with a minimum of **0.02** and a maximum of **0.048**.

Further, Sergei provides information from commercial fishermen and a representative of the border guard that controls fish transshipment from sailboats (kungas) into vehicles: "YKRK fishermen, who have been working in this area for more than 10 years, told us that Taimen are observed in by-catch in single quantities (1-3 fish no larger than 1 m), but not in every fishing season. The Taimen is released into the sea when the catch is removed from the trap net."

The catch from the trap nets is sorted directly on launches (boats), without bringing it ashore. Then the launch goes to Yuzhno-Kurilsk and is unloaded at the YKRK pier under the supervision of border guards and fish protection officers, who issue a catch unloading report indicating the species composition of the catch and its volume.

The foreman of the YKRK fishermen, who has been working here for more than 10 years, and the representative of the border guard service confirmed the words of the fishermen that the Sakhalin Taimen is observed only sporadically, and not every year. Fishermen release this fish into the sea when emptying and sorting out the fish from the trap net.

The Author thoroughly studied the issue of recreational (amateur) Taimen fishing on Kunashir. On the sea coast and in the river Serebryanka they encountered local people who

provided some valuable information on amateur fishing. According to the locals, the Sakhalin Taimen is common in the Serebryanka River and Serebryanoye Lake.

Sakhalin Taimen catch per year is estimated by experts to be up to 10 fish by each amateur fisherman, and the total catch of Sakhalin Taimen by amateur fishermen is about 200 fish. According to local experts, there are not so many amateur fishermen on Kunashir Island. Out of a population of 8,000 people, the number of amateur fishermen in Yuzhno-Kurilsk is no more than 20 people. They enjoy ice fishing and catching White-spotted Char using spinning rods, and the Sakhalin Taimen is just a bycatch. Some fishermen release the Sakhalin Taimen, but some keep them for food. The reason for such a small number of amateur fishermen is the abundance of sea fish: flounder, Saffron Cod, cod, halibut, Asian Smelt. Sea fishing is preferred here.

Taking into account the fact that some amateur fishermen release the captured Taimen, it can be assumed that about 150 specimens of the Sakhalin Taimen, which belong to the population group of the Serebryanoye Lake, still die annually from amateur fishing.

**Illegal fishing** on Kunashir Island exists, but it is not targeted at the Sakhalin Taimen. The reasons are quite simple: the lack of a market, the lack of food shortage, the availability of other fish species, mainly marine, and the natural small population of Taimen.

### **Chapter 7 Discussion of field research results**

In this chapter the Author presents the results of research and compares them with his data on Taimen reproduction in other regions. The Author also provides data on Taimen mortality due to commercial and recreational fishing: "The analysis of data collected in various fisheries and environmental institutions has shown that on the Pacific side of Kunashir Island the Sakhalin Taimen reproduce only in the basin of the Serebryanoye Lake."

"If we consider the highest recorded density of the Sakhalin Taimen juveniles as 0.185 fish/m<sup>2</sup> (Higurezawa stream, Hokkaido), then the average density of 0.033 in the tributaries of the Serebryanoye Lake will be about 18% of the highest. And it can be argued that, in terms of the average density of juveniles, the Serebryanoye Lake is lower than the watercourses of Sakhalin and Hokkaido, but higher than the mainland coast of the Sea of Japan with such rivers as Koppi, Samarga, Kievka (see Fig. 7.2). This is a very good indicator of the reproduction efficiency for the Sakhalin Taimen of Kunashir Island."

**Taimen catch and amateur fishermen.** The Author estimates that the total number of Sakhalin Taimen caught annually is about **150 Taimen**.

**Taimen catch and commercial fishing gear.** There is no information or estimates of the number of Sakhalin Taimen killed annually by commercial fishing gear. There is information about the by-catch of single specimens of Sakhalin Taimen by sea seines – 1-3 specimens per year.

The Author also studied the impact of fish farming activities on Sakhalin Taimen from Kunashir Island, which is mentioned in the "**Competitive relations between Taimen and Chum Salmon juveniles**" subsection. "The chief fish breeder of YKRRK Lagunnoye Lake Salmon Hatchery Dmitry Pastukhov noted that the hatchery had been built since 2012. Over the past 11 years, Sakhalin Taimen presence in the Lagunnoye Lake was not observed. To the question: "Is there any influence of hatchery Chum Salmon on juvenile Taimen on Kunashir Island? he answered very clearly "no". The reason is the lack of salmon hatchery in the basin of the Serebryanoye Lake, and the absence of Taimen in the Lagunnoye Lake".

In 2023 Zelennikov and Semyonov conducted a study in the Lebedinoye Lake on Iturup Island and also concluded that there was no negative impact on Taimen populations from Chum Salmon breeding (Zelennikov and Semyonov 2023). Most likely, juvenile Chum Salmon are an additional food source for Taimen. During surveys of the fish species distribution along the entire shoreline of the Lebedinoye Lake, Sakhalin Taimen *Parahucho perryi* was among the other species caught by minnow seine. Not only young fish of different ages of this species, but also an adult Taimen (approximately weighing 2 kg) were caught by the minnow seine. "Speaking about Sakhalin Taimen, it is impossible to judge how much its population is increasing or decreasing, as there is no data on its numbers in previous years. However, there are reasons to believe that there

are good prerequisites for increasing the population in the lake. Firstly, the lake is inhabited by juvenile Taimen of different sizes and, probably, ages. It is also interesting to note the fact of catching a large Taimen by a minnow seine near the shore. Secondly, the lake is practically devoid of chars, which are direct competitors of Taimen, successfully displacing them from other lakes. Thirdly, the lake has a large number of Ninespine Sticklebacks, which is the main food object for Taimen. Taking into account the biological characteristics of Taimen, as well as the temperature and hydrological characteristics of the Lebedinoye Lake, it can be assumed that reproduction of juvenile Chum Salmon in the lake and its tributaries cannot harm the Taimen population. On the contrary, the release of juvenile Chum Salmon and their mass migration across the lake, albeit for a short period of time, could multiply the food base for Taimen.”

In **Chapter 8 Legislation of the Russian Federation and Sakhalin Taimen on Kunashir** Sergei provides a detailed description of the legal aspects within Russian legislation related to the status and protection of Sakhalin Taimen.

The impact of the salmon fishery of PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd. (YKRK) on local Taimen populations is also investigated. The following conclusions were drawn: that in May the Sakhalin Taimen can be found in commercial trap nets in the coastal area only in single quantities (1-3 fish per year), and in other months its migratory activity is weak and during the salmon fishing season it is not observed in fishing gear at all.

As far as Kunashir Island's situation is concerned, there is no reason to assert that the YKRK causes damage to local groups of Taimen, since the total amount of catch (1-3 fish per year) is much less than the value of natural mortality of the Sakhalin Taimen.

All fishing activities carried out by YKRK fishermen are carried out in accordance with Russian legislation and the Fishing Rules for the Far Eastern Fisheries Basin. YKRK fishermen are well aware that Taimen is a protected fish.

Specialists and employees of PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd., as well as amateur fishermen, are well informed about the Sakhalin Taimen of Kunashir Island, know its habitat and behavioral characteristics. All respondents surveyed knew that Taimen belongs to ETP species and is listed in the Red Data Book of the Russian Federation. They confirmed that they are aware of the conservation measures for this species, including administrative and criminal liability for illegal fishing.

In the absence of a market and the presence of a large number of less rare and more accessible biological resources (marine fish species, for example), local fishermen are not focused on harvesting Sakhalin Taimen.

Taking into account all of the above, we can conclude that salmon fishing by YKRK does not have an adverse impact on ETP species, in particular on Sakhalin Taimen.

### **List of used literary and Internet resources**

1. Barabanschikov E. I., Nazarov V. A., Prozorova L. A. 2023. Preliminary assessment of current population status of the Sakhalin Taimen *Parahucho perryi* (Brevoort, 1856) in Primorsky Krai. Biota and Sreda Prirodnykh Territoriy. 2023. Vol. 11(2). pp. 32-43 (in Russian)

2. Zelennikov O.V., Semenov R.A. The state of the ichthyofauna in Lake Lebedinoye (Iturup Island) in connection with the functioning of salmon hatcheries. Izvestiya TINRO. 2023. Vol. 203(3). pp. 490-498 (in Russian)

3. Zolotukhin S.F. Research report “Current state and historical data on Sakhalin Taimen population on Kunashir Island”, July 2023

4. Makeev S.S. "On the current state and the need to take urgent measures to preserve the Sakhalin Taimen". Vladivostok State University, Monography "Ecological Research in the Russian Far East. History and Modernity", Chapter 14. Vladivostok, 2023

5. Website of Sergei Makeev - <https://sakhtaimen.ru/ru/news/category/2/>

6. Matthew R. Sloat What the Taimen Said: An Urgent Call for Conservation of the World's Largest Salmonids. January 2023. Fisheries / Volume 48, Issue 4 / p. 137-140

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