

October 17, 2022

Meetings in SakhNIRO (Yuzhno-Sakhalinsk)



On October 17, a meeting was held with Andrey Zhivoglyadov and Aleksander Antonov, scientists from the SakhNIRO Salmon Laboratory, as well as Marina Stekolshchikova, head of the Otolithometry Sector, and Anna Lapshina, employee of the Genetics Sector.

The meetings were attended by Anna Avdeeva, a representative of the company PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd. (YK RK).

A consultation was also held with the Deputy Head of SakhNIRO Vladimir Samarskiy.

Interview with Andrey Zhivoglyadov and Aleksander Antonov

Lyudmila: I have sent you a letter from Mark Chilcote dated April 18, 2022, where he expressed his opinion about the problems of Kunashir. Can you comment on it?

Andrey: In my opinion, Mark described all the problems very correctly. In particular, the problem of quantitative accounting of spawning areas.

Lyudmila: What other methods of accounting for spawning grounds exist?

Andrey: There are modifications of the visual counting of spawning grounds. This is when, at the time of mass spawning, researchers inspect the river and determine the presence of spawning grounds directly at the spawning sites. Ground tubes are also used to determine the quality of spawning grounds. It can't be done en masse, it's quite a time-consuming work. But to determine the direction of the ground flow (upwelling, downwelling or parallel flow) - this method can determine the quality of spawning grounds. And I have a question for Mark: "What does he mean by determining the number of spawning grounds for Kunashir?"

Lyudmila: Another problem voiced by Mark is the determination of the proportion of local populations.

Andrey: Yes, this is a very important point. Here, in my opinion, the most reliable option is otolith marking. Perhaps genetic methods. But I don't quite imagine, for example, how genetic methods can be used to separate Pink Salmon of Kunashir origin from Pink Salmon of Hokkaido origin.

Lyudmila: Zhivotovsky's article "Ecological, Geographic, and Genetic Differentiation and Management Units of Chum Salmon *Oncorhynchus keta* of the Southern Kuril Islands" has

recently been published, which describes an approach for allocating stock units using the concept of ecogeographic units (EGUs). «Each EGU can include several populations (water bodies). At the second stage, the delineated EGUs are tested for genetic proximity or distance from each other using multiple samples from the populations of each EGU.» (JOURNAL OF ICHTHYOLOGY, 2022, Vol. 62, No. 3, pp. 466-475, the full text of the article is [here](#)). The article provides an example that a sample of juvenile Chum Salmon caught in Pervukhina Stream formed a cluster of "lake" Chum. This confirms the fact of the displacement of lake Chum Salmon into the stream (perhaps the juveniles entered the stream in search of food, or perhaps the juveniles migrated out of the stream – this is not described in the article). Samples were collected back in 2009 – 2011, that is, before the construction of the salmon hatchery, and the displacement of Chum Salmon of lake origin within the lake-river system (Lake Lagunnoye and streams flowing into it) has always existed.

Andrey: Yes. Of course it's true.

Lyudmila: What are your impressions after the first expedition? What is the escapement of Kunashir rivers with Pink Salmon this year?

Andrey: I noted an interesting point that the escapement in the Severyanka River this year was better than in the Filatova River. Last year it was the opposite. For the rest of the rivers, the escapement was lower than last year.

Lyudmila: Mark drew our attention to the fact that rivers need to be examined three times per season. As we have seen from the experience of working in the north of Sakhalin, a single examination of rivers leads to an underestimation of statistical data on the number of spawning spawners. We have even included this condition in the Action Workplan (an increase in the number of examinations of watercourses). Is it necessary for the rivers of Kunashir? The features of the Kunashir rivers are that they are short and shallow.

Andrey: The rivers of Kunashir are small, and the area of spawning grounds is also small. For a single examination, it is quite realistic to get reliable data on the number of spawners who entered the river. The main thing is to choose the right moment when the first spawners have already spawned, and we see spawning redds, while the rest of the fish of the mass run and the end of the run are concentrated on spawning grounds, and there are practically no fish entering from the sea. We were there just at such a moment. This period is approximately from September 25 to October 5. A three-time examination makes sense for rivers such as Poronai, where three seasonal populations of Pink Salmon enter. But the picture on Kunashir is different, almost one autumn population is spawning there now. One examination, in my opinion, is quite enough. It is important to choose the right moment when mass spawning is already underway, and some part of the fish has already spawned. Actually, that's exactly what happened this year. But, in my impression, most of the spawning rivers of Kunashir, especially the southern part, "work" poorly. Severyanka, Filatova, and possibly Tyatinka are working, based on the survey data.

Aleksander: The peculiarity of Kunashir is that when we construct the equations of dependence "parents – recruits" according to the data we have, we get an almost straight line. That is, the more spawners enter the river, the more smolts migrate out of it.

Andrey: But we proceed from the standards developed for Sakhalin. Then it will take 2 million fish to fill all the available Pink Salmon spawning grounds on Kunashir. But on Kunashir and Iturup, the situation is a little different. Kunashir needs its own standards. And Kunashir will never reach Sakhalin levels.

Lyudmila: If we compare Iturup and Kunashir, these are two completely unequal units. On Kunashir, the rivers are shorter and shallower, and the coastal hydrology is different.

Aleksander: These are two different climatic and geographical zones.

Lyudmila: Is it correct to combine these two islands into one management unit (South Kuril subzone) as one stock unit?

Andrey: No, this is incorrect. But it is very difficult now to divide these islands for the management system.

Lyudmila: Is it possible for our purposes (fishery eco-certification) to determine "target" escapement rates for Kunashir?

Aleksander: This is a very big problem. It is very difficult to determine the "optimum escapement" for Kunashir. As I said, there is no inflection in the "parents-recruits" graph, there is no point of the maximum number of parents, when exceeding which the number of juveniles decreases. There is no tipping point. Therefore, it turns out that the "optimum" is 2 million Pink Salmon for the entire island, but it is unrealistic to achieve this value. The situation is also complemented by climatic factors. The area is peripheral for the reproduction of Pink.

Andrey: We can look at it differently. As current benchmarks, taking into account current climate changes, we can take data for the last 5 generations of Pink Salmon (generation of "even" and "odd" years), i.e. for the last 10 years, and calculate the average. And then see what the maximum levels of escapement may be there. But again, in general, in my opinion, it is impractical to do this for all the water bodies of Kunashir, because now mainly northern water bodies are "working", judging by what I have seen.

Lyudmila: Does half of the northern territories of Kunashir belong to the Kurilsky Nature Reserve?

Andrey: Yes, it does. We can establish contacts and get data on those rivers. But also the Severyanka and Filatova rivers, near which the fishing gears of PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd. are located and which we have been examining for the last two years, are also very important rivers - they make the main contribution to the reproduction of Pink.

Lyudmila: It turns out that we have been conducting careful observations for only the last two years. From about 2013 to 2021, there is no such thorough data.

Andrey: The data is available, although not so extensive. Ichthyologists from SakhRybVod conducted monitoring. We can try to look at the data for the last 5 generations of generations of "even" and "odd" years for Pink Salmon, as well as the data of escapement for Chum Salmon for the last 10 years. And calculate the indicators for Kunashir. Because we will never reach the Sakhalin indicators. But all this will be very preliminary.

Lyudmila: But this will be an indicator of escapement, it is already a fait accompli. And what should we strive for? what is the optimum?

Andrey: But does this "optimum" exist in principle for Kunashir? Maybe the level of reproduction that now exists, it is the "optimum" and corresponds to the state of the environment that exists now? I have not observed mass poaching on the rivers. There is also no mass transformation of the environment or degradation of spawning sites. Most likely, the current condition is caused by natural causes. Maybe at the moment this is the norm, at the level of homeostasis between the population and the environment. We can only give an intermediate approximate range, which must

be observed and maintained, and, as far as possible, increase the number of returning spawners to spawning grounds.

Regarding Chum Salmon, the situation is slightly better. Mark correctly says that it is desirable to limit the artificial breeding of Chum Salmon to the Lagunnoye Lake basin. Then it is possible to keep the balance of wild and hatchery fish.

Lyudmila: Unfortunately, we know about the plans of other organizations to build a salmon hatchery on Kunashir.

Andrey: I just can't imagine an alternative. Let's say we strictly prohibit all fish farming on Kunashir. Climate change and warming continue. The level of reproduction continues to fall. And what are we going to do in this case? Are we going to keep our eyes closed and just do nothing? We don't know. In fact, fish hatcheries are now working to restore populations.

Lyudmila: How did you determine the share of transit Chum?

Andrey: So far, it is possible to determine only according to literary data. The best method to date is by otolith marks. But we don't have such data yet.

Lyudmila: The issues of reproduction of Pink and Chum Salmon on Kunashir are the main issues of our Fishery Improvement Project Plan (FIP Plan) and are mentioned in Action #1. Together with PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd., we have developed a Workplan for this Action, which prescribes the collection of modern scientific and literary data and expedition work on the Kunashir during the spawning of Pink and Chum Salmon, as well as the analysis of the data obtained. We also plan to "Improve monitoring during the entry of Pink and Chum Salmon spawners to spawning grounds" (item 2 of the Plan to rebuild local salmon stocks adopted to achieve Action #1 of the FIP Workplan). We have planned to increase river examinations up to three times per season.

Andrey: As it turned out, due to the peculiarities of the Kunashir rivers and the peculiarities of the spawning run, this does not need to be done. We have a double examination in Kunashir: the ichthyologists from SakhRybVod conduct observation, and I (from SakhNIRO) come to observe too. Thus, an independent assessment is obtained.

Lyudmila: What is the mechanism of information transfer?

Andrey: I walk along the river, draw up an Examination Report and in the evening of the same day, or the next day I send the report to the head of the SakhNIRO Salmon Laboratory Vitaly Nikitin. Then Vitaly uses this information to inform the external management system, including for the preparation of materials for the Anadromous Fish Commission.

Interview with Anna Lapshina, a leading researcher in the Genetics Sector of SakhNIRO, PhD in Biological Sciences (PhD theses on the topic of Sakhalin summer Chum Salmon)

Lyudmila: How do you see the prospects for identifying the hatchery and lake forms of Chum Salmon in Lake Lagunnoye by genetic methods?

Anna: Lake fish can be identified from river fish. But it's very expensive. Is it advisable? It is possible to use otolith marking, it is much cheaper.

Lyudmila: Recently, an article by Lev Zhivotovsky was published, where he gave data on a sample from the Pervukhina stream, which was of a "lake" form. Will we get a clear result?

Anna: I can't tell you unequivocally. I didn't work on the Kuril Islands. And relying only on the data of the articles, I cannot firmly say "yes" or "no".

Lyudmila: If the company agrees to incur huge costs for work on genetics, will SakhNIRO undertake such work?

Anna: Our Genetics Sector is very "young", so far it is only in the development stage. At this stage, we will not undertake such extensive work yet. There are problems with reagents and consumables. I still recommend going a simpler way – to apply the method of marking otoliths at the fish hatchery.

Interview with Marina Stekolshchikova, Head of the Sector of Artificial Reproduction and Otolithometry of SakhNIRO

Lyudmila: How did the experiment on otolith marking of Chum Salmon eggs at the Lagunnoye Lake Salmon Hatchery end? Did it work out or not? Were fish breeders able to carry out "dry" marking? Do the conditions allow marking in this way on this hatchery?

Marina: The marking was carried out on a very small experimental batch. I can't say anything yet, because the processing of the samples received has not yet been completed. It was an experiment, a single action. Most likely, we will not carry out further work.

Anna: When will we be able to see the results of experimental marking? And assessment of the quality of the mark?

Marina: Most likely by December 2022.

Lyudmila: When returning hatchery fish, we must allocate their share in the total catch volume. Maybe you can tell us what other methods exist for this? Maybe we can apply the experience of the Khabarovsk Territory? Works by Pavel Mikheev?

Marina: Yes, we have read about the works of Pavel. But I don't think he will work with Kunashir.

Lyudmila: And what do you think about his method at all? About his scientific approaches?

Marina: I didn't go into detail. But what I read is most likely an effective method. Pavel is a serious scientist, and his work has been tested. I think you can try to start negotiations with him.

The SakhNIRO Otolithometry Laboratory is currently under a heavy load. There are a lot of fish hatcheries on Sakhalin, and a huge volume of processed samples. Most likely, we will not work with Kunashir.

Consultation with Vladimir Samarsky, Deputy Head of the Sakhalin branch of VNIRO (SakhNIRO)

Lyudmila: Today, together with a representative of PCF Yuzhno-Kurilsky Ryibokombinat Co., Ltd., we held a number of meetings with SakhNIRO researchers on the problems of reproduction of Pink and Chum Salmon on Kunashir Island. In particular, we held a meeting with Marina Stekolshchikova, who is responsible for the otolith marking programs conducted by SakhNIRO. In 2022, an experimental marking of Chum Salmon eggs was carried out at the Lagunnoye Lake Salmon Hatchery and we turned to her for the results of this work. Marina noted that the report is

not ready yet and she cannot announce the results. In this case, can we further work in the "request letter/response letter" mode to get some preliminary data?

Vladimir: Yes, the company can send such a letter to the head of SakhNIRO and the head will decide what information our institute can provide. But I would recommend applying with a letter to conclude a contract. As part of the contract, you can have a conversation about providing the information you need.

Lyudmila: Marina told us about the heavy workload of their laboratory.

Vladimir: First you send a letter, and then the head of SakhNIRO will decide on the conclusion or non-conclusion of the contract, as well as on the provision or non-provision of some information. You need to know the share of "your" Chum in the fishery. In my opinion, this is a completely solvable task.

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