

# Waters of Health 2020 – Season 1 Report

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This report has been produced by the coordination team of the Waters of Health project including and with original contributions from Jevgeni Kirillov, Håkan Tunón, Marie Kvarnström, Pauliina Feodoroff, and the community teams. Consent forms and ethical research guidance and methods of the Russian Academy of Sciences, Finnish Academy and Indigenous knowledge standards, including Free, Prior and Informed Consent were used during the project. All photos Snowchange, 2020 unless otherwise defined.

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Freshly collected whitefish roe, September, 2020 on Ponoi.

#### Introduction

Waters of Health 2020 is a new action on climate change combining Indigenous and scientific knowledge in monitoring in the Finnish-Norwegian borderlands and in the Murmansk region, Russia, funded by the Nordic Environmental Finance Corporation – NEFCO (The Programme for Environment and Climate Co-operation-PECC).

Waters of Health 2020 expands a monitoring network for northern climate change in Murmansk region (Ponoi river) and in Finnish Lapland (Näätämö). We know that the rapidly proceeding climate change influences biodiversity in these catchment areas. Ground work has been laid out in the previous decade on monitoring in order to detect change in these areas.

Three new locations in the region are included in our work:

- Voronye river catchment
- lake Lovozero
- lake Vuonnijavr in the Murmansk region

Simultaneously the monitoring work in Ponoi and Näätämö will continue and expand. Documented Community-based monitoring (CBM) observations are being analyzed by scientific experts in the Nordic partner institutions to provide a socio-ecological view of these central water ways.

On Näätämö the main local partners are the Indigenous Skolt Sámi. For Ponoi river the focus will be the wilderness communities of Kanevka, Krasnochelye, and Sosnovka. The newly included project areas are: Voronye river catchment, a highly important river way for the Kildin Sámi that has not previously been subject to any CBM action on this level, the lake Lovozero, which is the key site for food security for the Kildin Sámi and the wilderness lake Vuonnijavr is Western Kola. It has been proposed to be the first north boreal rewilding area in the Russian North due to its high biocultural significance.

Water is directly related to health and especially on lake Lovozero early indications point to a link between water quality, fish health issues and human stressors. They will be investigated during the project. Indigenous peoples, who are directly beneficiaries of the whole project, are fully dependent on their home waters and particular ecosystems.

A second and in no way minor issue is the pathway to choose and prepare lake Vuonnijavr as a first regional rewilding and restoration site, leading to a potential *zakaznik*-level (regional protection) new conservation area. Barents Hot Spot actions are directly compatible with these goals and the lessons learned from the Snowchange-led restoration on river Vainosjoki in Näätämö system 2017-2019 will pave a way for the expansion of the Näätämö restoration too, another potential high profile site for the Barents Hot Spot actions.

Lake Vuonnijavr has been carefully chosen by key Saami experts and Nordic scientists as well as previous consultation with the Murmansk regional authorities (communications in 2019) due to its current status as a partially degraded area (small-scale logging), combined with the potential for rapid returns and high symbolic and intangible cultural value as the home area of the Skolt Saami community of Suonikylä (abandoned in 1944).

Lake Vuonnijavr still has the remnants of Skolt Saami family and community cabins, traditional use areas and communal graveyards. Additionally pre-project planning and assessment studies by Snowchange have detected the presence of wild deer (*Rangifer tarandus*) as well as other keystone species for north boreal rewilding in the area. Murmansk regional authorities (communications in 2019) have indicated this to be a very promising and positive site for a cross-border cooperation on Barents Hotspots and the Greenbelt territories.

Information flows that are captured in the project will contribute significantly to the knowledge regarding biodiversity of the protected areas in the basins, aquatic health, drivers of worsening water quality from past environmental problems as well as the contemporary impacts of Northern climate change.



Harvest of the season, August 2020, Kanevka



Project locations on a regional map. Map: Johanna Roto, 2020

#### **Brief Summary of the Project Partners**

Project leader is the non-profit *Snowchange Cooperative* based in Finland. Staff and experts from Snowchange have been working in Kola Peninsula since 1999 and with the Sámi communities since 1996. This science work is carried out with the Russian Academy of Sciences and its research institutes as well as in cooperation with the local authorities.

The Russian coordination work will be carried out by the *Municipal Public Organisation Lovozero Center of Development of Culture* who has operational reach in the remote wilderness communities.

Swedish Biodiversity Centre at the Swedish University for Agricultural Sciences has decades of experience in demanding field-based and Indigenous - science interface actions in the European North. Staff involved with this project has been co-leading for example the Nordic IPBES reports and many other initiatives respecting and valuing Indigenous and traditional knowledge. Swedish Biodiversity Centre partnered with Snowchange in 2018 for the large-scale regional work on the community-based monitoring and has for instance capacity to arrange the chemical analysis of freshwater pearl mussel shells, biological detection of fish biology indicators and other key actions of the present project.

*Saa'mi Nue'tt* is a registered Indigenous association based in Keväjärvi, Finland with the operational reach for the Eastern Saami areas. It has been coordinating and participating in Saami and other Indigenous knowledge projects, including with the Arctic Council, the UN and Nordic Council of Ministers, since 2008. It will coordinate and facilitate the work in the Näätämö catchment area.

#### Actions in 2020

Despite the COVID impacts across the region Waters of Health 2020 kicked into action in June 2020. Then establishment of the teams in Näätämö and in the Murmansk region proceeded as well as making of the regional monitoring plans and actions. Between June and November 2020 the following actions were taken in the project locations:



River Vainosjoki, restored, in the Näätämö basin.

#### Näätämö basin, Finland – Norway

At the start of the summer the Skolt Sámi co-researchers were hired (leads by Kaisja Semenoja and Petteri Feodoroff). These teams

conducted water quality, weather and fisheries monitoring across the season, with the hotspots being lake Sevettijärvi and Vainosjoki river, a restored and rewilded stream.

Community meetings and workshops were held in Sevettijärvi town in August 2020 when the national COVID restrictions allowed for the science teams to conduct fieldwork (lead Adjunct professor Tero Mustonen, specialist Lauri Hämäläinen). Interviews with Skolt Sámi Elders unveiled new sub-catchment areas for the study in 2021 and documented locations of the freshwater pearl mussel habitats both from literature and from oral histories. Weather observations continued using Sámi knowledge.

In order to prepare for the field season to detect and monitor microplastics a large baseline information was produced on fish growth, size, age and locations. This included the analysis of over 300 samples of perch, Arctic char, salmon and sea trout gill and otolith samples to create an understanding of the fish biology and situation in key parts of the Näätämö basin.

Project identified and created the team to start to monitor the microplastics situation. Early results included:

- Detection of potential drivers of plastics in the Näätämö basin to include returning fish stocks from the ocean (salmonids), tourist and local sourcing along the main river course, waste in the fjord and other options (snow-driven plastics in spring melt)
- Assessment of the location of a plastic trap for 2021 in the main river course

• Literature screening of Arctic micro-plastics and comparative view with lake Kallavesi in Eastern Finland. These actions will continue into 2021.

In the Autumn monitoring a note of concern was that the water temperatures in the neighboring Teno basin were 10°C above the normal in mid-November 2020. This was due to another extremely warm Autumn. Monitoring actions were strengthened on Näätämö as a result.

#### Lake Vuonnijavr, Russia

Intensive work began in June to review both the cultural heritage and natural values on the lake. Due to COVID no field visits could be made to this remote region but key north boreal ecosystem surveys were available from the literature and the team ecologist began to assess the current status and trends of the lake and its surroundings.

Special attention is being paid to the presence of the wild deer (rangifer) in and around the lake catchment. Similarly, translation and use and occupancy of the last known Skolt Sámi on the lake (historically the home area of the Semenoffs) was carried out. These actions will continue into 2021.



Lake Lovozero and the River Voronye, Russia

The Voronye river originates from lake Lovozero and flows into the bay of the Voronye in the Barents Sea near the encampments of Gavrilovo. Its length is 155 km, with a catchment area of 9940 km<sup>2</sup>.

The river basin is located in the northern half of the central part of the Kola Peninsula. To the south, it is bordered by the water catchment areas of the rivers Umba, Varzuga, Ponoy, on the East by the water catchment areas of the rivers Kharlovka, Rynda, and Olenka and the West – by the rivers of Kola and Teriberka.

The Voronya river is known as a salmon river. There are perch, trout, pike, grayling, char, whitefish, burbot in the river. In 1962 the

decision was made on the construction of the Serebryansk hydroelectric power station *Cascade*. When constructing Serebryansky reservoir the following settlements were flooded and the inhabitants resettled:

- Pogost Voroninskiy
- Bolshoy Padun
- Serebryanskiy
- Golitsino



A small boy in Voronye original village, now flooded, in 1958.

After launching the Serebryansk hydroelectric power plant the length of the Voronya river was specified as 155 kilometers in the literature. The "new" length of the river is 50,5 kilometers from Lake Lovozero to the top step of the Serebryansk hydroelectric power station Cascade and 26 kilometers from the dam of HPP-2 to the river mouth.

Historically the Voronye remains one of the most famous salmon rivers on the Kola Peninsula. It was the salmon that brought original outside fame to the river. In 1924 its size brought joy to Professor V. S. Docturovskiy, and it continues to amaze fishermen. The genetic memory of the fish is remarkable and now the largest schools of wild Atlantic salmon continues to pour into the Voronya river for spawning in the lower un-dammed reaches of the river. From mid-August sea trout starts to arrive into the Voronya river.

In the 19th and early 20th century, the fishing for salmon was carried out mainly in the estuarine habitat with the help of *harvs*<sup>1</sup> and hidings. The annual catch of salmon in the Voronya river exceeded 4,800 kg<sup>2</sup>.

In 1925-1926 from 20 to 30 tons<sup>3</sup> were fished. In 1928-1933 up to 1,003 kg<sup>4</sup>. In 1950-1981 0,5-6,3 tonnes<sup>5</sup>. The maximum yield was recorded in 1975. Since 1982, there is no reliable data on the presence of salmon in the upper Voronya river from the estuary to Serebryanskaya HPP-2. This will be one of the future aims of the project investigation.

Monitoring and research work in 2020 included the following actions:

- Preliminary interviews in the town of Lovozero regarding the lake health and the river Voronye
- Literature survey of the river Voronye available from public sources
- A research plan to include science and oral histories of Voronye over the 2021 period into the project actions.



River Ponoi and Sosnovka on the White Sea Coast, Russia

#### Krasnochelye

Communications with the largest village on Ponoi were held across the summer and local co-researchers took note of the summer

<sup>&</sup>lt;sup>1</sup> Russian salmon fishing net

<sup>&</sup>lt;sup>2</sup> more than 1,600 salmon

<sup>&</sup>lt;sup>3</sup> or about 6,800-10,400 spawners

<sup>&</sup>lt;sup>4</sup> 200-350 spawners <sup>5</sup> 131-1220 spawners

changes. Finally on early September a large expedition took place to Krasnochelye and up and down Ponoi to document changes and key messages for the summer season. Small COVID-safe community "workshops" were carried out in early September. All in all six oral history interviews were carried out in September.



New playground in the village, 2020.

According to the diary of Vladimir Ylyich Anufriev<sup>6</sup> the ice was formed on October 27 in 2018, in 2019 it arrived October 22 with a difference of 5 days. Three of the respondents noted that the freeze-up has become later and the freezing time of the river has shifted.

Vladimir Ivanovich Filippov said that the freezing time of the river has shifted. Earlier, in the 1990s the river became covered with ice

<sup>6</sup> records are kept since 2005

around October 14-15 but now only in November. In good frosts, the river freezes within three days. "*In mid-November 2019, we already went across the river on snowmobiles*" said Filippov.



Fish being prepared for the season, 2020.

An anonymous respondent<sup>7</sup> believes that the freeze-up has become later. A respondent who wished to remain anonymous recalled: "According to my parents, there were reindeer migrations with sleds on the river already on November 7th. Already on 7<sup>th</sup> of November it was a stable winter reindeer road. This year, even tractors did not go to Lovozero, Lake Lovozero was not frozen as it should."

Lyubov Konstantinovna believed that the freeze-up in the Ivanovka/Chalme-Varre area happened as before at the same time.

<sup>7</sup> Snowchange Oral History Tape Kanevka #3, 2020

According to observations from Vladimir Ylyich Anufriev's diary, ice melt was on

- May 10, 2018
- May 9, 2019
- May 23, 2020.



Krasnochelye river bank, 2020

Three of the research participants noted that recently the ice flow has become slower, the ice "rots", melts gradually, darkens, becomes loose and dissolves in water. Sometimes ice floes are lifted from the bottom and carried away by the river flow. And before the ice floes came out on the banks and cracked, quickly in two days the ice was carried away by the river flow. In Spring 2020 residents of the village noted a high water level on the river. In an oral history interview with Vladimir Ylyich Anufriev he noted that the water level was higher than in 2014. In the area of the water measuring post on the Ponoi river water was flowing on top of the measurement site.

Vladimir Ivanovich Filippov was on the Saharnaya river in June 2020 and he noted that there was a lot of water. He fished, caught cisco, grayling, and trout, salmon had not come up the river yet at that time.

During a trip to Ivanovka (Chalmny Varre), the team visited the Rim Kurya where in 2018 there was shallow and little water. Team visited the Mishka river where it was very shallow. Compared to 2018 there is a lot of algae in 2020.



All residents noted that the hottest period of summer was mid-July 2020. According to Vladimir Ivanovich Filippov, in the middle of July 2020, it was very hot, up to 30 °C. People were swimming in the river. The river became very shallow and dried up.

Vladimir Ylyich Anufriev said that in July it was hot – about 26 °C. On the question about anomalies, Vladimir remembered that his uncle's wife, born in  $1908^8$  told him that in 1928 the river froze on September 28.



Inspecting whitefish catches, September, 2020

From Vladimir Ivanovich Filippov's oral history observations: "On lake Losye cisco became larger, mostly in winter, but there was less

of vendace. On this lake, local people put nets in winter. They began to catch more fish and therefore the cisco has become larger". Large salmon does not come to Krasnoshelie because of the tourist camps located lower on the Ponoi. Size of the salmon that reaches the village starts from 1 kg and slightly higher.

"In June, on the river Losinga I caught five fish on spinning, the largest one weighing four kilograms. Most of the fish are healthy without any changes. One was caught injured, pike are found both on the river and in lakes. I caught one on the spinning weighing five kilograms in the area of Ivanovka. White bubbles started to appear on the liver" said an anonymous source.

All residents noted that the liver of some fish has damaged by white spots. Spots on the liver of pike rarely appeared. Anonymous source noticed that salmon is not caught in the area of the village. To catch salmon, people go to the Sukhaya river or the Lebyazhka river. "*This year I took six licenses, though I took ten previously, and caught four fish of 1.5 kg. In 2019, I was fishing for a week and caught salmon of four kg. Licenses are sent to the village, one license costs about 300 rubles.*" He noted that until fishing tourist bases appeared, there were plenty of fish.

All residents noted presence of ducks on the river. Number of hazel grouse and capercaillies lowered near the village. Swans nest on lake Nizhne-Kamenskoe. White-tailed eagles are now more common over the river.

<sup>&</sup>lt;sup>8</sup> they lived in the Oksino area.

Vladimir Anufriev noted that this year there are no capercaillies: "the main thing is that there are berries, but there are no birds near the village. There are traces of an otter during the haymaking, if there is an otter then there are more fish. There are moose, wild reindeer haven't been simply seen at all."



Aerial view of Krasnochelye, 2020

According to Lyubov Konstantinovna's observations, the swans arrived on 20.04.2020. There are also many ducks, swans, and eagles in the area of the village. "There are a lot of bear tracks, and I only met one bear, but the dogs drove it into the forest". She noted that otters live on lake Peschany and began to appear in small rivers. She often watches through the window as moose cross the swamp from forest to forest. In summary for the 2020 discoveries, it can be said that life in Krasnoshchelye is becoming more comfortable, but the traditional way of life is preserved. Noticeable impacts included:

- Climate change is palpable, and warming affects ice and river flooding. The weather is less predictable. Oral histories indicate Ponoi used to freeze in September in 1928 with todays freeze-up usually in late October to early November.
- Health of the river and quality of water in the river do not cause any alarm.
- Salmon season this year was poor, the fish became smaller in size.
- Attention should be paid to changes of the river banks.
- The main problems are: the flight only once a week, the number of residents is decreasing, the lack of jobs for young people, alcoholism.



Kanevka

Preparations for the project actions were carried out in Kanevka with a connection to the local teams. A full visit took place from 9th to 16<sup>th</sup> September 2020. In summary in 2020, Kanevka village lives by nature - that means collecting wild berries, mushrooms, fishing, hunting and small businesses: selling mushrooms, berries, horns, fish, and receiving tourists.

Among the main problems of the village residents name lack of medical care, lack of round-the-clock power supply, lack of kindergarten and school. One of the achievements over the past two years is the construction of a new bridge over the Yoganka river connecting two parts of the village. The bridge was built on sponsors' money. Despite the fact that the need to build a new bridge was long overdue, local residents did not want to invest their money and effort in it.

Director of the company "*Serebro Ponoya*" (Ponoi silver) singled out construction materials and workers who worked at one of the tourist bases on Ponoi. Construction materials were also provided by the tourist company CJSC "*River Ponoi*". Construction of the bridge was also attended by two local residents and two female local residents made a painting of the bridge.

Also, one of the significant achievements is getting a mobile fire – fighting post, which includes a full set of inventory, equipment and uniform for fire extinguishment. It is a trailer that can be attached to a motorcycle, ATV or other vehicles. The mobile post was handed over by the Murmansk regional branch of the all-Russian voluntary fire society.

According to one of the residents, there are only two such posts in entire Murmansk region. Since the village has mostly wooden houses and fires have often happened before, the villagers are very happy with this acquisition. Residents of the village prepared an appeal to the district administration, and thanks to their perseverance, a volunteer fire brigade was organized in the village, where to this equipment was brought.

In the 1970s and 80s according to locals there were four brigades in the Kanevka branch of the state reindeer farm "*Olenevod*", each consisting of 6-8 people. Number of reindeer was about 15 000 in those days. In 2020 only one person worked in the Kanevka branch of the cooperative "Olenevod" on a permanent basis, three people are hired under a contract in the winter.

Today the number of reindeer is only about 3000. Kanevka has always been a village of reindeer-herders with the cooperative being a town-forming enterprise. Everyone who lives in the village is somehow connected with reindeer farming. Therefore, residents are worried about the future of the cooperative.



New bridge of Kanevka, 2020

Many people say that the reindeer in Kanevka are larger than in Lovozero and Krasnoshelye, the pastures are richer. But in order to develop reindeer herding leading to more prosperity, reindeer herders should be constantly with their herds taking care of them and protecting them from poachers.

Local residents remember that in autumn in November 15 years ago

(2005) reindeer were driven across the river. It is impossible to do the same right now. The climate has become milder, the river does not freeze so early. The river still freezes in the autumn but the quality of the ice has changed. There are less severe frosts in autumn, but more snowfall is noticeable. The ice does not have time to freeze, snow falls that prevents freezing. The ice became like a "*layer cake*".

Ice melt and associated drifting can change from year to year with a difference of a month. In 2016 the ice melted on May 1. Last year and this year it happened closer to June 1. According to local residents, the ice drift has changed compared to the past. The ice melts before it leaves the river. Since the ice is loose, the ice drift has ceased to be "*noisy*". There are no huge boulders, no stones are demolished, there is no hum.

15-20 years ago if standing next to the river during the ice drift talkers did not hear each other. Now the ice is coming off almost noiselessly in a couple of days. But, residents note, this year, due to heavy spring snowfalls, the water in the river rose strongly and the ice descended quite noisily, but still very quickly. This year, ice jams were observed in narrow areas of the Ponoi river. This year, the water level has increased very much. The last time such high water was observed according to locals in 1976.

Locals did not express any particular concern about water quality. Some residents note that there is now more vegetation in the Ponoi. There was a lot of snow this year, so the flood was significant. The river washed away the banks in some places. Pieces of the bank were carried into the center of the river, up to the formation of islands. At the confluence of tributaries of the Ponoi river, the river mouths change their shape, and "*a braid*"<sup>9</sup> appears.



Low waters of Ponoi at Kanevka, 2020

Over the past two years, there have been no forest fires near the village of Kanevka. Usually fires in this area occur due to dry thunderstorms. This year a summer was not dry but rainy. At the end of July 2020, the highest air and water temperature was observed. The air temperature rose up to 30 °C. The water temperature did not rise above 13 °C.

According to locals, there has been a decrease in the weight of each individual salmon over the past two years. If earlier the average individual fish weighed about three kilograms, now it is 1,8 - 2

kilograms. Changes in the taste of fish were not observed. Size of the salmon has changed according to the observations of residents. In the spring size of the fish was less than usually, but its number was greater.

In the spring, fishing was successful for everyone. Amounts of trout have decreased. Five years ago, there were a lot of trout in the Ponoi river but now the number of trout has sharply decreased. There are fewer large pike - almost no large specimens are found. As for whitefish (cisco) and ide, the situation has not changed much, but some residents note that the number of whitefish, especially large individuals are increasing. Cisco bite even on a spoon which is surprising because cisco is not a predatory fish.



Bank erosion of Ponoi, 2020

<sup>&</sup>lt;sup>9</sup> a low alluvial strip of land on the riverbank

Residents note that in the area of Kanevka village the number of predatory birds has decreased. There are more waterfowl birds now. In the last two years magpies have appeared though they hadn't existed here before. The number of capercaillies has not changed much, and maybe even have increased. Many residents said that capercaillie hunting is good.

Residents did not notice any abnormalities or deterioration in the quality and taste of fish. In the summer there were no pink salmon in the river. This is natural, since pink salmon spawning in the river comes once every few years. Last year (2019) there were a lot of pink salmon in the Ponoi river.

During the field visit, the team observed a large number of butterflies called peppered moth<sup>10</sup>. According to local elders, this has never happened in their memory. Nobody knows why they appeared in huge numbers. Some people expressed an opinion that it is time not only to take fish from the river, but also fish farming. To do this, they want to organize a fish farm for salmon.



Documenting the moth at night time, September, 2020

<sup>&</sup>lt;sup>10</sup> most likely *Epirrita autumnata* 



Sosnovka coast, 2020

#### Sosnovka

Analysis of the previous data constituted the first summer actions from June to August. A large expedition to document changes and establish local teams was carried out from 12<sup>th</sup> to 19<sup>th</sup> August 2020.

The visit included interviews with four people. Six audio recordings of the interviews were made, including interviews with the head of the hydrometeorological station and the representative of the Lovozero district administration.

The snowy winter of the end of last year and this year has caused serious adjustments in the process of ice formation. As all

respondents noted there was no solid freeze-up at the end of last year. The winters became warmer, but in Sosnovka, as in the entire Murmansk region, there was a very snowy winter.

This winter was the snowiest winter in the last 50 years. It brought a lot of problems to the inhabitants of Sosnovka. One person reported having to dig out his house and make almost a tunnel with threemeter-high snow walls to get to the firewood that heats the house. Quite similar problems were faced by almost all residents of the village, which does not have public services and special snow removal equipment.



River Sosnovka, 2020

Due to a large amount of snow, the ice has changed a lot. The rivers were clogged with sludge<sup>11</sup>, then, at the end of October, all this was covered with quite thin ice, which was raised and broken by the water. Frosts were replaced by thaws, during which still thin ice was covered with a thick layer of snow, then the water broke through the ice to the surface and froze again during the frost. Therefore, the ice mixed with sludge and snow froze in layers and turned out to be very fragile.



Preparing for the winter with timber

There has been no freeze-up in the sea for several years. As the head of the hydrometeorological Station Vladimir Zotov noted in his observations, a few years ago, the ice came in December, but now only broken ice comes at the end of January and leaves at the end of April. *Salma*, the strait between Sosnovets island and mainland, has not frozen in winter for five years (2015-2020).

If earlier the sea brought large ice floes that got stuck in the Strait and froze into the coast, connecting the island with the coast of the Kola Peninsula, now there it does not happen. There are also no large ice fields in the open sea. Mostly in the sea, you can see only shallow ice. The reason for this, as Vladimir Zotov thinks, is warming. If earlier the air temperature in winter reached minus 30 degrees Celsius, this winter the lowest air temperature was recorded at only minus 23.6. The average temperature is 10-12 degrees below zero.



Family harvesting on the Sosnovka with fish traps

<sup>&</sup>lt;sup>11</sup> fine loose ice that appears before the freeze-up

In the strait between Sosnovets island and the shore on which the village stands villagers often observe beluga whales. On 12 August 2020 during a trip to Sosnovets island, Sergey Eliseev observed a beluga while being on a boat near the coast of the island. As Sergey noted, usually at this time belugas appear here in places with more depth and hunt fish.

Sergey Yulin says that there are a lot of belugas and he has also repeatedly observed belugas that go out to sea both alone and in schools. In July of this year, he saw three beluga whales hunting fish in the strait. The same observation was made by Ivan Eliseev who watched a school of belugas hunt the fish.



Fish traps, September 2020

The number of ringed seals also did not decrease, the only thing is that they left Sosnovets island. All the ringed seals were scared away by the dogs living on the island<sup>12</sup> that did not allow them to breed on the island.

But, according to the employee of the lighthouse located on the island next to the hydrometeorological station all the seals are now on Snezhnitsky Cape five kilometers from Sosnovets island and there are a lot of them on it.



Community of Sosnovka

This year, quite a significant amount of navaga appeared. As Sergey Eliseev noted, it happens that there is a lot of navaga, but it was also so that this fish was not there for three years. Someone said that it

<sup>&</sup>lt;sup>12</sup> there used to be one, but now there are three on the island

was lost, poisoned. But now this type of fish has reappeared. There are both navaga and flounder in the sea.

There is less the lumpsucker or lumpfish<sup>13</sup>. Previously, there were many lumpfish nearby Sosnovka, but now only one large female and four small ones have been caught in the fyke hoop net<sup>14</sup>. The rest of the sea fish stocks were perceived to be healthy for the most part.

White sea herring, flounder, navaga, haddock and gobies are regularly caught. Concern for the amounts of salmon and health of the fish were raised on several occasions later in the season, especially in October and November 2020.

<sup>&</sup>lt;sup>13</sup> Cyclopterus lumpus (Пинагор - Russian, henfish)



#### Conclusions

The first field season for Waters of Health 2020 project has been concluded with success. Rather surprisingly, despite the sweeping impacts of COVID, field teams could go out to remote communities safely and without jeopardizing the locals. National and international instructions and guidance were followed carefully to conduct safe and meaningful expeditions.

In Lovozero, Sevettijärvi, Murmansk, Uppsala and Selkie the literature surveys and analysis of materials were carried out to support and analyze the field discoveries.

Whilst 2021 will bring a much-needed additional field season, we can see the impacts of climate change across the Näätämö, Vuonnijavr, Voronye and Ponoi systems, with some of the key messages being:

- Atlantic salmon, a keystone species of the region, was observed to be smaller and less in numbers, especially in the Näätämö system and parts of Ponoi.
- Changes to the cryosphere, i.e. snow and ice formation, quality and melt events continue. In November 2020 water temperatures above 10 C normal were detected in Teno system, close to Näätämö in Finland. Emerging data from oral histories indicate that in 1920s Ponoi used to freeze in September, now the freeze-up can be delayed to November.
- Droughts (despite big snow amounts in the previous winter) and algal blooms were observed in several parts of Ponoi. In Spring floods and ice dams were noticeable especially in Kanevka.
- On the White Sea coast, navaga stocks were doing well and seemed to be thriving and according to Indigenous

knowledge the fish operates in three-year-cycles. Lump fish was observed to dwindle.

- Beluga whales are healthy and in large numbers on the White Sea coast.
- Changes to bird populations especially on Ponoi were observed. Predator birds seemed to dwindle, and this will be monitored also in 2021.
- Ecological baseline of Arctic char, perch, salmon and sea trout was conducted on Näätämö and this work will continue in the context of plastics and fish stocks in 2021.



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