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**"POMORS' FISHING ACTIVITIES:
HISTORY AND UP-TO-DATENESS ON EXAMPLE OF THE KERET RIVER"**



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Introduction

In 2014 within RSO project "The Gold Coast of Pomors: features of culture of the population and of the natural environment of the Karelian and the Pomor coast of the White Sea" implemented by social organization "The Basin Council of North Karelian Coast of the White Sea", the scientific-research expedition was carried out. In the course of the expedition there have been meetings conducted with the population of the littoral zone of the White Sea. We have managed to examine not all the planned promising parts of the coast on the route of the expedition. This is connected with the fact that in the area of the Ivankov fishery (in the past the area of the Pomor community of Keret village) there were found the archaeological, ethnographic and historical monuments from the era of the early metal to modern times and up-to-date complexes. Detailed fixation of these findings, in accordance with existing requirements to the archaeological record took more time than that planned under the project. Among the discovered monuments there are the UNIQUE ones not only for Karelia, but also for the whole of Northern Europe.

In the mind of any person who is interested in Russian history, the word "Pomor" raises a range of quite specific, living and vivid images. For the first time this term appears in written sources in 1526, where it is set against "Loplyans". In official documents the term "Pomor" is used in 16 century as a self-name and as a name. It is possible that under "Pomorie" initially Murman was implied. As "Pomorie" in 16 century was not always a synonym to the conception "Pomorskaya volost" (Zaonezhie, Kola, Kandalaksha, Umba, Keret, Nyukhcha), by the second half of the 17 century eastern Murmansk fisheries were developed, in which mainly the population of Karelian Pomor, Winter, Summer coasts of the White Sea is occupied. The whole population of these places involved in fishery, not in trade, was called Pomors.

In the system of classification of Pomors' ethnic communities of different degree are attributed to smallest ethnic units of Russians. At present Russian Pomors live on the coasts of the White and Barents seas.

Populating of the White Sea coast and formation of its population, or appearance of the permanent Russian settlements, is a part of the ethnic history of the Russian North in general. It took place mainly in chronologic frameworks of formation of the whole massif of northern Russian population in 12-17 centuries. Based on sources we can suggest that vast majority of Russian permanent settlements on the coast of the White Sea appeared in the period from mid 16 century up to early 17 century.

By the first third of 18 century permanent settlements on the White Sea coast has formed a line from the mouth of the Mezen River up to the Ponoy River. In 16-17 centuries an increase in population occurred as in the previous centuries in spite of the difficult foreign-policy situation. Particular strongly Pomor districts have suffered in the war with Sweden in 1589-1592. From the second] part of 17 century life in marine districts has become stable, intensive development of sea fisheries and trade that attracted the population. Final populating of Pomor territory in general or appearance of all Russian settlements that exist now refers to the mid of 18 century and for the first time were shown in the Reineke map in 1827.

Formation of considerable part of Pomor territory happened on lands of Karelians, who moved to these regions in three stages: 1) late 12-13 centuries, 2) "second wave" – 15 century, 3) first half of 17 century – third wave of movement of Karelians.

Settling Russian migrants on the coast of the White Sea involved in the sphere of their life Karelian population who lived there. Participation of Karelians in formation of Pomor population during 15-17 centuries was reflected in self-consciousness and names of citizens of certain districts. Karelian population quickly assimilated in Russian population of Pomor regions: relation with their homeland was lost, Karelian language was forgotten. Assimilation of Karelians, who appeared in Russian Pomor environment not later than mid 19 century, was quick and without complications.

Main occupations of Pomors were fishing, marine sealing and catching of white fish. Atlantic salmon marine and river collector fishing continue to be of omnipresent importance. In the second half of 19-20 centuries Atlantic salmon couldn't compete with cod, herring and navaga regarding yield volume but its high price forced Pomors to intensively fish exactly this fish.

To ancient and unique business of Pomors refers salt production and pearl fishing. But both of them were brought almost to nought. Pearl was an indispensable material for decoration of Pomors' clothes and adornments. By the end of 19 century salt production was limited by local level and it also couldn't compete with the high quality salt as local level of production was primitive.

So, sea fisheries, river and lake fisheries being initially the main economic activity of citizens, settled on the White Sea coast, has been of great importance in formation of general features of socio-economic structure, culture and way of life of Pomors distinguishing them among the total northern Russian population.

As a result of expedition interrelation of archeological and historical monuments, traces of fishing activities of the population of Karelian coast, found during expedition, with contemporaneity was set, and in particular, when studying the state of historical businesses in our days. For local population our expedition was of high interest, there were no days without contacts and meetings with local contemporary population of Karelian coast. Meetings and discussions with people who are direct descendants of pioneers of the Russian Arctic were interesting for us.

As it was mentioned above, during the period of extending of the Russian state on the ground of economic interrelations of different groups of population living on Pomor, Karelian and partially Kandalaksha coasts of the White Sea, a community was formed that took the name - Pomors. The name Pomor on the Russian North, according to the available data, appeared for the first time in written sources around 1526: "Pomors from the sea Okiyan from Kondolakskoy inlet asked together with Loplyans the church to be built". From that time the name Pomors, Pomorsky, Pomorie permanently appear in act monuments and cadastres of 16-18 centuries, with this the last two of them are met more frequently than the first one. As a name it is used in governmental pancharts of 1546-1556. Citizens of Kandalaksha and Keret volosts used it as a self-name. When writing different pancharts in 1580-1581 the signed: "Pomor Kandalakshin", "Pomor of Keret volost". Besides Kandalaksha and Keret also Shiskaya volost -1549, Kola and Kovda, Poria Inlet – 1556, Umba – 1557, Keret – 1581, Kem, Suma, Varzuga were called "Pomor volosts" as well as other "Pomor volosts" of the Solovetsky Monastery.

These meetings with people consisting of professional hereditary fishermen survived in conditions of present economy, engaged in traditional industrial fisheries on the sea fishing grounds,

and people engaged in “cottage industry” on “old-fashioned” fishing grounds, always finished with the same question, which became rhetorical: **“You scientists, tell us: where “Fish”, what’s going on with “Fish”? ”**

Pomors always called only **Atlantic salmon** as “Fish” (exactly with capital letter), all other fish they called strictly in accordance with their names: pertui (cod), henfish, chabot (bull), etc. Initially there were not practicing ichthyologists and specialists in the given sphere among participants of our expedition. Herewith, studying historical artifacts and traces of the past we felt peculiar informational vacuum, which would have connected results of our work during investigating culture and history of Karelian coast with present condition of fisheries. In this interrelation we could more fully ascertain the purpose of some expedition findings that are not identified at present time but in the context of location are inseparable from the culture of Pomors. Probably the answer to this simple question, which citizens asked us, lies in this relationship.

KROO “Basin Council” organized and held in July 2014 in Chupa the international research and practice conference “Cultural and Natural Heritage of the White Sea 2014”. Among participants of the conference there were specialists of authority in ichthyology, fishing and fish-breeding, who perform a long-term work in breeding and investigating Atlantic salmon stock of the White Sea and the Keret River, in particular.

Keret is the only river in Karelia, in which the “brood stock” of Atlantic salmon has been preserved

It is the only river in Karelia, which is not overregulated by dams of hydropower plants. At the same time this famous and largest Atlantic salmon spawning river suffers from global problems with natural reproduction of Atlantic salmon. Difficulties of coastal sea fishing of Atlantic salmon and catastrophic drop in catches (of which we were asked by citizens during our expedition) on Karelian coast of the White Sea are the largest sequence of the problem of fish reproduction in the Keret River that is caused by numerous factors of anthropogenic impact.

If the fish suffers from reproduction problems in the native river the whole coast suffers. Atlantic salmon is spawning in that river, in which it was born and lived in, developing from hatchling up to «pokatnik» or smolt during several years (of course, there is a certain invariance but it is insignificant). Moving along Karelian coast of the White Sea to its native river, exactly Atlantic salmon going for spawning to the Keret is caught into fishermen’s nets.

On our request Vyacheslav Ignatenko, fish-breeder of the Keret unit of the Vygsky Fish Hatchery, who took part in some stages of our expedition, has drawn up a popular science essay about history and present state of fish-breeding on the Keret River, its problems and perspectives.

We hope that acquaintance with this essay will awake interest of local citizens, guests of the region; that presented information will actualize factors of human impact not only on the Keret River with exclusive and unique Atlantic salmon stock but also on other rivers of the Karelian coast being under threat. It is within our power to prevent this threat even with minimum means and actions.

We specially want to address our readers visiting the Keret River and particularly hundreds of fishermen and thousands of tourists rafting here:

**FOR THE PURPOSE OF PREVENTING INTRODUCTION OF
GYRODACTILUS FROM KERET TO THE NEAREST RIVERS ONE
SHOULD CAREFULLY DISINFECT AND DRY BOATS, FISHING
GEAR, BOOTS, ETC., AFTER WORK, FISHERY, RECREATION AND
TOURIST RAFTING AT THE INFECTED BASIN**

WHAT IS GYRODACTILUS, WHY IT IS NECESSARY TO FULFIL THIS SIMPLE RECOMMENDATION AND WHAT RELATIONSHIP IT HAS WITH SUSTAINABLE DEVELOPMENT OF THE COAST – READ IN THE ESSAY OF V.V. IGNATENKO.

Chairman of Karelian Regional Non-governmental Organization for Sustainable Development and Protection of the Environment “Basin Council of North Karelian Coast” Rybakov Yu.N.

IGNATENKO V.V. "FISHING ACTIVITY OF POMORS. HISTORY AND UP-TO-DATENESS ON EXAMPLE OF THE KERET RIVER"

From author to a reader

Beginning to write this brochure I thought what to tell about – about people, fish, place, about fishing, reproduction or protection?

I will tell mainly about salmon of the Keret River as of all rivers of Karelian coast it has retained the whole complex of problems related to ecology, fishing and reproduction of salmon.

First, the author would like to present a small article written several years ago for the regional newspaper. In it an attempt was made to shortly recount the essence of problems of the Keret Atlantic salmon. If after reading this article an interest to the declared theme will not wake up, don't waste time on reading this brochure.

As mentioned in introduction to the essay, during meeting with fishermen in 2014 we permanently heard the question: "**You scientists, tell us: where "Fish", what's going on with "Fish"?**" this question was actual also 15 years ago, it sounded absolutely in the same way, but at that time it was not simply ironic-rhetorical but rather with "threat", as local citizens quite sincerely believed that fish accounting barrier set on the Keret catch out all Atlantic salmon in the spawning river and because of this fishermen's yields on marine fisheries dropped. To clear up what fish-breeding point is engaged in and where the root of reasons of fish amount decline was the mentioned above article published in the local press.

Problems of Keret

(extract from newspaper "Pripolyarie", 1999, Ignatenko V.V.)

During several last years, as the interest to the Keret River grew up as an object of sport fishing of salmons, the issue of the Atlantic salmon population reduction in the mentioned basin raises more sharply.

Philistine reasoning on the given issue mainly attempts to connect activity of the fish-breeding point of FSI "Vygsky Fish Hatchery" on Lake Zabornoye with the effectiveness of the sport and illegal fishing of Atlantic salmon on the Keret River.

We present explanations of activities of the fish-breeding point on the Lake Zabornoye (Keret River) and problems of Keret Atlantic salmon.

The net blocking the river in the place of its leaving Lake Ozernoye is a fish accounting barrier (hereinafter, FAB), which has the following functions:

1. Account and passing into the river of adult salmon specimen for natural spawning.
2. Selection of spawners of Atlantic salmon for sampling incubation material (roe) with spawners returning (fish) into the river after collecting roe.
3. Impregnation and sending roe to the fish hatchery.
4. Tracking of released fry (two-year old) running to sea.

Installation and work of FAB is coordinated by acting enactments in the sphere of fishing and reproduction of water bioresources, Decree of the Federal Agency RF and authorization for fishing given by Administration of the Federal Service (Rosselkhoznadzor) in RK.

Annually the Vygsky Fish Hatchery releases 150 thousand of downstream-migrant fry to the Keret River. Main part of specimen in the spawning stock of Keret Atlantic salmon falls on the fish

released by the hatchery, in spite of the fact that major part of Atlantic salmon spawners is released for the natural spawning. This situation is made conditional on poor conditions of natural spawning.

The following factors impact the natural spawning:

- Press of poaching related to illegal Atlantic salmon fishing.

Branchial-dermal parasite of Atlantic salmon **Gyrodactylus** (*Gyrodactylus salaris*), one of the most dangerous parasites able to eradicate the whole population of salmon in the river.

Causative agents of gyrodactylosis are worms from monogenetic flukes, parasitizing on the body surface, fins and gills of fish. It is viviparous, small (less than 2 mm); its mouthparts are in the form of cupules with hooks for fixing in the fish tissues. It is reproduced in any season. Infection happens with the contact of ill fish with healthy ones, as well as through water. (*Kalyuzhin S.M. 2003*)

Infected with the parasite salmon population during 1-5 years decreases in amount almost up to null. Gyrodactyli are fed with mucus and cells of the fish body that results in cancers, branchial tissues necrotize, blood picture changes; the ill fish delays in growth, loses weight and dies. (Kalyuzhin S.M. 2003)

In 1990s *Gyrodactylus* infected several tens of rivers and salmon farms of Norway. Norway spends huge monetary resources to fight against parasite, rivers are treated with ichthyocides. Efforts are exerted to breed with hybridization the salmon strain persistent to *Gyrodactylus*. (*Kalyuzhin S.M. 2003*)

For the first time *Gyrodactylus* was discovered in the Keret River in 1992. In recent years its amount has reduced.

It is obvious that for the cardinal improvement and rehabilitation of the Atlantic salmon population in the Keret River it is necessary to completely exterminate the parasite. Observations showed that after reduction of the number of the parasite, some increase in number of natural fry and return of mature fish to spawn was recorded. Due to the revealed phenomenon it seems important to continue further parasitological investigations.

Regarding other salmon rivers of the White Sea coast, examinations showed that the Keret River is still the only basin, where the parasite is found. However, despite of the fact that dissemination of the parasite from river to river through the desalinated zones of the White Sea basin is almost excluded, for the purpose of prevention of introduction of *Gyrodactylus* from Keret to the nearest rivers it is necessary after work in the infected basin to carefully disinfect and dry boats, fishing gears, boots, etc. (*Iyeshko E.P., Shulman B.S., Shchurov I.L., Barskaya Yu.Yu. 2005*)

If a dear reader feels interested in, let's begin from biology.

Biology of Salmons of Keret River

Salmon family of the Keret River is represented by three genera: two indigenous genera, salmons and pollan, and also an artificially acclimatized representative of Far Eastern salmons at the turn of 1950-1960s – humpback salmon.

Genus of direct Keret salmons includes two species. They are Atlantic salmon and trout or steelhead. Let's dwell on Atlantic salmon. S.V. Maksimov in his book "Year on the North" (1856) describes it in this way.

"Following its centuries-old inherent instinctive incentives Atlantic salmon annually performs its migrations from polar countries to coasts of seas. Performing these innumerable travels and becoming on its way a rich prey for marine animals, this fish (still in abundance) enters by the way from the ocean into the White Sea. Here it chooses rivers, full of rapids, and if possible, the calmest in riverhead, probably due to the same instinctive incentive. Having strong muscles, giving it the opportunity to swim faster than all known fish species, Atlantic salmon wriggling along rivers and meeting obstacles in rapids,

jumps over them sometimes 1 1/2 sazhen (2.34 meters = 1 sazhen) high. Due to this features it was called salmo or jumper.

The White Sea Atlantic salmon scattering after polar migration and travels along the foreshore of Murmansk coast, Novaya Zemlya, along Norwegian coasts up to the extreme southern borders of the latter, along all longest full of rapids rivers of the White Sea: Dvina, Mezen, Onega, Kem, mainly and in far larger amount spreads in rivers of the nearest to the ocean Tersky coast. Here it is the most important and richest haul»

I should note that of all seen descriptions of Atlantic salmon this I like most of all.

I would like to acquaint readers with characteristic given in the work of Yu.V. Kostyliov "Fishes" in the series "Fauna of Karelia":

"Atlantic salmon is the most valuable species of our ichthyofauna. It is widespread along the whole White Sea coast in Karelia, where it enters for reproduction in 14 tributaries, some of them in single specimen. Of Karelian river in previous years Kem and Vyg were famous for Atlantic salmon, but because of construction on them of cascades of power plants and other hydraulic works both rivers have completely lost commercial importance".

The White Sea Atlantic salmon is represented by two ecological forms (races) – winter and spring, which differ by time of entering river for reproduction and state of reproductive products. Winter form (it is also called as "autumn" salmon) enters rivers from the end of summer and till late autumn. Reproductive products of this form are poorly developed and mature only by autumn of the next year. In winter its movement in river as a rule stops. Part of the "autumn" salmon goes back down the stream to mouths of rivers. In spring its movement in the river begins again but the former "autumn" salmon gets already different names – "podledka" and "zaledka", characterizing the time of migration beginning.

Spring form (known also under the name of summer salmon) enters from the sea with well-developed reproduction products and spawn in autumn of the same year. In Karelian rivers of the White Sea the spring form of Atlantic salmon prevails in number but in the neighboring Arkhangelskaya Oblast and along Tersky coast of Murmanskaia Oblast is a reverse picture.

Summer salmon in its turn is divided into several groups in accordance with the time of its run and some other biological characteristics. From mid June and till the end of summer are running large female fish under the name "zakroika". Mass run of this group is often happens in the first half of July. From mid July small male fish start running, known under the name "tinda", which spent in the sea only one winter stay. Large male fish named "mezhen" start running a bit later – in the second half of July. Their mass run falls on early August and usually corresponds to the lowest level of water in the river. In the sea these male fish spend two, more rarely three winter stays.

Attribution of salmons to "winter" and "spring" forms is to certain extent artificial and generatively is not stipulated. In the brood of parents of "spring" form, as experience of artificial breeding and marking fish indicates, both "spring" and "winter" specimen can appear.

Sizes of Atlantic salmon depend on belonging to one or another biological group. Some specimen of "autumn" Atlantic salmon of the Kem River reaches the mass of 16 kg; tinda usually weights 1.5 – 2 kg and rarely reached 3 kg. In other regions of distribution Atlantic salmon of bigger sizes is quite frequent. For instance, in the Pechora River specimen of up to 40 kg were caught and in the mouth of the Neman River (Baltic areal of Atlantic salmon) – even up to 46 kg.

Atlantic salmon spawns in autumn (in October). Spawning places are located in groups on different distance from the river mouth. Fish that began running earlier upstream usually move away more from the river mouth to places of spawning. Breeding power (a number of ripe roe) is not very strong in Atlantic salmon – even large female fish rarely have more than 20 thousand roes. But this amount can't be used completely for getting breed – not all the roe is spawned and not all spawned roe is impregnated during spawning. Majority of fish die after the first spawning but part of them survive and in the same autumn or more often in spring after ice drift run to sea (they are called "valchaki") and can take part in spawning again.

Fry of Atlantic salmon spends in the river 2 – 3 years, more rarely up to 5 years, then leaves it and runs to sea. But a part of young male fish remains in the river and, though it does not add in size, it

reaches sexual maturity here and is involved in spawning along with the large coming from sea males. Such "pygmy" males can spawn in the river more than once. Though, "pygmy" also can change its residence in any year, leaving the river for the sea and coming back as a large usual male.

In the sea Atlantic salmon switches over to predatory meals, grows quickly and in search of food it can move away from native rivers over long distances. It is known, for instance, that many stocks of the White Sea salmon fattens in the Norwegian Sea. Having spent from one to three years on fattening in the sea, Atlantic salmon returns to the river, where it was born and grew for the first years of life. In general life span of salmon is not very long – not more than 5 – 8 years. Quite rarely it manages to spawn more than twice though one case of five-fold spawning of female caught in Scotland was described.

Atlantic salmon is a quick and strong fish. As marking results showed, it can develop speed of 100 km per day while migrating in the sea. When entering to the river speed of its movement significantly reduces – it has to overcome numerous rapids and waterfalls rather than stream. Atlantic salmon copes with this task successfully as a rule: bending its body in an arc and hitting water with a tail it jumps up over obstacles for 2 and sometimes for 3 meters high. But such "run with obstacles" comes with high cost – salmon loses much weight, weakens and many fish have vital forces enough only for making brood chamber and hatching roe".

We have to add to this description only the fact that when Atlantic salmon enters the river from the sea for spawning its body acquires spawning color, the form of lower jaw changes; it doesn't eat at that time.

River Keret

Lake Petriyarvi is usually considered to be the riverhead of the Keret River, though some experts consider that Lake Keret is its head. The length of the river amounts to 110 km. The river has two large tributaries, in the upstream it is Elet, and in the lower course it is Louksa. Rafting along Keret one can count 18 rapids, among them the most well-known are: Murash, Varatsky, Krasnobstry, Kelevaevsky (named after the dynasty of Keret pearl fishers Kelevaevs), Zhemchuzhny and Morskoi. Lake areas make up approximately a third of all length of the river. The largest lakes in the stream of the Keret are Novoderevenskoye, Varlaamovo, Krivoye, Varatskoye, Maslyannoye and Zabornoye. Difference in height between mouth and head of the river that is called a general river's fall, amounts to 91 meter. Mouth is Keretskaya Inlet of the Kandalakshsky Bay of the White Sea. The river ends with Morskoi Porog, directly flowing into the sea; after its sandbars salty water appears.

The area of spawning-growing areas of the Keret River (NBU) is 71 ha, of them spawning one is of about 14 ha, in satisfactory state. This index is very important for estimation, if it is possible to say so, of productivity of the salmon river. According to this index one can approximately define how many salmons can spawn in the river per year. NBU are the water areas, where salmon spawns and growth before seaward run. These areas are characterized by certain factors: flow speed, depth and size of the ground particles. These we will discuss describing the spawning process of Atlantic salmon

Village Keret

On the northern bank of the river and Keretskaya Inlet one can see even nowadays remains (now it is one and a half of houses) of not the poorest settlement of old days of Karelian coast (between Kem and Kandalaksha). The village was famous for dynasties of pearl fishers the Kelevaevs and merchants-timbermen the Savins as well as a birthplace and everlasting rest of holy relics of blessed Varlaam Keretsky the Wonderworker in the local church.

There is a description of Keret village given in the book of S.V. Maksimov (we will apply to it describing the history of river fishing of Atlantic salmon on the White Sea).

"Village Keret is probably the best of all settlements of Karelian coast. Huddled and spread up on a significant distance over the mountain and under the mountain, it cheerfully looks with lined with deal and painted two-storey log houses. A lot of barns, not tumbled down, locked up, snuggled near the river and pier. The River Keret itself, as usually, full of rapids and thus noisy and rich of Atlantic salmon, as other White Sea rivers, looks festively: near its banks, closer to the mouth, not one but five boats are

swinging, not decayed over years and due to the inability to be used, but with tackles in them, with live people on decks. Between these large and ugly boats there are two schooners, nicely built according to the right reasonable draft, not primitively, and probably by clever owner, who has changed deep-rooted custom of ancestors (for common example and good admonition) to stick to boats and shnyakas (small flat-bottomed undocked vessel) of antediluvian design and type. If to all this, state wine vaults, salt and grain barns to be added, the Keret village could be definitely called trading quarter, at least in the sense of understanding the meaning of a trading quarter or non-chief town of auezd of remote Russia.

The chance brought me to a two-storey green house with mezzanine of a native rich man and gave me the possibility to see, with what luxury (relative) those rich men monopolists surround themselves. Several clean light rooms with painted floors look festively; wallpapers glued over walls, with nice tracery though of striking diversity of colors and brightness. According to appearance of rooms one can make a conclusion that the owner is a merchant and adheres to antiquity if take into consideration that all icons are with gold-plated riza of ancient painting, that under the icon case on the templon there is a hand-made censer, a bottle of holy water, psalmbook of ancient edition (in Lvov) and no one prosphora either here or in icon case. There is no any last-year pussy-willow, and there is no any crossed Easter egg. Room doors are decorated; there are rubber sheets on tables; on walls there are portraits of the Tsar family of the best edition; four clocks, of which one is a cuckoo clocks, ancient, and others are of mellow ringing and modern design ordered from Petersburg; there are many cupboards with glass curtained with cotton curtains, stuffed up to the top with Norwegian household faience and chinaware; there are many mirrors also probably brought from Norway; there are ancient sofas and chairs stiff and with high backs. Between stove and nearest wall behind the cotton curtain there is a clean light copper washstand over the basin, and a white as snow towel. All this has struck my eyes and I felt pleasure seeing these details, cleanliness and originality. I saw that a merchant lived there, and he was a rich merchant. At last, he himself came to me with cunning clever smile, with kind word and greeting, in blue Siberian caftan (man's outer garment) and polished terribly creaky boots. His wife in white cotton dress with flowers – ugly stout old woman spread like brew or a puffball – bowing from the waist, brought from the closed owner's room tea with lemon, cream, bread-rings from Arkhangelsk on the huge heavy silver tray. Tea drinking up a sweat began. Immediately during the tea party refreshments were brought such as pies, salty White Sea fish of all the kinds. At the same moment appeared as if from nowhere pine nuts, Vyazemsky gingerbreads, raisins and something else. I had to eat all this in order not to offend hosts with refusals and to save myself from bowing from the waist and annoying requests: to taste this, take a sip of that, show appetite (prizorets) to this; all this – speaking in short – resembled me Volga and its hospitable citizens. At last, also as usual, after lunch, the host sank me in high soft feather beds and left the room on tiptoe, where at that time, as I remember, a weaver's loom and some shaping and sawing had paused, probably by his order".

The mentioned merchant is probably Savin. For the moment one department of Fish Hatchery works in Keret – it is fish breeding point "Keret" pertaining to Vygsky Fish Hatchery FGBU "Karelyrvod"; near there are two biostations of Saint-Petersburg and Kazan universities located on the island Sredny on site of the former Savinsky Saw Mill.

Fishing of river and marine Atlantic salmon. History and practice

Initially let's get acquainted with river fishing as when somebody speaks about Atlantic salmon majority people attribute this to the river. During the work on the Keret River we often hear such words: "Forefathers never caught the fish in river". Hence I would like to tell you how our forefathers fished. Let's omit traditionally river fishing of Atlantic salmon with harpoon (jackfishing) and trains (fishing with small nets during the course of the boat), and let's dwell on collectors.

"As far back as in Ponoy you can see a collector for Atlantic salmon [] [Ponoy and Varguza - the longest rivers of the Laplandsky peninsula – flow out of a high wetland lying in the inner part of Lapland. This interior is underinhabited]. The same collectors are installed also in Varguza, in Umbo and in Kandalaksha. Also near Sosnovets and further along the bank there are tens of small fishing log houses and nets cast into the water for the same fish. Atlantic salmon is a single and rich means of living and fishing for citizens of Tersky coast. Hence, as they say, in all places of the White Sea fishermen do not participate in Murmansk fishing, that is masters do not send their artels (crews) for fishing cod and*

halibut. Some of them tried some time ago – they did not like it, and they preferred home fishing to fishing of those places. Atlantic salmon goes to Tersky coast in huge amounts. The White Sea Atlantic salmon dispersing after Polar migration and travels along the coastal strip of Murmansky coast, Novaya Zemlya, along coasts of Norway up to southern borders of the latter; along all stepped the most remote rivers of the White Sea: Dvina, Mezen, Onega, Kem, predominantly and incomparably in a larger amount runs into rivers of the nearest to the ocean Tersky coast. Here is its main and richest haul. The aborigines from dark and distant historical times prefer collectors as a best means for this purpose.

In early spring if possible immediately after high water, when ice will melt and river water enters its banks, people install these collectors in the Onega River (near Podporozhskaya Volost); on Karelian coast: in the Pongama, in the Keret; on Tersky coast: in Kandalaksha, in Umba, in the Varguza, in the Ponoy. In the Pongama the first prototype of these collectors could be met: there a not wide river is cut off across by barriers of brushwood and coniferous boughs tightly attached to two ledgers – long logs that converge between each other at the angle. The top of this angle is directed to the upper side of the river and only in this top there is a hole (both other sides are tightly caulked up with coniferous boughs and brushwood). In this hole, in pass, in gates (that is all the same) a fish trap is usually inserted with wide base. This fish trap is none other than an irregular formed cone composed of bars braided with rope nets. Inside this fish trap the so called tongue is bound in a hanging position – a branch (a kind of bell), faced by its base to the base of the fish trap, and by a narrow hole of its top certainly right against the top of the fish trap. Here the tongue is fixed in a hanging position by ropes and is used in this case for preventing the reverse run of fish able to enter the fish trap through its wide base facing to the side of fish arrival (down the river). In order the collector cannot be swept and washed away by river and rain water, heavy stones are usually put on its upper logs. The collector of such design is the easiest and smallest of all existing in Pomorie. The same collector with one top is built in the Kuzreka River near the settlement Kuzreka of Tersky coast.

In Umba a collector is installed in huge amount: here the river is wider and amount of fish is far greater. Umbovsky collector, when viewed from the mountain, looks as a big bridge with such a wide upper side that four people in row can freely walk on it. Upper side of this collector is made of logs and is called bridge. On these bridges towards the sea a significant amount of stones are put for gravity, and the more load, as is said, the more tightly the bridge logs are fixed on crossbeams (also logs), set on trestle (pereboi). These pereboi are hammered into the river bottom on Umbovsky collector in six places. Free spaces of triangular shape are shielded with so called taliya – twigs woven by vichie (wood roots). Taliya looking as the tightest palings is sunk to the river bottom in a slightly inclined position towards the sea and perpendicular to the upper planks of the bridge. Its importance is in preventing the fish from passing through it and at the same time from carrying it by the water. For this latter goal thin dry branches, called selga, are nailed in mid of taliya in parallel to the water surface. There are four such taliya triangles in Umbovsky collector, for four fish traps (the same amount is in Ponoisky collector, in Podporozhsky or Onezhsky – ten of them). In these triangles as in Pongamsky one the top is left free, with a hole, to which fish traps are fixed with their bases. The difference is only in the fact that Umbovsky fish traps are woven of thickest string and are so big that a man can enter them and stand freely on the wooden side of the cone (lying on the bottom during setting), not even touching the top of it with the head. Fish trap is laid on the side here too, and in order it can be kept on the water with its weight it rests against a stake or tongs stuck into the river bottom with its top or head. On these stakes rings are set; through these rings fish traps are risen up by means of **collar**. Fish trap is kept on water by three quarters, and in order the fish could not use this free space to run up the river, some kind of a short ladder, called napleska, is sunk there. The fish seeking the pass bumps its head against taliya, and have not discovered the hole; it goes to the first one that leads it to the fish trap. Here it continues the same urge forward and forward, and haven't found the way it leans its head against net and stands in such a way motionlessly as if taking a rest. Instinct hasn't taught it to turn back to the sea, and the fish doesn't have any need in this as it got used to spawn in the riverheads and not in salty water. As magnet attracts iron, its instinct entails it to the place, native land, in the riverhead.

These collectors serve usually for the whole summer, when the special species of salmon runs - mezhen (from mezhennoye – summer time) or mezhonka (summer salmon), reaching the weight from 1 up to 3 1/2 pounds, tasty and not very fat, which starts running in autumn from very early August. In autumn Atlantic salmon has more delicate and bright red meat, and their weight reaches from 6 up to 10

and more pounds. In spring, when rivers become excited, a special species of Atlantic salmon called zalyotka (fish that wintered under the ice) but in extremely small amount, and in addition it drops in taste, weight and even its look not only from the autumn fish but from mezhonka as well [] [Young fish is called tinda, it is born and grows over rapids, small and tasteless.]. This fish runs at that time always with roe, taste of which (specially salted) Pomors praise so much. They extract this roe from one fish sometimes up to five pounds. That's why fishing of zalyotka should be absolutely prohibited by the law, and those collectors installed in the river whole summer providing one people with means of living and take away the same means from others, citizens of riverhead (neighbors have already started many lawsuits for this reason). But the fish, which is able to pass upwards and moreover in small number, lays up roe on its way, and hence it cannot be hauled in the name of future generations, which with the years significantly reduce.*

Less fish in comparison with the former years run now to the rivers of the White Sea, - tell Pomors, - and it is less probably because of incorrect fishing performed without following any rules in any season of the year. New fish going back from rivers gets caught into the same nets, which are installed without following any rules except personal lawlessness of fishermen, always erroneous and therefore always harmful for the whole generation of the tasty, healthy for the man's organism fish. Rich haul in autumn per se indicates on legitimate time for fishing, when the fish does not have roe yet, which is usually spawned by mezhonka or mezhen. But this mezhonka, as it is said, mainly lingers in collectors, role of which in autumn is performed by nets, traps, garvas but as a help for big haul but not as a substitution of a collector.

Collectors stand for the whole winter. They are broken only by spring water or by keen-witted muzhiks (peasants), where timber is expensive and it is few. Industrialists in these cases justify themselves with the fact that if the fish is not caught into the collector it will be caught in the mouth of a marine animal: sharks, whales and beluga" (S.V. Maksimov 1857).

We won't go into details in interrelations between users, authorities and local population. Below I will give conclusion of R.P. Yakobson after visiting Onezhsky basin in 1912 for regulating salmon fishing in rivers of Arkhangelskaya province that was taken from the book of Krysanov A.A. "Pomors' Trades".

In 1911 and 1912 fishing junior specialist of the Agricultural Department R.P. Yakobson visited Onezhsky uezd. Having examined the Onega and its mouth area he made a conclusion that the most intensive salmon fishing was concentrated within Podporozhskaya Volost and on the Kozha River, where fishing collectors served as the main fishing tools. The rest places for salmon fishing were less effective and installed tools on it were of small haul and because of this harmless. Podporozhsky collector blocking both of the main fairwaters of the river made the Onega not enough passable in dry summer, but in deep water, when water covered a part of the river to the right of the collector salmon had the much free place for running up the river.

When the level of the Onega River was high, 528 Article of the Charter of Agriculture was followed, which regulated installation of collectors in such a way that a third of river was free for free run of fish. But on all collectors of Arkhangelskaya Guberniya this rule was not observed. Fishermen said: "If we leave a third of river free we will never catch a salmon". It was confirmed by caution of salmon, which in quiet weather and daylight did not go to the trap net, trying to avoid collector, to go through holes in it or stood in front of it. In years with shallow water a collector was a robbery fishing tool but it blocked the river not for the whole year, - when brash ice appear the collector was destroyed and salmon went up the river. Having spent the winter above village Porog Atlantic salmon went for spawning to the Kozha River. The collector on the Kozha prevented the fish from doing this, hauls were insignificant and damage done by the collector was huge. Therefore the collector on the Kozha River had to be prohibited. R.P. Yakobson in 1912 dissected 77 fish in Podporozhie, of which there were only 5 males. On the Kozha River of 31 fish there were only 4 hard-roed females. Peasants explained such predominance of males by not small amount of hard-roed females but high caution of the fish.

Of all this it followed that fishing collectors for catching Atlantic salmon of good quality and more expensive, which are installed near the river's mouth, are more acceptable than the collectors installed in the riverheads for catching less expensive but eugamic Atlantic salmon. Therefore Yakobson proposed to prohibit collecting fish on the Kozha River and at the same time to prohibit fishing lokh

(male salmon in spawning condition) and hard-roed fish with any implements. He proposed to install Podporozhsky collector but to prohibit additional nets to it.

To study Atlantic salmon Yakobson proposed to use both of collectors for fishing and marking fish until Kozhsky collector was prohibited. To catch out in Podporozhsky collector, mark and release higher the collector. To check fish got to Kozhsky collector. Podporozhsky peasants, realizing the necessity of studying the life of salmon of Lake Onega, proposed annually up to 50 salmons for free for marking them and releasing into the river, about what was their "decision" made at the united gathering on November 25 1912. If together with these 50 fish given for free more 50 were bought, this would have made up 1/5 of all fish caught in the River Kozha during summer. This amount of fish would be enough for figuring out the ways of migration of Atlantic salmon in Onezhsky basine.

And here is data of V.V. Nikolsky (1927, p.160)

"Atlantic salmon is fished by collectors on the Keret River and besides on the following special salmon fishing grounds".

Lacking of data about Atlantic salmon fishing by complete river blocking up to early 1960s, probably, related to the log drifting, which was performed on the Keret up to 1962, and then was prohibited. The log drifting most likely did not give the possibility to install fixed traps. Mainly drag nets were used for fishing in the river mouth area. Hauls in the river in 1931 was 1.4 tons and in 1957 – 0.4 tons.

Our time

When for the first time I came to the fish point of the Vygsky Fish Hatchery, on Zaborny Lake of the Keret River, a book of V.I. Smirnov "Belomorskiye Tropy" 1985, fell into my hands. Two chapters in it were devoted to the Keret River. Here how Atlantic salmon fishing was depicted in it:

"While speaking, the way imperceptibly led us to the head of the Sea ledge, where Collector dub gradually getting narrow, breaks in the last slope of the river into the sea. For Atlantic salmon going up almost one-kilometer Sea ledge is both the first spawning area and the first step in the long way to the riverhead. But only a half of fish will continue this way, for the second part of the stock the way will finish here, exactly over the Sea ledge. Because just here sophisticated traps lie in wait for them. Across the whole river a thick heavy wire of the frame has been extended on the driven in the bottom pickets; the riverbed was tightly, from one bank to another, blocked with the net wings. Dotted lines of floats as a tracer salvos draw a deceptively free way to three round-sided trap nets hidden in water and looking upwards and downwards with open mouths. Even nuzzling up to the barrier and turning back, the fish will be caught in the trap. This is the blocking for the concentrated Atlantic salmon catching. In other words it is a fish accounting barriers, FAB in short. Just above it, in the calm stream there is a huge raft on anchors with boxes of lattice floats of slab. The fished out spawners – roe and milt suppliers for Vygsky Fish Hatchery - were put into them.

We shouted to the other bank and a silent fisherman Arvo Pelto, recognizing the ichthyologist, took us to the other side, where there was a log house (izba) on the glade under birches. From spring till autumn a small fishing team lives here. In that season there were Pelto, one of his sons and a good-natured Pomor Nikolai Selyakov...

- At six o'clock we'll check traps, - said Selyakov. – Let's wait up for inspector with fish-breeders, they are coming...

Beyond the river appear a district inspector Nifakin and two girls in bright jackets. While Nikolai carries them to our side, Pelto pushes the karbass into the water with the installed tarpaulin cage. There is no water, however, in the cage, today the whole yield goes to the warehouse...

Get acquainted with girls after checking drag nets. Both of them are Svetlanas, both work for the first year. One is a fish-breeder of the Vygsky Fish Hatchery; the second is an ichthyologist of the look-out station of the Belomorskaya Fish Control Inspection. They have to select here about a hundred of fish during summer and autumn, ensuring collection of a half of million roe for further incubation in the hatchery. Floating cages near the raft is their gear. Girls try to look presentably as they believe. And as specialists are supposed to look, but they do not manage to do this well, and their eye shine. Everything is interesting and new to them, the same as to me.

And Pelto raises over the head the hoop of the first drag net, shining water trickles flow on his orange jacket. And in the corner of the drag net a live silver – Atlantic salmon, pollan, bulltrout – seethes, sparkles, thrashes.

- Oh, Arvo Petrovich, here they are! – are screaming girls. – One! And one more!..

But traps are checked and put again at their places...

Pelto and Nifakin are putting their stock books on the table of izba (log hut), each his book. Their “bookkeeping” is difficult, even not double-entry bookkeeping but triple one, and I am not able to understand its fine points. Only the principle is clear: fifty-fifty. That is a half of Atlantic salmon should be passed to the river for spawning and a half is to be withdrawn. In practice one day all the fish is taken for yield, and other day – all of it is passed upward”.

It is obvious from the mentioned above that though the river fishing is carried out but only a half of fish is caught, the rest one is released to the river for natural spawning, part of which is used for the reproduction purpose.

Dynasty of Pelto fishermen is not interrupted. Two years ago Andrei, grandson of Arvo Petrovich, died tragically. Andrei had a son Bogdan, who probably will continue the dynasty.

Today Atlantic salmon fishing on the Keret River is not carries out. All the fish caught in FAB is used for reproduction purposes, the rest one is released for the natural spawning. Ant the fish caught for reproduction, after roe withdrawal is sent back to the river live.

At the end of the above stated, with regard of the river fishing, I would like to present these tables from the article of I.L. Shchurov “Atlantic salmon of the Keret River (artificial and natural reproduction)”.

Fish caught in Keret FAB from 1969 till 1996

Years	Total amount of specimens	Wild specimens	From hatcheries specimens	From hatcheries %
1969	649	649	0	0
1970	1320	1320	0	0
1971	1305	1305	0	0
1972	1743	1743	0	0
1973	2054	2047	7	0.34
1974	1363	1232	131	9.6
1975	1770	1579	191	10.8
1976	2107	1782	325	15.4
1977	2296	1752	544	23.2
1978	1856	1359	506	27.1
1979	1312	1154	158	12
1980	2690	2271	419	15.6
1981	1145	671	474	41.4
1982	1590	1013	577	36.3
1983	4660	2177	2483	53.3
1984	3098	1285	1813	58.5
1985	3940	2161	1779	45.1
1986	3230	1781	1449	44.9
1987	2427	1341	1086	44.7
1988	3294	1998	1296	39.2
1989	3531	1728	1803	51.0

1990	2520	867	1653	65.7
1991	690	374	316	45.8
1992	536	121	415	77.4
1993	687	231	456	66.4
1994	753	50	703	93.4
1995	1066	411	655	61.4
1996	391	171	220	56.2

Of total amount of registered on FAB Atlantic salmon, 50% specimens were passed through up to 1989 inclusive. From 1990 passing through of spawners was increased up to 70 %. In this period a number of passed through spawners to the spawning point changed from 240 specimen (1969) up to 2222 specimen (1983)

Below data are given on dynamics of passing and average mass of Atlantic salmon of the Keret River with different duration of feeding period in the sea for 1989 (according to the data of Karelrybvod)

Month	Total amount of specimens	Age group (years of feeding in the sea)					
		1+		2+		3+	
		Amount spec.	Mass kg	Amount spec.	Mass kg	Amount spec.	Mass kg
June	136	4	2.25	113	3.42	19	8.2
July	894	671	2.22	167	3.85	56	6.25
August	339	232	2.4	396	3.9	11	6.64
September	68	5	2.4	44	3.18	19	3.53
October	56	30	2.17	19	4.3	7	7.57
Total	1493	942	2.26	439	3.71	112	6.28

Marine fishing of Atlantic salmon. History, up-to-dateness and... foreigners.

Let's begin as it is called now, from coastal fishing. At present we often hear about extinction of Pomor culture, foremost of language, as a language as a rule is the reflection of economic activities of its carrier. Marine fishing is an important part of economic activity of Pomors, which was considered to be the only marine people on the European North of Russia. Now the coastal fishing slowly but surely reduces. Fewer citizens remain in villages related to this hard fishermen's labor, and with this meanings of some words are forgotten, then words themselves. I won't go into analysis of reasons of decreasing of coastal fishing activity. But hardly changes in effectiveness of fishing became the main reason of decline of interest to the coastal fishing.

For more clear understanding of decrease in sea fishing press on the Keret Atlantic salmon stocks I will present in the table with the list of fishing districts (fisheries) aimed for catching of Atlantic salmon, which were revealed by the Institute of North in 1921 in the district of villages Keret and Gridino (on the River Gridino in the same edition of 1921, where we took tables, a barrier is mentioned)

Keret

Atlantic salmon is caught by barriers on the Keret River and moreover on the following special Atlantic salmon fisheries:

# of Fisheries	Names of Fisheries	Distance from settlement	Number of fishermen	Number of A.salmone dragnets	Number of garvas	Number of	Number of polians' nets	Number of karbasses	Comments
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		To the south-east of Gridino							
1	Kivikanda	40	5	2	-	-	2	3	Good quality
2	Ileikina	38	7	2	2	-	3	4	Good quality
3	Yurisnya	37	3	1	1	-	1	2	
4	Peliaka	36	6	2	2	-	2	3	Good quality
5	Egorovshchina	35	2	1	1	-	1	2	
6	Voronia	31	2	1	1	-	-	2	
7	Ludushka	28	6	2	1	-	2	3	Good quality
8	Tryasova	25	6	2	-	-	1	3	Good quality
9	Sharapova	20	4	1	-	-	1	2	
10	S.Zhemchuzhnaya	17	2	-	2	-	-	1	
11	North. Pereima	12	2	-	2	-	-	1	
12	Oborikha	5	2	-	2	-	-	1	
		To the north-west to the Chupa River							
13	Sidorovy Pereimy	20	2	1	1	-	-	1	
14	Korozhna	22	3	-	1	1	2	2	
15	Krasnaya Luda	20	6	-	2	1	-	2	
16	Kem-ludy	25	12	1	5	3	3	4	Best quality
17	Osiniva	½	3	-	3	-	2	1	Bad quality
18	Monastyrskaya	2	2	-	2	-	1	1	Medium quality
19	Ivanov	12	2	-	2	-	1	1	Bad quality

Семга ловится забором на реке Керети и, кроме того, на следующих специально семужьих тонях:

№ тоней.	Наименование тоней.	Расстояние от селения.							Примечания.
			Число рыбаков.	Число сев-муж. невод.	Число гарв.	Число ти-линтов.	Число си-говиков ¹⁾	Число карбасов.	
На ю-в., к Гридину									
1	Кивиканда . . .	40	5	2	—	—	2	3	Хор. кач.
2	Илейкина . . .	38	7	2	2	—	3	4	» »
3	Юрисня . . .	37	3	1	1	—	1	2	
4	Пельяка . . .	36	6	2	2	—	2	3	Хор. кач.
5	Егоровщина . . .	35	2	1	1	—	1	2	
6	Воронья . . .	34	2	1	1	—	—	2	
7	Лудушка . . .	28	6	2	1	—	2	3	Хор. кач.
8	Трясова . . .	25	6	2	—	—	1	3	» »
9	Шарапова . . .	20	4	1	—	—	1	2	
10	М. Жемчужная.	17	2	—	2	—	—	1	
11	Сев. Перейма . . .	12	2	—	2	—	—	1	
12	Обориха . . .	5	2	—	2	—	—	1	
На с-з., к Ч. Реке									
13	Сидоровы Переймы . . .	20	2	4	1	—	—	1	
14	Корожна . . .	22	3	—	1	1	2	2	
15	Красная луда . . .	20	6	—	2	1	—	2	
16	Кемь-луды . . .	25	12	1	5	3	3	4	Лучш. кач.
17	Осинова . . .	1/2	3	—	2	—	2	1	Плох. кач.
18	Монастырская.	2	2	—	2	—	1	1	Средн. кач.
19	Иванов . . .	12	2	—	1	—	1	1	Плох. кач.

Gridino

## of Fisheries	Names of Fisheries	Distance from settlement	Number of garvas (system of nets)	Number of dragnets
		In direction of Kalgalaksha		
1	Kokkov	1 ½	3	-
2	Sosnovtsy	3	4	-
3	Kochkam	7	3	-

4	Kabatov	9	2	1
5	Kabatchskiye	10	-	1
6	Lesovataya	1	2	-
7	Varavino	9	2	-
	On the Gridino River			
8	Nerpiya korga	1	2	-
9	Podvarkovo	1 ½	3	-
10	Zareka			
11	Belya luda	1 ½	1	-
	In direction of Keret			
12	Dmitriyev	2	3	-
13	Bugrin krest	3	2	-
14	Chernoye shchelie	3	2	-
15	Churakina	5	1	1
16	Purnavolok	7	1	1
17	Sheludkova	2	2	-
18	Krestovaya	14	2	1
19	Sosnovy ruchei	14	2	1
20	Sheromloghee	17	2	1
21	Orlov	18	1	1
22	Sukhaya guba	20	2	1
23	Potychina	22	2	-
24	Kulevna	23	1	1
25	Krasnaya	24	1	-
26	Bolshaya	25	1	1
27	Odinchikha	27	-	1
28	Mezhnaya	30	1	1

№ № тоней.	Наименование тоней	Расстояние от селения.	Число гарв.	Число неводов.
		В сторону Калгалиакши.		
1	Кокков	1 $\frac{1}{2}$	3	—
2	Сосновцы	3	4	—
3	Коцкам	7	3	—
4	Кабатов	9	2	1
5	Кабатчские	10	—	1
6	Лесоватая	1	2	—
7	Варавино	9	2	—
		На реке Гридине.		
8	Нерпья корга	1	2	—
9	Подварково	$\frac{1}{2}$	3	—
10	Зарека			
11	Белая луда	1 $\frac{1}{2}$	1	—
		В сторону Керети.		
12	Дмитриев	2	3	—
13	Бугрин крест	3	2	—
14	Черное Щелье	3	2	—
15	Чуракина	5	1	1
16	Пурнаволок	7	1	1
17	Шелудкова	2	2	—
18	Крестовая	14	2	1
19	Сосн. ручей	14	2	1
20	Шеромлоги	17	2	1
21	Орлов	18	1	1
22	Сухая губа	20	2	1
23	Потычина	22	2	—
24	Кулевна	23	1	1
25	Красная	24	1	—
26	Большая	25	1	1
27	Одничиха	27	—	1
28	Межная	30	1	1

At the moment (**year 2014**) in Gridino fisheries fish is caught as I know only in one of them. Keret fisheries are used (mainly by Chupa citizens), at the best, at 1/3. Dragnets are not set, only garvas are used. A number of fishermen is out of the question. Therefore, the press of the coastal White Sea fishing within Karelian coast has reduced at least.

Impact of foreign and oceanic fishing on Atlantic salmon stock of the Keret River

And now let's touch upon the issue of the foreign fishing impact on Atlantic salmon stock condition in the Keret River. It is no wonder that Atlantic salmon bears this name. A lot of the time it spends in the Atlantic. Here what V.F. Bugaev writes in his article "Impact of foreign fishing on Atlantic salmon population of the Keret River", 1987 (hardly our neighbors began fishing less).

"In places of feeding in the North Atlantic and on the ways of spawning migration along the coast of Norway, Atlantic salmon of the Keret River is caught by longlines, drift nets and bottom gill nets. This is confirmed by observations of fishing of Keret Atlantic salmon in sea fisheries along the coast of the White Sea in the region of the Keret River. It is characteristic that gilled Atlantic salmon consists for 80% of grilse (tinda), or selective impact of fishing on break of the population structure is obvious."

From 1982 experts of the Institute of Biology KFAS of the USSR and ichthyologists of Karelyrvod tagged two-years-old Atlantic salmon on Vyksky Fish Hatchery. Every year they tagged 9 thousand fry specimens with individual tags for the purpose of finding out behavior and survival rate of the fish in the river, aiming finally at identification of the best time of its release. Groups "Vyg 1", "Vyg 2", etc., were of 1500 specimens; observations of seaward run of smolts were carried out in the river mouth in the water protection zone of FAB gates. However they managed also to get an idea of the destiny of Keret Atlantic salmon in the sea, though such kind of tasks hasn't been set initially.

To the address of the PINRO from Norwegian Higher Agricultural School in OS City the following tags were sent:

- 1) "Vyg 8" was caught by drift net in the Tromsyo Province on July 15, 1984.
- 2) "Vyg 11" was caught by drift net within Soroe district in the Finmarken Province in June, 1984.
- 3) "Vyg 16" was caught by drift net on June 29, 1984, in the district of the lighthouse Ona between Bergen and Trondheim.
- 4) Transparent cellulose tag without marking (the inscription has become obliterated). Salmon has been caught by drift net in the district of Western Finmarken.
- 5) "Vyg 5", was passed from Murmansk Fish Factory, where it was found during fish splitting.
- 6) From Torshavn (Faeroe Islands) from fishery laboratory with inscription "Vyg 5".
- 7) From directorate for environmental control from Trondheim an inscription "Vyg 13". Salmon was caught by net on 01.07.1985 in Skruvhusen to the west from Narvik. No other information.

Calculation of catch losses due to 10% escape of Atlantic salmon from drift nets and longlines

year	amount of injured Atlantic salmon during the season pcs. (=10%)	losses		average many-years mass of specimen, kg
		pcs. (=90%)	in mass	
1983	303	3030 – 303 = 2727	9.0	3.32
1984	294	2940 – 294 = 2646	8.8	3.32
1986	1085	10850 – 1085 = 9765	32.4	3.32

Small tinda (grilse), judging by traces of injuries on scales, goes through the net cells as a result of long fight. Large Atlantic salmon comes out of nets with deep and large wounds only after tearing of

the net cell. We consider that owing to selective actions of fishing gear amount of large Atlantic salmon decreases, mainly spawners, and with this diminishing of average mass from 3.32 kg in 1983 up to 2.7 kg in 1986. Selective impact of drift nets results in decrease of percent of repeatedly spawning Atlantic salmon in the Keret River.

Approximate commercial losses (falling out from gill nets of live or dead fish, eating away of part of fish by predators during drift, etc.) amount to not less than 30 % of catch. Only small part of escaped from nets and injured fish reaches coast and takes part in spawning. Within economic zone of Norway about 350 tons of salmon are fished out from rivers of the USSR.

If a hypothesis of a number of experts is true that the escaped from longlines and drift nets fish doesn't exceed 1/10 of fished out ones, we can approximately detect amount of losses of Keret Atlantic salmon by years based on the average percentage of gilled fish in the year of fishing. Passing through into the Keret Rive of 50% Atlantic salmon stock for spawning our consolidated losses amounted 9.0 tons in 1983, 8.8 tons in 1984, 32.4 tons in 1986. The numbers speak for themselves.

Killer of Atlantic Salmon - Parasite *GYRODACTYLUS* (lat. *GYRODACTYLUS SALARIS*)

Before speaking about reproduction of Keret Atlantic salmon let's return to the river and speak about one more serious problem.

It is a parasite - ***GYRODACTYLUS SALARIS***

Here is an extract from the article **Reaction of Atlantic salmon population (*Salmo Salar L.*) of the Keret River on invasion of a parasite *Gyrodactylus Salaris*. MALMBERG 2011** (Artamonova V.S., Makhrov A.A., Shulman B.S., Khaimina O.V., Laius D.L., Yurtseva A.O., Shirokov V.A., Shchurov I.L.).

"Monogenetic fluke *G.salaris* as a rule parasitizes on the Atlantic salmon fry. Initially it was met only in the Baltic Sea basin [reviews: Malmberg, 1993; Kudersky et al., 2003] – its sensitivity to the increased salinity of water impedes spreading of the parasite. However at present *G. Salaris* quickly spreads in the North of Europe because during fish breeding we do not always succeed to fulfil adequate security measures. Together with artificially grown up Atlantic salmon fry from Sweden it got into rivers of Norway in about 1975 [review: Johnsen, Jensen, 2003], that resulted in the death of tens of natural populations or they were on the verge of death.

Specific role in the spreading of *G. salaris* is played by coast rainbow trout (*Parasalmo mykiss*); in foreign literature of the last years this species is attributed to genus *Oncorhynchus*, which doesn't die if is infected with this parasite but becomes its carrier. Probably, exactly with it the parasite has got to Denmark and Germany [review: Peeler et al., 2006]. It could be met on the coast rainbow trout in fish breeding hatcheries [Keranen et al., 1992], Poland and Macedonia as well [Ziętara et al., 2010].

In 1992 *G. salaris* was found in Russia, in the Karelian Keret River. Next years, Atlantic salmon fry of this river was investigated for infection with *G. Salaris* actually every year, and during the whole period of systematic observations only in 2004 the parasite was not registered (from 2005 it was again discovered in Keret) [Iyeshko et al., 2008; author's info].

Recently *G. salaris* has been discovered also in one Karelian river – in the Pista River located in the riverhead of Kem [Shulman et al., 2007]. There is a probability that the parasite has got into Pista with Atlantic salmon fry brought from the Baltic basin by Finnish fish breeders, however genetic investigations of *G. Salaris* suggest that it has moved to salmon from coast rainbow trout bred in the basin of this river on the territory of Finland [Meinila et al., 2004]. Unfortunately, in recent years, due to mass purchases of rainbow trout seeding in Finland the parasite penetrated into many basins of Karelia, including the Segozero Lake, situated in the White Sea basin [Yevseeva, 2009; Yevseeva et al., 2009].

Dynamics of Atlantic salmon quantity in the Keret River

From 1967 the population of the Keret River has been partially maintained with artificial reproduction of fry in Vygsky and Kemskey Fish Hatcheries. Spawners for hatcheries (both wild and those from hatcheries) are annually caught with the help of fish accounting barrier (FAB) in 1 km from river's mouth (usually not less 100 specimens). In the period, when fish-breeding works were started, the fry,

which was got from spawners from other rivers, were released into Keret, however for more than three decades only descendants of the Keret population spawners are settled here [Artamonova, Makhrov, 2005].

Accounting of amount of Atlantic salmon in Keret is made from 1969. Maximum account number of spawners (1983) amounted to 4660 specimens. Up to 1991 only once less than thousand fish was recorded on FAB [Shchurov, 1998]. From 1991 the Atlantic salmon population in the river considerably reduced. Beginning from that year not more than a thousand of spawners as a rule drops into Keret, of them overwhelming majority is fish from hatcheries [data of the Vygsky Fish Hatchery].

After 1991 the density of wild Atlantic salmon fry also sharply reduces in Keret (tenfold), and it is still low up the present time, though in years of low infection with *G.salaris* some growth of fry amount was observed [Iyeshko et al., 2008; Makhrov et al., 2009]. We should note that the same considerable drop of amount of Atlantic salmon was also registered in 45 rivers of Norway, where the parasite got into. In the country in general this invasion has resulted in 15% reduction of salmon catch [reviews: Johnsen, Jensen, 2003; Peeler et al., 2006]."

It is really a very serious problem for Keret.

Therefore, we ask you, who reads this brochure, after being on the Keret River dry up your fishing gear and all things, which were in touch with water. Under no circumstances carry wet things to other rivers.

Illegal Atlantic Salmon Fishing in the Keret River

If you have read all the stated above material you should understand how difficult is the way of the fish to the river, here I mainly speak about spawners (hard-roed fish), at that time they are slightly more than a hundred. All of us have feet of clay, if suddenly, by chance, you've caught a spawner, set it free, it literally worth its weight in gold. If we lose Keret Atlantic salmon, new one will appear not very soon as each of it goes exactly to its own river.

Inspection of Fishing Control Authority of Loukhsky district of the Republic of Karelia has beaten all records in a number of discovered violations of fishing in the republic, and a half of them are in the Keret River.

And a pike is to be fished. Rare pike caught out in spring doesn't have Atlantic salmon fry in its stomach. Thus, the more pike you catch the better.

Atlantic Salmon Reproduction in the Keret River

My entry into the case of reproduction of Atlantic salmon in Keret started with meeting with a cadre fish breeder. Resanov Anatoly Semenovich is a person, whose 40-year experience of fish breeding includes almost complete history of Vygsky Fish Hatchery, and the whole history of Keret fish breeding. Here what he tells about himself:

"For the first time I found myself in this miraculous, fantastic place in September 1966, when after graduating from "Ichthyology and Fish Breeding" department of the Eisk Marine Fishing Industry Technical School and job placing (at that time), I went to the place of my future job – to the Vygsky Fish Hatchery. At that time the director of this hatchery was Zubenko Yevgeniya Vasilievna, and the chief fish breeder was its permanent and first chief fish breeder, graduate of PSU, Kostyliov Yury Vasilievich, who later on became the Candidate of Science (Biology) and very famous within biologists of Republic of Karelia. And as I have mentioned, in September 1966 I went to the business trip to Chupa, to be more exact, to the timber mill "Karellesoeksport" on Sredny Island, which closes Keret Inland, in which the Keret River, the gem in the full sense of the word, flows. Still from the time immemorial in this northern

beauty, the Keret River, dwelt and is still dwelling a Pearl shell – host of a pearl that is clear from its name.

So, in this very cold September morning I came to Sredny Island in the Settlement Council, the Secretary of which was famous Nifakina Aleftina Egorovna, a wife of the local inspector of the Fishing Control Authority Nifakin Grigory Andreevich. Having registered my business certificate I went to get acquainted with the place of my future job, where I work from that time till now. Yes, it is to be seen and perceived by soul. And as it is said in a song: "If you fell in love with the North, you will never stop loving it", and this happened with me. Looking back to my close past, I am so glad that I have a chance to be engaged in conservation and reproduction of stocks of Keret Atlantic salmon and pollan, destroyed in rivers Vyg and Kem. The period of my business trip came to its end and I went home to settlement Sosnovets of Belomorsky district to my job place as I couldn't call it in another word than home. I came home to continue the affair of my colleagues and their forerunners or founders of Atlantic salmon breeders in the Karelo-Finnish Soviet Republic, the first director of the mill, Gillep Pavel Stepanovich, chief fish breeder Kostyliov Yu.V., unfortunately late, Gillep Zinaida Aleksandrovna and other workers of the mill. So, in July 1967 I went again to village Keret to improve the work of the fish breeding point in catching, separating, holding, collecting and further incubation of Atlantic salmon hard roe in Vygsky Fish Hatchery. The chief of Karelrybvod at that time was Mekhnin Vasily Petrovich – real Pomor-gridon, as they were called earlier, or those who were born in village Gridino. A Komsomol member of 1920s, as it is said nowadays, he was one of them.

Thus, July 1967, village Keret, I am not only a fish breeder-theorist but becoming a fish breeder-practitioner. Under the guidance of Kostyliov Yu.V. The year has not passed in vain; my working experience on Vyg and Kem rivers as well as on the Kola River in Murmanrybvod gave me an opportunity to establish a full-fledged fish breeding point on Keret River. The main reason for appearance of FAB and fish point with it has become the decline of stocks of Atlantic salmon and pollan in the river as a result of log drifting – this scourge, dare I say it. Log drifting aggravates to the upmost the hydrochemistry, hydrobiology and ecology of the basin in general. This still goes on nowadays. The river lacks forces to combat this press; furthermore, in addition to this in 2 km from its mouth in 1970s Klimovskaya rock vein appeared. The river had barely recovered from drifting, blasting works have started. 12 – 16 blasts during the day. Small house of fisherman jumps up the same amount of times. And what we can say about the poor river: it continues enduring again. When the fish point was established, its servicing or fishing is performed by a team of fishermen of Chupinsky Fish Hatchery headed by Vlasov V.P., and Atlantic salmon spawners are separated by a team of a great fisherman, Arvo Petrovich Pelto. I never had and do not have till now such a brilliant fisherman – for what very much I was lucky. He loved nature as nobody, he was a fisherman with a God-given talent, and I have learnt much from him"...

Memoirs were recorded in 2009. Anatoly Semenovich id still alive and is in good health up to date. Sometimes, however, he was quite sharp, but in these cases I was told by a danger of all our poachers, now late Pyotr Ivanovich Rezantsev: "And what do you want of him: he is Eisky Cossack, when he is stubborn, he won't budge".

In 1953 starts the building of Vygsky Fish Hatchery. The task of the hatchery was reproduction of Atlantic salmon in northern rivers of Karelia. Already at that time the issue was raised about support and ways of increase in number of this fish species as regions of northern rivers, in which Atlantic salmon spawns, more and more are involved in people's economic activities.

The hatchery was put into operation in 1956. In those years the designed capacity of the hatchery was 167 thousand of youngs of the year and 10 thousand two-years-old fish. But in a year the hatchery two times exceeded the designed capacity of growing youngs of the year. 338 thousand youngs of the year and 33 thousand two-years-old Atlantic salmon were grown up. Release of fish into rivers of Karelia didn't give required commercial return. In accordance with decree of CPSU Regional Committee and Council of Ministers of KASSR as of 26.09.67 "On measures for further development of fish industry in KASSR" construction of hibernating shop was begun. When it was put into operation in 1972 capacity of the hatchery became 200 thousand of two-year-old fish. Efficiency of the hatchery was investigated in the Keret River, where the fry was annually released. Observations showed that commercial return was increasing. Now the Vygsky Fish Hatchery consists of several fish points on the

western coast of the White Sea, incubator of the hibernating shop, summer ponds and trout ditches. And the main thing is a highly qualified staff; the hatchery being guided by the grandson of its founder, Gillep Vladimir Yevgenievich. Salmon fry is released into rivers Keret, Vyg, Suma, into lakes Onega and Ladoga, and in the north fry of lake char is released into the Lake Topozero.

Now I will betray a main secret: success in growing Karelian Atlantic salmon (and now pollan, trout, lake char as well) is in woman's hands. The essence of the process of Atlantic salmon breeding comes to the replication of the river life period of Atlantic salmon fry in artificial hatchery conditions. The process begins with catching of spawners in fish points. Spawners and milters are held in separate nurse ponds up to ripening of roe and milts. In autumn roe is collected and inseminated in fish point, whether in Keret or other rivers. Living roe is delivered to the hatchery and laid into the incubator, where it is kept in trays with flowing water till spring until hatchlings hatch out, then they are laid into basins: in summer into ponds and in winter again into hibernating shops' basins, and so two years. Two years because major part of Atlantic salmon fry of rivers of Karelian coast migrates down into the sea in age of two years. The hatchery fish is marked by cutting of fatty fin in order to distinguish it from wild one. The fry is released in spring with vehicles and helicopters, equipped with containers for live fish transportation.

Interested persons can come to settlement Sosnovets at the Vygsky Fish Hatchery to go excursion and see with own eyes how the valuable fish is bred.

Conclusion

I tried to disclose main factors, which affected the drop in Atlantic salmon catches in the Keret River, and as a sequence, the sea fishing as well. It is difficult to draw well-defined conclusions. In the old days there were problems with Atlantic salmon catching and with installing fishing fences. Today factors shown in our assay are of exclusively anthropogenic character and are able just to deprive us of the Keret Atlantic salmon. The conclusions are obvious.

Because of the presented in the assay factors, the self-reproducing natural resource – Atlantic salmon "Fish" - has become fewer, and as a sequence its traditional coastal fishing in the White Sea has almost stopped. In 1980s overcatching of herring in the White Sea by oceanic trawlers and destruction of *Zostera* seaweed (wrack) resulted in almost complete stop of herring fishing. Another local self-reproducing resource is forest. In the 17th century the Solovetsky Monastery cut down completely the forest in Chupa Usolye in order to fire stoves in saltworks – saltern places have fallen into neglect and people scattered. In the 20th century logging enterprises again cut down forest and hundreds of settlements became deserted. Such processes recur in the history and are interrelated, but with each century they are more widespread. And numerous examples of such interrelation of the history and up-to-dateness could be provided.

In order to avoid degradation and sustainably use natural resources, in which Karelian and Pomor coasts of the White Sea are still rich, it is necessary to reproduce them as much as possible and use them efficiently.

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