

PHC-12

INSTITUTE OF CURRENT WORLD AFFAIRS

DRIFTNETS, RUINED SPAWNING GROUNDS, AND A ROAD GOING NOWHERE:  
THE DISAPPEARING WEALTH OF KAMCHATKA'S SALMON FISHERY

March 26, 1993

Petropavlovsk-Kamchatsky  
Russia

Mr. Peter Bird Martin, Executive Director  
The Institute of Current World Affairs  
4 West Wheelock Street  
Hanover, New Hampshire 03755

Dear Peter,

The stores and markets of Petropavlovsk-Kamchatsky, Russia's largest fishing city, overflow with fish indigenous to the seas of the Russian Far East. Unexalted benthic fish, like 'kambala' (sole), 'mintai' (pollock), 'treska' (cod), 'navaga' (a type of small codfish), dredged in great tonnages from the Bering Sea and the Sea of Okhotsk, reflect their low gustatory status and cheap abundance by decidedly unattractive presentation. The consumer confronts a frozen or thawing mass of limp bodies, gaping fish mouths, and bulging eyes in dented steel pans on filthy counters, and upon choosing 'the catch of the day', watches as a bored shopworker grabs the fish unceremoniously with bare hands and rolls it up in newspaper or stuffs it into a plastic bag. These fish feed people, but like so much of the daily Russian diet, do little to please the senses.

Contrast this with the silver-jacketed, ruby-fleshed, crowning glory of Petropavlovsk-Kamchatsky's piscatory cornucopia, the 'losos' (salmon). The lovely losos, caught in enormous quantities in Kamchatka's waters, gets the royal treatment it deserves in these parts. Russians here love their salmon all ways: smoked to velvety smoothness, salted or kippered as a side dish with beer, boiled in ravioli-like dumplings called 'pelmeni' (usually made with meat, but wonderfully light and fragrant when prepared with salmon), baked with butter and dill, or broiled in sour cream. One classic presentation--bright red salmon caviar on thinly sliced, buttered white bread, eaten immediately following a bracingly cold shot of vodka--dazzles the palate with a novel, purely Russian combination of flavors.

Fresh, canned, smoked, dried, and salted salmon can be found for sale everywhere in Petropavlovsk-Kamchatsky. As one friend

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Peter H. Christiansen is researching Pacific Fishing Nations.

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Since 1925 the Institute of Current World Affairs (the Crane-Rogers Foundation) has provided long-term fellowships to enable outstanding young adults to live outside the United States and write about international areas and issues. Endowed by the late Charles R. Crane, the Institute is also supported by contributions from like-minded individuals and foundations.

of mine quipped, "Krasnaya ryba vseгда i vezde modna"; the red fish is always and everywhere in style. But salmon's importance for Kamchatka goes far beyond pleasing local palates. Salmon contributes vast amounts of rubles and hard currency to the economies of the Kamchatka Region and the Koryak Autonomous Region (in Russian, the KAO, or 'Koryaksky Avtonomny Okrug', the region occupying the northern half of the Kamchatka peninsula. An 'Okrug' is a specially-designated administrative region for native ethnic groups). According to official catch data, fishing enterprises on the Kamchatka peninsula harvested 96 751 mt. of salmon in 1991. ('Catch Figures for 1991 for the Kamchatka Region', a White Paper issued following an April 1, 1992 meeting by the Fishing Industry Executive Coordinating Committee of the Kamchatka Regional Soviet of People's Deputies. Official catch statistics for 1992 were not made available to me. Sources in the Kamchatka Regional Administration put the total salmon quota allocation for the Kamchatka Region and the KAO at nearly 99 000 mt. for 1993.)

Much of this rich yearly harvest finds its way to Japan, the single largest foreign consumer of Kamchatka's salmon, and easily the most influential overseas player in Kamchatka's salmon fishery. The Japanese prize the lovely, firm scarlet meat of the 'nerka' (*Onchoryncus nerka*, commonly known as sockeye or red salmon). 'Kizhuch' (*O. kisuch*, coho or silver salmon) and 'tsarishca' (*O. tshawyscha*, or king salmon) are also quite popular. 'Keta' (*O. keta*, or dog salmon) and 'gorbusha' (*O. gorbuscha*, or humpback salmon), Kamchatka's commonest salmon, have pinker and less oily meat, making them less aesthetically pleasing to Japanese consumers; their open market value is generally about five times below that of nerka and kizhuch.

The total present dollar value for salmon exported to Asia by Kamchatka's fishing enterprises doubtless brings in substantial yen and dollar earnings, but these amounts are all but impossible to determine. According to Russian Federation law, Russian fishing enterprises may keep hard-currency profits earned from sales to foreign partners a 'commercial secret' from even the government (and nobody volunteers this information), and are required only to show total catch figures, a practice that contributes enormously to corruption in the fishing industry. Widespread corruption in Russia's fishing industry in turn compounds familiar resource management problems like overfishing, habitat loss and environmental degradation; if present trends continue, local experts say, Kamchatka's ostensibly healthy salmon fishery will soon face serious hardships.

"Kamchatka's salmon aren't threatened with extinction, but they are being depleted at a rate serious enough to cause the fishery to become economically unfeasible in the foreseeable future,." said Dr. Boris B. Vronsky during a recent interview. Vronsky is a Doctor of Science and the Director of Salmon

Research at KO TINRO, the Kamchatka Branch of the Pacific Research Institute of Fisheries and Oceanography in Petropavlovsk-Kamchatsky. KO TINRO analyzes the ecological health of Kamchatka's fisheries, and uses this information to establish the allowable catch, or quota, for different species in geographic regions and zones around the Kamchatka peninsula. Based on the KO TINRO analysis, the size of the quota 'pie' can be determined, and divided among Kamchatka's fishing enterprises. When I spoke with him, Dr. Vronsky had just returned from negotiations in Moscow between representatives of the Japanese salmon fishing industry and the Russian Federation Fisheries Management Committee.

"To understand what is happening with Kamchatka's salmon now, it is necessary to look at the history of the resource. In 1941, before the Second World War, Kamchatka's salmon resources were in an optimum condition, and easily supported an annual catch of up to 500 000 tons per year," he said. "In addition to local salmon fishing, the Japanese were granted special fishing concessions, and worked in our waters quite intensively."

"After the war, the concessions were closed, but the Japanese were soon back fishing around Kamchatka," continued Dr. Vronsky. Concerned with the effects of uncontrolled fishing in the North Pacific, the Soviet Union, Canada, Japan, and the United States formed the International North Pacific Fisheries Commission (INPFC) in 1953. The INPFC's tasks included determining jurisdiction over salmon stocks and regulating fishing for anadromous species in the open ocean. Dr. Vronsky called the INPFC efforts to regulate Japanese salmon fishing a failure. "By the early 1970s, the Russian Far East was experiencing a severe depression in salmon resources," he said. "By KO TINRO estimates, the Kamchatka peninsula alone had lost 320 000 tons of available salmon due to uncontrolled fishing."

In 1976 and 1977, the Soviet Union entered into serious negotiations with Japan over salmon fishing and the implications of the introduction of 200-mile Exclusive Economic Zones in the territorial waters of coastal states. The talks were especially acrimonious and difficult because of the Kurile Islands territorial dispute, but they finally produced a renegotiated USSR/Japan Treaty, and a serious reduction for the allowable Japanese salmon catch in the Russian Far East. One commentator wrote, "Japanese salmon allocations in the area covered by the Japan/USSR Joint Commission had been declining anyway from a high of 124 400 mt. in 1963 to 91 000 mt. in 1975...for the 1978 fishing year, the Soviets cut the quota again, settling eventually at 42 000 mt." (The U.S./Japan Fisheries Relationship in the Northeast Pacific: From Conflict to Cooperation? Edward L. Miles, Fisheries Management Foundation and Fisheries Research Institute, University of Washington, Seattle, Washington, July, 1989.)

The Soviet quota cuts did not slow the Japanese salmon fishing fleet down, but rather sent it out into the open ocean. "(With the introduction of restricted access to the Soviet zone) The Japanese moved their salmon fleet out into the open ocean around the 160 and 170 East Latitude lines, and began driftnet fishing there," explained Dr. Vronsky. "The open ocean driftnet fishery continued the depletion of Russian Far East salmon stocks; locally, KO TINRO noticed a profound alteration in the species profile of Kamchatka's salmon. By fishing along certain temperature gradients, or simply discarding what they didn't want, the Japanese selectively fished the most valuable species. Nerka and kizhuch used to make up about forty percent of Kamchatka's total salmon. They now constitute only ten percent of the catch. The other ninety percent is far less valuable keta and gorbusha."

Dr. Vronsky explained that the open ocean salmon fishing also resulted in the loss of some salmon spawning grounds on the Kamchatka peninsula. After growing to maturity in the open ocean, salmon return to spawn in the same lakes and rivers where they were hatched, a phenomenon known as 'homing'. Homing does not happen with all salmon; some individuals may get lost in the open ocean or blunder into the wrong river on their way back to the spawning grounds. Fisheries biologists call this 'straying'. Straying functions as a kind of insurance against natural disasters; for example, if a spawning ground gets wiped out by a landslide, at least some of the salmon will survive by straying to another spawning ground.

"Unfortunately, straying only happens successfully with a large salmon population," he said. "Because of homing, a single driftnet can hit salmon from one spawning ground so hard that very few salmon actually make it back home. Even fewer will stray. In the end, the all the salmon from a given spawning ground just get wiped out by drift nets, and we lose the spawning ground."

After years of stalling, the Japanese have ceased driftnet fishing for salmon in the open ocean. "At the initiative of the North Pacific Fisheries Management Council (NPFMC), the 1991 International Salmon Convention was signed by the Soviet Union, the United States, Canada, and (with great reluctance) Japan. Beginning in 1992, Japan agreed to halt driftnet fishing for salmon in the open ocean," concluded Dr. Vronsky.

However, the ban on driftnet salmon fishing outside the Russian 200-mile economic zone has not meant the end of the Japanese driftnet fishing. At least some of the Japanese fishing fleet has transferred its activities inside Russian waters, and is again driftnet fishing for salmon, this time working legally, by government-sanctioned contract with Russian partners. "What happens to salmon in the open ocean outside of our Exclusive

Economic Zone is regulated by international law," wryly notes Dr. Vronsky. "But what we do in our own territorial waters is our own business. Many Russian Far East regions have Japanese driftnet fishing operations."

Russia allows Japanese driftnet fishing in its territorial waters for one reason, and one reason alone; 'valuta', or hard currency. Valuta, desperately needed by fishing enterprises strapped for cash, can be earned quickly by contracting the Japanese to fish for 'their' salmon quotas. Russian Federation law prohibits foreign vessels to fish directly for certain valuable marine species, like king crab or nerka, but foreigners are allowed to harvest less valuable gorbusha or keta in 'directed fisheries'. In a directed fishery, a Russian observer works on a Japanese vessel and ensures that only targeted species get caught and harvested. According to unofficial sources, this practice is almost universally ignored. "Many times, gorbusha and keta get discarded, and the catch is high-graded for more valuable species. The Japanese routinely offer observers bribes to overlook the illegal harvesting of nerka and kizhuch," said a factory manager from one such venture, who requested anonymity. "They can easily afford to buy off observers, who earn very little in the first place, and since our Coast Guard suffers from fuel and manpower shortages, there's no way to get them out to the Japanese vessels to see who the violators are. It's a very troubling situation."

Regional administrations, their budgets strained to the limit by inflation and economic chaos, have actively encouraged Japanese driftnet fishing in Russian Far East waters. For a savvy Regional Administration, the payoffs are handsome indeed, offering both the chance to earn valuta, and encourage foreign investment in local infrastructure. The Kamchatka Regional Administration, for example, apparently plans to use earnings from the Japanese driftnet fleet to pay for the construction of a series of much-needed, local salmon hatcheries. According to one document, "In light of the cessation of Japanese (driftnet) fishing activity in the open areas of the Pacific Ocean, and the transfer of this activity into the Russian Federation Economic Zone, the Kamchatka Regional Administration is requested to petition the Fisheries Management Committee for the complete allocation of hard-currency earnings from the sale of 8 thousand tons of salmon for direct investment into a program of reproduction of anondromic fish species..." (Resolution No. 107 of the Kamchatka Regional Administration, May 15, 1992)

Sources within the Kamchatka Regional Administration would neither confirm nor deny the Japanese driftnet fleets presence, but in 1992, the giant, government fishing enterprise 'Kamchatrybprom' (privatized in early 1993) did open 'Kamchatka-Pilengo-godo', a joint Russian-Japanese salmon

PHC-12

hatchery intended to be the first of a series of similar, modern joint-venture hatcheries.

The hatchery, officially lauded as the wave of the future, released 4 million salmon fry into local waters earlier this year. Some local analysts, however, sharply criticize Kamchatka-Pilengo-godo. The Japanese partners received permits to fish for salmon based on the expected return of salmon released from the hatchery. Because nerka and kizhuch both spend 2 to 3 years maturing in the open ocean, the data on returns will not be available until then. Even then, said one KO TINRO biologist, the numbers will be "practically meaningless, since the hatchlings aren't being tagged or marked. They could all die, and we'd never know. So the whole project may be a waste of time, except for the Japanese who get to fish for salmon in the meantime, and for Kamchatrybprom, whose bosses get the prestige and perks from working with a foreign partner."

These criticisms aside, the Kamchatka Regional Administration likely made the best possible choice for the Kamchatka Region in approving Kamchatka-Pilengo-godo. Kamchatka, isolated from the mainland and stuck with a deteriorating industrial base, faces a cruel, no-win situation--sell off its resources and mortgage the future to acquire foreign technology and know-how, or conserve and stay poor and backward.

But pursuing coveted 'salmon dollars' creates serious disputes between local, regional, and federal governments. Because of unresolved legal ambiguities (according to the Russian Constitution, the administrative, ministerial branch of government controls natural resources, while decrees issued by President Yeltsin give this right to elected local Councils of People's Deputies), everyone can claim a piece of the pie.

Ust-Bolsheretsk, a small fishing village on the Sea of Okhotsk, recently found itself caught in the crossfire, with potentially disastrous consequences. Life in the distant regions of Kamchatka was never idyllic in even the best of times; chronic fuel and food shortages left Ust-Bolsheretsk cold and hungry for much of this winter. Town officials now say Japanese driftnet fishing may put the village permanently out of work.

Ust-Bolsheretsk's inhabitants work either for the October Revolution or Red Worker Collective Farms; the village also has two small 'national fishing enterprises', 'Kikhich' and 'Khaiko', supporting native Kamchadal and Itelmen fishermen. These fishing enterprises were allocated a total salmon catch of 17 385 tons for 1992 by the Kamchatka Regional Fisheries Council. (Distribution of Anadromic Species of Fish Between Kamchatka Region Users, Including the Koryak Autonomous Region, for 1992. Addendum #1 to the Kamchatka Fisheries Control Management Council, April 1, 1992)

Government-sanctioned Japanese driftnet fishing for salmon, according to locals, directly threatens Ust-Bolsheretsk's livelihood. On March 3, 1993, the Ust-Bolsheretsk Regional Council of People's Deputies appealed to the Supreme Soviet of the Russian Federation and the Russian Federation Government to halt the Japanese operations in the Sea of Okhotsk. The appeal, sent "by demand of fishing village inhabitants, fishermen, and processing plant workers," reads in part: "In 1992, the Fisheries Management Committee permitted Japanese fishermen to conduct salmon fishing operations in the Russian economic zone. According to the information available, two Japanese companies sent 142 fishing vessels, which caught 23 thousand tons of salmon."

"According to unofficial data, the Fisheries Management Committee gave permission to Japanese fishermen to conduct drift net fishing operations for salmon in the Kurile Island Straits, and in areas closed for fishing in the Sea of Okhotsk."

"Such permission places the renewal of spawning grounds in jeopardy, and consequently, salmon reproduction, similar to the situation at the end of the 1960s and beginning of the 1970s; (this permission further threatens) the unique nerka spawning grounds at Kuril'skoye Lake."

"We consider that the Fisheries Management Committee is ignoring the regulations of the International Salmon Convention."

"This act will bring great harm not only to salmon, but will severely damage the economy of fishing collectives and fish processing plants on the western shore of Kamchatka, bringing in its wake the impoverishment of the majority of the region's population, making it impossible for them, already in extreme hardship, to secure the normal conditions for human survival..."  
(We Demand A Ban on Fishing in The Sea of Okhotsk, 'Vesti', March 13, 1993)

Driftnet fishing poses the most obvious danger to salmon resources, but Japanese efforts to keep themselves supplied with hatchery-raised salmon from Hokkaido may be playing an equally harmful, more insidious role in the diminishment of Kamchatka's native stocks. According to Dr. Vronsky, Japanese salmon hatcheries produce about 200 000 mt of keta annually. "These salmon are extremely harmful," he said. "They migrate north, intermingle with our salmon, and occupy their place in the food chain. KO TINRO research conducted in the Kommandorskiye Islands also indicates that the Japanese keta cannibalize Kamchatka's salmon."

Adding more salmon hatcheries to Kamchatka--there are now only three on the entire peninsula--offers one solution to the problem of shrinking resources, but earlier efforts foundered because

of poor planning, clumsy, irresponsible bureaucracy, and wasteful indifference. These 'human factors' plague the Kamchatka Region's salmon fishing industry more than ever in 'reform' Russia. Commented one KO TINRO scientist, "Salmon hatchery policy on Kamchatka is so wasteful, it amounts to little more than officially-sanctioned, government-sponsored poaching. Our hatcheries do almost no good. They take wild salmon eggs, which hurts stocks in the first place, and then mismanage the hatcheries so badly they get almost no return. The government is as guilty of destroying Kamchatka's salmon resources as anyone else."

The Paratunka Salmon Hatchery is a prime example. One Kamchatka journal wrote in 1990, "A salmon hatchery, as usual bought in Japan for twenty million rubles, is now being set up in the upper reaches of the Paratunka River. (note: in the late 1980s, the official ruble/dollar exchange rate was about .6:1. Dr. Vronsky of KO TINRO quoted the total cost of the hatchery as twenty million dollars. Like Kamchatka-Pilengo-godo, the hatchery was paid for by allowing Japanese fishermen direct access to salmon quotas.) Proposed annual productivity is up to 400 tons of keta. It can only be recalled with anger that a mere twenty years ago the same Paratunka River was overflowing with over 1000 tons of salmon per year...this very salmon hatchery, by the way, spent two years rusting in the hold of a ship, (consequently) lost many parts, and then was delivered to the site on the Paratunka; but in 1987 'Minrybprom' (the Ministry of Fisheries, now the Fisheries Management Committee) decided to stop funding the project..." (The City on The Edge of the World, 'Mir Iskusstva', Moscow, 1990)

The Paratunka Salmon Hatchery, at last operational in 1993, suffers from chronic economic and management problems. Laboratory space originally intended to house a state-of-the-art Far East Salmon Biotechnology Research Center wound up being turned into warehouses. Expensive feed for salmon hatchlings must be purchased abroad with hard currency, driving up the hatchery's operating budget. Employees get low wages. Even worse than these problems, according to KO TINRO's Dr. Vronsky, is "the old Soviet preference for indicators instead of results. The Paratunka River and Avacha Bay simply don't have the feed base necessary to support the hatchlings released every year. There's no problem showing on paper that the hatchery produces enough hatchlings; but what's not shown is that a large percentage of the hatchlings die of starvation in the river and bay within a few days of release." Dr. Vronsky estimates that the mortality rate for hatchlings from the Paratunka Salmon Hatchery runs about twice that for natural-spawned salmon. The high mortality rate can be attributed to starvation, and to the fact that hatchery-raised salmon generally do not swim as well as wild salmon, and so are more vulnerable to predation.

PHC-12

Besides overfishing and mismanagement, environmental degradation of inland migration routes and spawning grounds--streams, rivers, and headwaters--contributes to the decline of Kamchatka's salmon stocks. For example, salmon hatchlings from the Paratunka and Avacha Rivers entering Avacha Bay must swim through a soup of raw sewage and industrial wastes from Petropavlovsk-Kamchatsky's factories before entering the relatively clean, open waters of the Pacific Ocean. Recent water quality tests conducted in Avacha Bay to allay public worry about nuclear wastes dumped in the ocean near Petropavlovsk-Kamchatsky indicated normal radiation levels, but showed distressingly high levels of lead, mercury, and other heavy metals.

To gain a better understanding of environmental degradation's effects on Kamchatka's salmon, I visited a KO TINRO Experimental Salmon Laboratory on the Paratunka River and spoke with Doctor Oleg Zaparozhets, a 43-year old fisheries biologist. Zaparozhets has been studying salmon behavior and habitat in the waters around the Kamchatka peninsula since 1980. Although he primarily researches homing, Dr. Zaparozhets finds salmon a very useful indicator for monitoring natural phenomena (he has, for example, devised a methodology for forecasting earthquakes using salmon behavior), as well as for determining man's effect on Kamchatka's environment. Dr. Zaparozhets lives with his wife, Galina (a fisheries technician) and family at the Experimental Salmon Laboratory much of the year.

Dr. Zaparozhets expresses deep concern about the imperiled state of Kamchatka's wild salmon habitat. "The Paratunka River system, extending from Kamchatka's central mountain range to Avacha Bay, is the largest river system in southern Kamchatka, and forms the basis for a fishery ecosystem of great productivity and importance," he explained. "Since much of the Paratunka's salmon gets processed at plants in Petropavlovsk-Kamchatsky, the Paratunka is critical for Kamchatka's economic health."

Because of its proximity to Petropavlovsk-Kamchatsky (about an hour's drive by automobile), its lovely setting among the mountains, and its scores of hot springs, the valley of the Paratunka River enjoys great popularity among the local population. City dwellers go in droves on the weekends to soak away their stresses in thermal waters, breathe clean country air, and break away from the dull routines of city life. Unfortunately, the resort area's popularity spells serious trouble for the Paratunka River salmon.

Sewage from the numerous resorts flows untreated into the river. Careless construction practices dirty the once pristine waters, and litter, construction debris, and topsoil runoff further ruin water clarity, degrading salmon habitat and spawning grounds. Construction workers on a big geothermal energy project at 'Termalniye' spoiled salmon spawning grounds by dumping tons

PHC-12

of soil and leftover building materials directly into the river's upper reaches. "Construction degrades salmon habitat on an almost daily basis," said Dr. Zaparozhets. "We have had a few real major disasters here, though. They are the worst."

Dr. Zaparozhets continued, "In 1986, the huge government construction company 'Gosstroi' (in Russian, 'Gosudarstvenny Stroitelny Material', or the Federal Construction Materials Agency) decided to open a construction materials mine on Barkhatnaya Mountain, located along the migration route to one of the two major spawning grounds for salmon in the Paratunka River system. When they built the road to the mine, Gosstroi dammed off a significant portion of these spawning grounds. Gosstroi didn't consult with anyone, didn't ask anyone's permission, and didn't try to find out what the impact of the project would be on the salmon population. They just went ahead and filled in streams and built their road. Locals were terribly upset--someone even took a gun and shot up a bulldozer. After a long fight in the Regional Administration, we forced Gosstroi to restore at least some of the habitat."

Dr. Zaparozhets notes with no little irony that the Gosstroi project happened concurrently with the construction of the Paratunka Salmon Hatchery. "Here we are, building a salmon hatchery to boost the river's stocks," he said disgustedly. "And at the same time, Gosstroi is building a road and mine that will completely ruin the salmon habitat. Sometimes nothing anybody does here makes any sense. And, of course, after all the hullaballo, the construction materials mine never even opened, so all we got for all that effort were ruined spawning grounds and a road going nowhere."

Industrial accidents, although infrequent, wreak no less havoc on the ecological integrity of the Paratunka River. "This year, there was an accident involving three waste-holding tanks from the local power plant (in Russian, 'kotel'niye) that provides electricity and heat to the village of Paratunka," said Dr. Zaparozhets. "The boilers there sprang a leak, and dumped waste water with a high concentration of alkaline compounds into the river. Of course, this unfortunate incident happened at the worst possible time--the Paratunka Salmon Hatchery, located right up the river from the power plant, just ran out of feed for their hatchlings and was forced to release seventy thousand kizhuch fry into the river to fend for themselves. Almost all of them died."

The day before I came to visit Dr. Zaparozhets, a man-made tragedy visited the salmon of the Experimental Salmon Hatchery. All winter long, the Kamchatka Region has been on the verge of running out of fuel needed for heating and electricity, living from tanker load to tanker load with no practically no reserves. The worst came to pass in early March when storms delayed a

PHC-12

scheduled fuel tanker en route from Japan. Most of Petropavlovsk-Kamchatsky lost power for about a half a day while the Administration scrambled around looking for a couple of hundred tons of fuel to make up the shortfall (as luck would have it, a vessel was found passing by with some fuel, and so the city was saved). This minor catastrophe caused some temporary discomfort to the citizens of Petropavlovsk-Kamchatsky, but turned into an apocolypse for Dr. Zaparozhets' salmon, which faced suffocation in their tanks when the circulation pumps stopped working. "We had to release thirty five thousand immature keta hatchlings into the river", he said. "We could have done something to save them if we knew we were going to lose our electricity, but nobody bothered to call and warn us. I don't know how many will survive. We've lost a good portion of our research effort for this year."

Although human destruction of habitat and spawning grounds is most noticeable around the Paratunka River, the same threat hangs over Kamchatka's salmon in other regions as well. "Overall, our spawning grounds are basically in satisfactory condition," said KO TINRO's Dr. Vronsky. Kamchatka has about 30 thousand square hectares of spawning grounds scattered around the peninsula. "But every year more roads are being built up river valleys, and more and more of the peninsula is becoming accessible for mining and logging. This hurts the salmon population by physically destroying spawning grounds, and by making streams and rivers more accessible to people. We can do something about the first problem by forcing construction enterprises to repair the damage, but what people do after that is too often out of our control."

Dr. Vronsky went on to explain that, although the laws regarding the preservation of salmon spawning grounds are very good, they are too often observed only on paper. "For example, by law no construction is permitted within one kilometer of salmon streams. Well, this rule gets violated constantly, and nobody enforces it...or, if we do find a violator and fine him, he just builds the cost of the fine into his operating expenses, and that's the end of it."

Drs. Vronsky and Zaparozhets both agree that virtually uncontrollable poaching is hurting Kamchatka's wild salmon stocks badly. With Russia's economic situation worsening, and laws less and less respected, poachers are catching more and more illegal salmon and brazenly selling it in Petropavlovsk-Kamchatsky's open air markets. "It used to be, that someone would go out at midnight and catch a few salmon for themselves, or for their friends, but there was no way they would sell it openly--that was way too dangerous. Now nobody cares," said Dr. Zaparozhets. A shortage of trained Fish and Game officers (in Russian, 'inspektori') doesn't help matters any.

PHC-12

The witches' brew of troubles for Kamchatka's salmon has all but ruined the largest river on the peninsula, the Kamchatka, which drains a large portion of the northern Kamchatka Region and the KAO before emptying into the Bering Sea at the village of Ust-Kamchatsk. "As a result of overfishing, the destruction of spawning grounds, pollution, and poaching, the Kamchatka River now produces only five or six tons of salmon per year; it used to produce three hundred thousand," said Dr. Vronsky.

How long will it be before the other salmon rivers on the Kamchatka peninsula suffer the same fate? While visiting with Dr. Zaparozhets, I went cross-country skiing with him and his family along the bottomlands of the Paratunka River. We skied across a wide, treeless plain surrounded on all sides by snowy mountains. The day, perfectly still and sunny, was perfect for a picnic and campfire in the snow. As we slurped down hot soup and munched pieces of dry, salted salmon, we talked about the prospects for saving the Paratunka.

"During the spring thaw, this whole basin fills with snowmelt," said Dr. Zaparozhets. "There's so much water running through here that salmon hatchlings make it to the ocean in less than a day. In June and July, the runs begin--so many salmon, it seems like the river is boiling with them. That's when the poachers come out in force--dozens of them, lined up along the river banks with nets. 'We catch 'em and catch 'em,' they say, 'and we still can't fish 'em out.' Nothing seems to slow them down. If we keep on like this, we could lose the salmon altogether in another ten or fifteen years."

"Maybe less."

All Best,

A handwritten signature in cursive script that reads "Peter H. Christiansen". The signature is written in dark ink and is positioned to the right of the typed name "All Best,". Below the signature is a horizontal line that underlines the name.

Peter H. Christiansen