Marine Stewardship Council Assessment

VA-Delta Kamchatka Salmon Fisheries

Public Certification Report

September 2016

MRAG Americas, Inc.

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CLIENT DETAILS:

Vityaz-Avto Co Ltd and Delta Co Ltd
Kamchatka, Russia

MSC reference standards:
MSC Certification Requirements (CR) Version 2.0

CONTENTS

Executive Summary

An assessment team of Ray Beamesderfer and Dmitry Lajus conducted the assessment using CR v2.0 (1 October 2014), with modifications to the default assessment tree for salmon fisheries as defined by the Marine Stewardship Council (MSC). The units of assessment and certification included Pink Salmon and Chum Salmon spawning in the Ozernaya, Koshegochek, Golygina, Opala, Kol, and Vorovskaya Rivers of the West Coast of Kamchatka, and Coho salmon spawning in the Kol River.

Site visits was conducted at the Vityaz Avto Company Offices and other offices in Petropavlovsk-Kamchatsky, Russian Federation on 20-25 April 2015 and 30 March 30 – 1 April, 2016. The team met with the clients, with the client's consultant, federal and state salmon scientific and management agencies, and key stakeholders. The team also reviewed extensive written documentation provided by the client and the fishery management system.

All principle scores exceeded 80 but several performance indicators scored between 60 and 80. As a result, seven conditions were identified. On the basis of this assessment of the fisheries, the Assessment Team recommends that the fisheries be certified. Following this recommendation of the assessment team, and review by stakeholders and peer-reviewers, a determination is hereby made by MRAG Americas to certify the fisheries.

Principle Level Scores

Principle	Final Principle Scores		
	Pink Salmon	Chum Salmon	Coho Salmon
Principle 1 – Target Species	81.9	81.9	81.9
Principle 2 – Ecosystem	85.7		
Principle 3 – Management System	81.9		

Summary of PI Level Scores

Prin-ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score pink	Score chum	Score coho
One	1	Outcome	0.333	1.1.1	Stock status	0.5	0.167	70	70	70
				1.1.2	Stock rebuilding	0.5	0.167	80	80	80
		Management	0.333	1.2.1	Harvest strategy	0.25	0.083	85	85	85
				1.2.2	Harvest control rules & tools	0.25	0.083	70	70	70
				1.2.3	Information & monitoring	0.25	0.083	65	65	65
				1.2.4	Assessment of stock status	0.25	0.083	75	75	75
		Enhancement	0.333	1.3.1	Enhancement outcome	0.333	0.111	100	100	100
				1.3.2	Enhancement management	0.333	0.111	100	100	100
				1.3.3	Enhancement information	0.333	0.111	100	100	100
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.067	80		
				2.1.2	Management	0.333	0.067	90		
				2.1.3	Information	0.333	0.067	70		
		Bycatch species	0.2	2.2.1	Outcome	0.333	0.067	100		
				2.2.2	Management	0.333	0.067	80		
				2.2.3	Information	0.333	0.067	80		
		ETP species	0.2	2.3.1	Outcome	0.333	0.067	85		
				2.3.2	Management	0.333	0.067	90		
				2.3.3	Information	0.333	0.067	80		
		Habitats	0.2	2.4.1	Outcome	0.333	0.067	95		
				2.4.2	Management	0.333	0.067	95		
				2.4.3	Information	0.333	0.067	80		
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.067	90		
				2.5.2	Management	0.333	0.067	90		
				2.5.3	Information	0.333	0.067	80		
Three	1	Governance and policy	0.5	3.1.1	Legal & customary framework	0.3	0.150	100		
				3.1.2	Consultation, roles &	0.3	0.150	85		
				3.1.3	Long term objectives	0.3	0.150	80		
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.25	0.125	80		
				3.2.2	Decision making processes	0.25	0.125	75		
				3.2.3	Compliance & enforcement	0.25	0.125	70		
				3.2.4	Management performance	0.25	0.125	80		

Summary of Conditions

Condition number	Condition	Performance Indicator
1	Demonstrate that pink, chum and coho salmon escapements are at or fluctuating around target reference points established for each stream system.	1.1.1
2	Demonstrate that harvest control rules are likely to be robust to the main uncertainties regarding future marine productivity regimes for Pink, Chum and Coho Salmon of the unit of certification. Demonstrate that well-defined harvest control rules are in place that ensure that the exploitation rate is reduced as the LRP is approached, and are expected to keep the SMU fluctuating around a target level consistent with MSY for component populations in different rivers and stocks (e.g. distinguish even and odd year runs for pink salmon).	1.2.2
3	Provide sufficient information on wild spawning escapement for a representative range of wild Pink, Chum and Coho populations in the unit of certification to support the harvest strategy and demonstrate that wild abundance is regularly monitored at a level of accuracy and coverage consistent with the harvest control rule.	1.2.3
4	Estimate stock status of Pink, Chum and Coho Salmon of the unit of certification relative to reference points that are appropriate to the SMU and demonstrate there is some evidence of coherence between the status of the indicator streams and the status of the other populations they represent within the management unit, including selection of indicator stocks with low productivity to match those of the representative SMU where applicable.	1.2.4
5	Provide quantitative information on escapement of (non-Ozernaya) Sockeye and (non-Kol) Coho Salmon adequate to assess the impact of the UoA with respect to status.	2.1.3
6	Demonstrate that information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	3.2.2
7	Demonstrate that a monitoring, control and surveillance system has been implemented in the fishery and associated enhancement activities and has demonstrated an ability to enforce relevant management measures, strategies and/or rules, and that sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	3.2.3

1 AUTHORSHIP AND PEER REVIEWERS

The assessment team consisted of the following individuals, who collectively have knowledge of the stock status and assessment, ecosystem impacts, and management systems applicable to this fishery:

1.1 Assessment Team

Mr. Ray Beamesderfer (Team Leader), M.Sc., Senior Fish Scientist, R2 Consultants, USA. Mr. Beamesderfer holds a bachelor's degree in Wildlife and Fisheries Biology from the University of California, Davis, and a Master's in Fishery Resources from the University of Idaho. Ray has special expertise in using quantitative analysis, statistics, and computer modeling to solve difficult fisheries-related questions, and in synthesizing and translating scientific analyses. He has completed a wide variety of projects in fishery management, biological assessment, and conservation/recovery planning. He is the author of numerous reports, biological assessments, management plans, and scientific articles on fish population dynamics, fish conservation, fishery, and hatchery management, sampling, and species interactions. Ray has served on MRAG and other fishery assessment teams for salmon fisheries in Alaska, Japan and Russia and brings perspective and harmonization between salmon fishery assessments in the Pacific.

Dr. Dmitry Lajus, Associate Professor in the Department of Ichthyology and Hydrobiology of St Petersburg State University. Dr. Lajus holds a BS and MS from St. Petersburg University, and a PhD from the Zoological Institute of the Russian Academy of Sciences. His research interests include population biology of marine fish and invertebrates, population phenogenetics, stress assessment, history of fisheries, historical ecology, and population dynamics. Dr. Lajus has authored numerous scientific articles, book chapters, and scientific reports, and conducted certification pre-assessments for a number of fisheries in Russia.

1.2 Peer Reviewers

MRAG appointed the following peer reviewers following an opportunity for public comment. The peer reviewers are considered the peers of the experts comprising the assessment team, and have expertise in one or more of the following: the fishery under assessment, stock assessment issues, relevant ecosystem interactions, and fishery management.

Dr. Chet Chaffee is an expert on the scientific and policy issue surrounding sustainability and certification. He has a distinguished and varied professional history that includes work for the National Marine Fisheries Service, Executive Vice President for Scientific Certification Systems, Inc., CA., Partner with Boustead Consulting & Assoc. USA, and as Vice President for FirstCarbon Solutions Inc., Dr. Chaffee has conducted more than 30 MSC pre-assessment projects worldwide covering more than 400 fisheries, including the Dungeness Crab Fisheries, US Albacore Fishery, and the US and Canadian Halibut fisheries. Dr. Chaffee also has significant experience in conducting a variety of full assessments, from some of the largest and most complicated fisheries assessed and certified under the MSC program (Alaska salmon, British Columbia salmon, Bering Sea and Aleutian Islands Pollock (one of the largest commercial fisheries in the world), and Gulf of Alaska Pollock to small community-based fisheries such as Mexico's Baja spiny lobster fishery and Australia's Lakes and Coorong fishery. Among the fisheries assessed by Dr. Chaffee are pelagic net fisheries (pollock, sardines), bottom trawl fisheries (Chilean hake and Australian Mackerel icefish), and line fisheries (Pacific cod, US halibut, Canadian halibut, and US sablefish), as well as estuarine fisheries. Dr. Chaffee has most recently led an assessment team that assessed the first salmon fisheries in Russia (Iturup Island pink and chum fisheries) and is currently engaged on reviewing fishery assessment processes and outcomes.

Dr. Greg Ruggerone has investigated population dynamics, ecology, and management of Pacific salmon in Alaska and the Pacific Northwest since 1979. He was the Project Leader of the Alaska Salmon Program, University of Washington, from the mid-1980s to early 1990s where he was responsible for conducting and guiding research at the Chignik and Bristol Bay field stations, preparing salmon forecasts, and evaluating salmon management issues. Most of his research involves factors that affect

survival of salmon in freshwater and marine habitats, including climate shifts, habitat degradation, predator-prey interactions, and hatchery/wild salmon interactions. He is currently a member of the Columbia River Independent Scientific Advisory Board and the Independent Scientific Review Panel. He recently served as the fish ecologist on the Secretary of Interior review of dam removal on the Klamath River. During the past six years, he has evaluated salmon fisheries for sustainability using guidelines developed by the Marine Stewardship Council.

2 DESCRIPTION OF THE FISHERY

2.1 Unit(s) of Assessment (UoA) and Scope of Certification Sought

2.1.1 UoA and Proposed Unit of Certification (UoC)

The MRAG Americas assessment team determined that the fishery is within scope as required by the MSC.

Table 1. The units of assessment and certification consist of:

Species	Pink Salmon *Oncorhynchus gorbuscha*
Geographical range of fishing operations	Western Kamchatka, Sea of Okhotsk
Method of capture	Set nets, beach seines
Stock	Populations of Pacific salmon spawning in Western coast of Kamchatka (Ozernaya, Koshegochek, Golygina, Opala, Kol, Vorovskaya Rivers) and also adjacent rivers whose populations can be intercepted by the fishery
Management	Federal Agency for Fisheries SVTU, regional divisions of Federal Agency for Fisheries. Regional (Kamchatka) Fisheries Research Institute, KamchatNIRO. Regional (Russian Far East) Fisheries Research Institute, TINRO-Center. All-Russia Fisheries Research Institute, VNIRO. SevvostRybvod.
Client group	The clients for this assessment are: "Vityaz-Avto Co" Ltd and "Delta Co" Ltd Str. Stepnaya 5 Petropavlovsk-Kamchatsky, Kamchatsky region, Russian Federation Contact: Mr. Andrei Bokov Email: andrei-bokov@bk.ru

Species	Chum Salmon *O. keta*
Geographical range of fishing operations	Western Kamchatka, Sea of Okhotsk
Method of capture	Set nets, beach seines
Stock	Populations of Pacific salmon spawning in Western coast of Kamchatka (Ozernaya, Koshegochek, Golygina, Opala, Kol, Vorovskaya Rivers) and also adjacent rivers whose populations can be intercepted by the fishery
Management	Federal Agency for Fisheries SVTU, regional divisions of Federal Agency for Fisheries. Regional (Kamchatka) Fisheries Research Institute, KamchatNIRO. Regional (Russian Far East) Fisheries Research Institute, TINRO-Center. All-Russia Fisheries Research Institute, VNIRO. SevvostRybvod.

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Species	Coho Salmon *O. kisutch*
Geographical range of fishing operations	Western Kamchatka, Sea of Okhotsk
Method of capture	Set nets, beach seines
Stock	Populations of Pacific salmon spawning in Western coast of Kamchatka (Kol River) and also adjacent rivers whose populations can be intercepted by the fishery
Management	Federal Agency for Fisheries SVTU, regional divisions of Federal Agency for Fisheries. Regional (Kamchatka) Fisheries Research Institute, KamchatNIRO. Regional (Russian Far East) Fisheries Research Institute, TINRO-Center. All-Russia Fisheries Research Institute, VNIRO. SevvostRybvod.
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The Ozernaya Sockeye Salmon fishery operated by Vityaz-Avto and Delta achieved MSC certification in September 2012. The third surveillance audit for this fishery was completed in the spring of 2016.

2.1.2 Final UoC(s)

The final Unit of Certification is as proposed.

2.1.3 Total Allowable Catch and Catch Data

Table 2. TAC and Catch Data for Pink Salmon.

TAC	**Year**	**NA[a]**	**Amount**	**--**
UoA share of TAC	**Year**	**NA[a]**	**Amount**	**--**
UoC share of (UoA)	**Year**	**2015**	**Amount**	**90%**
Total green weight catch by UoC	**Year (most recent)**	**2015**	**Amount**	**357 mt**
	Year (second most recent)	**2014**	**Amount**	**780 mt**

[a] *Not applicable: Fishery managed based on realized annual escapements rather than a prescribed total allowable catch.*

Table 3. TAC and Catch Data for Chum Salmon.

TAC	**Year**	**NA[a]**	**Amount**	**--**
UoA share of TAC	**Year**	**NA[a]**	**Amount**	**--**
UoC share of (UoA)	**Year**	**2015**	**Amount**	**90%**
Total green weight catch by UoC	**Year (most recent)**	**2015**	**Amount**	**2,330 mt**
	Year (second most recent)	**2014**	**Amount**	**2,292 mt**

[a] *Not applicable: Fishery managed based on realized annual escapements rather than a prescribed total allowable catch.*

Table 4. TAC and Catch Data for Coho Salmon (Kol River only).

TAC	**Year**	**NA[a]**	**Amount**	**--**
UoA share of TAC	**Year**	**NA[a]**	**Amount**	**--**
UoC share of (UoA)	**Year**	**2015**	**Amount**	**100%**
Total green weight catch by UoC	**Year (most recent)**	**2015**	**Amount**	**445 mt**
	Year (second most recent)	**2014**	**Amount**	**704 mt**

[a] *Not applicable: Fishery managed based on realized annual escapements rather than a prescribed total allowable catch.*

2.1.4 Scope of Assessment in Relation to Enhanced Fisheries

The fishery targets naturally reproducing salmon stocks returning to rivers within the certification unit. There are no hatcheries located within the proposed certification unit. Therefore, this is not considered an enhanced fishery.

2.1.5 Scope of Assessment in Relation to Introduced Species Based Fisheries (ISBF)

The fishery does not include introduced species or inseparable or practically inseparable (IPI) species.

2.2 Overview of the fishery

The fishery occurs in the Western part of Kamchatka Peninsula on the Sea of Okhotsk coast and the lower reaches of six coastal rivers, the Ozernaya, Koshegochek, Golygina, Opala, Kol, Vorovskaya (Figure 1).

The region of the fishery is remote and largely undeveloped. Watersheds are in excellent condition and salmon habitat diverse and highly productive. The human population is concentrated in about 10 small communities. The largest towns, Ust-Bolsheretsk and Oktiabrsky, are located on the Bolshaya River. Two small towns are also located near the mouth of the Ozernaya River, Ozernovsky and Zaporozhie, each consist of about 2,500 residents. Two small towns are also located on the Vorovskaya river. During the two-month fishing season, many people also come to the region from Petropavlovsk-Kamchatsky and from mainland Russia for seasonal work with the fishing companies. The local population has been declining recently due to limited economic opportunity in the region.

Road access to the fishery is limited in comparison with majority of other Kamchatka fisheries. There is a road connecting Petropavlovsk-Kamchatsky to the west Kamchatka coast at the Bolshaya River, the total distance is about 200 km. The Vorovskaya, Kol, Opala, and Ozernaya rivers are not located near main roads, although there is a road built for the natural gas pipeline near the middle section of the Kol River. Vehicle access to rivers north and south of the Bolshaya is made along the beach, conditions permitting. However, most travel between fishing rivers occurs by helicopter or boat.

Two fishing companies are included in this assessment: Vityaz-Avto and Delta. Vityaz-Avto was founded in 1997 and grew quickly. The company has three branches in the western coast of Kamchatka in the towns of Ozernovsky, Oktiabrsky and Sobolevo. Delta has operated in the Ozernaya and Opala river areas of Kamchatka since 1998. The companies generally process and freeze all of their catch at their own fish processing factories. Fish processing plants are operated by the fishing companies near the mouths of the Ozernaya, Koshegochek and Opala Rivers near the areas where main fishing activities occur. These plants process the catch from sea nets and lower river fishing parcels. Local catches are delivered by boats to the processing plants. Most production by Vityaz-Avto is sold abroad to Japan and Canada. More than half of total production by Delta is exported to Asian countries.

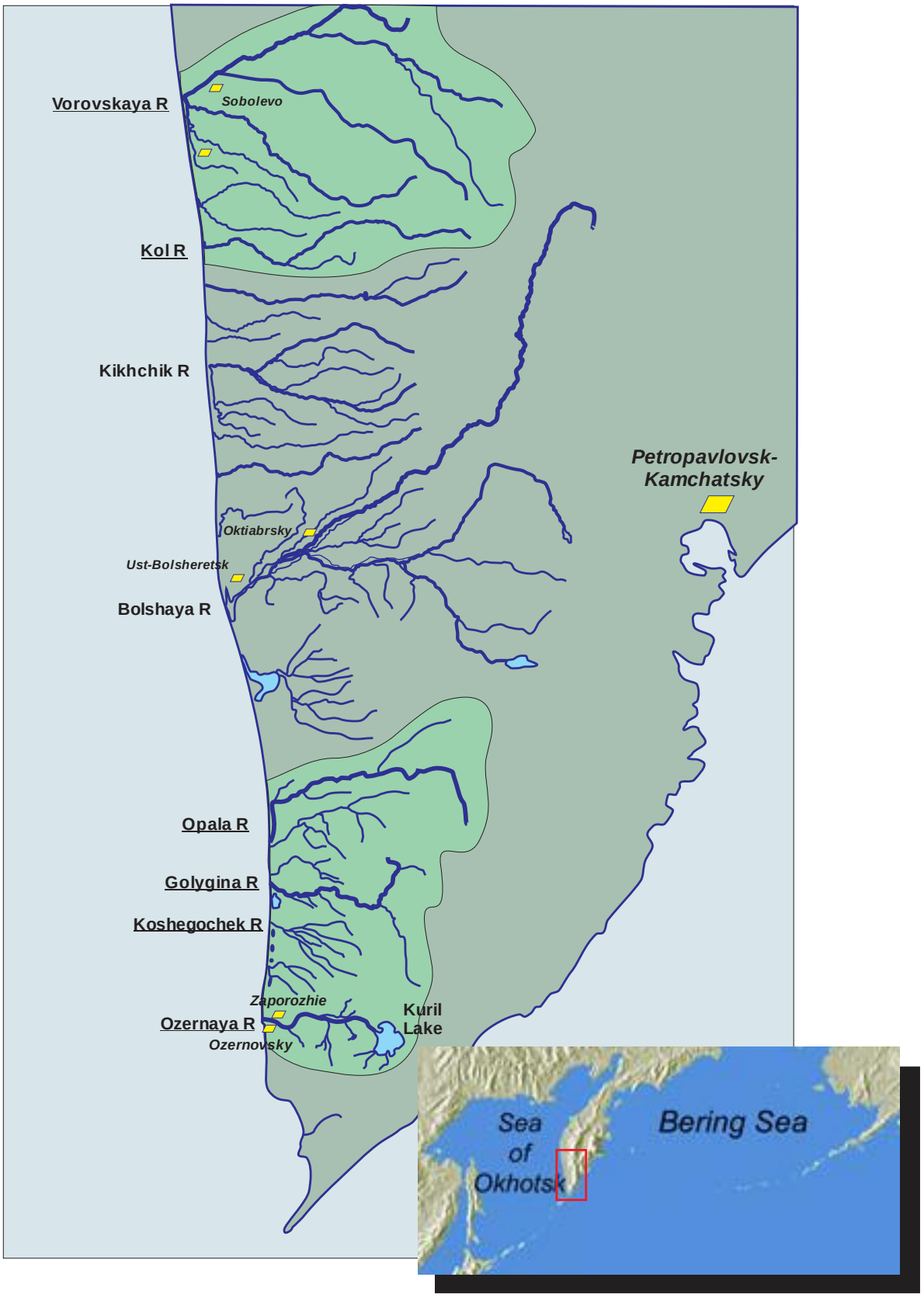

Figure 1. Western Kamchatka region of the fishery assessment. Names of rivers included in this assessment are underlined.

2.2.1 Historical development of the Fishery

Fishing is and has always been the primary occupation of people of western Kamchatka including indigenous peoples. Since the beginning of Kamchatka colonization, the western coast played a significant role in the local economy because of rich and diverse Pacific salmon resources. A settlement near Bolshaya River is one of the first in Kamchatka; it is known since early 18th century.

Industrial salmon fisheries have operated in western Kamchatka at least since 1914 when a cannery began operation on the Ozernaya River. The fishing industry expanded during the Soviet period, although catches began to decrease in the 1950s due to Japanese driftnet fishing and unfavorable ocean conditions for salmon production.

A series of events fundamentally changed the fishery situation by the early 1990s. The collapse of the Soviet Union led to a period of severe economic disruption. At the same time, salmon returns increased considerably following improvements in ocean conditions for salmon throughout the North Pacific during the 1980s and an international ban in 1993 on unregulated high seas drift net fishing outside of the Russian Exclusive Economic Zone. Fishing parcels and fishing rights were also redistributed during the economic crisis. Until Perestroika, fishing was conducted by very few governmental enterprises. After 1990, commercial fishery access was leased to small private companies.

2.2.2 Fishing Methods

The fishery is prosecuted with fixed trap nets in nearshore marine waters, beach seines in the lower reaches of the river, and gillnets at one site upstream from the estuary. Gill nets are not included in the units of assessment.

Coastal trap nets typically consist of a mesh lead set perpendicular to shore to guide fish into one or more mesh wing-style traps where narrowing mesh fykes make it difficult for fish to exit. The mesh lead or “fence” is usually 1,100 -1,300 m in length and 11-15 m deep at low tide. The mesh size of the central net and the traps is being chosen to prevent fish from being gilled in the net cells. Traps are constructed of net mesh on a steel frame, typically have a wall height of 9 m and do not reach bottom. Coastal trap nets are effective because tidal exchange is relatively small and littoral areas are wide and gradually-sloped. Traps have proven to be especially efficient at capturing fish migrating in the coastal area. This type of fishing is passive and catch per unit effort is related to the intensity of the run strength. Coastal trap nets are operated from small boats. Catch is typically crowded from traps and dip netted into the boats for transport a short distance to shore or the fish processing plant where they are off-loaded by crane or hand at the beach.

Beach seines are long nets used to encircle and crowd fish toward shore where they can be captured. These seines are typically 200 m in length. Seines are fished in the shallow waters of the lower river where the current is relatively slow and the river is shallow. Seines are set from small skiffs and hauled from shore with vehicles and by hand.

2.2.3 Organization & User Rights

Administratively, the fishery area is a part of Ust-Bolsheretsk district of Kamchatka Krai of Far East Federal Region of the Russian Federation. Management of fisheries in this region is based on fisheries zones, subzones and management units (Figure 2). The assessment fishery occurs in the Kamchatka-Kuril subzone of Sea of Okhotsk zone. The Kamchatka-Kuril fishery subzone includes three management units. The companies in this certification process have fishing parcels in two management units (Table 5). The Opala River is included in the most southern management unit together with Ozernaya River. Golygina, Koshegochek, Iavinskaya Rivers and adjacent coastal areas. Bolshaya and Kikhchik Rivers are included in the other unit.

Fishing parcels consisting of trap or seine sites are leased to fishing companies under a long-term lease arrangement. Fishing parcels were distributed for period 2008-2027. Only commercial fishing occurs

in sea fishing parcels. River parcels may be allocated for commercial fishing, sport fishing or hatchery purposes. Vityaz-Avto leases 18 fishing parcels, 14 of which are in the sea, and 4 of which are in the Ozernaya, Koshebochek, Golygina and Kol rivers. Delta leases 9 fishing parcels, 7 of which are in the sea, and 2 of which are in the Ozernaya and Opala rivers. The companies also participate in marine fisheries for white fish.

Fishermen are hired by contract – they have a salary and then extra pay by their results based on catch. In addition to employing the local inhabitants in fish processing factories, the companies also pay considerable attention to investing in community development projects of the towns in western Kamchatka where they are based.

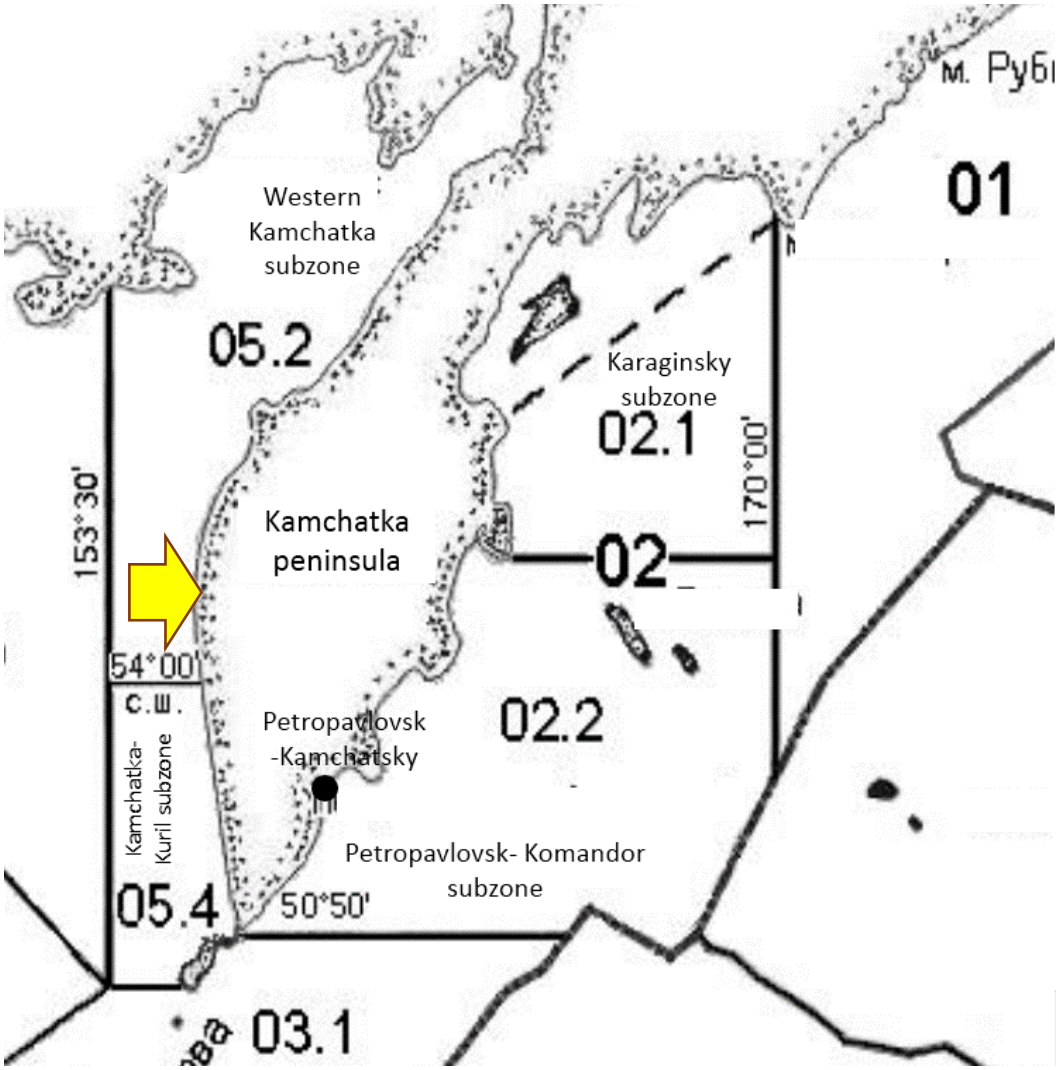

Figure 2. Administrative units for Kamchatka peninsula fishery management. Vorovskaya and Kol Rivers are included in subzone 05.2, and the other rivers are included in subzone 05.4. Yellow arrow indicates the Vorovskaya River mouth, which is the northmost location of this assessment

Table 5. Management units where fishing parcels of Vityaz-Avto and Delta are included (from materials of Anadromous Fish Commission of Kamchatka region, http://www.kamchatka.gov.ru/?cont=oiv_din&id=169&menu=4&menu2=0&oiv_id=102).

Management unit	Company	Fishing parcels
1: Kikhchik, Mukhina, Khomutina, Utka, Mitoga and Bolshaya rivers and adjacent parts of Sea of Okhotsk	"Bolsheretsk" LTD	102, 104-107, 702, 703, 727
	"RKZ Komandor" OAO	103, 110, 112, 115, 116, 152, 157, 164, 711, 716, 723
	"Loid-Fish" LTD	108, 150, 154, 160, 706, 707, 713
	"RA Narody Severa" LTD	109, 111, 156, 159, 162, 704, 718, 719, 734
	"Oktiabrsky rybokombinat" LTD	113, 114, 118, 163, 717, 720
	"RPK Skop" LTD	117, 708, 709, 724, 732
	"Vityaz-Avto" LTD	**151, 710**
	"Dary Kamchatki" LTD	155
2: Opala, Golygina, Koshegochek, Iavinskaya, Ozernaya rivers and adjacent parts of the Sea of Okhotsk	"Rybkholkam" LDT	165-169, 194, 195, 200, 209, 750, 754
	"Oktiabrsky rybokombinat" LTD	170, 171, 199
	"RPF KamNORiS" LTD	172
	"Bolsheretsk" LTD	173, 182, 738
	Loid-Fish LTD	174, 183, 186, 739
	RA Kolkhoz Krasny Truzhennik	175, 196, 744, 749, 753
	"RA Narody Severa" LTD	176, 185
	"Delta" LTD	**177-181, 184, 198, 740, 755**
	"Ozernovsky RKZ № 55" OAO	187, 188, 192, 193, 202, 207, 208, 745, 748, 751, 756
	"Vityaz-Avto" LTD	**189-191, 197, 203, 204, 746, 747, 752**
	"Dary Kamchatki" LTD	201
	"SOI Khaiko" LTD	206, 760
	"Rybokombinat Zapadny" LTD	759
	"NIO Alyk" LTD	757, 758

Table 6. List of fishing parcels permitted for use by Vityaz-Avto and Delta companies. Parcels denoted with a * are rarely fished in practice.

Co.	Parcel	Water body	Latitude			Longitude			Length/ width (m)	Processing location
			Deg	min	sec	Deg	min	sec		
Vityaz-Avto	752	Ozernaya river	Low point - 1000 m from the mouth, top point - 1200 m from the mouth (south part of the island)						200/'--	Ozernaya
	189	Sea of Okhotsk	51	48	20	156	30	06	300/2000	Ozernaya and Koshegochek
	191	Sea of Okhotsk	51	46	10	156	30	10	300/2000	Ozernaya and Koshegochek
	197	Sea of Okhotsk	51	39	43	156	29	58	300/2000	Ozernaya
	203	Sea of Okhotsk	51	32	44	156	29	07	300/2000	Ozernaya
	204	Sea of Okhotsk	51	31	38	156	29	07	300/2000	Ozernaya
	746	Golygina river	Low point - 4000 m from the mouth, top point - 6200 m from the mouth (left shore)						2200/--	Ozernaya and Koshegochek
	747	Koshegochek river	Low point - 1000 m from the mouth, top point - 1500 m from the mouth (both shores)						500/--	Ozernaya and Koshegochek
	697	Kol river	Low point - 3000 m from the mouth, top point - 5000 m from the mouth (both shores)						2000/--	Kol

Co.	Parcel	Water body	Latitude			Longitude			Length/ width (m)	Processing location
			Deg	min	sec	Deg	min	sec		
	90	Sea of Okhotsk	53	48	18	155	57	04	300/2000	Kol
	89	Sea of Okhotsk	53	49	22	155	56	49	300/2000	Kol
	*81	Sea of Okhotsk	54	03	11	155	52	29	300/2000	at sea (vessels)
	*80	Sea of Okhotsk	54	04	15	155	52	03	300/2000	at sea (vessels)
	*79	Sea of Okhotsk	54	05	18	155	51	41	300/2000	at sea (vessels)
	78	Sea of Okhotsk	54	06	22	155	51	17	300/2000	Ozernaya and Koshegochek
	77	Sea of Okhotsk	54	07	25	155	50	53	300/2000	Ozernaya and Koshegochek
	76	Sea of Okhotsk	54	08	29	155	50	29	300/2000	Ozernaya and Koshegochek
	*60	Sea of Okhotsk	54	23	55	155	44	51	300/2000	at sea (vessels)
Delta	755	Ozernaya river	Low point - 2000 m from the mouth, top point - 2400 m from the mouth (left shore)						400/--	Ozernaya
	740	Opala river	Low point - 1000 m from the Khetik river mouth, top point - 2000 m from the Khetik river mouth (both shores)						1000/--	Opala
	177	Sea of Okhotsk	52	03	43	156	28	40	300/2000	Opala
	178	Sea of Okhotsk	52	02	39	156	28	49	300/2000	Opala
	179	Sea of Okhotsk	52	01	34	156	28	56	300/2000	Opala
	180	Sea of Okhotsk	52	00	30	156	29	02	300/2000	Opala
	181	Sea of Okhotsk	51	59	25	156	29	08	300/2000	Opala
	*184	Sea of Okhotsk	51	54	49	156	29	31	300/2000	at sea (vessels)
	198	Sea of Okhotsk	51	37	13	156	29	53	300/2000	Ozernaya

2.2.4 Seasons

Commercial salmon fishing seasons generally run from July until September. Fishing in the rivers generally begins around July 5-9. Fishing in sea nets generally begins around July 15-20. Salmon species return and are harvested in broadly overlapping distributions throughout this period. Fishing generally continues as long as fish abundance and weather permit. Sea nets are typically removed in September as the bulk of the salmon run is complete and autumn storms begin. Fishing may continue in river sites when fish are available.

The start of the commercial season is timed to avoid harvest of Chinook Salmon. No commercial fishing occurs from May until early or mid-July. The majority of the Chinook and Cherry salmon return occurs during this closed period. These species are not subject to significant commercial harvest. Commercial Sockeye harvest typically begins in the second week of July. Maximum catches occur from mid-July until mid-August, and the latest industrial catches occur in late August to mid-September. Pink harvest typically begins around the third week of July. Maximum catches occur in the early-mid August. Catches are largely complete in even years by the beginning of September and in odd years from late August to mid-September. Chum harvest begins in mid- to late July with peak catches in early to mid-August. The latest catches generally occur in the early to mid-September. Coho harvest typically begins in mid- August with maximum catches in the early to mid-September, and catches until the beginning of October. The large majority of the Coho harvest in the commercial fishery occurs after the period of Sockeye, Pink and Chum catches. Fishing seasons may be modified based on fish abundance.

2.2.5 Harvest

The large majority of the salmon harvest (90%) occurs the commercial fishery. Salmon are also harvested by sport fishing; for personal consumption fisheries by communities, families and individual

representatives of indigenous peoples; and by salmon hatcheries for reproduction purposes (although no hatcheries occur on the rivers in the UoA).

Commercial Fishery

Commercial salmon harvest data is available for western Kamchatka since the 1930s. Extensive catch records are kept by the commercial fisheries. Each fishing parcel has an individual log book that is maintained by the captain of that crew. Fishing companies compile and report numbers to the management systems. Numbers were historically tracked relative to fishery quota allocations and are currently the basis for landing tax assessments.

Annual salmon harvest in western Kamchatka commercial fisheries currently averages about 50,000 mt per year (Figure 7). Pink Salmon average about 88% of the even year harvest and 14% of the odd year harvest. Of the non-Pink Salmon harvest, Chum typically comprise about 50%, Sockeye about 37%, Coho about 10%, and Chinook about 4%.

Pink Salmon are caught primarily by sea nets in even years. During odd years, Pink Salmon harvest is distributed between sea and river sites. Chum Salmon catch is distributed between sea and river sites. Sockeye are harvested primarily in sea nets where the harvest included substantial numbers of the large MSC-certified Ozernaya run which migrates south along the coast. Coho Salmon are harvested mainly in the river.

The Vityaz-Avto and Delta companies have fished on the Vorovskaya, Opala and Ozernaya rivers since 1998 and the Kol since 2004.

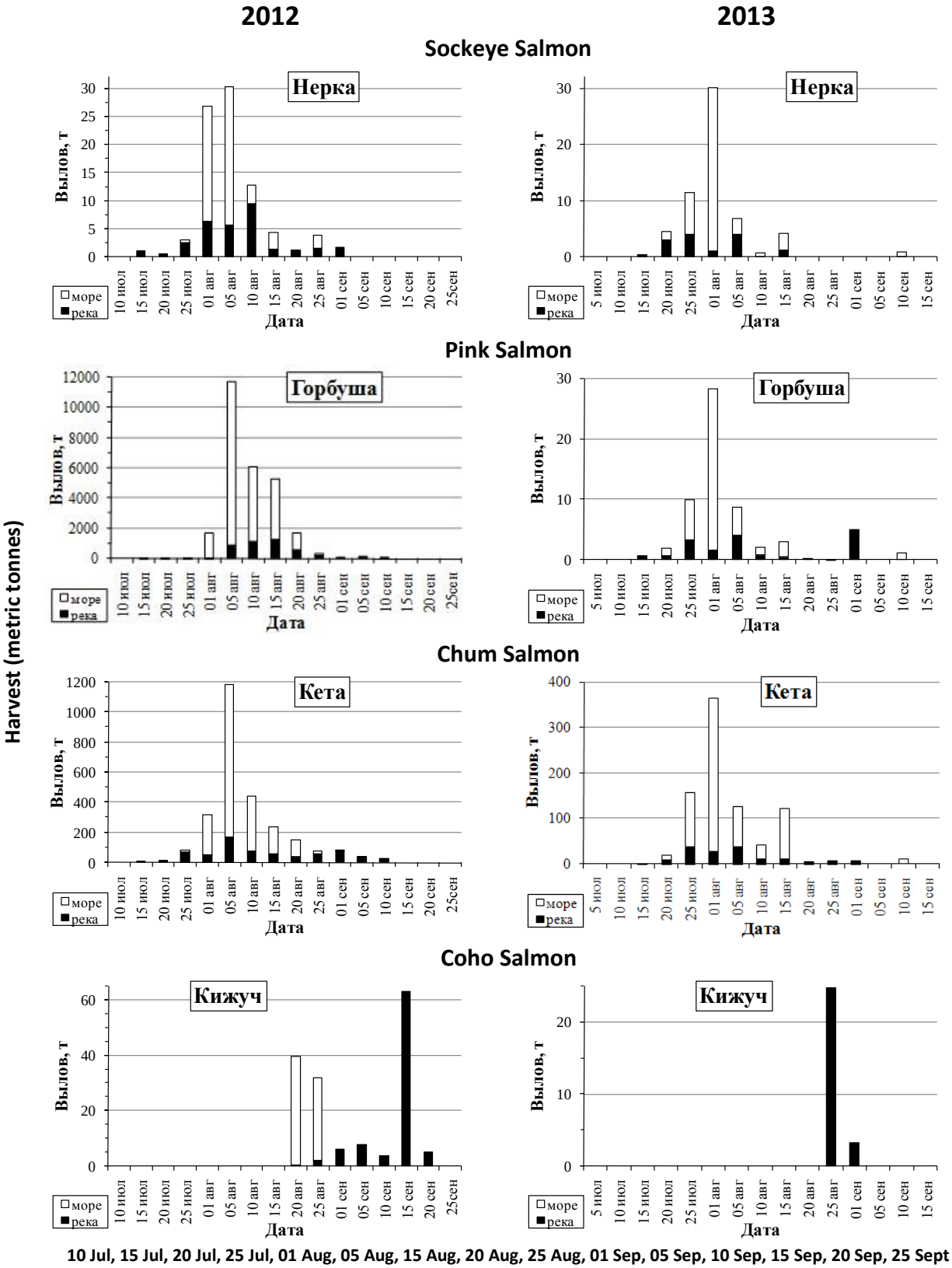

Figure 3. Salmon harvest in the Vorovskaya River, 2012-2013, by five-day period (□ Sea, ■ River).

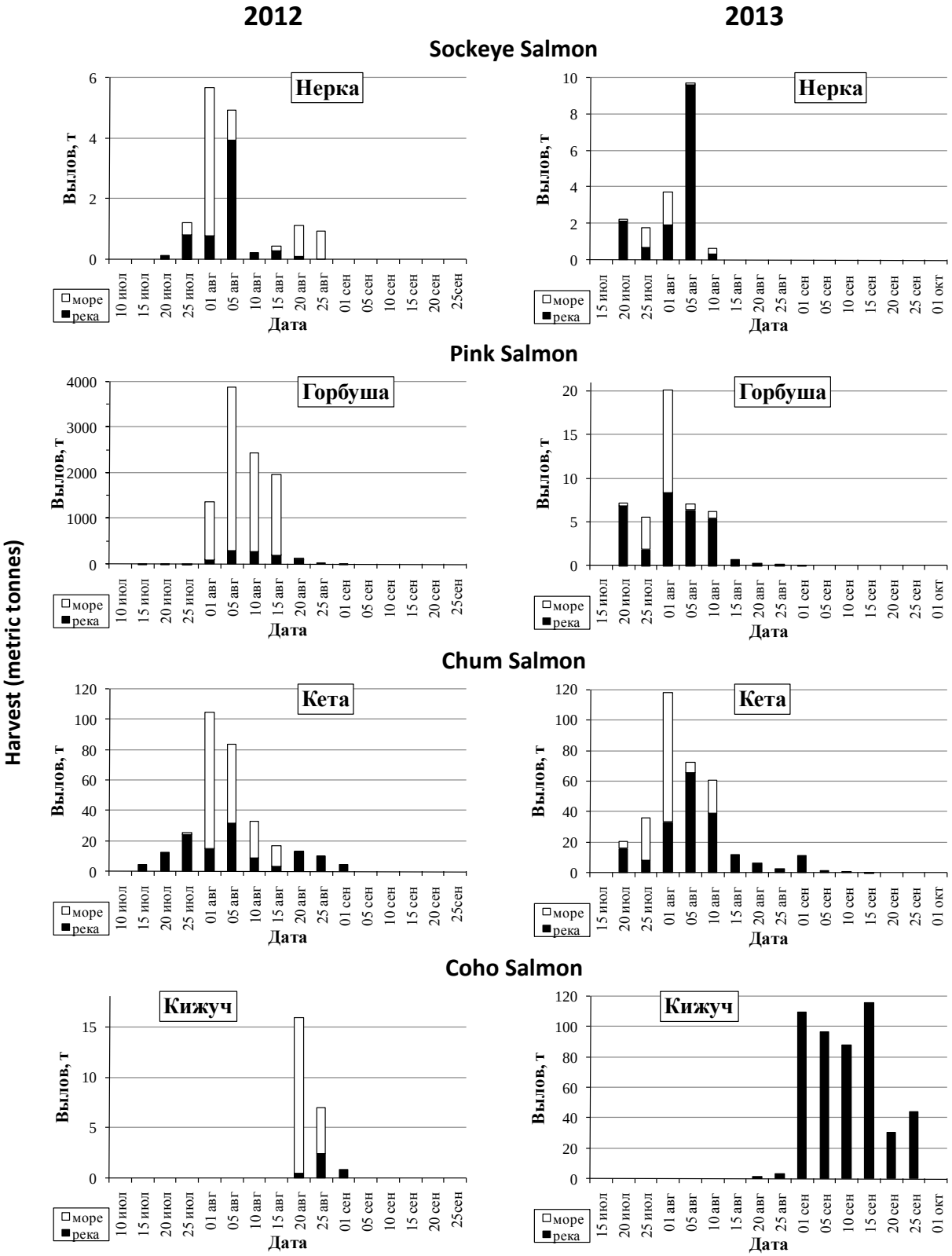

Figure 4. Salmon harvest in the Kol River, 2012-2013, by five-day period (□ Sea, ■ River).

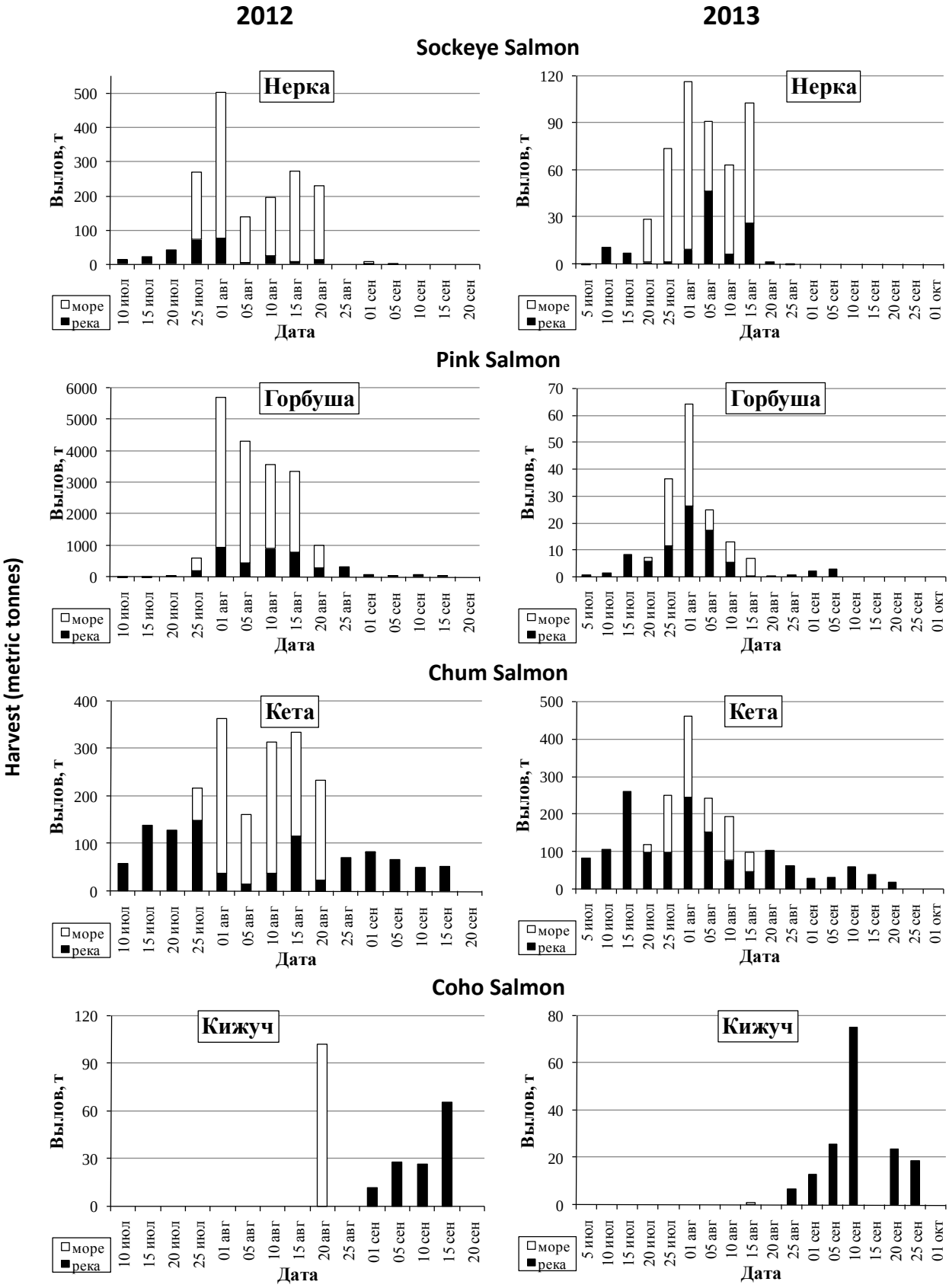

Figure 5. Salmon harvest in the Opala River, 2012-2013, by five-day period (□ Sea, ■ River).

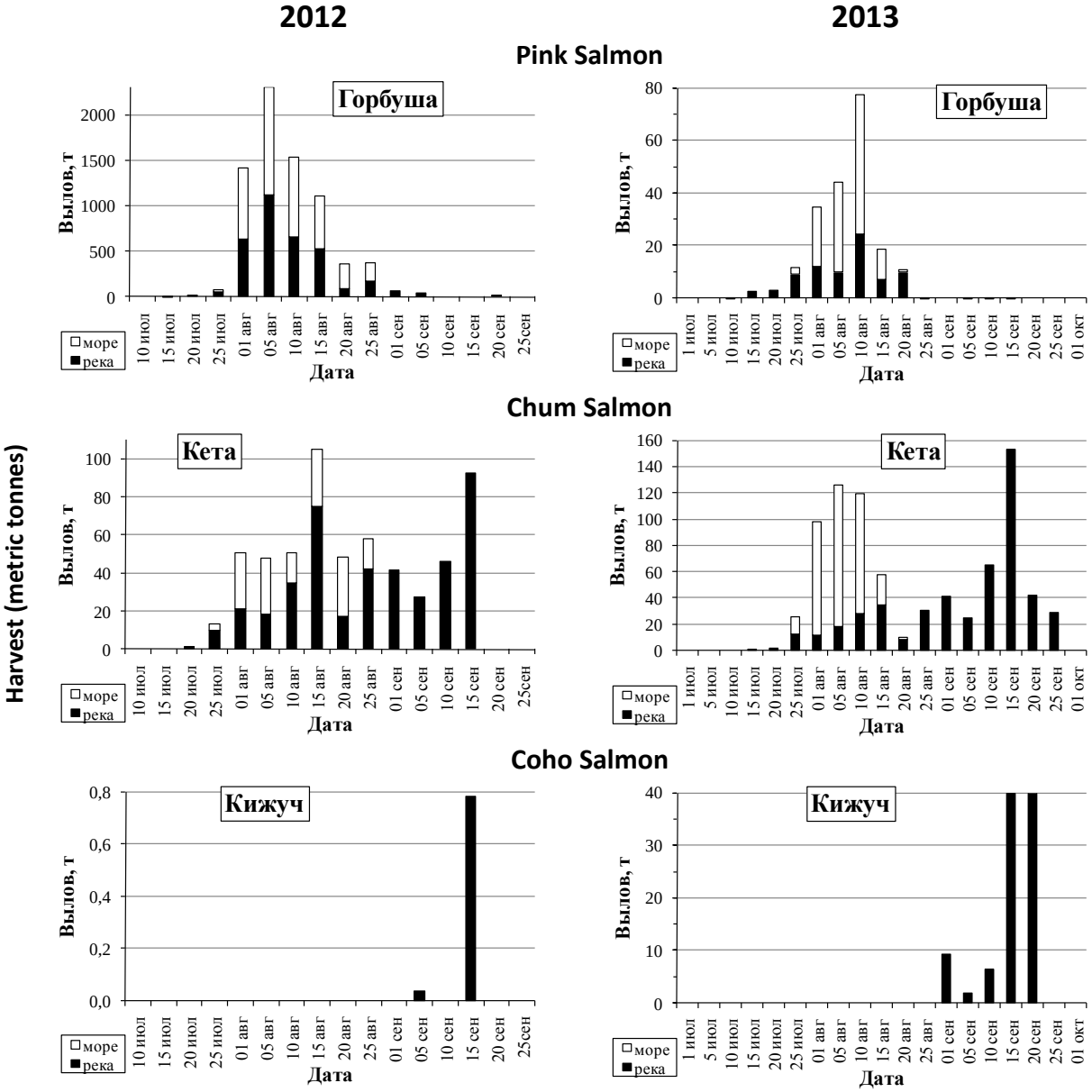

Figure 6. Salmon harvest in the Ozernaya River, 2012-2013, by five-day period (□ Sea, ■ River).

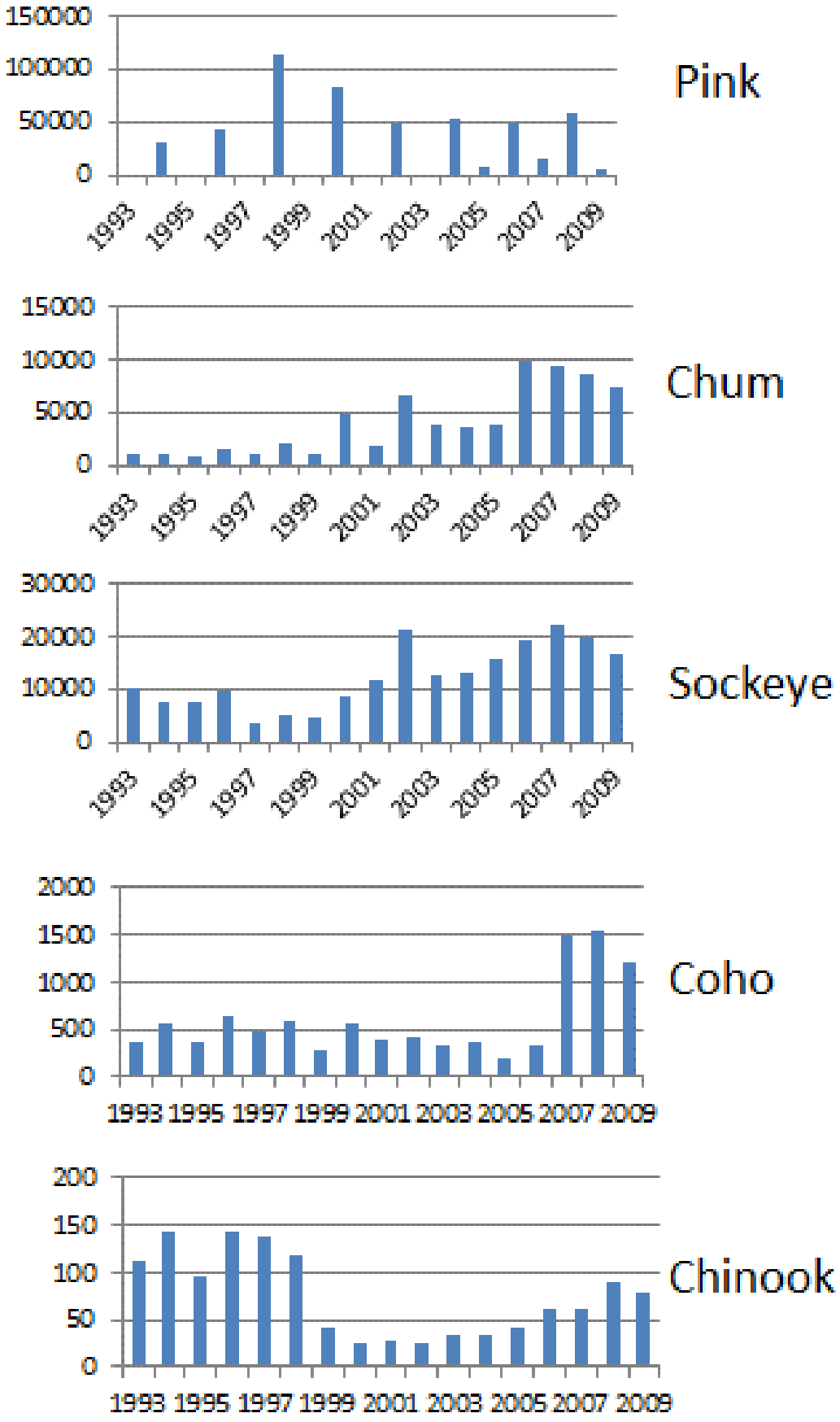

Figure 7. **Total harvest (metric tonnes) of Pacific salmon in the Western Kamchatka area (Rassadnikov 2006, 2009; Rassadnikov and Starovoitov 2007; Starovoitov and Rassadnikov, 2008).**

Table 7. Distribution of portion of Pacific salmon caught during commercial fishing in the Vorovskaya, Kol, Opala and Ozernaya rivers by periods (%).

Years	**Pink** (*Горбуша*)	**Chum** (*кета*)	**Sockeye** (*нерка*)	**Coho** (*кижуч*)	**Chinook** (*чавыча*)
	Vorovskaya — even years				
1994–1998	91.6	5.8	0.8	1.4	0.4
2000–2004	90.8	8.1	0.1	1.0	+
2006–2012	86.6	12.1	0.4	0.9	+
Average	**89.3**	**9.0**	**0.4**	**1.1**	**0.2**
	Vorovskaya — odd years				
1995–1999	3.2	45.8	7.1	35.0	8.9
2001–2005	26.8	58.6	2.4	11.1	1.1
2007–2013	40.6	52.4	3.2	3.7	0.1
Average	**25.2**	**52.4**	**4.1**	**15.3**	**3.0**
	Kol — even years				
1994–1998	94.3	4.0	0.3	1.3	0.1
2000–2004	91.8	7.4	0.5	0.3	0.0
2006–2012	93.6	5.4	0.4	0.6	+
Average	**93.3**	**5.6**	**0.4**	**0.7**	**+**
	Kol — odd years				
1995–1999	0.0	29.7	3.5	65.3	1.5
2001–2005	30.4	55.8	3.6	9.4	0.8
2007–2013	40.6	39.5	1.8	17.8	0.3
Average	**25.3**	**41.5**	**2.8**	**29.6**	**0.8**
	Opala — even years				
1994–1998	79.2	10.0	5.2	4.5	1.1
2000–2004	78.8	8.6	12.3	0.3	0.0
2006–2012	76.8	10.1	12.2	1.0	+
Average	**78.2**	**9.6**	**10.1**	**1.8**	**0.3**
	Opala — odd years				
1995–1999	1.0	54.1	10.3	23.2	11.4
2001–2005	9.8	72.0	12.8	5.4	+
2007–2013	24.8	46.0	24.3	4.8	0.1
Average	**13.1**	**56.2**	**16.7**	**10.5**	**3.5**
	Ozernaya— even years				
1994–1998	38.2	0.3	61.5	+	+
2000–2004	34.0	0.9	65.0	0.1	0.0
2006–2012	14.8	1.2	83.9	0.1	0.0
Average	**27.6**	**0.8**	**71.5**	**0.1**	**+**
	Ozernaya — odd years				
1995–1999	0.2	0.6	99.2	+	0.0
2001–2005	0.5	0.4	99.1	+	0.0
2007–2013	0.9	1.4	97.5	0.2	0.0
Average	**0.6**	**0.8**	**98.5**	**0.1**	**0.0**

Note: + = portion of catch is equal to less than 0.1%.

Table 8. Total commercial harvest of salmon and char in the Golygina River (metric tons).

Years	Pink	Chum	Sockeye	Coho	Chinook	Char	Total
2004	883.11	58.43	1.82	5.00	0.00	6.26	954.62
2005	15.14	47.92	2.00	0.60	0.00	2.24	67.90
2006	313.48	93.00	4.00	0.00	0.00	2.10	412.58
2007	102.41	81.53	8.21	10.00	0.00	8.64	210.78
2008	399.00	28.70	8.94	5.03	0.00	7.01	448.67
2009	224.60	100.74	10.00	25.17	0.00	2.27	362.79
2010	581.90	108.90	24.00	3.00	0.00	99.68	817.48
2011	28.85	143.69	300.00	33.40	0.00	25.64	531.58
2012	509.69	251.50	34.79	46.44	0.00	15.86	858.28
2013	15.61	367.44	61.00	69.10	0.00	73.56	586.72

Table 9. Total commercial harvest of salmon and char in the Koshegochek River (metric tons).

Years	Pink	Chum	Sockeye	Silver	King	Char	Total
2004	2812.70	33.16	476.50	0.30	0.00	23.10	3345.76
2005	78.32	22.50	2.00	0.00	0.00	5.30	108.12
2006	1674.68	149.33	856.16	0.00	0.00	30.65	2710.83
2007	162.86	77.89	451.00	2.40	0.00	18.99	713.14
2008	1740.86	68.79	812.86	15.95	0.00	31.20	2669.66
2009	117.55	45.00	206.00	4.00	0.00	5.16	377.71
2010	3404.23	188.78	895.67	40.85	0.00	72.88	4602.41
2011	30.78	86.34	408.18	15.94	0.00	13.41	554.65
2012	4603.97	462.50	1252.86	44.50	0.00	51.25	6415.08
2013	51.94	176.90	837.08	27.70	0.00	58.35	1151.96

Table 10. Salmon harvest by fishing area of fishing companies included in Unit of Assessment.

	Area		Pink	Chum	Sockeye	Coho	Char
2010	Opala	River	564.5	356.3	16.4	55.0	22.7
		Sea	1,999.2	214.3	127.9	0.0	42.0
	Golygina/Koshegochek	River	0.0	0.0	0.0	0.0	0.0
		Sea	65.6	31.3	241.3	5.8	3.9
	Ozernaya	River	282.5	20.0	2,207.2	0.0	10.9
		Sea	0.0	0.0	0.0	0.0	0.0
	Total	***River***	***847.0***	***376.4***	***2,223.6***	***55.0***	***33.6***
		Sea	***2,064.9***	***245.6***	***369.2***	***5.8***	***45.9***
		All	***2,911.9***	***622.0***	***2,592.8***	***60.8***	***79.4***
2011 (Vityaz-Avto only)	Vorovskaya	River	75.1	145.4	7.9	105.6	20.0
		Sea	299.1	933.0	87.4	0.0	59.0
	Kol	River	185.0	366.4	10.0	47.0	66.7
		Sea	0.0	0.0	0.0	0.0	0.0
	Bolshaya	River	75.6	156.1	129.1	95.0	68.2
	Golygina/Koshegochek	River	0.2	167.2	0.0	45.1	0.0
		Sea	0.0	3.3	111.8	0.0	0.3
	Ozernaya	River	14.2	53.1	3,885.4	0.0	0.4
		Sea	0.0	8.3	288.6	0.0	0.2
	Total	***River***	***350.1***	***888.1***	***4,032.4***	***292.7***	***155.2***
		Sea	***299.1***	***944.6***	***487.8***	***0.0***	***59.5***
		All	***649.2***	***1,832.8***	***4,520.3***	***292.7***	***214.7***

	Area		Pink	Chum	Sockeye	Coho	Char
2012	Vorovskaya	River	1,383.2	252.1	10.0	17.2	27.6
		Sea	7,863.8	591.3	11.1	69.2	11.0
	Kol	River	1,045.2	125.4	6.2	3.8	37.2
		Sea	2,937.5	45.5	4.5	19.9	5.7
	Bolshaya	River	2,700.7	208.6	225.8	144.4	29.6
		Sea	63.1	0.7	0.2	0.0	0.0
	Golygina/Koshegochek	River	1,041.6	400.0	6.7	85.0	0.0
		Sea	1,891.0	129.6	706.4	2.0	10.1
	Ozernaya	River	1,650.3	205.6	9,164.3	0.0	11.9
		Sea	579.5	11.7	350.3	0.0	0.5
	Total	***River***	***8,700.9***	***1,459.6***	***9,436.1***	***250.4***	***108.0***
		Sea	***19,425.9***	***999.4***	***1,342.9***	***91.1***	***38.1***
		All	***28,126.8***	***2,459.1***	***10,779.0***	***341.5***	***146.0***
2013	Vorovskaya	River	1.7	24.2	1.5	21.8	4.8
		Sea	13.9	210.8	9.4	0.0	32.1
	Kol	River	29.9	197.2	14.6	487.3	49.5
	Golygina/Koshegochek	River	14.5	230.3	0.0	54.7	1.6
		Sea	71.9	116.6	2,763.8	0.0	40.5
	Ozernaya	River	28.1	180.3	8,602.6	74.6	8.0
		Sea	37.3	36.5	1,806.9	0.0	0.0
	Total	***River***	***96.3***	***942.9***	***8,625.7***	***638.4***	***105.9***
		Sea	***136.0***	***519.7***	***4,606.2***	***0.0***	***107.4***
		All	***232.2***	***1,462.6***	***13,231.9***	***638.4***	***213.3***
2014	Vorovskaya	River	7.4	56.5	4.5	4.9	6.4
		Sea	105.9	451.2	26.7	0.0	80.0
	Kol	River	224.2	399.3	42.6	704.5	121.1
		Sea	116.2	423.6	11.2	0.0	24.3
	Opala	River	55.1	270.7	38.9	0.0	17.6
		Sea	75.1	175.5	78.1	0.0	25.3
	Golygina/Koshegochek	River	15.1	223.1	1.0	34.4	3.5
		Sea	75.6	44.9	1,009.2	0.0	5.0
	Ozernaya	River	68.4	205.6	5,463.4	0.0	6.9
		Sea	37.2	41.8	1,211.7	0.0	3.5
	Total	***River***	***370.2***	***1,155.2***	***5,550.4***	***743.9***	***155.6***
		Sea	***409.9***	***1,137.1***	***2,336.9***	***0.0***	***138.2***
		All	***780.1***	***2,292.3***	***7,887.3***	***743.9***	***293.8***
2015	Vorovskaya	River	0.1	27.3	0.5	118.9	0.0
		Sea	45.3	604.3	27.6	181.2	49.3
	Kol	River	60.9	639.2	26.7	361.9	66.1
		Sea	7.8	151.6	6.1	82.9	1.9
	Opala	River	4.6	76.2	14.4	5.1	0.6
		Sea	33.9	297.8	120.7	2.1	0.6
	Golygina/Koshegochek	River	10.1	270.1	0.0	46.2	1.0
		Sea	87.0	65.1	2,081.6	0.0	16.3
	Ozernaya	River	47.2	153.9	5,598.6	63.0	7.4
		Sea	59.9	44.6	1,661.0	1.0	6.0
	Total	***River***	***122.8***	***1,166.7***	***5,640.2***	***595.2***	***75.0***
		Sea	***233.9***	***1,163.4***	***3,897.0***	***267.2***	***74.1***
		All	***356.7***	***2,330.1***	***9,537.2***	***862.4***	***149.2***

Sport Fishery

Sport fisheries exist for all salmon species but are primarily focused on Chinook and Coho Salmon. In the Russian practice, sport and amateur fishing can occur with sports gear (spinning or rod) or amateur fishing gear (various types of nets). Sports and amateur fishing occurs in designated fishing parcels some of which may be leased to fishing companies. There are two sport fishing parcels in the Vorokskaya River basin, four parcels on the Opala River, and one on the Kol River. The sport fishery on the Ozernaya River is not limited to a specific parcel.

Chinook Salmon support very popular sport fisheries in rivers throughout western Kamchatka. The sport fishery is now the primary harvester of Chinook Salmon in many rivers since closure of early commercial fishing seasons beginning in 2010. Harvest allocations are identified for Chinook sport fisheries. The demand for such quotas of king salmon is very high and exceeds the offered ones significantly. Catch and release fishing for Chinook is significant and this fishery attracts numerous foreign anglers. The Russian system does not specifically provide for catch and release sport fishing but this type of fishing allows repeated catch without loss for reproduction within allocated quotas.

Sport and/or amateur fisheries have occurred on the Vorovskaya and Ozernaya rivers since 1994. These sport fisheries have expanded to other species in subsequent years (although amateur net fishing was closed in the Ozernaya River after 2006).

Table 11. Average annual sport fishery harvest (tonnes) by river and species, 2001-2015 (Shevlyakov et al. 2016).

River		Pink	Chum	Sockeye	Coho	Chinook	Char
Vorovskaya	2001-2015	27.3	18.1	1.2	11.5	2.1	0.3
Kol	2001-2015	0.2	0.8	--	0.9	1.0	0.5
Opala	2009-2015	1.9	5.8	3.9	7.0	1.7	5.5
Golygina	2007-2008	--	7.0	--	1.5	--	--
Ozernaya	2001-2006	12.0	1.0	40.0	--	--	--

Indigenous Fishery

All species of salmon are harvested for consumption by communities, families and individual representatives of indigenous peoples (Small Indigenous Peoples of the North, Siberia and Far East). In 2009, the government decreed in Document №631 that the indigenous peoples of Kamchatka territory were allowed to fish for personal consumption without written permits\documents. Personal limits of 50 kg per season are allocated for indigenous people. Native communities may also be provided with a specific allocation which varies from river to river. Indigenous quota has priority relative to industrial quota. Indigenous catch may be retained for subsistence and personal use or sold.

Indigenous fisheries in the unit of certification assessment occur in the Vorovskaya and Ozernaya Rivers. There is one traditional fishery parcel for indigenous peoples in the Vorokskaya River basin. Annual indigenous catch of combined salmon species typically averages about 16 t in the Vorovskaya and 90 t (90% Coho) in the Ozernaya. Subsistence fisheries do not occur on the Kol, Opala, Golygina or Koshegochek rivers due to remote locations. The largest indigenous fishery in the region occurs in the Bolshaya River, which is not in the unit of certification. Indigenous harvest in some rivers like the Bolshaya, has increased considerably in the last ten years, and currently comprises 9 to 10% of the total catch of Chum, Coho, and king salmon. The indigenous fishery is reportedly the source of some abuse as qualifications for permits are loose, individual harvest limits are difficult to enforce, and permits are sometimes illegally transferred to others to fish.

Marine Drift Net Fishery

Kamchatka Sockeye are subject to harvest in Russian and Japanese drift net fisheries occurring in areas of the Pacific Ocean, Sea of Okhotsk, and Bering Sea (Bugaev and Dubynin 2000; Bugaev et al. 2009). This fishery primarily targets mature Sockeye, using net mesh size to avoid catch of smaller, immature fish. By-catch of Pink, Chum, and masu salmon taken in high seas drift nets is typically discarded. The research institute estimates that the combined Chum and Pink bycatch roughly equals the reported Sockeye catch.

Marine harvest rates of Kamchatka salmon have varied considerably over the years in response to changes in management of the drift fisheries. High returns of salmon in Kamchatka occurred during 1941-1950 with the reduction and cessation of the Japanese marine drift net fishery. Resumption of the unregulated drift net fishery in marine waters resulted in an extended period of low salmon returns until the 1970s. Prior to introduction of the 200-mile exclusive economic zone in 1977 and 1978, most harvest of Kamchatka salmon occurred in this fishery. The drift net fishery outside of the EEZ was finally banned in 1993.

From 1977 until 1991, drift fishing effort within the EEZ was very limited and corresponding harvest of Kamchatka Sockeye was very low. However, drift fisheries continued in the Pacific Ocean outside of the EEZ until 1993. This fishery harvested large numbers of salmon including those of Kamchatka origin but estimation of specific numbers is difficult due to incomplete catch data and the mixed stock nature of the far flung fishery. In 1993, drift fisheries outside of the EEZ's were banned by agreement between Russia, Japan, Canada, and the United States under the "Convention for the Conservation of Anadromous Fish Stocks in the North Pacific Ocean."

Beginning in 1992, Russia began leasing some drift fishing rights inside the EEZ to Japanese vessels under bilateral agreements between the governments of the USSR and Japan adopted in 1984 and 1985. For instance, Japan has secured quota from Russia for 10,275 tons of salmon in 2007 and 9,735 tons of salmon in 2008 from the Russian EEZ. Pressure of ocean driftnet fishing is relatively stable in recent years, which makes it easier to account for harvest of Ozernaya Sockeye in marine drift net fisheries is estimated annually based on reported harvest and catch composition data. This task has been made much simpler by the current distribution of the drift fishery inside of the EEZ where it primarily harvests Asian Sockeye stocks of which the Ozernaya is the largest (Bugaev and Dubynin 2000). Drift net fisheries are currently estimated to account for less than 20% of the annual harvest of Ozernaya Sockeye with annual exploitation rates of approximately 67-88% (average 81%) since 2000. These values are likely to apply to other western Kamchatka Sockeye as well.

The high seas drift gillnet fishery was closed in the Russian Exclusive Economic Zone beginning in 2015. This closure included Russian vessels based on Sakhalin and Japanese vessels licensed to operate in Russian waters.

Illegal, Unregulated & Unreported Harvest

Illegal fishing has long been a serious problem for salmon in Kamchatka (Clarke 2007; Clarke et al. 2009; Dronova and Spiridonov 2008). It is fundamentally a social problem resulting from economic factors and ineffective enforcement. Illegal fishing can take various forms (Maksimov and Leman 2008):

- Industrial poaching: exceeding of quota by fishing companies.
- Criminal poaching: organized illegal fishing in industrial scale.
- Everyday poaching of first type: unorganized illegal fishing by the local population for sale to the market, processing factories and/or illegal packers.
- Everyday poaching of second type: unorganized illegal fishing by the local population primarily for personal use.

Industrial and everyday poaching use both fish and roe, whereas criminal poaching generally uses only roe. Geographically, industrial poaching takes place mostly in sea, mouths of spawning rivers and in large rivers, while criminal and everyday poaching are located in spawning rivers and in spawning grounds. In most cases it is poaching for roe. Roe is extracted from fish caught with gillnets, beach seines or weirs (in case of small river). Both locals and outside people poach, although locals predominate.

Large-scale illegal harvest grew rapidly after 1988 during uncertain economic times accompanying the dissolution of the Soviet Union. During the political and economic upheaval of the 1990s, many of the local people lost their working places and began fishing illegally, focusing on the valuable caviar market. State enforcement efforts during this period were weak. During this period high levels of poaching substantially influenced salmon population dynamics. The volume of historical levels of illegal harvest is difficult to estimate reliably but a 2008 study by TRAFFIC Russia (Dronova and Spiridonov 2008) concluded that scale of illegal harvest varies considerably from area to area depending on transportation infrastructure; illegal harvest may be comparable or exceed official catch by up to three fold in a number of large river systems which are major contributors of commercial catch.

Since 2002 KamchatNIRO has conducted research on scale of poaching in Kamchatka (Zaporozhets et al. 2007, 2008; Regionalnaia… 2008). Data have been published through 2006. The following approaches were used for analysis of poaching production:

- Analysis of changes of sex ratio in the river mouth and spawning ground (assuming that poaching is mostly targeted on females).
- Comparison of official data and total removal obtained by modeling of catch per unit effort data.
- Comparison of current fisheries statistics and past statistical data assuming acceptable level of misreporting.
- Confidential surveys of people who have direct or indirect relation to poaching (legal and illegal businessmen, fisheries inspection, and the local population).
- Analysis of economical indices of fishery (official catch data, amount of products produced after adjusting to raw weight, total amount of fish products sold locally and imported adjusted to raw weight.

The change in ratio of males to females between the river mouth and spawning grounds was taken as one of the clearest indicators of the magnitude of illegal harvest. Females are selectively removed by poachers fishing for caviar while males are thrown back. This selective harvest can also confound estimates of the effective spawning escapement when it is heavily skewed toward males.

Illegal harvest during 2002-2006 was estimated to equal or exceed the legal catch depending on species (Table 12, Figure 8). The studies have shown that in the period 2000-2006, the illegal catch of salmon averaged about 75% of the total runs of fish to the mouth of the river, excluding Pink Salmon, for which this indicator was at the level of about 15%. The levels of illegal harvest likely had serious and direct consequences for salmon populations throughout this period.

Illegal harvest was most significant in the Bolshaya River due to its accessibility by a developed road system. The dependence on road access on poaching was highlighted by a large reduction in the contribution of the Tolmacheva river to Bolshaya basin salmon production from 3.8% in 1987-1996 to 0.6% in 1997-2005 after a road was completed in 1996.

Poaching pressure on low-abundance species (Sockeye, Coho, Chinook) was typically much higher than on high-abundance (Pink and Chum). For instance, an estimated 50-60 poaching teams operated in the Bolshaya River between the river mouth and Ust-Bolsheretsk from mid-May to mid-June of 2006. These groups caught an estimated 500 mt or 230,000 individual spring Sockeye and 150 mt or

25,000 individual Chinook. Poaching rates were higher in years with lower salmon runs (243% of legal catch) than in years of higher salmon years in low-years (58% of legal catch).

Illegal harvest levels were reportedly much lower in other western Kamchatka rivers than the Bolshaya River due to difficulty of access. Transport of illegal harvest is not easy because of necessity to cross several rivers and police control posts along the main road. Several rivers north of the Bolshaya, including the Kikhchik and Kol, are crossed in the middle reach with a road serving the natural gas pipeline. This has provided access for small groups of poachers. However, the total amount of illegal harvest was estimated to be low based on normal sex ratios observed on spawning grounds. Illegal fishing in the Opala and Ozernaya areas is reported to be negligible because of inaccessibility, local peoples are primarily employed by the fishing companies, and fishing companies are heavily involved in fishing control activities. The Vorovskaya River supports small local communities but fishing parcels have been provided for local inhabitants to take salmon for personal consumption.

Estimates of illegal harvest during 2002-2006 included substantial levels of industrial poaching by licensed fishing companies as well as criminal poaching by unlicensed fishermen. During these years, commercial fishing companies operated under a quota system where allowable catch levels were assigned prior to the season based on run forecasts and allocation formula established by the fishery management system. This system encouraged widespread under and misreporting. Much of the illegal harvest occurred in the form of misreporting of one species as another to avoid species-specific quota limits.

Illegal harvest appears to have been considerably reduced since 2002-2006 due economic improvements, changes in the management system, and an increased commitment to enforcement. Economic conditions have continued to improve over time following the upheaval of the 1990s and these improvements have provided other opportunities for employment. At the same time, social reasons for poaching continue to exist, particularly among the local populace of communities on the Bolshaya River.

Table 12. Illegal harvest of salmon in Kamchatka and in the Bolshaya River, 2002-2006 average (Regionalnai 2008).

		Pink	Chum	Sockeye	Coho	Chinook
Kamchatka	Amount (mt)	16,139	20,298	12,376	4,065	1,110
	% of legal catch	28%	201%	61%	376%	230%
Bolshaya R	Amount (mt)	1,510	3,393	2,484	402	498
	% of legal catch	22%	438%	484%	555%	2109%

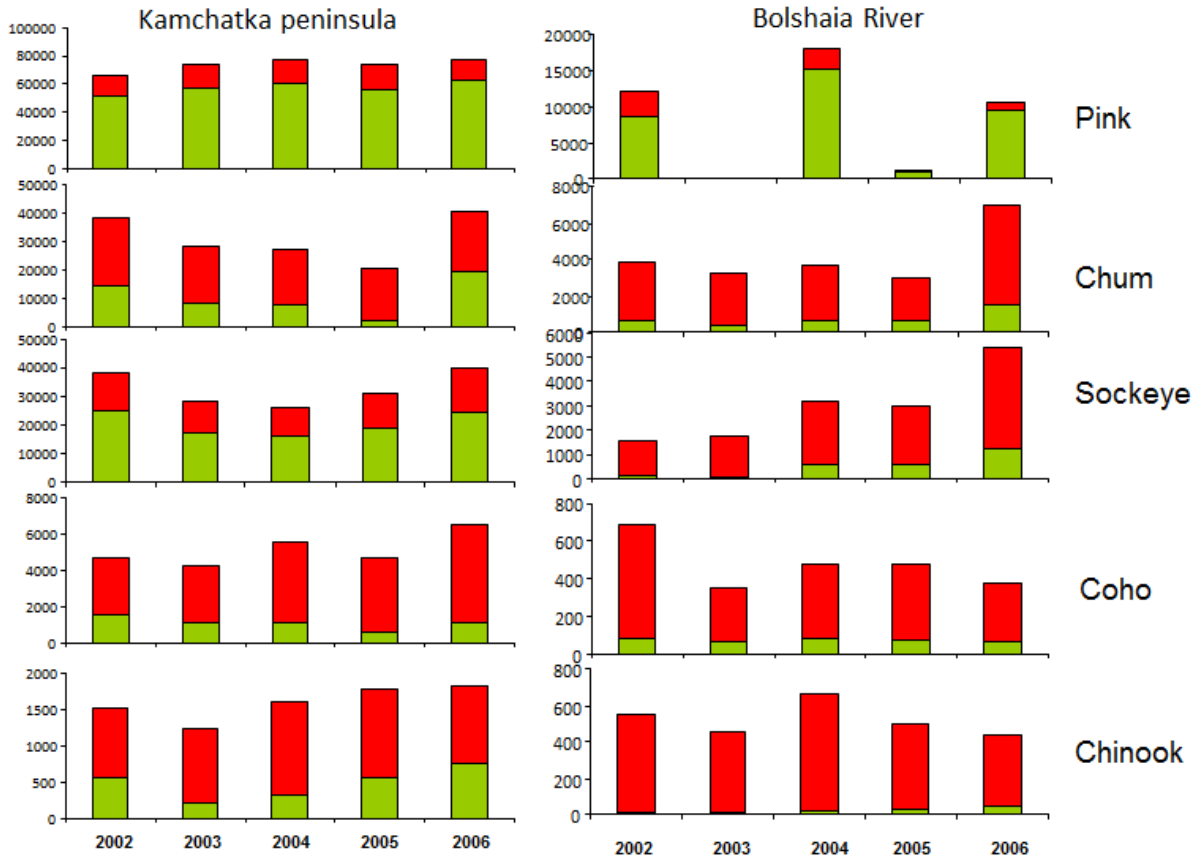

Figure 8. Legal (green) and illegal (red) landings, mt, of different species of Pacific salmon in Kamchatka peninsula and Bolshaya river 2002-2006, mt (Regionalnai 2008)

Reforms in the fishery management in 2008 have substantially reduced incentives for industrial poaching (Shevlyakov 2013). Fishing parcels were allocated to specific users for 20 years. Harvest quotas are now established for management units rather than individual companies (Vinnikov et al. 2012). Under the current "Olympic" system, companies may harvest as many fish as they can at designated sites when the fishery is open. Companies no longer need to hide the catch because of absence of individual total allowable catches (TAC). Moreover, the size of official catch is taken into consideration during competition for fishing parcels, and therefore companies with larger catch will have advantages at next distribution of leases. Where fishing is regulated exclusively by days closed to fishing, commercial poaching basically means fishing during closed days. This is not easy to do, especially in those fishing parcels that are adjacent to settlements, because all fishing operations in the lower part of the river are easily observed from the town. Commercial catch reporting is now believed to be close to actual catch because of these changes.

Enforcement efforts have been improved in recent years by state agencies and their cooperation with fisheries companies. Governmental resources for enforcement remain limited but increased support from fishing companies has been key to reducing the incidence of illegal fishing. Long term leases of fishing parcels have now incentivized investments by fishing companies in resource protection. Many of the larger companies provide joint enforcement efforts with the state enforcement agency, SVTU, in their fishing areas.

In addition to river patrols, enforcement agencies conduct regular inspections of fishing plants and records. Disparate catches in adjacent set nets or fishing sites are an indicator of accepting illegal fish. Enforcement has instruments for limiting catches of suspicious companies even though there as an Olympic system.

KamchatNIRO estimates that illegal harvest has been substantially reduced from historical levels. In 2007-2009, an estimated illegal salmon harvest of 3-19 thousand tons from the Bolshaya River accounted for 70 to 85% of the runs. By 2012, the total illegal catch of salmon, excluding Pink Salmon, dropped to 1-3 thousand tons. Illegal catch fell in 2012 to just 9% of the total Chum Salmon run and 14% of the total Sockeye run. Illegal harvest in other rivers is reportedly much less than in the Bolshaya due to limited access.

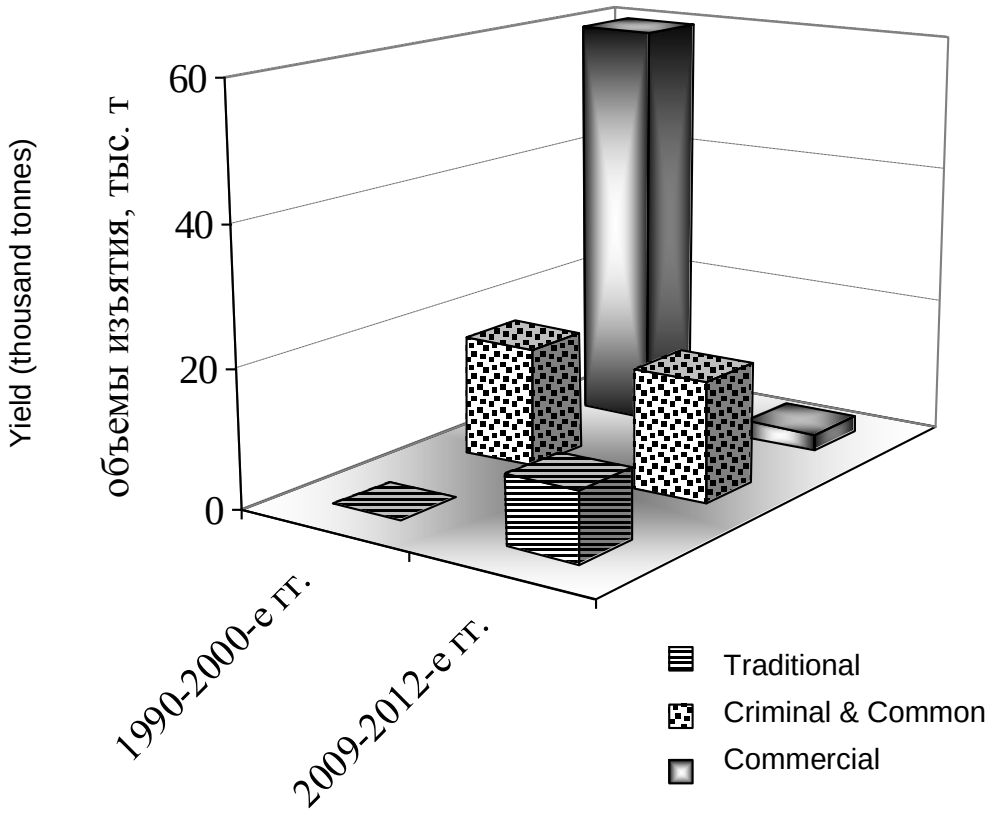

Figure 9. Dynamics of illegal harvest of Pacific salmon in the Kamchatka Region (Shevlyakov et al. 2016).

2.3 Principle One: Target Species Background

Target species include Pink Salmon, Chum Salmon, and Coho Salmon (Kol only).

2.3.1 Pink Salmon

Distribution

Pink Salmon are the most abundant salmon species in western Kamchatka (Semko 1954). This species is found throughout the north Pacific, including streams of western Kamchatka south of 54° Northern Latitude. The largest populations in western Kamchatka occur in the Bolshaya, Vorovskaya, and Kikhchik rivers. Unit of certification rivers contribute approximately 30% of the regional return on average (Shevlyakov et al. 2016). The distribution of Pink Salmon in western Kamchatka Rivers changed from 1998 to 2006, generally shifting northward.

Russian Pink Salmon generally range into ocean waters of the Okhotsk and Bering seas. The deep-water part of the Okhotsk Sea is the major feeding ground of juvenile salmon within the Russian EEZ. The western Bering Sea has a low foraging importance for juveniles (Temnykh and Kurenkova 2006; Shuntov and Temnykh 2008a). High seas tag-and-recapture experiments have revealed that Pink Salmon originating from specific coastal areas have characteristic distributions at sea which are overlapping, nonrandom, and similar from year to year.

Life History

Pink Salmon return to western Kamchatka primarily in July and August, and spawning occurs in August and September. Spawning typically occurs in the lower and middle reaches of streams, rivers and sometimes the intertidal zone at the mouths of streams. After spawning all Pink Salmon die.

Like all salmon, eggs buried in redds excavated by the females in coarse gravel or cobble-size rock, often of shallow riffles and the downstream ends of pools. Fecundity typically averages about 1,500 eggs per female. Fry hatch after several months, then spend several weeks in the gravel before emerging in late winter or spring to migrate downstream into salt water. Pink Salmon fry spend only few days in river.

In Western Kamchatka, Pink Salmon typically average 1.2 - 1.5 kg and 50 cm. Extensive information on Pink Salmon size and sex is collected by KamchatNIRO (2014) on an annual basis from the commercial catch in West Kamchatka rivers. All Pink Salmon spawn at age of two years. As a result, this species forms two independent populations in the same river, entering the river in odd and even years. The odd-year or even-year cycle will typically predominate, although in some streams both odd- and even-year Pink Salmon are about equally abundant. Cycle dominance will occasionally shift with the previously weak cycle become most abundant. In Western Kamchatka, a massive run of Pink Salmon in 1983 resulted in excessive spawning escapement that subsequently depressed odd-year runs (KamchatNIRO 2013). The even-year return now dominates.

Stock Structure

Run patterns in larger river systems suggest that the aggregate return includes a number of substocks. KamchatNIRO (2013) reports that up to five overlapping runs can be distinguished in large systems like the Bolshaya River based on run timing, size and sex ratio. Smaller systems may support fewer types. Genetic analyses of Pink Salmon stock structure have generally identified broad geographical patterns but little or no difference among local populations in any given region. Genetic differences appear to be less in Asian Pink Salmon than in North American Pink Salmon (Zhivotovsky, personal communication). Natural straying among local populations of Pink Salmon is generally assumed to be more significant than in other salmon species (Sharp et al. 1994; Zhivotovsky et al. 2008; Shpigalskaya et al. 2011). However, the available information on Pink Salmon genetic stock structure and straying patterns is not conclusive. It remains unclear whether historical genetic methods found no stock structure because none existed or because the available methods lacked sufficient power to identify

differences. More recent genetic analyses of Pink Salmon using microsatellites have been similarly inconclusive.

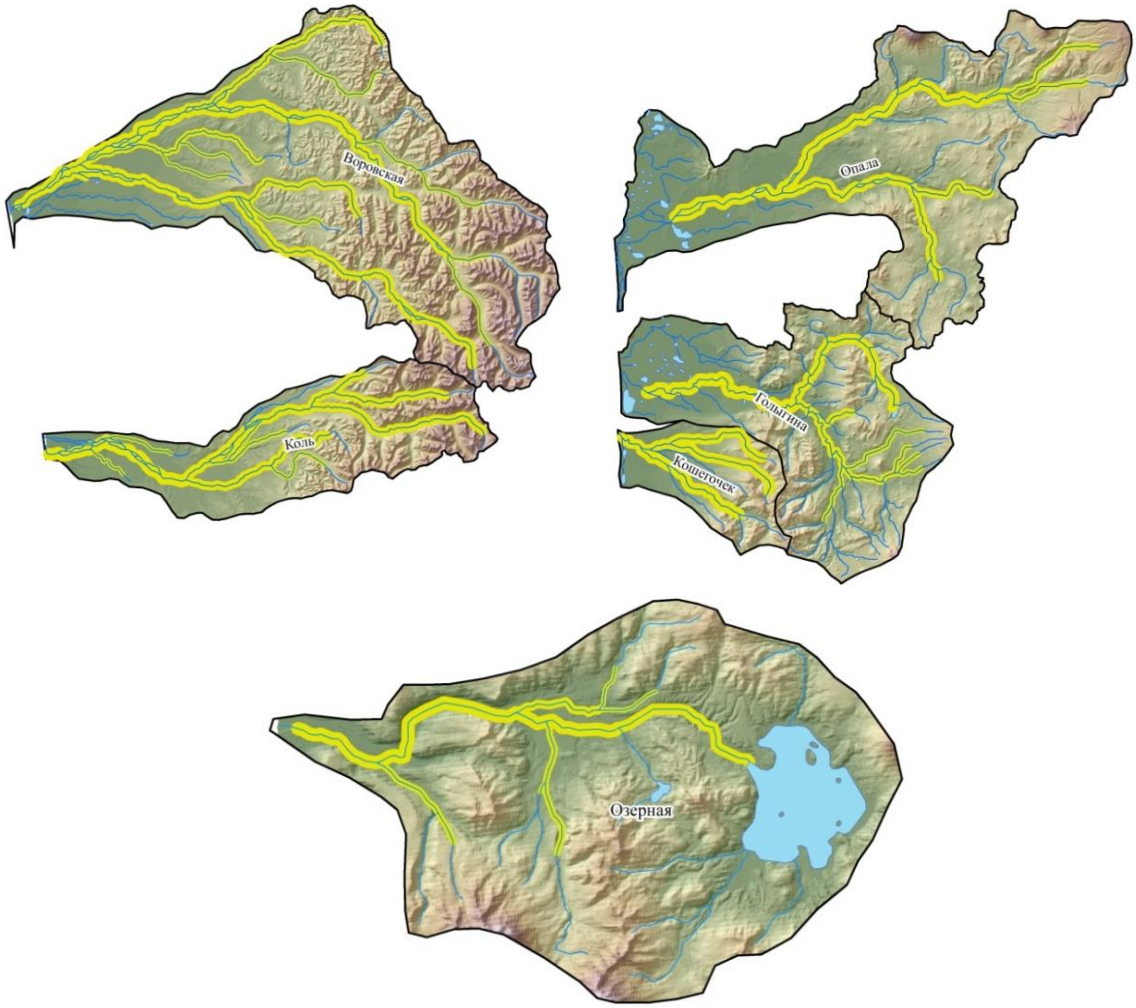

Figure 10. Spawning distribution of Pink Salmon in the Vorovskaya, Kol, Opala, Golygina, Koshegochek, and Ozernaya rivers (Shevlyakov et al. 2016).

Status

This species is currently at historical levels of high production throughout the western Pacific including the west Kamchatka rivers. High levels of production are demonstrated by high levels of commercial harvest during even years since the late 1990s. This follows an extended period of low returns from the 1950s through the 1970s due to impact of the Japanese high seas drift net fishery and unfavorable ocean environmental conditions. Harvest of the now-dominant even-year return increased substantially in western Kamchatka after the 1983 collapse of the dominant odd-year cycle (Figure 16). Directed fishing on Pink Salmon is limited to the even years. Pink Salmon harvest in odd years occurs incidental to harvest of other salmon species, primarily at fishing sites within the river. Total harvest in even years currently averaged approximately 100 million fish per year with annual exploitation rates of 40-80%. River-specific harvests are depicted in Figure 12.

Run sizes during odd years have been much lower than even years since 1983 when a very large spawning escapement resulted in a shift in cycle dominance from odd to even years. Spawning ground overfilling by spawners in the west Kamchatka rivers in 1983 was believed to subsequently depress the odd-year cohort due to digging of the spawning grounds, excessive density of spawners therein and high mortality of the offspring at early stages of ontogenesis resulting from organic contamination of nests and spawning grounds (Shevlyakov et al. 2016). The odd-year cohort has begun to rebound somewhat with several significant runs since 2003 (Table 13).

Even-year numbers have decreased in the 2012-2014 cycle for unknown reasons (Shevlyakov et al. 2016). Spawning escapement was high in 2012 and produced a strong year-class of downstream migrants. Work on genetic identification of the west Kamchatka origin pink salmon in trawl yields of performed in autumn in the Sea of Okhotsk showed a drop abundance as confirmed by low Humpback run to the west Kamchatka coast in 2014.

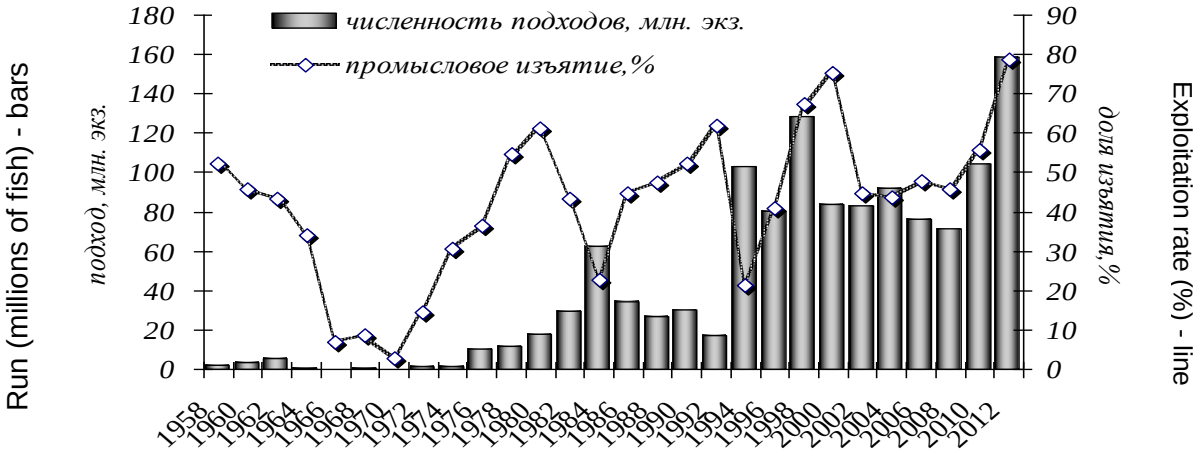

Figure 11. Dynamics of even-year commercial catch of Pink Salmon of Western Kamchatka (vertical bars = run size; line = exploitation rate).

Management

Spawner-recruitment analysis of the aggregate western Kamchatka return has estimated that maximum sustained yield (MSY) is produced by spawning escapements of approximately 40-50 million Pink Salmon (Figure 13). Spawning escapement data points are generally distributed around this range for dominant (even-year) broods. Fisheries on the west coast of Kamchatka are managed to achieve region-wide escapement goals of 40-50 million Pink Salmon during even years. Pink Salmon escapements in western Kamchatka are estimated to achieve this goal on average for 2004-2012 (Table 13). Specific goals are not identified for the subdominant odd-year run but fishing effort is substantially reduced in those years.

Fisheries are regulated to ensure that significant escapements are distributed among individual rivers (Figure 14) but each river is not managed to achieve a river-specific goal as long as the aggregate goal is being achieved. Thus some rivers are fished at higher rates and some at lower rates but MSY-based goals are generally achieved in aggregate. Recent work by KamchatNiro has developed river-specific reference points based on stock-recruitment analysis (Table 14, Figure 23). These reference points include buffers for uncertainty in stock assessment.

Spawning escapement of Pink Salmon is estimated based on expansions of aerial counts in a series of index areas throughout western Kamchatka. These surveys estimate that millions of Pink Salmon spawn in western Kamchatka Rivers during dominant (even-numbered) years. Estimates are also made in subdominant (odd-numbered) years. However, Shevlyakov and Maslov (2011) reported that odd-year escapement estimates are subject to significant error in definitions and cannot be used as a prognostic parameter.

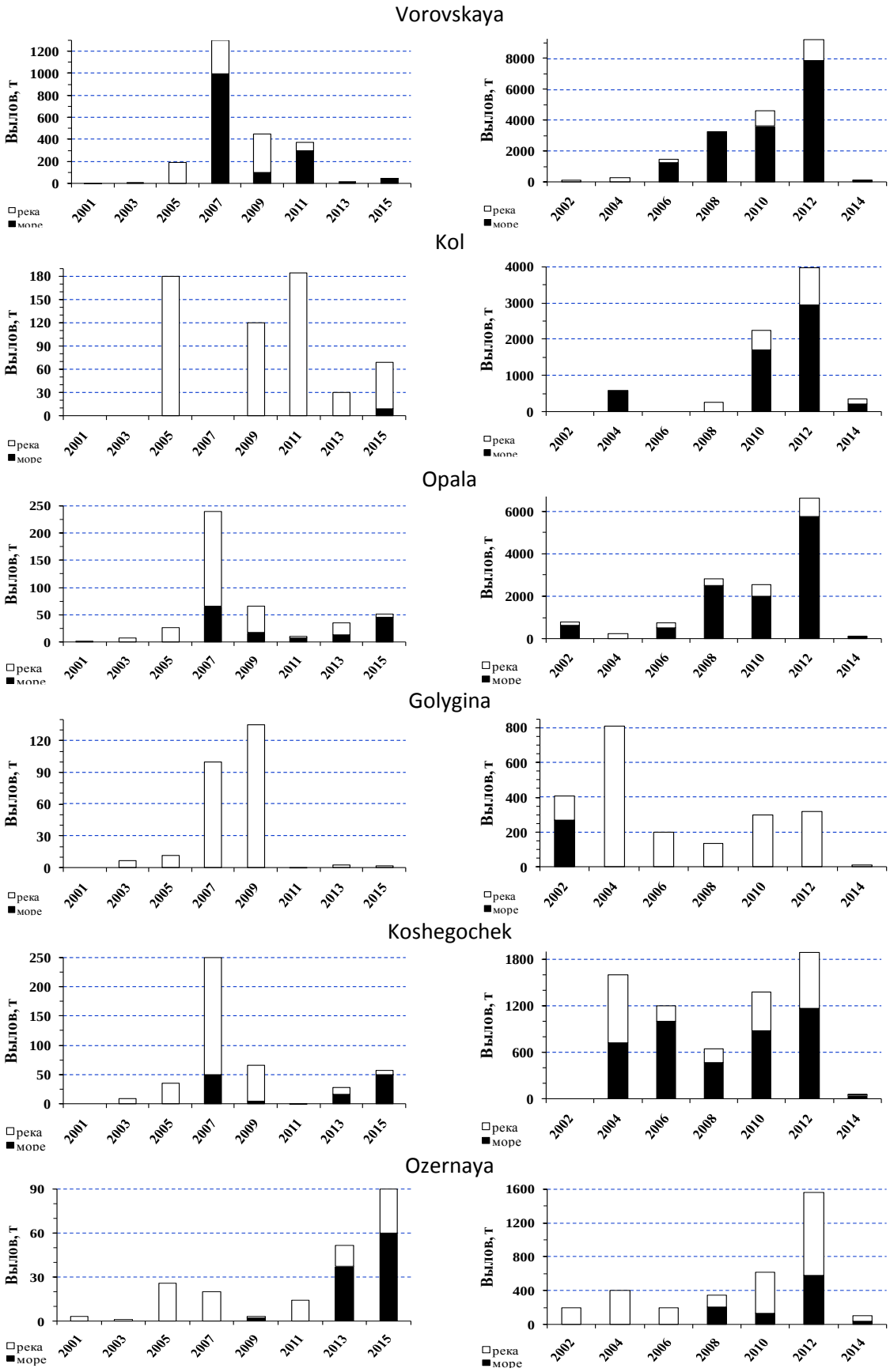

Figure 12. Odd and even year Pink Salmon commercial harvest by area (river harvest = white, sea harvest = black)

Table 13. Recent estimates of Pink Salmon run size and spawning escapement (millions).

	West Kamchatka	
Year	Run	Spawners
2003	11.4	11.2
2004	91.8	51.7
2005	24.0	17.7
2006	67.4	31.0
2007	15.2	3.6
2008	71.5	39.0
2009	4.25	0.12
2010	104.5	46.4
2011	5.05	0.83
2012	158.6	33.6
2013	1.57	0.21
Even year avg.	98.8	40.3
Odd year avg.	10.2	6.7

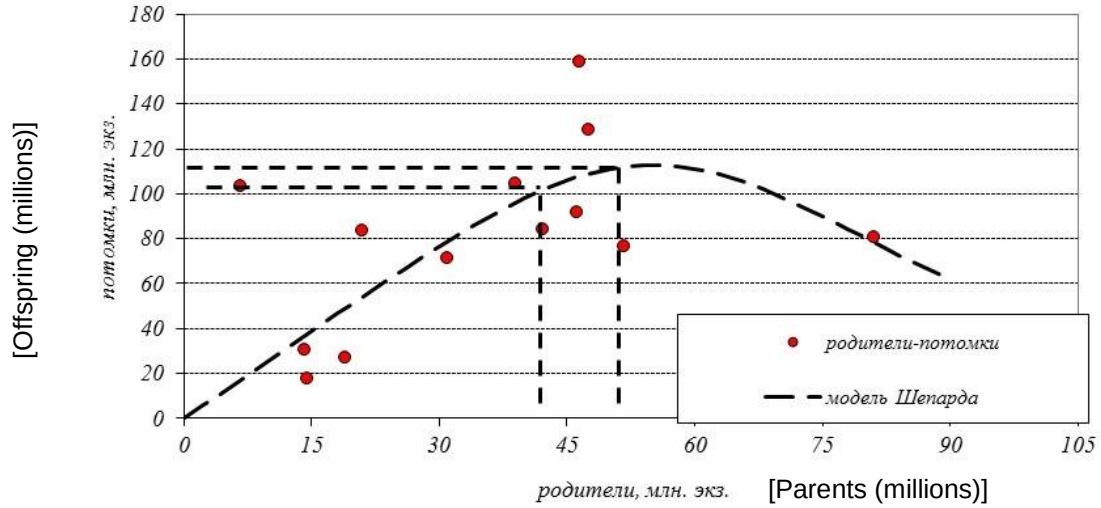

Figure 13. Spawner-recruit relationship for Pink Salmon of Western Kamchatka. Maximum sustained yield is identified by Sheppard's model Shevlyakov 2004).

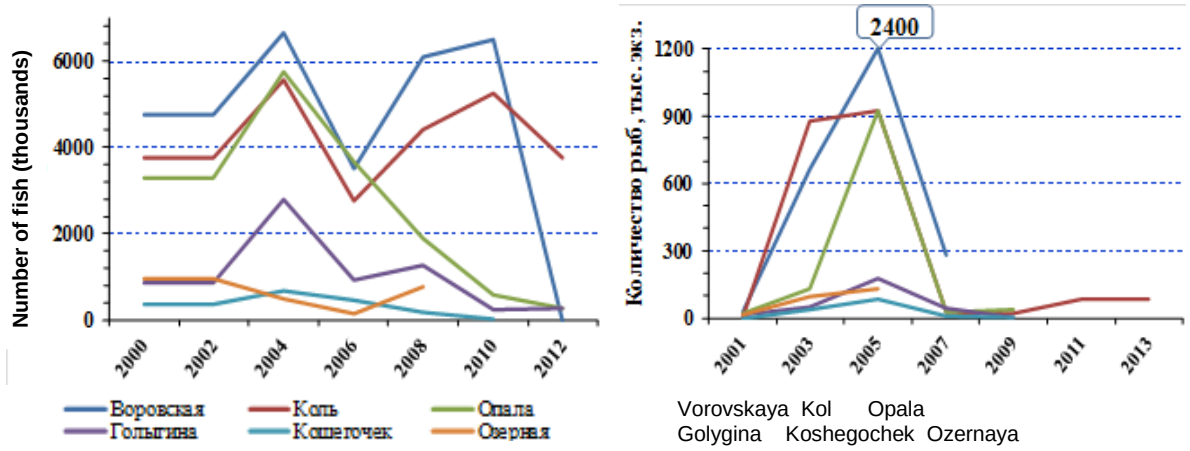

Figure 14. Even and odd year spawning escapement of Pink Salmon in West Kamchatka rivers, 2000-2013 (Shevlyakov 2016).

Table 14. Escapement parameters and reference points for the minimum stratum of the general model of west Kamchatka and particular river models of Pink Salmon (Shevlyakov et al. 2016).

Model	Parameters, thsd specimen			Shares	S*msy	MSY	S buf
	a	b	So	%	thsd.	thsd.	thsd.
Total minimum	12,228.86	1,618.83	7,073.00	100.00%	7,154.57	46,622.77	3,253.80
Vorovskaya	1,473.82	353.21	852.44	12.05%	881.32	2,749.50	397.44
Kol	526.44	168.40	304.49	4.30%	321.18	664.65	144.19
Opala	403.66	139.11	233.47	3.30%	247.84	457.28	111.21
Golygina	84.83	45.28	49.06	0.69%	54.25	45.04	24.91
Koshegochek	90.59	47.48	52.40	0.74%	57.85	49.99	26.49
Ozernaya	166.14	73.45	96.09	1.36%	104.45	126.38	47.08

a = limit of R replenishment with unlimited spawning stock S,

b = resonance damping coefficient, with effect the stronger the more difference between current S and resonance parameter S0,

S_0 = spawner level S with maximum survival R/S.

*S*MSY = precautionary estimate of spawning escapement at maximum sustainable yield determined for the lower boundary of the confidential interval of model regression (α = 0.05).*

*Sbuf = precautionary estimate of the boundary reference point – buffer reference point set to the upper boundary of the confidential interval of parameter S0 estimation (Slim + tα*σSo) where tα is Student's coefficient as a given level of probability belief (α = 0.05), σSo is standard deviation of parameter S0 estimate.*

2.3.2 Chum Salmon

Distribution

Chum Salmon have the widest distribution of any of the Pacific salmon. Chum Salmon generally spawn in low gradient temperate and subarctic rivers and streams throughout the north Pacific. They range south to the Sacramento River in California and the island of Kyushu in the Sea of Japan. In the north they range east in the Arctic Ocean to the Mackenzie River in Canada and west to the Lena River in Siberia. Chum Salmon are abundant in western Kamchatka streams.

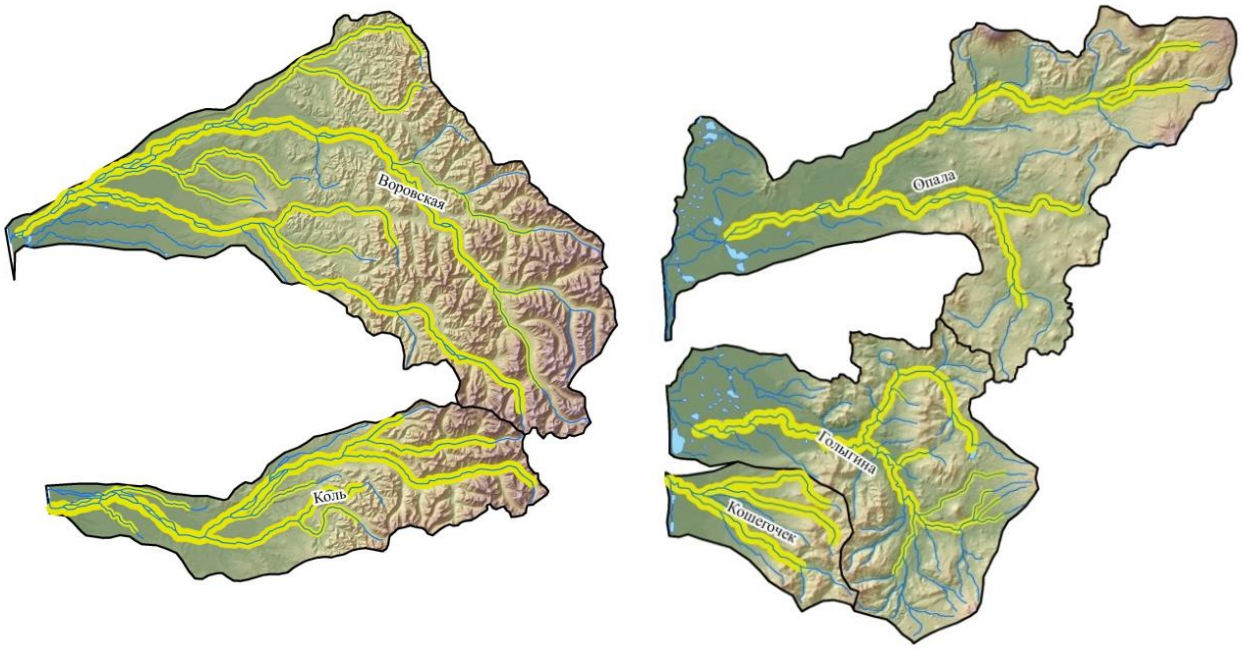

Figure 15. Spawning distribution of Chum Salmon in Vorovskaya, Kol, Opala, Golygina and Koshegochek rivers (Shevlyakov et al. 2016).

Life History

Chum Salmon generally return to western Kamchatka from late June through October. Numbers peak in late August and early September. Chum Salmon typically reach their spawning grounds in August and September. Spawning typically occurs in the lower and middle reaches of streams, rivers and sometimes the intertidal zone at the mouths of streams. Spawning areas often occur in areas of upwelling springs. After spawning all Chum Salmon die.

Western Kamchatka Chum Salmon typically average about 3 to 4 kg in length and 60 to 70 cm in length. Age of maturity is 2 to 6 years (primarily at 4 years of age). Age composition of Bolshaya Chum has varied over 70 years of records. Percentages of younger fish (2+ and 3+) increased from 1940-1960. The percentage of older fish (4+, 5+, 6+) has increased since the early 1970s. Older fish are typically more abundant in the early portion of the run and younger fish in the later portion of the run.

Fecundity typically ranges between 2,400 and 3,100 eggs. Eggs incubate over the winter before hatching in early spring. Juvenile Chum Salmon spend one-two months in the fresh water after hatching and then migrate to the sea soon after emergence in the spring.

Table 15. The age structure of some groups of Chum Salmon on the Western coast of Kamchatka.

Years	Age structure, %						Average age
	1+	2+	3+	4+	5+	6+	
Vorovskaya River							
1991–1995	–	0.6	37.6	54.3	7.5	–	3.69
1996–2000	–	0.7	47.1	43.7	8.5	–	3.60
2001–2005	–	0.9	50.5	43.9	4.7	+	3.52
2006–2010	–	1.1	42.4	49.1	7.2	0.2	3.63
2011–2013	0.1	1.0	22.0	63.3	13.4	0.2	3.90
Kol River							
2001–2005	–	0.1	48.5	41.9	9.5	–	3.61
2006–2010	–	1.1	22.7	55.6	20.6	–	3.96
2011–2013	–	3.1	14.6	50.0	32.3	–	4.11
Opala River							
2001–2005	–	1.1	55.0	39.0	4.9	–	3.48
2006–2010	–	0.9	49.9	38.3	10.9	–	3.59
2011–2013	–	2.3	26.7	62.9	8.1	–	3.77

Stock Structure

Kamchatka Chum include spring, summer and fall runs, returning in June, July-August, and October-November, respectively. Different runs typically spawn in different portions of a basin with earlier fish generally traveling farther upstream. Genetic analyses have generally identified system and run-specific differences among Chum populations in others regions. All three stocks are present in the area of this assessment. The early run is significant in the Opala River.

Status

Chum Salmon returns and commercial harvest rates have steadily increased in western Kamchatka from very low levels observed in the 1970s (Figure 16). Total run size averaged about 420,000 fish from 1970-1985 with commercial catch and exploitation rate averaging 300 mt and 20%, respectively. From 1986-2000 run size averaged 1.3 million fish with commercial catch and exploitation rate averaging 2,000 mt and about 44%, respectively. Since 2010, runs have averaged about 5 million Chum per year, exploitation rates have averaged 90% for an annual average harvest of 17,000 mt. The assessment team suspects that increases in run size and harvest since 2008 result from more accurate commercial catch reporting following the implementation of the “Olympic” management system.

Historical abundance of Chum Salmon has varied widely as evidenced by harvest numbers (Figure 16). Mortality of juvenile Chum Salmon in the Japanese drift net fishery in the open ocean explains much of the variation (KamchatNIRO 2013). High catches in Kamchatka during 1941-1950 coincide with the reduction and cessation of the drift fishery. Returns declined from 1960 - 1980 with the resumption of the drift fishery and climatic factors. Numbers rebounded beginning in the 1990s with regulation of the high seas drift net fishery and favorable ocean conditions for salmon throughout the north Pacific.

Spawning escapement of Chum Salmon is estimated based on expansions of aerial counts in a series of index areas throughout western Kamchatka since 1957. Spawning escapements have grown concurrent with increasing run sizes, averaging 410,000 from 1970-1985, 640,000 from 1986-2000, and 940,000 from 2001-2013.

Since the mid-1970s, the intensity of fishing has been steadily increasing, reaching a maximum in the last 11 years. Chum are currently the primary focus of the commercial fishery in odd-numbered years when Pink Salmon are less abundant. Chum Salmon escapement objectives may limit the catch of Pink Salmon in large Pink return years.

Figure 16. Dynamics of commercial catch of Chum Salmon of Western Kamchatka (vertical bars = run size; line = exploitation rate).

Management

Escapement objectives are identified for Chum Salmon based on historical production patterns although the spawner-recruit relationship is not as pronounced for Chum Salmon as for other species in western Kamchatka (Shevlyakov 2004). Maximum yield is estimated to be produced by an aggregate spawning escapement of 800,000 Chum. Fisheries on the west coast of Kamchatka are managed to achieve region-wide escapement goals. Estimated escapements have averaged over 500,000 Chum Salmon per year in Western Kamchatka rivers from 2009-2013 (Table 16).

The relationship between juvenile production and the number of Chum Salmon spawners is not as clear as for other species of Pacific salmon. It is thought that juvenile Chum production is related more to the relative abundance of spawning Pink Salmon (Shevlyakov and Zavarina 2004). Low Pink Salmon escapements do not provide sufficient nutrients for foraging juvenile fish, and excessively large (greater than 60 million) Pink Salmon escapements can reduce Chum egg survival due to associated oxygen depletion in the system. KamchatNIRO believes that in order to provide enough eggs to adequately seed available habitat, the total Chum Salmon escapement to Western Kamchatka must not be fewer than 800,000 fish (based on forecast materials from KamchatNIRO). However, it is not clear if this is an official minimum escapement target. Information available from the North Pacific Anadromous Fish Commission suggests that escapements have been below 800,000 fish since 2007.

These levels are below the point value for MSY (800,000) but are clearly producing a large percentage of maximum yield based on consistent high catches of Chum Salmon concurrent with an increasing trend in run size and escapement since the 1980s.

Fisheries are regulated to ensure that significant escapements are distributed among individual rivers but each river is not managed to achieve a river-specific goal as long as the aggregate goal is being achieved. Thus some rivers are fished at higher rates and some at lower rates. Estimated exploitation rates of chum salmon in some rivers can approach 95% rate in some years. Such high rates would exceed average values in other wild chum fisheries throughout the Pacific with the exception of years of big returns for productive stocks. However, KamchatNIROo suggests that high rates in recent years are overestimates due to undercounting of escapement during large run years (Shevyakov et al. 2016).[1] Recent work by KamchatNiro has developed river-specific reference points based on stock-recruitment analysis (Table 17, Figure 23).

Table 16. Recent estimates of Chum Salmon run size and spawning escapement (millions)[a].

	West Kamchatka	
Year	**Run**	**Spawners**
2009	2.808	0.716
2010	4.268	0.392
2011	5.164	0.448
2012	6.956	0.665
2013	5.169	0.415
Avg.	4.873	0.527

Table 17. Escapement reference points (thousands of fish) for Chum Salmon in west Kamchatka Rivers (Shevlyakov et al. 2016).

	S lim	Sbuf	Smsy	S*msy
Vorovskaya	18.34	31.58	56.38	72.80
Kol	1.07	7.94	11.81	26.46
Opala & Golygina	16.03	27.26	95.7	113.78
Koshegochek	0.87	5.40	7.60	9.09
Ozernaya	0.73	1.95	4.97	6.31

[1] *KamchatNIRO reports that spawning escapement estimates are substantially underestimates salmon due to incomplete spawning surveys, particularly in recent years. As a result, exploitation rates derived from harvest and escapement numbers are substantial overestimates. For instance, rates of 100% are reported in years when no spawning escapement data is available due to a reduction in aerial survey funding. As a result, numbers reported for escapement in Table 16 should be considered indices rather than than absolute estimates.*

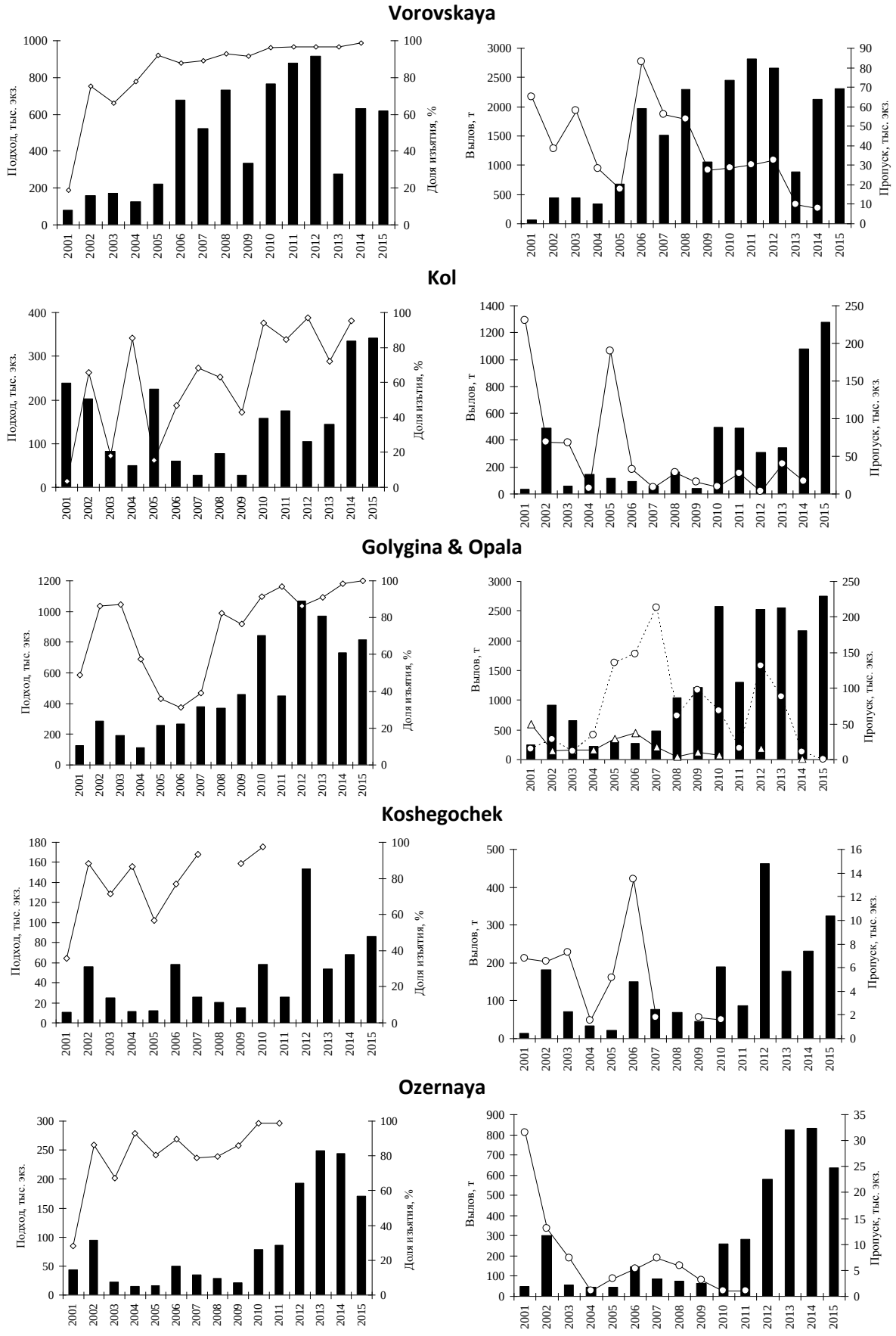

Figure 17. Chum Salmon status in selected western Kamchatka Rivers. Left panel: Run size in thousands of fish (bars) and exploitation rate (lines). Right panel: Yield (bars) and spawning escapement (lines) (Shevlyakov et al. 2016).

2.3.3 Coho Salmon

Distribution

Coho Salmon are generally distributed in streams and rivers throughout the subartic and temperate north Pacific from the Sea of Okhotsk to northern California (Sandercock 1991). Distribution in Kamchatka is generally limited to the southern portion of the Peninsula where they may be found in most mid-large and large bodies of water. Commercial quantities occur from Palana Village south to the Kambalnaya River. Significant populations in southwest Kamchatka occur in the Bolshaya River and in the rivers of the Central-West region including the Vorovskaya, Krutogorova, Pymta, Kol, and Kikhchik.

The amount of Coho Salmon spawning habitat varies by river in Western Kamchatka. The Vorovskaya River is one of the largest rivers and accounts for about 8% of the total spawning grounds along the western coast. The Kol, Opala and Ozernaya Rivers contribute 5.0%, 3.3% and 1.7%, respectively of the Coho Salmon spawning habitat in Western Kamchatka (Shevlyakov et al. 2016). The greatest densities of spawners are found in groundwater upwelling areas where production potential is higher. Nearly 22% of the spawning habitat in the Kol River is in upwelling areas, compared to 19% in the Opala and 10% in the Vorovskaya River. The Ozernaya has the least amount of suitable Coho spawning habitat.

Life History

Coho return over a protracted period from August to December with spawning as late as February. Spawning typically occurs in a wide range of rivers and streams, including the uppermost accessible tributaries. Low water temperatures and the presence of shallow gravel areas allow Coho Salmon to spawn along nearly the entire lengths of the rivers. Coho Salmon prefer to spawn in areas with intra-gravel water flow and/or areas with groundwater upwelling.

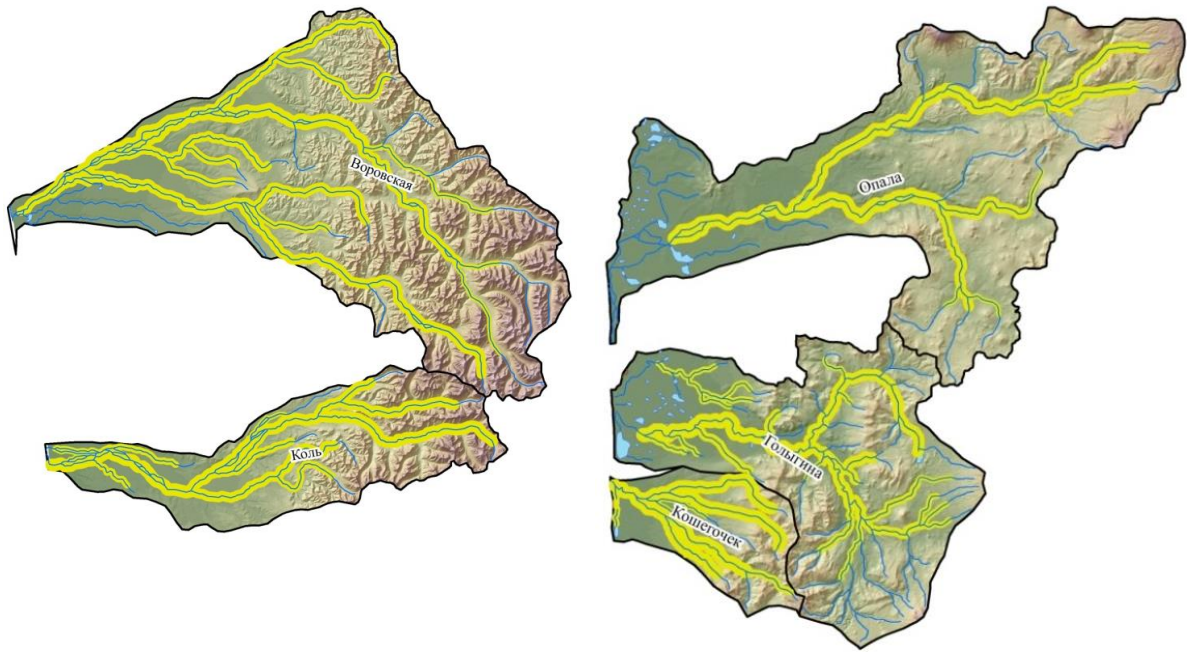

Figure 18. Spawning distribution of Coho Salmon in Vorovskaya, Kol, Opala, Golygina and Koshegochek rivers (Shevlyakov et al. 2016).

Western Kamchatka Coho average 3.0 - 3.5 kg in size but may reach 5 to 7 kg. Adults typically return to spawn at 3 to 4 years of age after 1 year at sea. Juvenile Coho may rear in streams for one to three years before undergoing a physiological transformation to smolts and migrating to the sea. As with other species that have a protracted freshwater rearing period, Coho Salmon are characterized by a complex age structure that includes up to 8 different age-at-maturity groups. The commercial harvest is almost always comprised of age of 1.1+, 2.1+, 3.1+ fish that reared in freshwater 1 to 3 years and resided one year in the ocean. In some years, the spawning run may include a small number of fish that spent two years at sea (1.2+ 2.2+), and also a small number of "jacks" or "kaurkas" that return to freshwater the same year they out-migrate to sea (1.0, 2.0, 3.0). On average, the dominant age class in the Vorovskaya, Kol and Opala Rivers is age 2.1+ (i.e. most juveniles resided in the river for two years before outmigrating to the sea (Figure 19).

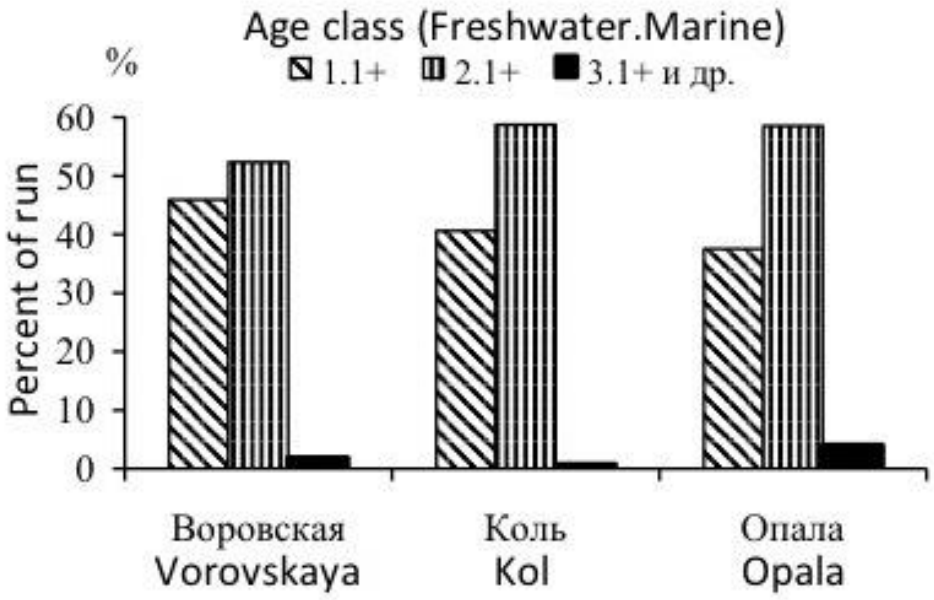

Figure 19. Coho Salmon age structure for some Western Kamchatka Rivers.

Stock Structure

Rivers with significant groundwater upwelling areas typically include two distinct Coho Salmon runs - summer and autumn (early and late). The early run includes fish returning in August and September. The late run includes fish returning beginning in late September. In years of high Coho Salmon returns, competition for available spawning area forces some fish to spawn in sub-optimal habitats where the egg survival is poor.

Status

KamchatNIRO reports that reliable fishing statistics are available since 1970 but additional data is available as far back as 1934. Numbers can vary substantially from year to year with no clear trend since 1970. Coho Salmon landings increased over the past few years, but this increase may have resulted in a reduction of previously-unreported catch due to changes of management system.

Spawning escapement of Coho Salmon is estimated based on expansions of aerial counts in a series of index areas. Estimates are made for only the early portion of the run due to the protracted run timing of Coho and difficulty of conducting surveys later in the year. As a result, KamchatNIRO estimates that counts include only 50 to 70% of the total number.

Coho Salmon returns were heavily impacted by unregulated drift gillnet fishing in the ocean from 1950 until the 1970s. Run sizes improved from 1979-1990 with the restriction and closure of the drift fishery. Run sizes and escapements of Coho Salmon have declined substantially from 1990-2006.

Returns have improved from 2007. KamchatNIRO attributed the recent improvement in returns, despite low estimates of spawning escapement, to favorable ocean conditions.

Most Western Kamchatka Coho Salmon populations declined after 1992-1994 but have improved in recent years. There have been several cycles of growth and decline of Coho Salmon production historically (Zorbidi 2010). For example, one of the largest Coho Salmon fisheries in Western Kamchatka, the Vorovskaya River, had its highest catch in 1946 (1312 mt), followed by a period of decreased catches. Then the fishery rebounded in the 1960's to the mid 1980's when the annual catch often exceeded 100 mt, and ranged as high as 700 mt. Then the fishery steadily declined through the mid-2000s, ranging from 13.8 mt (1993) to 42.9 mt (2005). In 2010, the Vorovskaya fishery catch reached 312 mt (1.135 million fish). In 2013 the total catch in this river basin was 38.8 mt. However, the reason for the low catch was the late migration timing which resulted in an extended closure of the fishery. As a result, more than 27,000 fish escaped to the spawning grounds in 2013 (Figure 20).

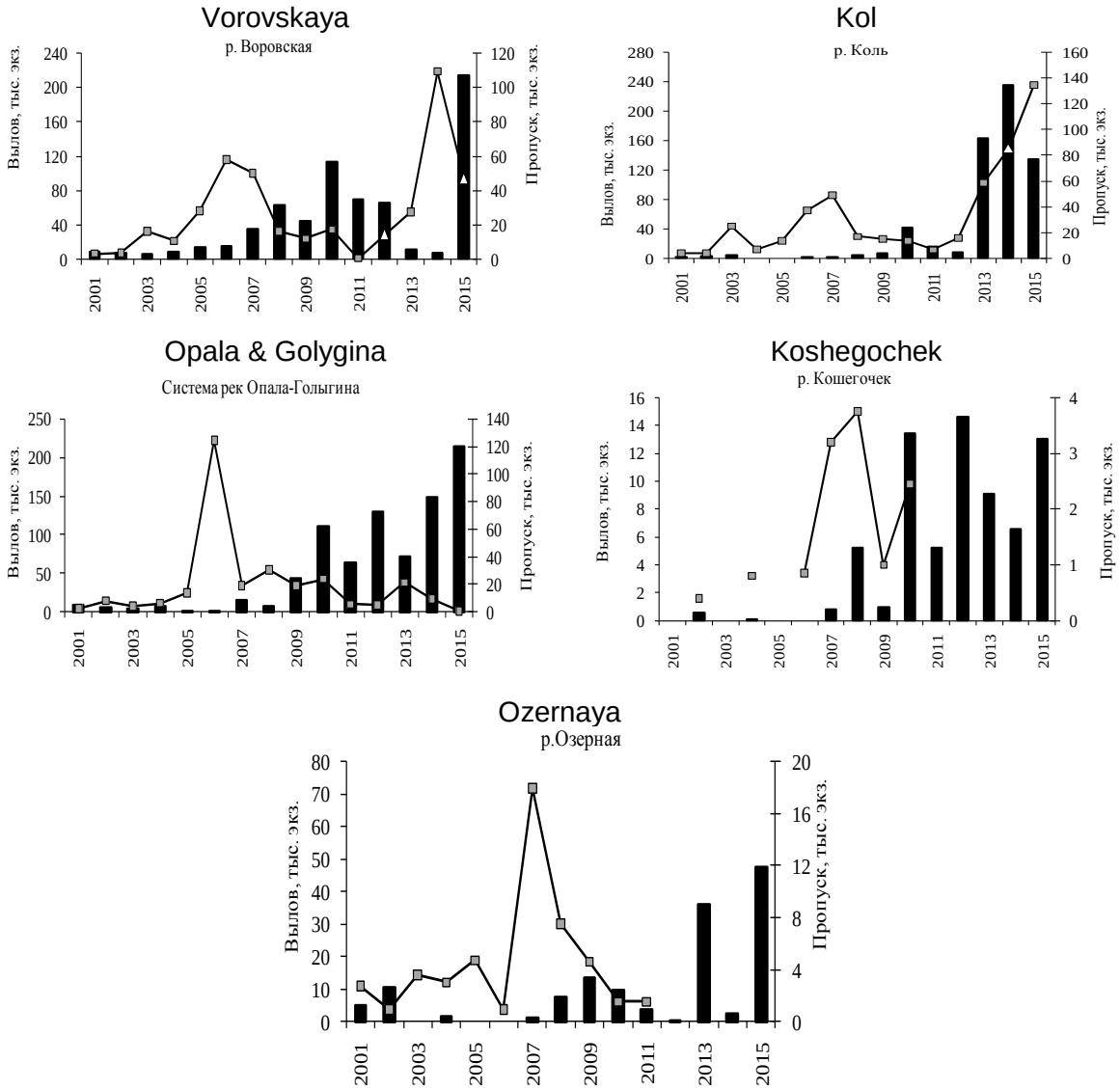

Figure 20. Annual catch (bars) and escapement (lines with square markers) of Coho Salmon (thousands) in selected western Kamchatka rivers, 2001-2013 (Shevlyakov et al. 2016).

In the 1970s and 1980s, run timing of Coho shifted approximately 15 days later in the rivers of the Western coast. Age composition also shifted with a decrease in the percentage of three-year-old fish (1.1+). Changes were attributed to a reduction in spawning escapement, conditions in wintering and feeding in the ocean, and poorly controlled fishing beyond the 200-mile zone. Beginning in the 1990s, run timing and age composition have returned to more normal levels.

Spawner-recruitment analysis of the aggregate western Kamchatka return has estimated that maximum sustained yield (MSY) is produced by spawning escapements of approximately 300-350 thousand Coho Salmon (Shevlyakov 2004).

Total runs of Coho Salmon have been increasing in recent years, although data reported to the NPAFC suggests that escapement targets have not been reached since 2009 (Figure 11). However, most Coho Salmon spawn late in the season after aerial surveys have been conducted (Shevlyakov 2014) so escapements are likely under-estimated.

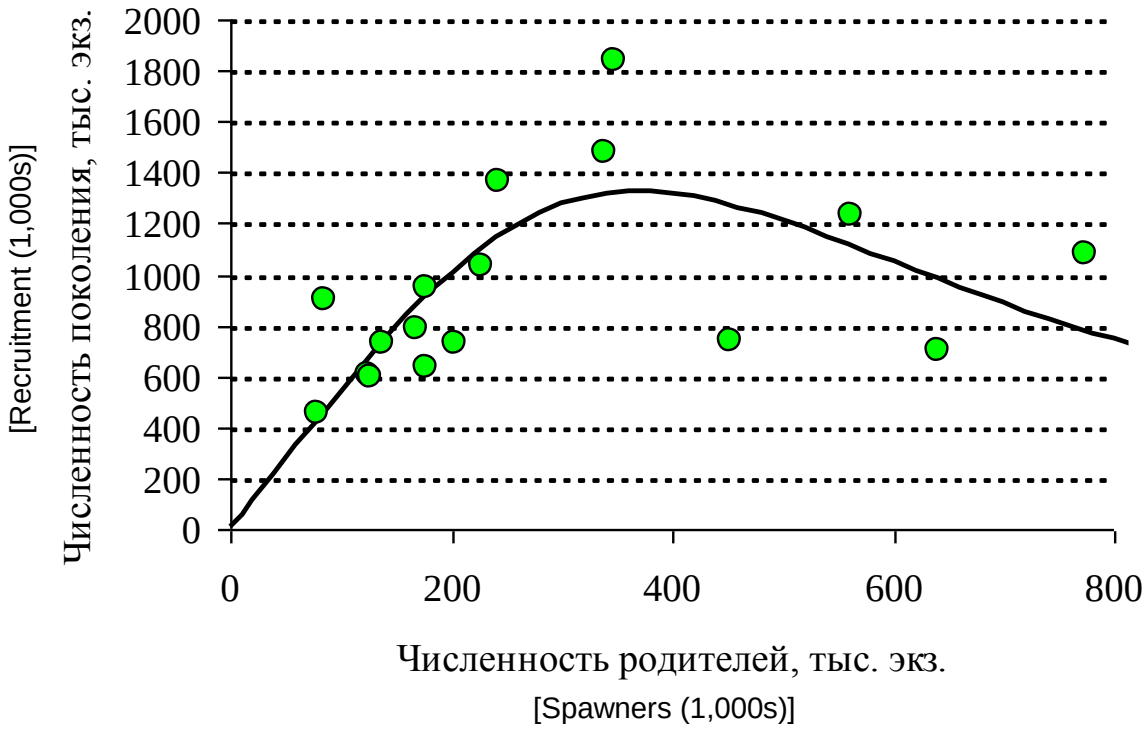

Figure 21. The dependence of the "parent-offspring" (Shepard's model) of Silver\Coho Salmon of the Western coast of Kamchatka in generations of 1978-1982, 1987-2008's.

Management

Fisheries are regulated to ensure that significant escapements are distributed among individual rivers but each river is not managed to achieve a river-specific goal as long as the aggregate goal is being achieved. Recent work by KamchatNiro has developed river-specific reference points based on stock-recruitment analysis (Table 18, Figure 23). Recent average escapements generally meet or exceed a range between described by precautionary boundary (S_{buf}) and precautionary MSY (S^*_{msy}) reference points.

Table 18. Escapement reference points (thousands of fish) and recent average escapements for Coho Salmon in west Kamchatka Rivers (Shevlyakov et al. 2016).

	S_{lim}	S_{buf}	S_{msy}	S^*_{msy}	2001-2015 avg.
Vorovskaya	8.73	11.75	20.21	23.59	25.0
Kol	3.63	9.69	10.18	15.04	27.0
Opala & Golygina	1.11	4.24	12.99	19.92	20.0
Koshegochek	0.05	0.94	2.50	2.64	2.0
Ozernaya	0.08	0.88	1.54	2.71	4.0

S_{lim} = boundary reference point set to the model parameter S_0 (spawner level S with maximum survival recruits per spawner)

*S_{buf} = Precautionary estimate of the boundary reference point – buffer reference point set to the upper boundary of the confidential interval of parameter S0 estimation (Slim + tα*σSo) where tα is Student's coefficient as a given level of probability belief (α = 0.05), σSo is standard deviation of parameter S0 estimate.*

S_{MSY} = spawning escapement at maximum sustainable yield;

S^*_{MSY} = precautionary estimate of spawning escapement at maximum sustainable yield determined for the lower boundary of the confidential interval of model regression (α = 0.05).

2.3.4 Management

Assessment Methods

Stock assessments for fishery management purposes include catch estimation based on daily reporting of commercial fishery landings, fishery catch per unit effort, regular subsampling of the catch for estimation of biological characteristics, and estimation of run size and spawning escapement. Stock assessment data have been collected for all species of Pacific salmon in the area under assessment since 1957. Catch data and occasional research are available since the 1920s.

Detailed records on daily harvest are kept because fishermen are paid in part based on their catch volume and companies are required to maintain detailed records for production and licensing purposes. Fish volumes are recording upon delivery to the processing plants. All fish delivered to the plants for processing and sale are weighed. Amounts are then recorded at several stages throughout processing. Numbers are reported by the fishing companies to the management authorities who compile the information for each fishing area for weekly reporting to the Anadromous Fish Commission which is responsible for in-season management decisions.

Biological sampling of the catch is conducted periodically throughout at fishing season in fish processing plants by government inspectors. Measurements include length, weight, sex and age.

Run size and spawning escapement data is estimated with a combination of aerial surveys, ground surveys, and remote sensing. Aerial surveys are a primary assessment tool throughout Kamchatka due to the numerous rivers and vast area involved.

Aerial surveys have been conducted since 1950 almost without interruption (Ostroumov, 1964). Flights are made mostly by helicopter from a height of 50-150 m and, to a lesser extent by plane from a height of 150-250 m. Counts are made of live fish, carcasses ("snenka") and/or redds. Surveys are ideally at least two or three times per year but single peak or maximum counts are sometimes used. The historical aerial survey program targeted a total of 600 hours of flight time for the purposes of total accounting of all species of Pacific salmon mature fish in all major water bodies of the region. However, assessment time has been declining over the last decade due to budgetary constraints (Figure 22). Current effort is allocated to high value index areas and flights are timed to allow counting of multiple species (Shevlyakov and Maslov 2012). Index areas were established by selecting the most representative areas in the comprehensive historical data set.

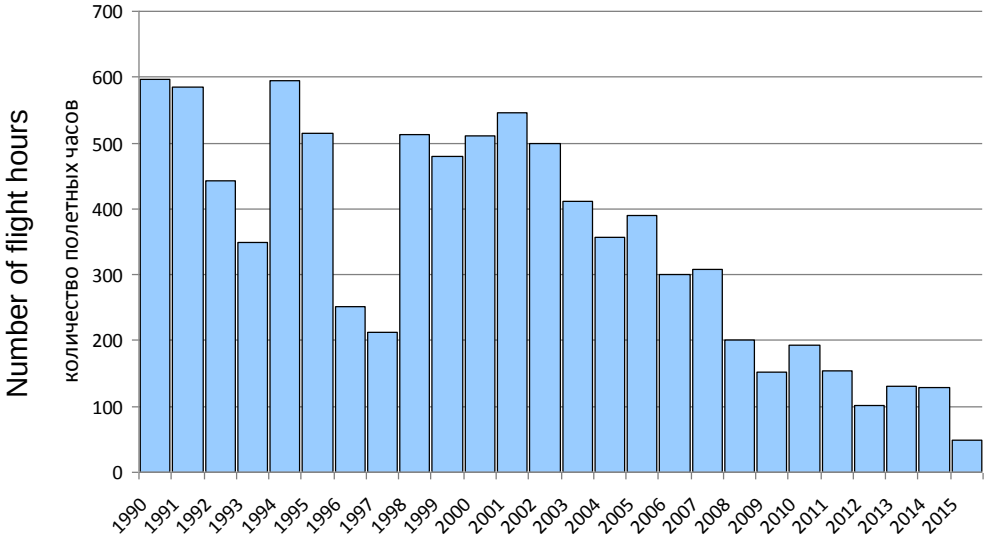

Figure 22. Aerial salmon stock survey effort (flight hours) in Kamchatka, 1999-2015 (Shevlyakov et al., 2016).

Counts from index areas are expanded to non-index areas based on formulae established from historical sampling data. For instance, Bolshaya is a reference river for the region that includes the Kikhchik, Mukhina, Khomutina, Utka, Mitoga and Bolshaya rivers. Recent aerial survey effort in western Kamchatka is summarized in Table 19.

Table 19. Recent aerial survey schedule for salmon spawning escapement in western Kamchatka.

Location	Time period	Stock counted	Flight time
Lks. Nachikinskoe, Golyginskoe, Kurilsky & Kambalnoe	Late June – Early July	Early Sockeye	4 hrs
Opala & Golygina rivers		Early Chum, Chinook	
	Late Sept – Oct	Coho	4 hrs
Vorovskaya, Kolpakova & other rivers	Late June – Early July	Early Chinook	5 hrs
Bolshaya River	Late July	Early Sockeye, Chinook	5 hrs
	August - 3rd week	Pink, Chum	5 hrs
	Early September	Sockeye, Chum, Coho	5 hrs
	October - middle	Late Chum, Coho	5 hrs
Kikhchik & Kolpakova rivers	Late July	Sockeye, Chinook	10 hrs
	August	Pink, Chum, Late Chinook	10 hrs
	Late September	Sockeye, Chum, Coho	10 hrs
Oblukovina & Icha rivers	July - 2nd half	Sockeye, Chinook	6 hrs
	August	Pink, Chum, Late Chinook	6 hrs
	Late September	Sockeye, Chum, Coho	10 hrs
Tigil & Palana rivers	Late Aug – Early Sept	Pink, Chum, Coho	7 hrs
Total			92 hrs

Extensive ground counts of fish numbers are made to supplement aerial surveys. Counts are made weekly or every other week in each of the Bolshaya, Opala and Kikhchik rivers. Ground surveys also include smaller streams not included in aerial surveys. Biological samples are collected concurrently by beach seine. Fishing associations and several fishing companies currently help support the stock assessment program by providing food, accommodation and transportation.

Remote methods include hydroacoustic methods, and photo and video recording are also being evaluated as an alternative for stock assessment. Similar equipment has long been used in eastern

Kamchatka (Degtev et al. 2012) and Alaska. Hydroacoustic equipment was tested in the Kikhchik River in 2013 for Coho Salmon but effectiveness was limited due to an unseasonal flood.

Reference Points

Optimum escapement objectives are established by KamchatNIRO for each salmon species and management area based on analysis of historical production patterns. In most cases, this involves stock-recruitment analysis where comparisons of numbers of progeny vs. parents (using for instance, a Ricker model) are used to calculate spawning escapements that produce maximum levels of sustained yield. Species summaries in this report included a number of examples of these stock-recruitment analyses. In most cases, stock-recruitment analyses where based on aggregate species run reconstructions for multiple rivers within western Kamchatka. River specific objectives were then defined by apportioning the totals based on relative population sizes in the various areas. The portions were generally based on relative run sizes and available spawning habitats. Formal limit reference points are not used in management of salmon fisheries in Russia. In this system, target reference points based on maximum yields function as operational equivalents of limit reference points.

Recent work by KamchatNiro has developed river-specific reference points based on stock-recruitment analysis. Values are documented for each species in previous sections of this assessment report. These quantities are not currently used to drive management decisions although it is expected that future evaluations will consider consideration in management. Definitions of references points from Shevlyakov et al. 2016 are as follows:

S_{lim} = boundary reference point set to the model parameter S_0 (spawner level S with maximum survival recruits per spawner)

S_{buf} = Precautionary estimate of the boundary reference point – buffer reference point set to the upper boundary of the confidential interval of parameter S0 estimation (Slim + tα*σSo) where tα is Student's coefficient as a given level of probability belief (α = 0.05), σSo is standard deviation of parameter S0 estimate.

S_{MSY} = spawning escapement at maximum sustainable yield;

S^*_{MSY} = precautionary estimate of spawning escapement at maximum sustainable yield determined for the lower boundary of the confidential interval of model regression (α = 0.05).

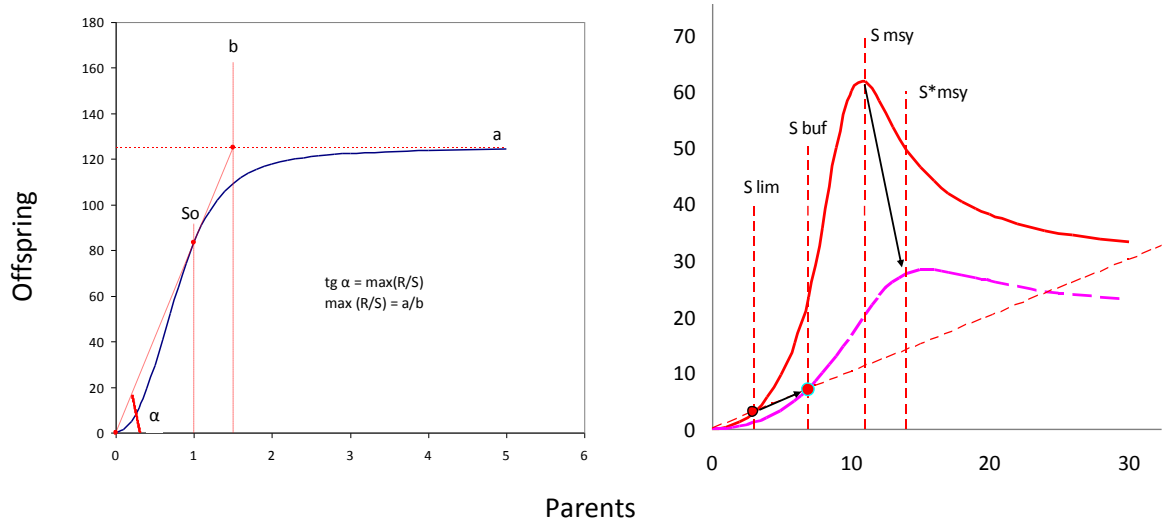

Figure 23. Depiction of boundary and buffer reference points (right) defined for west Kamchatka salmon stock-recruitment model (left).

Management Strategy

For management purposes, the Kamchatka peninsula coastal zone is subdivided into several management units (six in Western Kamchatka coast). Each management unit contains several fishing parcels.

Pre-season run forecasts are made for each salmon species by the Fisheries Research Institute (KamchatNIRO). The fishery management agency (FAR) approves a recommended annual catch for each fishery subzone based of this forecast. The pre-season forecast is now used primarily for planning purposes and possibly to establish quotas for some non-commercial fisheries. The forecast was historically used to establish total allowable catches and quotas for fishing companies. However, this system has now been replaced with an "Olympic" system where fishing companies operate in designated areas and periods and are allowed to harvest fish as available, as opposed to artificially limited by a specific allocation. Harvest quotas are still established for the fishery as a whole in each river but these quotas are adjusted in-season based on real time data.

The fishery is managed in-season with time and area openings and closures based on catch, biological characteristics of the catch, run size and escapement information. Management occurs with time and area closures. Fishery openings and closures may be made on short notice based on fish availability and progress in meeting spawning escapement objectives.

A primary means of controlling harvest in freshwater is through the use of passing days where fishing is closed. On large rivers like the Bolshaya, passing days are managed by river zone because fishery is spread over a large area and fish need to transit the fishery. Area closures are staggered to provide passage. The freshwater fishing area is more concentrated in smaller systems like the Opala, so passing days are typically applied to the entire river. For instance, two passing days are typically closed per week on the Opala River where only three users are concentrated in the lower river. In the Ozernaya River, passing days are typically two days of no fishing followed by two days of fishing (Figure 24). The number of passing days may be reduced to avoid exceeding established escapement goals.

Areas and dates that sea nets can be fished are also regulated. Regulations may take the form of temporary closures where leads and traps are tied up so as to allow fish to pass or season-long closures where nets are removed. Sea nets are very effective and can take up to 90% of the catch if unregulated. The majority of sea nets are typically fished only during even years when the dominant Cohort of Pink Salmon is returning.

During large Pink Salmon runs, the potential harvest exceeds the capacity of the fish processing plants and so fishing companies voluntarily reduce their fishing time even when the fishery is open. In this case, harvest rates are effectively reduced by capacity limitations even when passing days are cancelled due to large escapements. Escapements of other salmon species likely benefit in large Pink Salmon years due to this effect.

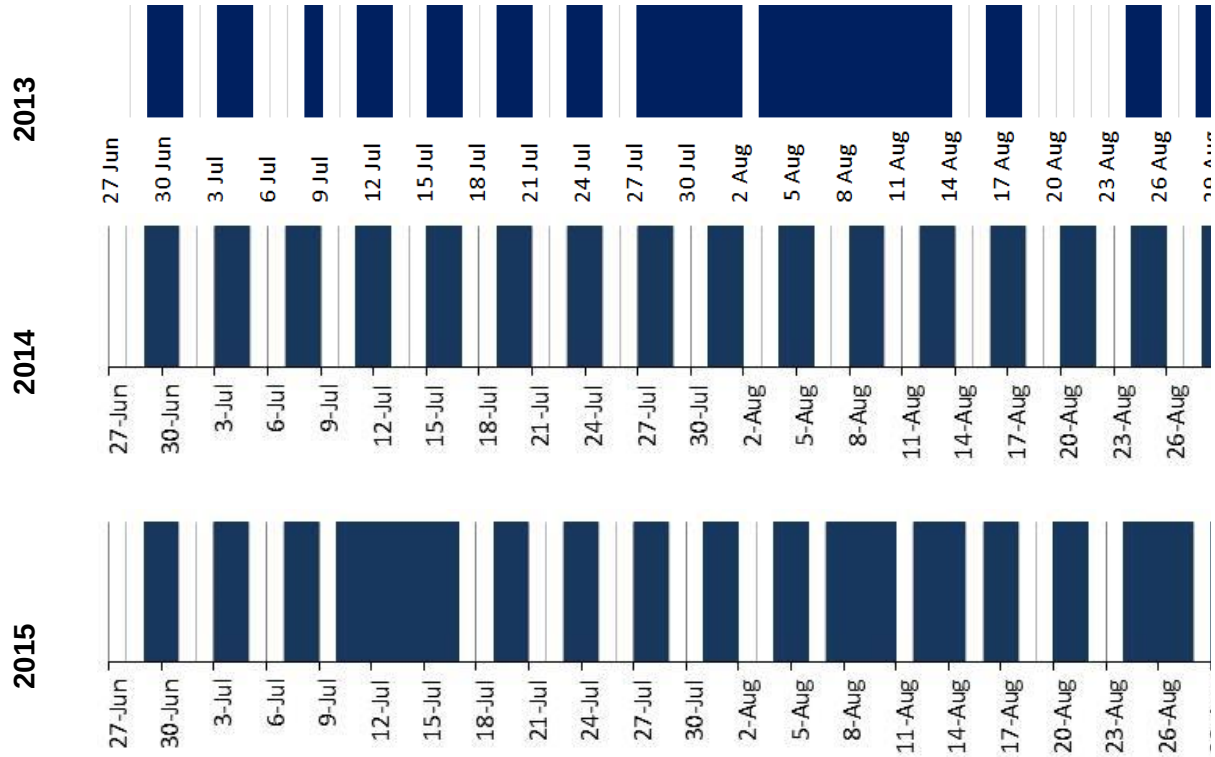

Figure 24. Pattern of passing days for Ozernaya fishery in 2013-2015 (fishing days are indicated by solid bars).

Example Inseason Management Actions

Shevlyakov et al. (2016) report that the main document regulating salmon fishery for a certain year is a basic protocol (No. 3 in 2014, No. 4 in 2014)[2] that establishes conditions, regulation measures and harvesting restrictions for the current fishing season. Protocols following the basic one revise regulations based on current fishery conditions.

Fishing season 2014.

April 15, 2014. Protocol No. 3: Cl. 4.1. Determine starting dates for commercial and coastal fishery, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds), as well as amateur and sport fishery (by net and gillnet fishing gear) in respect of Pacific salmon and Arctic salmon:

- in Sobolevsky district (rivers Vorovskaya, Kol):
- on river grounds from July 14;
- on sea grounds from July 25;
- in Ust-Bolsheretsky district:
- on grounds in rivers Ozernaya, Opala from June 25;
- on river grounds (except for rivers Bolshaya, Ozernaya, Opala) from July 14 (i.e. including rivers Golygina and Koshegochek);
- on sea fishing grounds from July 25.

[2] *Protocols are numbered from the beginning of each year with the number 1 (thus, both 2014 and 2015 have protocols numbered 3 and 4.*

P. 4.5. Introduce a ban for commerial, amateur and sport fishery, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds) using net and gillnet fishing gear in the water area of river Vorovskaya (Bolshaya Vorovskaya) and its tributaries up to resolution of the Commission.

P. 4.6. Introduce a ban for commercial and coastal fishery in respect of red salmon in the West Kamchatka and Kamchatka-Kuril subzones (i.e. all subject rivers from the list).

P. 5.1. Determine escapement days for commercial, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds) by net and gillnet fishing gear, as well as amateur and sport fishery:

- in inland water reservoirs (except for rivers Bolshaya, Ozernaya (west), Opala, Kolpakova, Oblikovina and Kamchatka) – Monday and Tuesday weekly (i.e. for rivers Koshegochek, Golygina and Kol);
- in river Opala – June 27, 28, July 1, 2, 5, 6, 9, 10, 13, 14, from July 15 – Wednesday, Thursday weekly;
- in river Ozernaya (west) – June 27, 28, July 1, 2, 5, 6, 9, 10, 13, 14, 17, 18, 21, 22, 25, 26, 29, 30 and August 2, 3, 6, 7, 10, 11, 14, 15, 18, 19, 22, 23, 26, 27, 30, 31;

P. 5.2. Do not determine escapement days for pole-and-line fishing.

May 20, 2014, Protocol No. 4. P. 1.13. Determine dates of the ban for amateur and sport fishery in respect of Pacific salmon by pole-and-line fishing gear: for water reservoirs of the west coast of Kamchatka (all subject rivers from the list) – from October 15;

July 8, 2014, Protocol No. 10. P. 2.1. cancel previously determined escapement days on fishing grounds in river Ozernaya (west) on July 9, 10, 13, 14 (according to KamchatNIRO recommendation in order to meet the summer red salmon escapement goals in Kurilskoye lake up to the end of the run).

July 21, 2014, Protocol No. 13. P. 2.1. By way of amendment of the Commission resolutions dated 15.04.2014 (paragraphs 4.1, 4.2 of the Protocol No. 3), determine starting days for commercial and coastal fishery, traditional fishery of Small Indigenous Peoples of the North as well as amateur and sport fishery in respect of Pacific salmon and Arctic salmon in the Sea of Okhotsk water area (Sobolevsky and Ust-Bolsheretsky districts), by all fishing gear – from July 23.

P. 2.2. Due to the expected worsening of weather conditions in the Sea of Okhotsk permit fishing companies to attach netting gear of the stationary ocean nets on sea fishing grounds in Sobolevsky and Ust-Bolsheretsky districts from 00:00 on July 22, provided that the conditions for ocean stationery net idling are observed (according to P. 5.3 of the Protocol dated 15.04.2014 No. 3 – rules regulating the stationery net idling procedure).

July 23, 2014, Protocol No. 14. P. 2.4. Remove previously introduced (paragraph 4.5 of the Protocol dated 15.04.2015 No. 3) ban for commercial, amateur and sport fishery, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds) using net and gillnet fishing gear in the water area of river Vorovskaya (Bolshaya Vorovskaya) and its tributaries from 00:00 on July 25, subject to observance of the escapement days mode – Monday, Tuesday weekly. (On the basis of the report by head of Aquatic Bioresources Monitoring Department of FSUE Sevvostrybvod, due to the start of a salmon large-scale run in river Bolshaya Vorovskaya)

July 31, 2014, Protocol No. 16. P. 1.2. Determine an additional weekly escapement day for commercial, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds) by net and gillnet fishing gear, as well as amateur and sport fishery in the water area of river Vorovskaya (Bolshaya Vorovskaya) and its tributaries - Friday.

August 14, 2014, Protocol No. 19. P. 1.1. Introduce a ban for Pacific salmon harvesting on fishing grounds for commercial and coastal fishery in the West Kamchatka and Kamchatka-Kuril subzones from 00:00 on August 16. The ban does not cover the fishing grounds located in the lagoon of rivers Khayryuzova and Belogolovaya (according to the recommendation of KamchtNIRO for the ending-up of commercial salmon fishing due to reduction of Pacific salmon run intensiveness in the coastal area of the west Kamchatka coast for the purpose of relieving the fishing pressure on the exploited populations and providing for sufficient escapement of spawners into the water reservoirs).

August 22, 2014, Protocol No. 20. P. 3.1. Introduce a ban for commercial, amateur and sport fishery, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds) using net and gillnet fishing gear in the water area of river Vorovskaya (Bolshaya Vorovskaya) and its tributaries from 00:00 on August 24.

P. 3.2. Introduce a temporary ban for commercial, amateur and sport fishery, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds), including the same in water area, using net and gillnet fishing gear in Tigilsky, Sobolevsky and Ust-Bolsheretsky districts (except for river Bolshaya) from 00:00 on August 24 to 00:00 on August 26.

P. 3.3. By way of amendment of previous resolutions made by the Commission for the introduction of an escapement days mode, determine escapement days (including the same for the sea water area) for commercial, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds) by net and gillnet fishing gear, as well as amateur and sport fishery from 00:00 on September1 in Tigilsky, Sobolevsky and Ust-Bolsheretsky districts (except for rivers Bolshaya and Ozernaya (west) – September 1, 2, 5, 6, 9, 10, 13, 14, 17, 18.

According to P. 3.1-3.3 – according to KamchatNIRO recommendations due to the necessity in providing additional escapement for Chum and Coho Salmon to the spawning grounds of the rivers flowing into the rivers of central and south parts of the West Kamchatka and Kamchatka-Kuril subzones – i.e. all subject rivers from the list.

September 10, 2014, Protocol No. 22. P. 2.1. Introduce a ban for anadromous fish species harvesting on fishing grounds (except for fishing grounds of rivers Opala, Zhupanova and Vakhil) for commercial coastal fishery by all types of fishing gear, as well as traditional fishery of Small Indigenous Peoples of the North (by communities) and amateur and sport fishery by net and gillnet fishing gear from 00:00 on September 15 (i.e. all subject rivers from the list, except for river Opala).

P. 2.2. Introduce a ban for anadromous fish species harvesting on fishing grounds for commercial fishery: in river Opala from 00:00 on September 17.

September 17, 2014, Protocol No. 23. Introduce a ban for anadromous fish species harvesting (yield) by net and gillnet fishing gear for traditional fishery of Small Indigenous Peoples of the North (by individuals) in rivers adjacent to the coast in sea water areas of West Kamchatka and Kamchatka-Kuril subzones from 00:00 on September 20 (according to KamchatNIRO recommendations due to Kamchatka summer salmon runs and entering the rivers).

October 09,2014, Protocol No. 24. P. 1.1. Introduce a ban for Pacific salmon harvesting (yield) by pole-and-line fishing gear for amateur and sport fishery, traditional fishery of Small Indigenous Peoples of the North: for water reservoirs of the west coast of Kamchatka (i.e. all subject rivers from the list) – from October 15;

Fishing season 2015

April 22, 2015, Protocol No. 4. Determine the following conditions for Pacific salmon and Arctic salmon harvesting (yield) in the water reservoirs of Kamchatka region in 2015:

P. 4.1. Establish the terms for amateur and sport fishery in respect of Pacific salmon by pole-and-line fishing gear:

- in Avacha bay, river Avacha and river Paratunka from June 20 to July 5 and then for the period of Coho run from August 20;
- in other water reservoirs of Kamchatka region (i.e. all subject rivers from the list) starting date for harvesting – from June 1.

P. 4.2. Determine starting dates for commercial and coastal fishery, amateur and sport fishery, traditional fishery of Small Indigenous Peoples of the North by net and gillnet fishing gear in respect of Pacific salmon and Arctic salmon: On the west coast:

- in Sobolevsky, Ust-Bolsheretsky and Bystrinsky districts:
- in river Ozernaya (west) from June 25;
- in river Opala from July 1;
- in rivers and lakes (except for rivers Bolshaya, Ozernaya, Opala, Oblukovina, Vorovskaya) from July 24 (i.e. for rivers Koshegochek, Golygina and Kol);
- in sea water areas (except for the one adjacent to river Bolshaya estuary) from July 11.

P. 4.4. Due to the need to restore reproduction of Chinook and Chum Salmon in river Vorovskaya, introduce a temporary ban by August 15 for Pacific salmon and Arctic salmon harvesting for the purposes of commercial fishery, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds), amateur and sport fishery, using net and gillnet fishing gear in river Vorovskaya (Bolshaya Vorovskaya), its tributaries and sea waters adjacent to the river estuary, including fishing grounds Nos. 72-74.

P. 4.5. Introduce a ban for commercial and coastal fishery in respect of red salmon in the West Kamchatka and Kamchatka-Kuril subzones (i.e. all subject rivers from the list).

P. 4.8. In all the regions, permit fishing companies to set frames of ocean stationery nets in advance, without attaching the netting gear.

P. 5.1. Do not introduce an escapement days mode for pole-and-line fishing (i.e. all subject rivers from the list).

P. 5.2. Determine escapement days for commercial, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds), as well as amateur and sport fishery:

- in rivers and lakes (except for rivers Bolshaya, Ozernaya (west), Opala and Kamchatka), as well as in the Avacha bay and on the fishing grounds Nos. 217, 218, 219 – Monday, Tuesday weekly (i.e. for rivers Koshegochek, Golygina, Kol);
- in river Opala – July 3, 4, 7, 8, 11, 12, 15, 16, 19, 20, 23, 24, 27, 28, 31; August 1, 4, 5, 8, 9, 12, 13, 16, 17, 20, 21, 25, 26, 29, 30; September 2, 3, 6, 7, 9, 10, 13, 14, 17, 18, 20, 21, 24, 25, 28, 29;
- in river Ozernaya (west) – June 27, 28; July 1, 2, 5, 6, 9, 10, 13, 14, 17, 18, 21, 22, 25, 26, 29, 30; August 2, 3, 6, 7, 10, 11, 14, 15, 18, 19, 22, 23, 26, 27, 30, 31;

May 25, 2015, Protocol No. 5. P. 5.1. By way of amendment of the Commission resolution dated 22.04.2015 (P. 5.2 of the Protocol No. 4) determine escapement days for river Koshegochek – Saturday and Sunday weekly.

July 9, 2015, Protocol No. 9. P. 1.4. Cancel from 00:00 on July 10 the previously introduced ban for Pacific salmon and Arctic salmon harvesting using net and gillnet fishing gear on the fishing ground No. 73 (the Sea of Okhotsk near the estuary of river Vorovskaya) for the organization of amateur and sport fishery.

P. 2.1. Cancel previously introduced escapement days on fishing grounds in river Ozernaya (west) - July 10, 13 and 14 (according to KamchatNIRO recommendations due to the achievement of the summer red salmon escapement into lake Kurilskoye that ensures an optimal reproduction level for this population).

P. 2.2. Cancel previously introduced escapement days mode for river Opala, determine escapement days for commercial fishery – Thursday, Friday and Saturday weekly (previously introduced mode – two days of harvesting alternating with two escapement days – proved to be nonoptimal in terms of spawning escapement, for two days are not enough for the spawners to run through the fishing area in the river).

P. 4.3. Determine escapement days for commercial and coastal fishery using gillnets in the West Kamchatka and Kamchatka-Kuril subzones within the limits of sea fishing grounds, where harvesting is performed by stationery nets – Tuesday, Wednesday, Thursday, Friday weekly.

July 22, 2015, Protocol No. 12. P. 5.2. Cancel from 00:00 on July 23 the ban for Pacific salmon and Arctic salmon harvesting on fishing grounds for commercial fishing Nos. 72, 74 (the Sea of Okhotsk, Sobolevsky district, near the estuary of river Vorovskaya).

August 6, 2015, Protocol No. 16. Cancel previously determined escapement days on fishing grounds in river Ozernaya (west) from 00:00 on August 7 up to special instruction of the Commission (according to KamchatNIRO recommendations due to spawning ground filling close to optimal in the basin of Kurilskoye lake according to the survey data obtained using a fish counting fence in the mouth of river Ozernaya).

August 14, 2015, Protocol No. 17. Adopt verification of the Commission resolution dated 22.04.2015 (paragraph 4.4 of the Protocol No. 4) for cancellation of the temporary ban for Pacific salmon and Arctic salmon harvesting for the purpose of commercial fishery, traditional fishery of Small Indigenous Peoples of the North (by communities on the fishing grounds), amateur and sport fishery, using net and gillnet fishing gear in river Vorovskaya (Bolshaya Vorovskaya) and its tributaries from 00:00 on August 16.

August 21, 2015, Protocol No. 18. Determine escapement days for commercial fishery in river Ozernaya (west) – August 22 and August 28 (according to KamchatNIRO recommendations for the purpose of spawning escapement of the epigenetic spawner groups that end up spawning migration of autumn red salmon).

September 25, 2015, Protocol No. 21. P. 1.1. Introduce a ban for anadromous fish species harvesting (yield) by net and gillnet fishing gear for commercial and coastal fishery, amateur and sport fishery in order to ensure traditional life style and traditional economic activities of Small Indigenous Peoples of the North, Siberia and Far East of the Russian Federation (communities and individuals) from 00:00 on October 1 (i.e. for all subject rivers from the list).

P. 1.2. Cancel escapement days previously determined by the Commission resolutions in all the water reservoirs in Kamchatka region for the period from 00:00 on September 26 to 00:00 of October 1 (for all subject rivers from the list).

P. 1.3. In accordance with the Commission resolution dated 25.05.2015 (P. 1.7 of the Protocol No. 5) determine the dates of a ban for amateur and sport fishery by pole-and-line fishing gear in respect of Pacific salmon from November 1 (for all subject rivers from the list).

2.3.5 Enhancement

In total, five hatcheries exist in the Kamchatka region, three on the eastern coast and two in the western coast on the Bolshaya River (Malkinsky and Ozerki hatcheries). Hatchery objectives are to increase salmon returns for commercial fisheries. No hatcheries are present on rivers included in this assessment.

2.4 Principle Two: Ecosystem Background

2.4.1 Primary Species

For the purposes of this assessment, primary species in the catch are defined as those not included under Principle I in the Unit of Assessment but subject to management tools and measures intended to achieve stock management objectives reflected in either target or limit reference points. Primary harvested species addressed by this assessment include coho salmon (in rivers except for Kol where they are a P1 species), sockeye salmon (in rivers except for Ozernaya where they are subject to a separate certification), and Chinook salmon (all rivers). Coho and sockeye in the commercial catch are retained, processed and sold. Chinook are not subject to commercial fishing or sale but small numbers may occasionally be caught during early season fisheries in some rivers.

MSC assessment criteria further distinguish Principle II species based on level of harvest. “Main species” constitute 5% or more of the catch by weight. There are also provisions for identifying a “main” retained species if there is concern that the fishery is having a negative impact on the stock status or if the volume of the fishery is very large. All other species are identified as “not main.”

- Sockeye salmon are a main primary species because they regularly exceed 5% of the catch by weight in some areas, particularly in odd-numbered years of the sub-dominant Pink Salmon return. In other years, catch percentages are low because total catch of Pink Salmon in the Unit of Assessment is very large. Sockeye catch is sufficiently large to impact affected populations.

- Coho salmon are a main primary species because they exceed 5% of the total commercial salmon harvest in many years, particularly in odd-numbered years of the sub-dominant Pink Salmon return. In other years, catch percentages are low because total catch of Pink Salmon in the Unit of Assessment is very large. Coho catch is sufficiently large to impact affected populations.

- Chinook Salmon are not considered a main primary species because this species is protected from commercial harvest, commercial seasons are scheduled to avoid Chinook run times, and incidental catch levels are very small. Chinook Salmon are considered bycatch as current regulations prohibit retention.

Sockeye Salmon

Distribution

Sockeye occur throughout the north Pacific from Washington USA to Kamchatka. Two large populations comprise the majority of the Sockeye return in Kamchatka, the Ozernaya (with Kurilsky Lake) in western Kamchatka and the Kamchatka River in eastern Kamchatka. The Ozernaya population dominates the west Kamchatka return. Significant Sockeye populations also occur in Western Kamchatka in the Bolshaya River system (including Lake Nachikinskoe) and the Palana River. Smaller populations also occur in a number of other systems throughout the region including lakes Golyginskoe and Kambalnoe, and the Kikhchik and in Opala Rivers. Small population of Sockeye occur in the Vorovskaya. Kol and Opala rivers. Some Sockeye hatchery production occurs in the Bolshaya River but these fish are estimated to contribute 5-6% of the total commercial catch in the Bolshaya based on scales pattern analysis (Bugaev et al. 2001; Bugaev 2011).

The marine period of western Kamchatka Sockeye has been studied quite well, primarily for Ozernaya population. After migrating to the sea, smolts spend 2-3 months in the Sea of Okhotsk near the river of origin and then migrate southeastwards into the western north Pacific and Bering Sea.

Life History

Ozernaya and Bolshaya Sockeye have been studied extensively (Bugaev 1995; Bugaev et al. other, 2001, 2002). Sockeye typically average 2 to 3 kg and 55 to 60 cm in length. Adults typically return to

spawn at 5 or 6 years of age but can spend 1 to 5 years at sea. Sockeye generally return to freshwater from early May to late August. Commercial quantities are generally available from late May to early August. Spawning may occur from July until January.

In general, Sockeye Salmon prefer lake and lake-river systems because they rear primarily in lakes and can achieve large abundances in these systems (Bugaev 1995). Sockeye Salmon production in small and medium river basins is low. Spawning may occur in lake tributaries, outlet streams or along the lake shore. Spawning of Ozernaya Sockeye occurs predominately in the littoral zone of Kuril Lake at depths of 3 m or less and also in the upstream part of Ozernaya River and in lake tributaries.

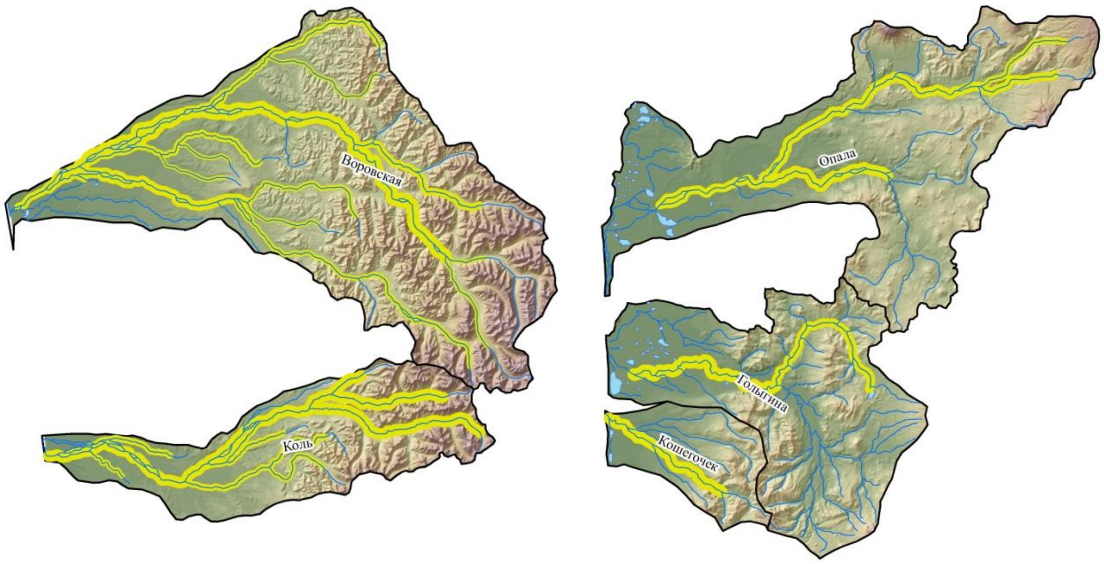

Figure 25. Spawning distribution of Sockeye Salmon in the Vorovskaya, Kol, Opala, Golygina, and Koshegochek rivers (Shevlyakov et al. 2016).

Juvenile Sockeye typically rear in lakes where they feed on zooplankton. Sockeye smolts typically rear in freshwater for one to three years before undergoing a physiological transformation to smolts and migrating to the sea in June and July.

Stock Structure

Sockeye runs are generally comprised of populations returning to specific spawning and rearing areas. These populations are typically demographically and genetically distinct. Late run Sockeye are generally larger than early run Sockeye but age composition is often similar.

Two seasonal races of Sockeye are recognized in many areas of west Kamchatka. In the Ozernaya River, an early run returns primarily in June and early July to spawn in tributaries to Kuril Lake. A late run returns primarily in July and August to spawn in Kuril Lake and the Ozernaya River. The later part of the early run and the early portion of the late run overlap substantially in timing. The late run predominates in the Ozernaya and its contribution in total amount is approximately 98%.

In the Bolshaya River, early (May-June) and late (July-August) returning portions of the run are believed to be primarily lake and stream spawners, respectively. Four isolated temporal groups are identified in the Bolshaya system: early and late runs of Lake Nachikinskoe, and late runs in the main tributaries of the rivers Bystraya and Plotnikova. The early run in Lake Nachikinskoe spawns in tributary streams while the late run spawns in littoral areas of the lake. Early Sockeye current predominate (55%) in the Bolshaya River, although late Sockeye comprised 70-75% of the total run in the 1930s and 1940s. The Opala River Sockeye run also includes a significant early component.

Status

Sockeye abundance, as evidenced by Ozernaya numbers, is currently at record high levels (Figure 26). Returns to western Kamchatka streams have increased substantially since control of the high seas drift net fishery and the shift to more productive ocean conditions for salmon in the North Pacific since the late 1970s. More accurate harvest reporting may also have contributed to higher numbers since 2008, as a result of changes to the management system.

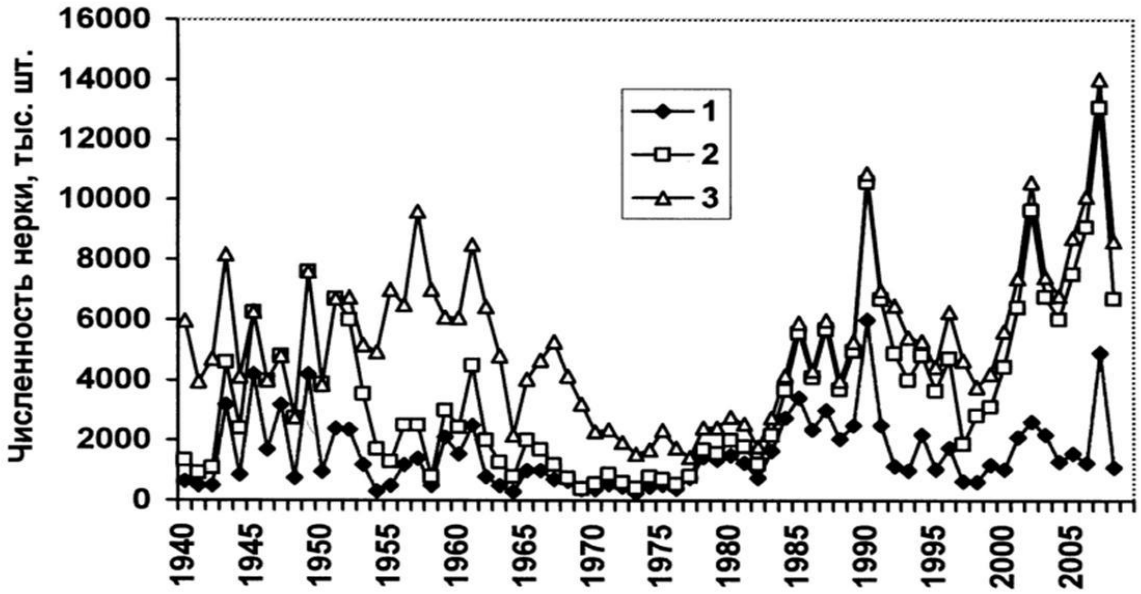

Figure 26. Ozernaya Sockeye abundance (millions), 1941-2010 (Dubynin et al. 2007; Antonov et al. 2007; Bugaev et al. 2009). 1=mature part of the stock, 2=fish approaching the shore, 3=spawners.

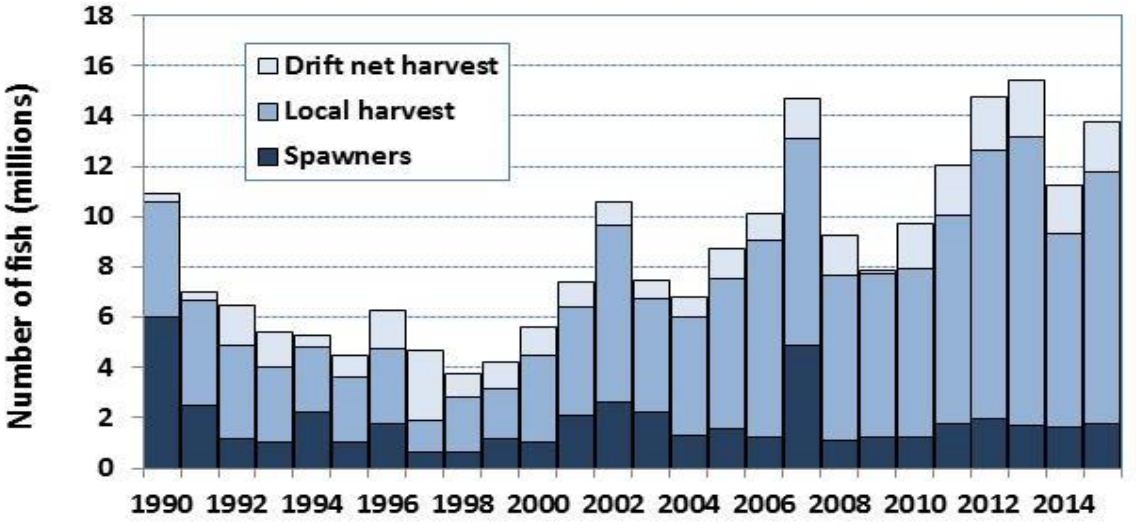

Figure 27. Abundance, harvest and escapement of Ozernaya Sockeye, 1990-2015.

The main commercial Sockeye Salmon fisheries in Western Kamchatka occur in the Ozernaya, Bolshaya and Palana Rivers. The Sockeye harvest is dominated by the Ozernaya stock. Recent 10-year annual harvest of Ozernaya Sockeye in terminal marine and river fisheries has averaged about 10 million fish per year (about 22 thousand metric tons). Another 1.7 million Sockeye were historically harvested per year in marine drift net fisheries in the Russian exclusive economic zone although this fishery was closed in 2015. Corresponding annual exploitation rates of Ozernaya Sockeye currently average about 84%. These rates equal or exceed the highest exploitation rates documented for any Pacific Sockeye population.

Sockeye harvest in other areas of west Kamchatka are summarized in Figure 28. Outside of the Bolshaya and Ozernaya Rivers, most harvest of sockeye in West Kamchatka occurs in marine waters (Shevlyakov et al. 2016). Sockeye typically migrate southward along the western Kamchatka coast where they may be intercepted in marine trap nets. As a result, Sockeye harvest along the coast south of the Bolshaya is dominated by large contributions of Ozernaya population. Ozernaya Sockeye are estimated to account for 50% of the coastal marine trapnet harvest near the Bolshaya River, 90% near the Opala, and almost 100% south of the Koshegochek Rivers.

Catches of Sockeye Salmon in and near most rivers are relatively incidental and small compared to those of Pink, Chum and Coho Salmon. It should also be noted that recent large increases in reported harvest may be in part due to the elimination of incentives for under-reporting of commercial harvest following management system changes in 2008.

Management

Escapement of Ozernaya Sockeye is estimated at a weir at the mouth of Kuril Lake. Escapements of Ozernaya Sockeye are managed to produce maximum sustained yield based on production curves fit to spawner-recruit data (Figure 29). Current escapement goals are 1 to 2.3 million Sockeye as counted at the weir (1.5-1.9 million optimum). Escapement goals for the period 1970-1994 were 2.5-3.5 million (3 million optimum). Escapement goals have been consistently met or exceeded since the goal was reduced in 1994.

Spawning escapement of other western Kamchatka Sockeye Salmon is estimated based on expansions of aerial counts in a series of index areas. Optimum escapement levels have been identified based on analyses of historical production and habitat availability (Table 20). Recent average escapements generally meet or exceed a range between described by precautionary boundary (S_{buf}) and precautionary MSY (S^*_{msy}) reference points.

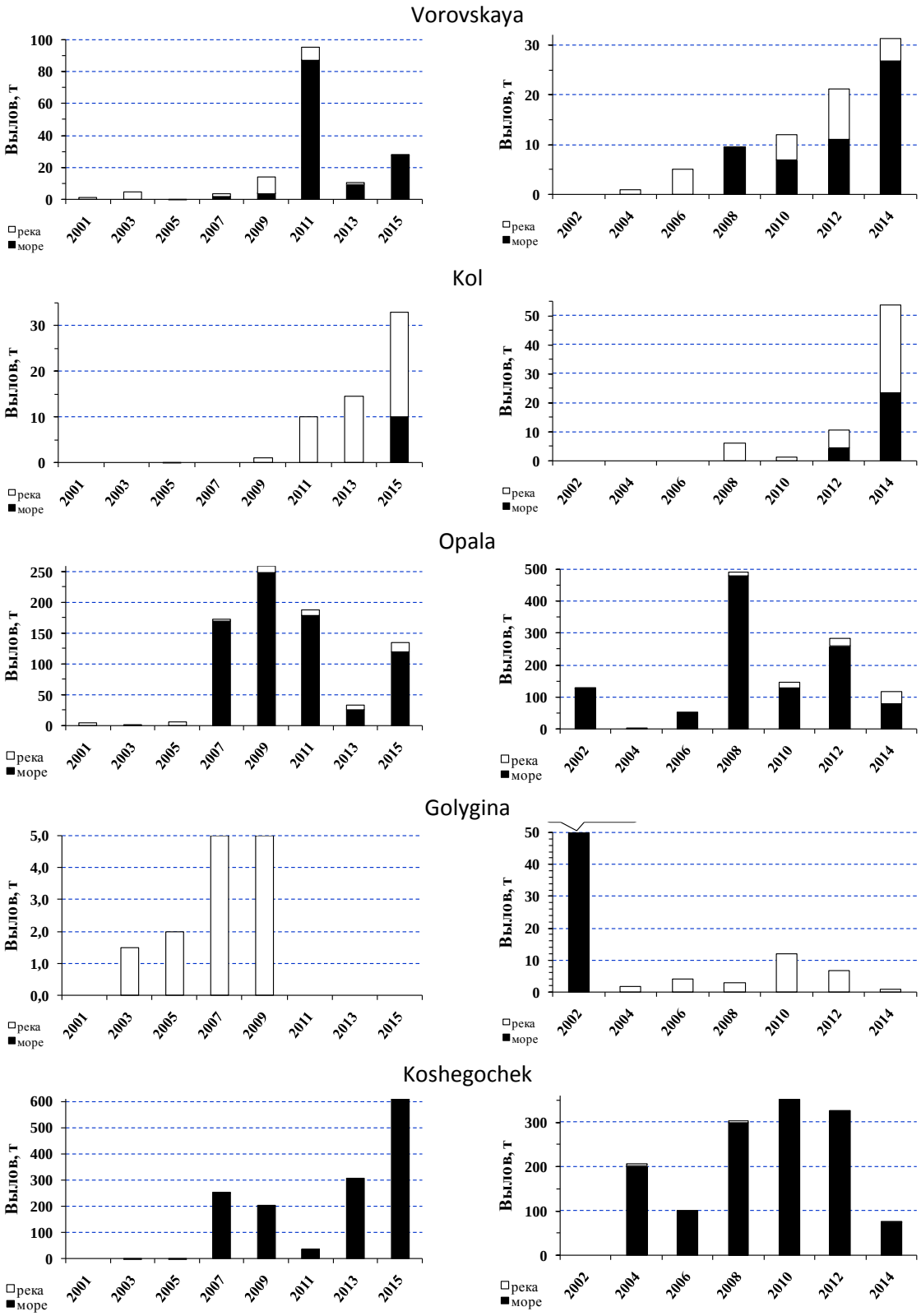

Figure 28. Odd and even year Sockeye Salmon commercial harvest by area (river harvest = white, sea harvest = black)

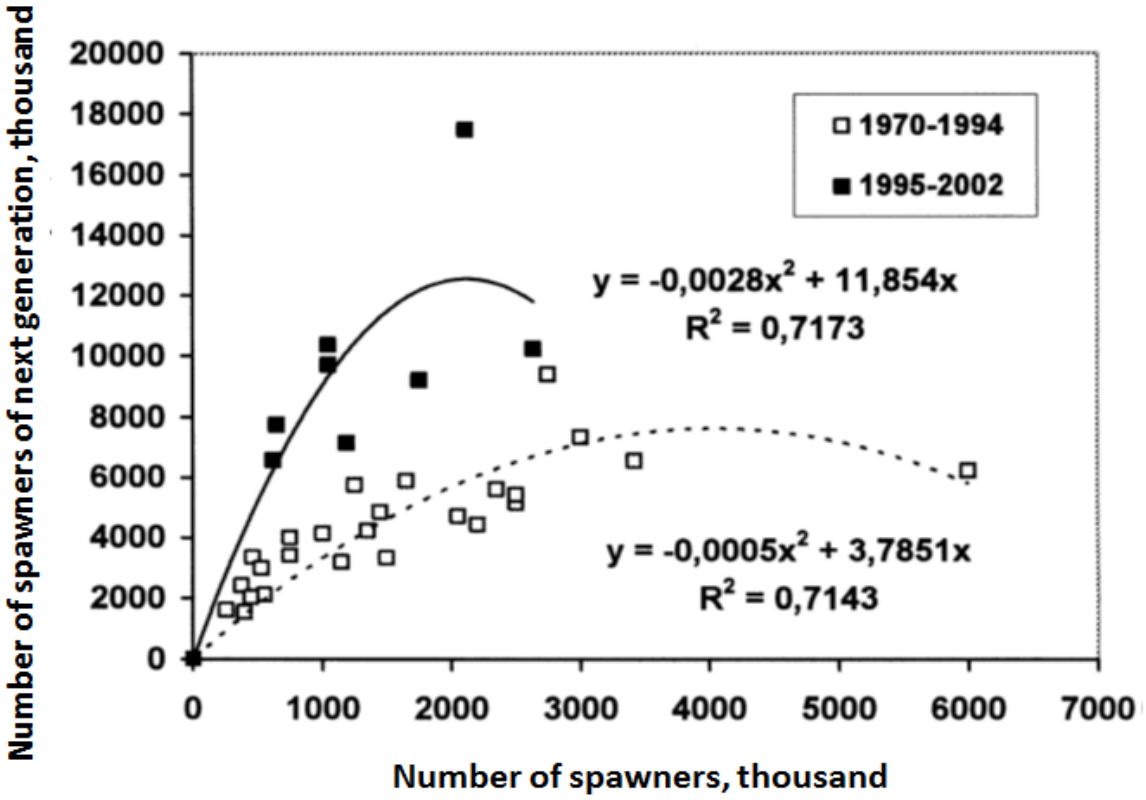

Figure 29. Spawner-recruit relationships for Ozernaya Sockeye (thousands of fish) (from Bugaev et al. 2009).

Table 20. Escapement relative to reference points estimated by KamchatNIRO to maintain sustainable catch of Sockeye (Shevlyakov et al. 2014, 2016).

		Reference points		
River	**Group**	**Historical [a]**	**Revised[b]**	**Recent avg.[c]**
Vorovskaya	Total	5,000 – 16,000	5,100 – 16,000	13,000
Kol	Total	5,000 – 10,000	3,400 – 5,900	11,000
Kikhchik	Total	8,000 – 10,000	na	9,000[d]
Bolshaya	Lk. Nachikinskoe (early)	30,000 – 40,000	na	48,000[d]
	Lk. Nachikinskoe (late)	10,000 – 15,000	na	
	Other	40.000 – 50,000	na	--
	Total	>100,000	na	--
Opala/Golygina	Total	15,000 – 20,000	16,700 – 27,200	20,000
Kochegochek		na	3,100 – 5,000	1,500
Ozernaya	Total	1.0 – 2.3 million		1,855,000

[a] *based on historical run patterns (Shevlyakov et al. 2014).*

[b] *based on recent population-specific analysis (Shevlyakov et al. 2016). Includes precautionary boundary and maximum sustained yield range.*

[c] *2000-2015 unless otherwise specified*

[d] *2009-2013*

Coho Salmon

Coho Salmon from the Kol River and included as a P1 species in the Unit of Certification. Coho salmon in other west Kamchatka Rivers are not included in the Unit of Certification hence are treated there as P2 species. See Section 2.3.3 for additional information on coho.

Chinook Salmon

Distribution

Chinook Salmon production in Asia is primarily limited to the Kamchatka peninsula where significant populations may be found in large rivers of the western and eastern coasts. On the West coast of Kamchatka, Chinook Salmon may be found in the Palana, Tigil, Khairyuzovo, Icha, Oblukovina, Krutogorova, Bolshaya, Kolpakova, Vorovskaya, Kikhchik, and Opala rivers. Chinook are most abundant in the Bolshaya, Opala, Kolpakova, and Vorovskaya rivers. The Bolshaya River supports the largest population with about 60% on average west coast catch of Chinook in 1988-2010 caught in this river. Chinook Salmon habitat is very limited in the Ozernaya River and is insufficient to support a significant population.

Life History

Western Kamchatka Chinook typically average 6 – 10 kg in size but may reach 20 to 30 kg. Adults typically return to spawn at 3 to 5 years of age after 2 to 4 years at sea. Predominate ages are 1.3, 1.4 and 1.2 (Figure 30). Age composition has shifted since the 1990s with fewer older fish (5+ 6+) in the run. Spawning occurs in large rivers and streams (Figure 31). Chinook return to freshwater in from May through July and spawn in July and August. Juvenile Chinook generally rear in streams for one year but some individuals may spend from a few months to three years before emigrating.

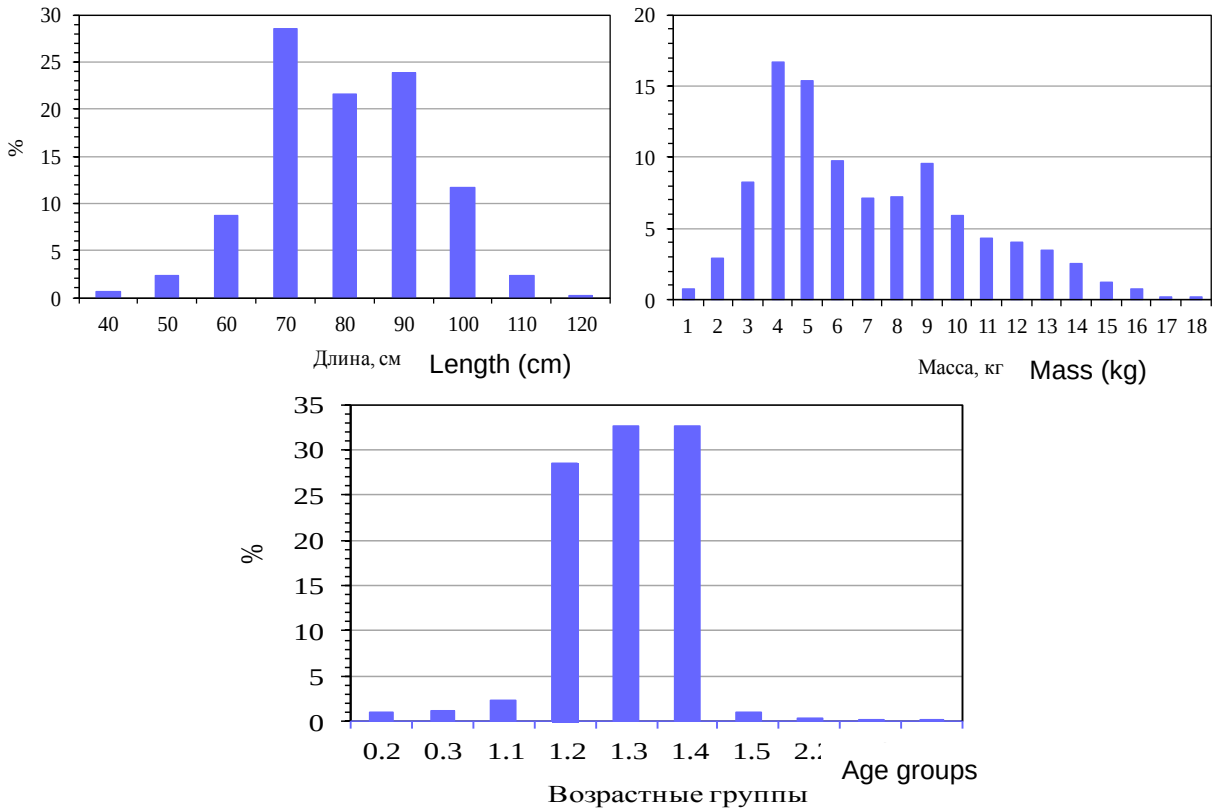

Figure 30. Length, weight and age composition of Chinook spawners in rivers Vorovskaya, Kol and Opala, 2001-2015 (Shevlyakov et al. 2016).

Stock Structure

Substocks of Chinook Salmon have not been identified within western Kamchatka rivers. Average size is typically greater in the early portion of the run because the portion of females in catches is larger, and size-weight indicators of females are usually higher comparing with males.

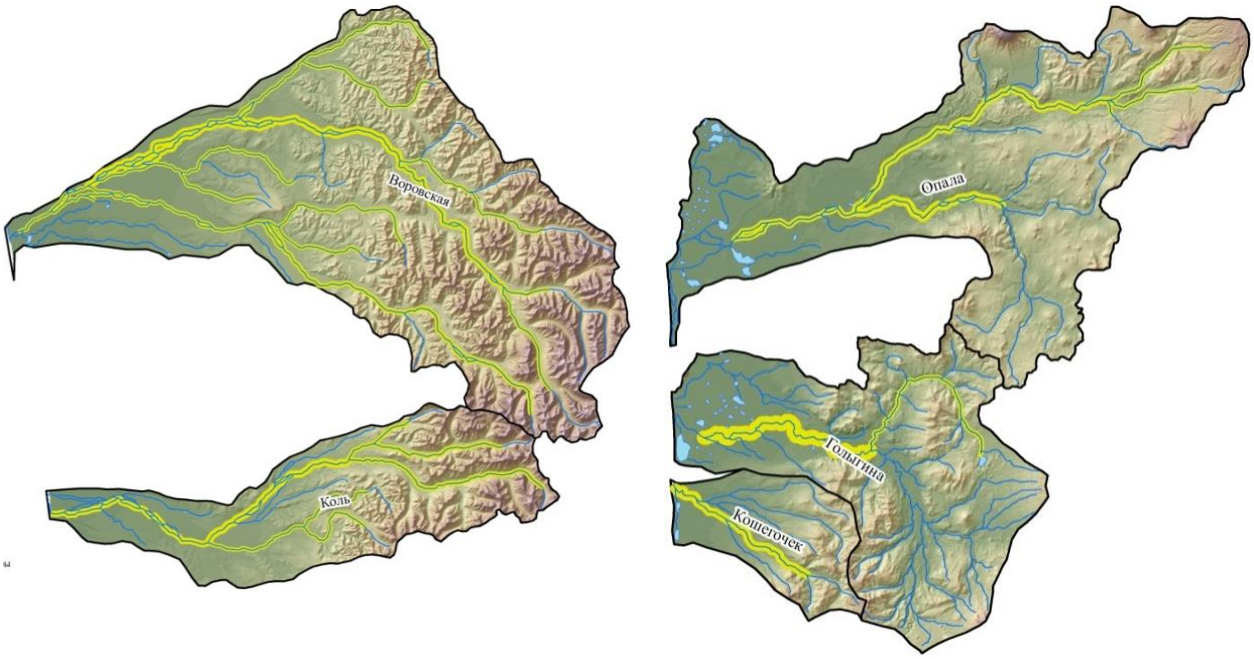

Figure 31. Spawning distribution of Chinook Salmon in the Vorovskaya, Kol, Opala, Golygina and Koshegochek rivers (Shevlyakov et al. 2016).

Status

Chinook numbers have rebounded from low levels observed during the early 2000s. Chinook harvest peaked during the 1970s and then declined (Figure 32, Figure 33) until the recent improvements (Figure 34). Similar patterns have been observed for Chinook Salmon stocks throughout the North Pacific and are related in part to patterns of ocean productivity. In Kamchatka, declines were also exacerbated by commercial and illegal harvest in some areas (e.g. Bolshaya River). More conservative fishery management and reductions in illegal harvest have contributed to improvements.

Escapement of Chinook is assessed based on aerial surveys of representative spawning areas. Optimum spawning escapements have been identified based on historical production data (Table 21). Rebounds in Chinook returns and reductions in harvest have restored escapement to optimum near-optimum levels in some rivers but not others. However, it should also be recognized that historical optimums may be difficult to achieve under conditions of reduced ocean productivity for Chinook.

Table 21. Optimum and long term average spawning escapements for Chinook in west Kamchatka Rivers (Shevlyakov et al. 2014, 2016).

River	Optimum	Avg. escapement
Vorovskaya	8,000 – 12,000	4,500
Kol	na	2,000
Kikhchik	3,000 - 5,000	Na
Bolshaya	20,000 – 30,000	< optimum
Opala	5,000 - 7,500	6,000
Golygina	na	1,000
Kochegochek	--	200
Ozernaya	--	200

na = not available

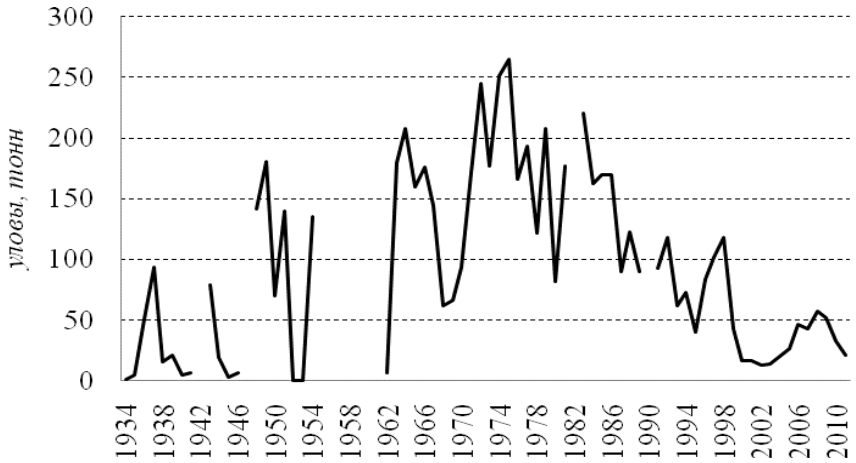

Figure 32. Chinook salmon catch (tons) Bolshaya River commercial fisheries, 1933-2010 (Shevlyakov et al. 2014).

Figure 33. Run size of Chinook salmon to the Vorovskaya River in 1969-2009 (brown points and trend line) relative to the long term average (horizontal line) of approximately 35,000 (Shevlyakov et al. 2014).

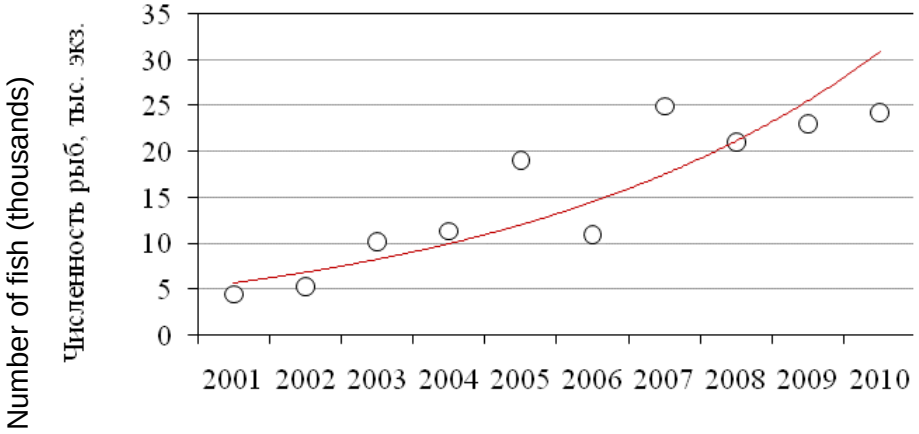

Figure 34. Recent escapement trends of Chinook Salmon in the Vorovskaya, Kol and Opala rivers (Shevlyakov et al. 2016).

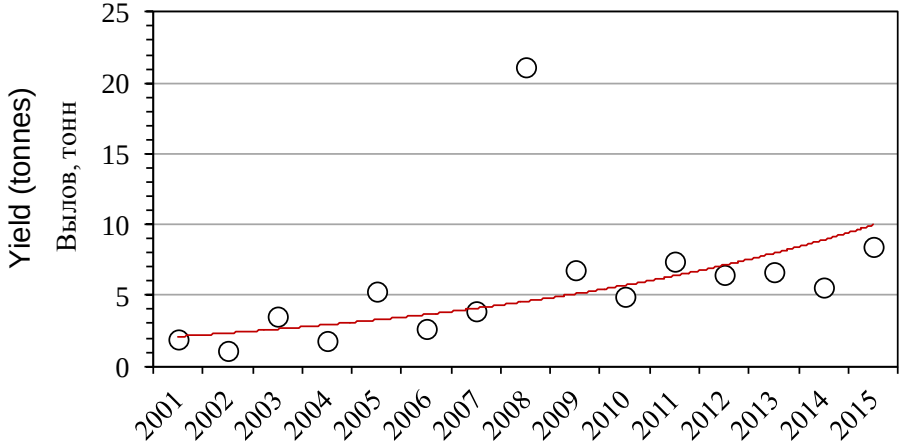

Figure 35. Recent yield trends of Chinook Salmon in the Vorovskaya, Kol and Opala rivers (Shevlyakov et al. 2016).

Management

Since 2010 commercial fishing for Chinook Salmon has been closed in the fishery area. Industrial fishing of king salmon was also significantly reduced in recent years prior to 2010, and in some years (2000, 2006, 2008) it was totally absent. Chinook run timing occurs prior to the beginning of current commercial fishing seasons which are established to minimize Chinook harvest. Even minimal occurrence of Chinook in the catches may result in closure of a fishing area. Chinook Salmon are currently reserved for sports and traditional fishing. The sport fishery is very popular. Allocations are small (Figure 35).

2.4.2 Secondary Species

For the purposes of this assessment, secondary species in the catch are defined as those not included under Principle I in the Unit of Assessment and not identified as primary. These include both retained and nonretained catch. Retained secondary species in this fishery predominately include char which are harvested in significant numbers for commercial use. Non-retained catch includes a variety of species, none of which comprise a significant volume of catch. There are no main secondary species.

Retained species include those which provide a commercial value significant enough to warrant processing and sale (and thus an economic incentive for capture). All retained fish delivered to the plants for processing and sale are weighed and numbers are reported to the management agencies. Information about retained species is collected by fisheries inspection and research institute.

Other species that are not typically processed for commercial value are treated as bycatch. Some bycatch species are released at fishing sites and additional sorting occurs at the processing plants. By-catch of non-retained species comprises a negligible portion of the harvest in the fishery. Due to the very low percentage of bycatch relative to the total fishery, no 'main' bycatch species are identified. By-catch can include a variety of marine and freshwater species including codfish (Gadidae), flatfish (*Platichthysstellatus* sp.), smelt (*Osmerus* sp.), sculpins (*Cottus* sp.) and jellyfish (Blikshteyn 2011; Semanov et al. 2016). Bycatch species are abundant within the habitat boundaries and incidental levels of harvest in salmon fisheries pose no danger to bycatch species (Shevlyakov et al. 2016).

Trap nets and seines employed in this fishery generally keep the entire catch of all target and non-target species alive until it gets loaded into boats or trucks for delivery to the processor. Small numbers of small-sized bycatch species might become gilled in net. Some sorting of by-catch may occur at the fishing sites and some by-catch may be delivered to fish processing plants along with the target species. Fishers don't typically handle fish directly as the catch is dipped or brailed from the trap or seine; however, an attempt is made to remove by-catch species as the catch is removed from the nets. Fishers might brail only commercially-important species, while leaving more bottom-oriented bycatch species (like flatfish) behind until they are ready to empty the net completely. If discarded, flatfish and cottids probably stay alive because they are very resistant to handling.

By-catch species delivered to the processing plants are sorted from the retained catch at the start of the processing lines. Amounts typically do not exceed 15 or 20 kg per delivery. Any non-commercial species delivered to the plants are generally processed for fish meal along with heads and guts of the commercial catch. There is a large market for fish meal in Russia.

Because of its low volume, by-catch is not assessed by the fishery or the management system. There is no official reporting of bycatch such as cod, flounder, silver smelt and birds in these fisheries (Shevlyakov 2014). By-catch species are reported to be abundant throughout the region and fishery managers do not consider harvest levels to significantly affect these species.

By-catch assessments in other similar salmon fisheries in the Russian Far East, including Iturup, Sakhalin Island, and Ozernaya sockeye, have found similar low levels of by-catch. For instance, a quantitative bycatch sampling program conducted in 2011 for the Ozernaya Sockeye fishery (Blikshteyn 2011) found that by weight, by-catch numbers comprised a negligible percentage of the total harvest consisting of tons of retained species.

Table 22. Bycatch reported (number by species) for marine and river fishing site samples at the Vityaz-Avto Ozernaya processing plant (taken from MRAG 2012).

	Fishing area		Totals	
Species	**Marine**	**River**	**Number**	**%**
Number of net days	38	13	51	
Starry flounder (*Platichthys stellatus*)	364	106	470	84.2%
Japanese sandfish (*Arctoscopus japonicas*)	69	14	83	14.9%
Sculpin (*Melletes papilio*)	2	0	2	0.4%
Rock sole *(Lepidopsetta bilineata)*	0	1	1	0.2%
Longhead dab (*Limanda proboscidea*)	0	2	2	0.4%
Fish/sample	11.4	9.5	10.9	

Char

The following species of char are associated with this fishery: Dolly varden (*Salvelinus malma*) and white-spotted char (*S. leucomaensis*).[3] Arctic char *S. alpinus*is are present in other parts of Kamchatka but do not occur in rivers in the fishery area (Leman and Esin 2008). Char are widely distributed and abundant throughout the Kamchatka region. Life history of these species is diverse and includes anadromous and resident individuals. Char are caught throughout the fishing season but numbers vary from month to month. Char generally move upstream following the Coho during late summer and return back downstream along with the juvenile salmon outmigration in spring. Char abundance throughout the region is believed to be increasing.

Char is retained during commercial salmon seasons and sold (Figure 36). Target commercial char fisheries also occur in some areas. Char catch as a percentage of the total harvest during salmon seasons varies from year to year due to differences in Pink Salmon abundance of the even and odd year runs (Figure 37). The proportion also varies from river to river but does not exceed 3% of the total catch in any river on average (Shevlyakov et al. 2014).

Harvest levels are established for char by the management system based on historical catch levels. The total commercial harvest of char is typically 70-80% of recommended catch during salmon season. Harvest rates are typically much less in alternate years when large abundance of Pink Salmon results in less fishing effort due to limitations in fish processing capacity. Recent increases in commercial harvest of char are likely a result of more accurate catch reporting since management system changes in 2008 than an expansion of fishing effort. Char are not managed for specific stock levels or escapement objectives. Rather, catch levels and age composition are monitored over time to identify any changes in numbers which might be indicative of overfishing (Shevlyakov et al. 2016). Trends in these indicators have been observed to generally fluctuate around long-term averages which has led KamchatNiro to conclude that current harvest levels and fishing rates are sustainable (Shevlyakov et al. 2016).

[3] *Russian common name for white-spotted char is kundzha.*

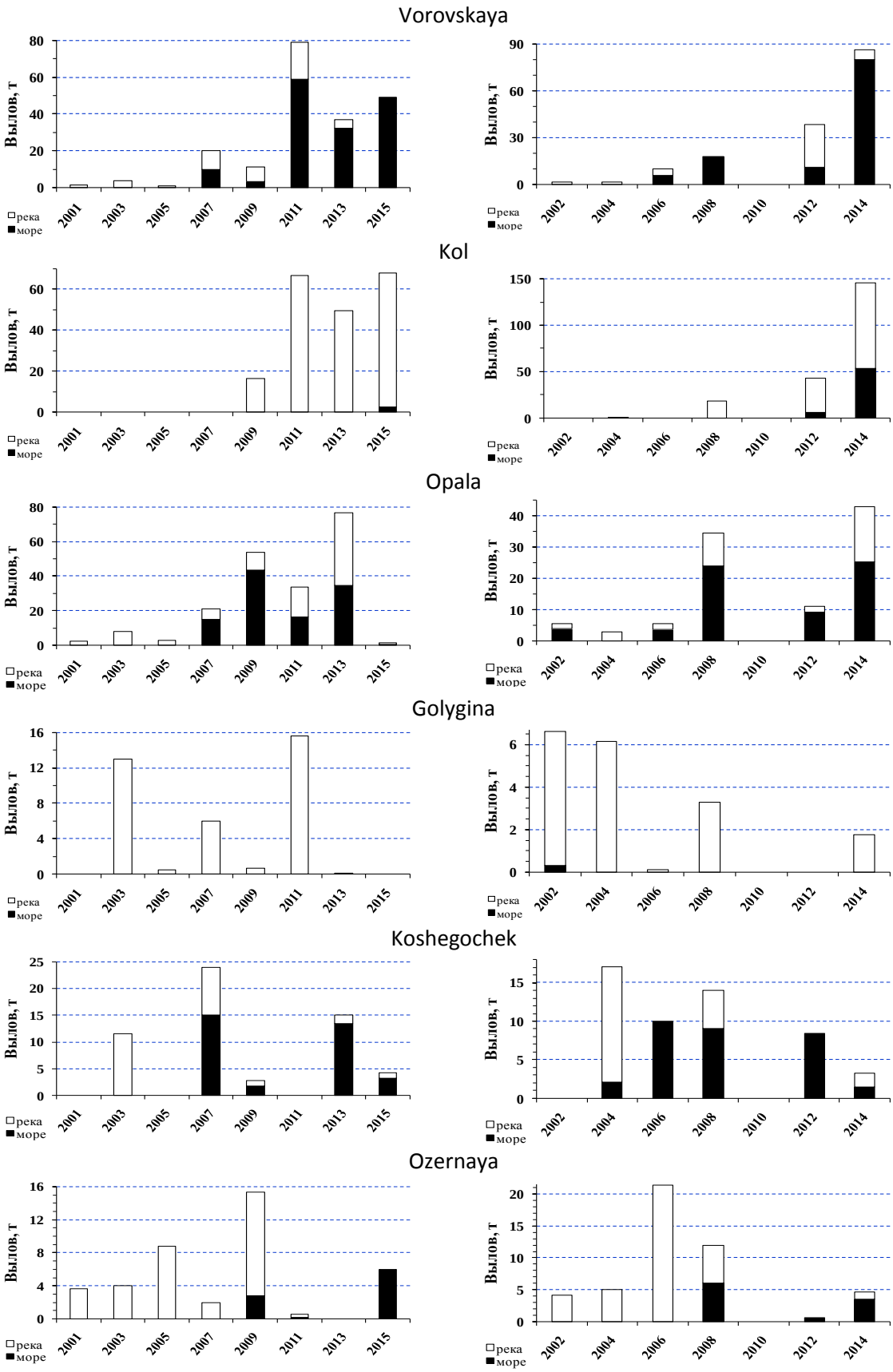

Figure 36. Odd and even year char commercial harvest by area (river harvest = white, sea harvest = black)

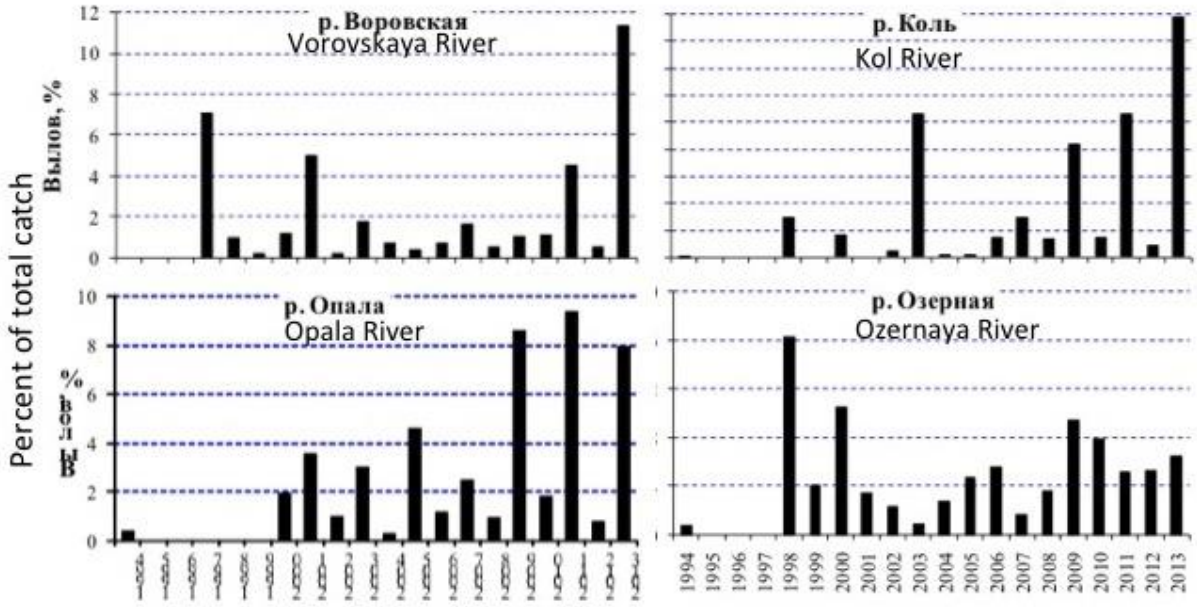

Figure 37. Char catch as a percent of the total commercial catch in the Vorovskaya, Kol, Opala, and Ozernaya Rivers, 1994 to 2013. Char catch data was not available for every year and river.

Masu Salmon

Although Masu (cherry) Salmon (*Oncorhynchus masou*) are not caught in significant numbers, this assessment reviewed the available information for West Kamchatka as status of this species is sensitive in other parts of this range. Masu Salmon occur in some southern Kamchatka streams which represent the northern distribution of their range. The Kikhchik, Bolshaya, and Opala rivers all support small populations of Masu Salmon. Adults typically return to freshwater from March through May at three or four years of age and spend the summer in freshwater before moving to headwaters to spawn in September and October (Groot and Margolis 1991). In western Kamchatka streams, adults average about 46 cm in length and 1.4 kg in weight. Fecundity averages about 2,200 eggs. Spawning occurs primarily in groundwater and spring fed streams or brooks. Adults feed actively while in freshwater. Juveniles typically rear in freshwater for one year before smoltification and seaward migration in the spring and early summer.

Masu salmon abundance has increased substantially in recent years, apparently due to favorable environmental conditions (Shevlyakov et al. 2016). Due to their early run timing, Masu Salmon do not occur in the commercial fishery in significant numbers. Closure dates for Chinook also protect the Masu spawning migration. With the recent increase in abundance, small quantities have been allocated for the research purposes and sport pole-and-line fishing.

2.4.3 ETP Species

For the purposes of this assessment, endangered, threatened, or protected species are those that are recognized by national legislation, binding international agreements (e.g., CITES) to which jurisdictions controlling the fishery under assessment are party, or 'out-of scope' species (amphibians, reptiles, birds and mammals) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE). In this case, national legislation provides for protection of ETP species identified in the Russian Federation *Red Data Book,* also known simply as the *Red Book*. The Red Book is based largely on the International Union for Protection of Nature and Natural Resources (IUCN), which formally designates protected species subject to enhanced regulatory protection. Related natural conservation legislation was adopted in 1980s-1990s including laws for protection of natural environment and fauna, natural (wildlife) areas under special protection, ecological expertise along with a number of various decrees by the Russian Federation Government. These regulations established conservation priorities for the Red Book's rare fauna and flora species and liabilities for damage inflicted to the species and their habitats.

The only red-listed species present in this area are steelhead (*Oncorhynchus mykiss*) and Steller sea lion. These as well as a number of other fish, marine mammals and birds are also discussed briefly below. Although no ongoing observer program exists for the fisheries, federal scientists, managers, and inspectors regularly visit the fishing sites and processing plants throughout the season. Over the course of the many years of fishing operations, none of these species are observed to have adverse impacts from the fishery. The fishing authorities have determined that the fishery has such low impacts that it needs no specific data collections on interactions with ETP species.

Steelhead

Steelhead are a sea-run form of rainbow trout present in large rivers of Western Kamchatka. Both resident and sea run life histories occur in the same systems, and are demographically and genetically related. Steelhead may reach 10-12 kg in size but are typically half that. Kamchatka steelhead enter river in September-November, i.e. later than main fishing season of Pacific salmon. Steelhead spawn in May and June after overwintering in freshwater. Spawning may be broadly distributed in rivers and streams. Unlike salmon, not all steelhead adults die after spawning. Adults typically may reach twelve years of age and spawn repeatedly over their lifespan. Juvenile steelhead may rear in streams for one to several years before emigrating.

Catch of any Red listed species in Russia is prohibited and in case of catch, they must be immediately released. Steelhead are also largely protected from significant catch in the commercial salmon fishery by season dates. Run timing of adults in fall is outside the period of the fishery. Emigration timing of adults and juveniles is prior to beginning of the fishing season.

KamchatNIRO (Shevlyakov 2015, unpublished) reports:

> *According to the Russian classification rainbow trout is not a species of the Oncorhynchus and belongs to the Parasalmo. In spite the fact that in the recent past Russian researchers have proved that Kamchatka salmon \mikizha and Atlantic salmon\ Salmo salar are the (landlocked\living and passing) forms of the same species - P. mykiss, only anadromous form has the status of endangered species. The ratio of landlocked and anadromous forms of mikizha is determined by the capacity of the watercourse, by the development of hydro network, by the presence of comfortable habitats for the landlocked form. The southern border of Salmo salar distribution is The Bolshaya River. Quite a large population of mikizha landlocked form is in The Opala River, however, neither the documentary facts on its passing form catch nor oral statements have been recorded. Salmo salar main spawning run in the rivers is in late September - early October (winter form), and in April-May (spring form). Neither in the first case nor in the second one there is no official fishing at these periods of time. In late September, salmon commercial fishing on the West coast is finished because of spawning run end of silver\Coho Salmon, and also due to the beginning of Salmo salar spawning. In spring there is a limited fishing of Pink\char in rivers during its escapement to the sea for feeding; the mesh size of used*

nets is 30 mm, fishing locations are in the lower parts of the rivers on salmon fishing parcels. These limits are designed to eliminate the possibility of Salmo salar bycatch during the fishing of the other species.

Marine Mammals and Birds

Information on population abundance of Kamchatka marine mammals is well documented in the scientific literature (Burkanov 1986, 1988; Lagerev 1988; Kosygin et al. 1986). Spotted seals (larga) and sea lions feed largely on fish and are the most likely to be encountered in or around fishing gear.

Steller sea lions are included in the Red book of Kamchatka (2006), and hunting of this species is illegal. This species inhabits the coast of western Kamchatka year-round, but its distribution and number changes seasonally. Approximately 2,500 sea lions gather in a rookery on Sivuchiy Cape during winter before dispersing generally northward during spring and summer. Small groups or individual sea lions are occasionally observed in the fishing area in summer. Sea lions sometimes enter the trap or fish well where they feed on fish. Large males sometimes damage nets to get at salmon.

In Russia, the major Steller Sea Lion rookeries were protected under a Northern Fur Seal and Sea Otter conservation act in the late 1950s. They were listed as endangered (category 2) in the Russian Red Data Book in 1994 and harvest was prohibited.[4] These measures had a positive effect in the western portion of the range as the population increased around Sakhalin Island, the Kuril Islands, and in the northern Sea of Okhotsk. Take of sea lions is illegal as it is a protected species. The possession of firearms on boats and shooting seals are prohibited by the companies in the assessment.

Other seals are abundant in the area and frequently observed around the marine trapnets. The most numerous species in the Russian Far East is spotted seal or larga. A number of researchers consider that harbor seal (*Phoca vitulina*) in the Russian Far East is represented by subspecies called *Phoca vitulina largha*, but others consider them as a separate species *Phoca largha*. This species is found in local waters year-round. Large numbers gather in rookeries along the western coast of Kamchatka from February until mid-March. These seals concentrate near estuaries and capes to feed almost exclusively in salmon during salmon spawning runs. Since 2000 KamchatNIRO has been conducting research on the influence of larga seals on the Pacific salmon population in the period of its spawning run in the Bolshaya River. The analysis of stomach contents of larga seals near the Bolshaya River showed that in summer period Pacific salmon dominated in the diet of animals. These seals constantly enter marine net traps, eat or damage fish, and then freely leave the nets. Beach seines do not normally affect marine mammals. Incidental take of these seals or sea lions by tangling in gear has not been observed due to the nature of the gear.

Seals may be hunted with the proper license but the harvest allocation is considerably underused because of degradation of hunting infrastructure. Licenses can be obtained for commercial harvest but have not by the assessment companies. Seals are regarded as a nuisance by fishers. KamchatNIRO scientists report that fisherman drive off seals from nets by making noise. While shooting seals is illegal, it was reportedly an occasional practice in the past prior to adoption of the company policy prohibiting firearms on boats. The available information indicates that this occurred at a low level, is not systematic, and fishermen generally complied with the law.

Other marine animals present in the area include killer whales, white whales, sea eagles, and cormorants. There was no mention by government officials or fishing industry representatives of other sea mammals or sea birds captured or killed by the gears. The nature of the fixed trap net gear substantially reduces opportunities for encounters with marine mammals or birds. Beach seines do not normally encounter or affect marine mammals.

[4] *http://www.iucnredlist.org/details/8239/0*

2.4.4 Habitats

The footprint and scale of human development in western Kamchatka is very small and impacts on watershed and river habitats and functions are very limited. Human habitation is concentrated in only a few sites. Alterations of these sites may be substantial but impacts appeared to be quite localized. Similarly, road construction was very limited in the basin and related habitat effects appeared minor relative to the scale of the watershed and impacts were likely localized to a few areas. Coastal habitats are shaped entirely by natural processes rather than human activities.

Fishing activities with traps and beach seines do not have a significant long-term impact on habitat. Any effects of stationary trap construction or operation are localized and temporary. The traps are anchored to the sea bottom with large bags full of sand. Permits are required to dig. Net leads and wings are weighted to rest on the bottom but trap boxes constructed on steel frames are constructed on floats and do not contact the bottom where mechanical damage to benthic organisms might occur. KamchatNIRO scientists report no harmful effect on bottom flora or fauna. Assessments of this gear in other regions (i.e., Iturup and Sakhalin) have also shown minimal impacts. There is a special agency, State Sanitary-epidimeological inspection that monitors whether the fishery affects the fishing operation zone. In a case of violations, it is a usual practice to levy fines on the company.

Beach seines used in the river and estuary may be dragged along the bottom but any impact is minor and temporary. The river bottom is comprised of gravel and cobble which is regularly redistributed by flood flows. River seine sites in some areas (e.g., Ozernaya) are physically graded during low water to facilitate use of beach seines. This activity is permitted and monitored by government agencies and has been determined to produce no significant ecological effect.

Discharge of fish waste from processing plants is limited to liquids because offal is processed into fish meal. This liquid is discharged to the ocean by permit and a fee is paid to the government for discharge. The government also monitors quality of the discharge. As part of plant reconstruction, the fishing companies have acquired new equipment to also make fish oil which will further reduce discharge as well as discharge license fees. Fish by-products from more remote processing sites (e.g. Kikhchik) are placed in special areas designated by the government administration.

Beach travel by vehicle from some rivers for delivery of fish to processing facilities involves crossing of several rivers for which the government assesses fees to compensate for any related environmental damage. Fees are paid to SVTU and utilized by hatcheries.

2.4.5 Ecosystem Structure and Function

The salmon life cycle encompasses a vast ecosystem including natal rivers and lakes, the near-shore ocean, and the high seas of the North Pacific Ocean. Salmon migrate across large areas of the North Pacific Ocean which provides major feeding habitats for various salmon stocks originating from Asia and North America (Myers et al. 2009; Urawa et al. 2009). Juveniles gain over 90% of their biomass in the ocean before returning to freshwater to spawn (Groot and Margolis 1991). Ecosystem effects of salmon harvest and enhancement can be significant.

Marine-derived nutrients from salmon carcasses can have a significant impact on freshwater communities as well as those communities in the freshwater to terrestrial interface (Wilson et al. 1998). The flux of salmon biomass entering fresh water from the ocean can be massive (Gende et al. 2002). It is known that these nutrients form a base for the development of zooplankton in coastal areas, which serves as food for young salmon just after downstream migration. Russian scientists estimate that each Pink Salmon carcass is 0.5% organic phosphorus (Kizevetter 1971), and in dominant Pink Salmon years, carcasses provide a large amount of nutrients to the ecosystem. For example, KamchatNIRO has estimated that the Pink Salmon run in 1994 contributed about 110,000 mt of carcasses or 550 mt of organic phosphorus to the ecosystem (Shevlyakov 2014). Some dead fish drift to the sea, but the rest remain in the floodplains of the rivers, where within a year carcasses are transformed into organic material that is incorporated into the food chain.

Removal of Pacific salmon by the fishery has consequences for river ecosystems. The relationships between salmon and the population dynamics of their terrestrial predators has been well documented (Gende et al. 2002). Possibly, the most serious of them is the decrease of food for predator animals and predator birds, which to a considerable extent consists of spawning salmon. The following animals depend on salmon in their diet: brown bear *Ursus arctos*, Kamchatka fox *Vulpes vulpes*, sable *Martes zibellina*, ermine *Mustela erminea kaneii*, mink *Mustela vison*, Steller's sea eagle *Haliaeetus pelagicus*, Pacific seagull *Larus schistisagus*, whooper swan *Cygnus cygnus* and many other mammals and birds. On the other hand, active fishery management might also help stabilize returns by avoiding excessively large escapements which can depress future returns under some conditions.

It is clear that salmon influence the food webs in the North Pacific Ocean although the effect varies widely between systems and is dependent on many factors like timing, scale and alternative nutrient sources, etc. (Naydenko 2009; SCS 2011). In addition, like most large marine ecosystems, resolving interactions strengths among food web constituents is made difficult by limited data and confounding effects of environmental forcing (Essington 2009). Ecosystem models that have been developed for the Eastern Bering Sea, Aleutian Islands and the Gulf of Alaska (Gaichas and Francis 2008, Aydin et al. 2008) do not suggest a critical or unique role of salmon in respect to the structure of the food web in the ocean. Gaichas and Francis (2008) used network theory to identify potentially key species in the Gulf of Alaska food web on the basis of high connectivity and four species were identified as (Pacific cod, Pacific halibut, walleye pollock and arrowtooth flounder) as highly connected species.

Extensive research has been conducted by the Russian Scientific Institutes on (1) Juvenile Anadromous Stocks in Ocean Ecosystems; (2) Anadromous Stocks in the Bering Sea Ecosystem (BASIS); and (3) Anadromous Stocks in the Western Subarctic Gyre and Gulf of Alaska Ecosystems (Temnykh et al. 2010) This work also involved substantial monitoring and research of related ecosystem components including food web composition, production and dynamics.

Enhancement of Pacific salmon across the Pacific Rim since the 1970s has resulted in very large abundance in the North Pacific Ocean (Mahnken et al. 1998; Irvine et al. 2009; Ruggerone et al. 2010). There is some evidence that high salmon abundances in the ocean might adversely affect wild salmon through competition (Peterman 1991). Ocean growth of Pink Salmon inversely correlated to their own abundance and survival of Chum, Chinook, and Sockeye appears to be reduced in years of high Pink Salmon abundance (Ruggerone et al. 2003, Ruggerone and Goetz 2004, Ruggerone and Nielsen 2004, Ruggerone et al. 2005; Ruggerone et al. 2010). There is growing concern that the ocean carrying capacity of Pink and Chum Salmon has been globally reached. However, salmon populations in the fishery under assessment have not been significantly enhanced.

The regional scientific agencies are conducting ongoing research and monitoring of the aquatic ecosystem of area rivers. Stationary or seasonal research stations are established in each significant river. KamchatNIRO has operated a research station in the Bolshaya basin since 1945 (located on the Karymaskaya River, which is a tributary of the Bystraya River).

A research project is currently being conducted in the Bolshaya and Opala rivers to evaluate system productivity and salmon effects. This project includes a systematic sampling program of macroinvertebrates with collection of benthos and drift sampling at two-week intervals from benchmark sites. Along with this, juvenile salmon are caught to assess physiological condition, age structure, growth parameters, fat condition, etc. An extensive annual sampling program is also conducted to measure biological characteristics of the commercial salmon harvest in all three assessment rivers including length, weight, sex and age as indicators of ecosystem function.

2.5 Principle Three: Management System Background

The current Russian Federation became independent of the former Soviet Union in 1991. As a federation, it consists of numerous jurisdictions with various levels of autonomy. The legal system is based on civil law system with judicial review of legislative acts. The federal government has centralized authority in Moscow, where final decisions are made. The fisheries management consists of complex levels of authority for management and research, with ultimate authority centralized in

Moscow. At the same time, recent years more decisions are delegated to the regional level, in particularly, in the Far East, to the Far East Scientific Commercial Fisheries Council in Vladivostok. In-season management is entirely delegated to local agencies. The Federal Agency for Fisheries is governed directly by the government of Russia, is the ultimate authority, reviewing recommendation passed up from the local level and passing directives back, as described in the next section.

2.5.1 Management Structure

Management of Kamchatka salmon fisheries is administered by Federal and Regional governmental agencies. Kamchatka Kray, which includes Kamchatka Oblast and Koryak Autonomous Okrug is the subject of the Russian Federation and is a part of Far Eastern Federal Region (Okrug). It is under the direction and control of the Government of the Russian Federation. Fisheries of Russia are managed and controlled by Federal Fishery Agency (FAR) of the Russian Federation, which located in Moscow and also represented by a local office in Kamchatka. Operational management of all activities is performed by the Governor of the Kamchatsky Kray. In total, 69 different governmental agencies control the fisheries (data of Vitiaz-Avto company), and the most important of them are addressed below.

Federal governance

Federal Fishery Agency

Federal Fishery Agency (FAR) (*Федеральное агентство по рыболовству or Federal'noe Agentstvo po Rybolovstvu*, http://fish.gov.ru) is an executive authority of the Russian Federation, established by the Presidential Decree No. 724 issued 05.12.2008, by converting the pre-existing Russian Federation State Committee for Fisheries (Rossrybolovstvo). The President issued the Decree No. 863 on 12.30.2008, which established that FAR reports directly to the Government of Russian Federation. RF Government Decree of 06.11.2008 No. 444 approved the current Regulations governing the FARs operations.

FAR interacts with various agencies at the federal level while controlling its territorial departments. It is responsible for oversight of departments under its jurisdiction, which define the rules and the annual Total Available Catches or recommended catches (for those species which are not under TAC regulation, like Pacific salmon), as well as define the areas of fisheries. Also FAR conducts communication and coordination with foreign government agencies, international committees and international organizations on issues of fisheries, policy and technical programs related to the application of innovative technologies in the fisheries complex, and prepares federal-level and agency-level reports on the fishing industry.

The head of FAR supervises deputies and departments, which are responsible for the management of the fishing fleet, protection and rational use of resources, reproduction of aquatic biological resources and their habitats. FAR is also responsible for monitoring water resources and stocks of commercial species and control over the distribution of TAC/recommended catch among the users. FAR also provides related to fisheries social services, conducts research and engineering, directs federal fishing vessel and fishing ports, and controls the activity of artificial breeding.

Northeastern Territorial Administration of FAR

FAR has territorial departments in all regions of the Russian Federation, which have been created in order to accelerate the implementation of many of the functions of the FAR on the level of Russian Federation subjects. *Northeastern Territorial Administration of FAR (SVTU) (Северо-восточное территоральное управление ФАР, СВТУ or Severo-vostochnoe upravlenie FAR)* is the local management and enforcement arm of FAR for Kamchatka Kray and Chukcha Autonomous Okrug, which is located in city of Petropavlovsk-Kamchatsky. SVTU has final approval of fishing concessions and in-season fishery management regulation actions (to open and close fisheries). They give fishing companies permission to harvest, monitor fishing companies and processors to ensure regulation compliance, and patrol streams to reduce poaching activities. SVTU posts all approved management decision of Anadromous Fish Commission on its website (www.terkamfish.ru).

Federal Fishery Research Institutes

FAR includes a network of scientific research organizations conducting the research and development of both applied and fundamental nature in accordance with the program entitled "Scientific and engineering support of the Russia's fisheries industry." Federal Agency of Fisheries has 15 scientific-research organizations under its direct supervision – of which nine are marine scientific research institutes; they are assigned to appropriate regions on the legal basis and are responsible for the state level monitoring of stocks and additional resources and inclusion of the said resources in harvesting process and also responsible for rational and efficient usage of the bio-resources. The above-mentioned scientific research institutes have a legal status as federal state unitary enterprises. Their activities are regulated by the charters approved by FAR. All-Russia Institute for Fisheries Research and Oceanography, VNIRO (Всероссийский научно-исследовательский институт Рыбололовства и Океанографии, ВНИРО or Vserossiiskii nauchno-issledovatelskii institute rybolovstva i okeanografii) of Moscow is a head institute in the field of fishery related research.

Research for the Pacific aquatic biological resources is conducted by the following scientific regional research institutes: TINRO-Center (Vladivostok) (Тихоокеанский научно-исследовательский институт Рыбололовства и Океанографии, ТИНРО-Центр or Tikhookeanslii nauchno-issledovatelskii institute rybolovstva i okeanografii) with branches in Khabarovsk and Anadyr; MagadanNIRO (Magadan) (Магаданский научно-исследовательский институт рыбного хозяйства и океанографии, МагаданНИРО or Magadanskii nauchno-issledovatelskii institute rybolovstva i okeanografii), KamchatNIRO (Petropavlovsk-Kamchatsky) (Камчатский научно-исследовательский институт рыбного хозяйства и океанографии, KamchatNIRO or Kamchatskii nauchno-issledovatelskii institute rybolovstva i okeanografii) and SakhNIRO (Yuzhno-Sakhalinsk) (Сахалинский научно-исследовательский институт рыбного хозяйства и океанографии, СахНИРО or Sakhalinskii nauchno-issledovatelskii institute rybolovstva i okeanografii). Studying of aquatic biological resources of the Arctic, northern Atlantic Ocean, Baltic Sea and Atlantic Ocean and that of Black, Azov and Caspian seas and, biological resources of internal freshwater bodies is performed by other territorial institutions. KamchatNIRO conducts research of marine and freshwater resources in the Kamchatka region to monitor the status of commercial species, including salmon, and preparing annual forecasts of commercial species and the proposal on the volume of their potential catch. Each October KamchatNIRO issues forecast for recommended catch of salmon for the next season. The forecast is developed based on the amount of salmon required for optimal filling the spawning grounds (i.e., optimal spawning escapement), the number of juveniles from natural spawning grounds (based on sampling of juveniles in the sea and their survivorship there), and the release of juveniles from hatcheries (taking into account their survivorship in the sea).

Annual forecasts by KamchatNIRO of potential catch are sent to TINRO-Centre where they are approved in the special Far East Salmon Council (FESC) and then sent to VNIRO, which examines and approves the forecast on the Scientific Council. Following the adoption of the forecast VNIRO sends it to the FAR for approval. Approval forecast is the basis for the organization of fishing in the region.

Northeastern Rybvod (SevvostRybvod)

SevvostRybvod (Севвострыбвод) is directly managed by the Federal Fisheries Agency. SevvostRybvod does not occupy as important a role in management of salmon fisheries in Kamchatka as, for instance, the analogous structure, SakhRybvod, in Sakhalin. This is because artificial reproduction in Kamchatka is not of such significant as in Sakhalin-Kuril region. SVTU controls hatchery permitting and management in the Kamchatka Kray. Sevvostrybvod operates five hatcheries in Kamchatka including two in the Western coast of the Peninsular (Bolshaya river basin).

Federal Ministry of Natural Resources and Ecology of the Russian Federation encompassing the Federal Service for Supervision in the Sphere of Ecology & Natural Resources Use (Rosprirodnadzor)

Rosprirodnadzor (Росприроднадзор) is the Federal agency responsible for enforcement and control. It is also responsible for State supervision of usage and protection of water bodies, wildlife and their habitats, federal level wildlife preserves, and environmental protection status.

Federal Agency for Veterinary and Phytosanitary Supervision (Rosselkhoznadzor)

Rosselkhoznadzor (Россельхознадзор) is the Federal enforcement and control agency for biological resources under the Russian Ministry of Agriculture. Responsibilities include accounting for and analysis of violations of technical regulations and other regulatory documentation, supervision of compliance with Russian Federation laws by the state agencies, local government, and the public, supervision of marine fishery ports and vessels, and administration of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora.

In total, activities of any enterprise operating on rivers are controlled by 14 different State commissions, but their role is not as significant as those described above.

Public Council for FAR

FAR Policies and Regulation of fisheries are created by a consultative process. In 2008, FAR created the Public Council (PC) in Moscow (Общественный совет по рыболовству, Obschestvennyi sovet po rybolovstvu), which facilitates public discussions of accepted and proposed regulations. The PC is composed of wide range of fishermen associations, environmental institutions, environmental services, the World Wildlife Fund and other interested community organizations. In the consultative process the PC is joined by government agencies and territorial Association of Fishermen, fisheries departments and offices of subjects of Russian Federation. The government policies are finally adopted and implemented following the process of consideration of the proposed policies and discussions between the PC and the interested parties.

Far East Scientific Commercial Fisheries Council (FESFC)

Far East Scientific Commercial Fisheries Council, FESFC (Дальневосточный рыбопромысловый совет, Dalnevostochny rybopromyslovy sovet) is an independent council made up of representative of the Federal Fisheries Agency, scientific research institutes, non-profit commercial associations of commercial fisheries, minority peoples of the North and Russian Far East, and the union of the pool of professional fishers. The personnel composition of the FESFC is approved by order of FAR based on the recommendations of the Russian Federation territorial subject. However, half of its members must be either from scientific or similar fish conservation or natural resources agencies. The council has the authority to engage other competent authorities, interested parties (or stakeholders) as needed, upon approval of a vote of its members. Meetings are held in Vladivostok at least twice a year. The FESFC meetings can be attended by any interested party, where they may express their opinions and participate in the discussions. Central to the responsibilities of the FESFC is the compilation of scientific information concerning the management of marine bio-resources in the Russian Far East for submission to the Federal Fisheries Agency for final approval. In addition, it reviews and submits its recommendations on fisheries regulations, construction of fish hatcheries and the recommendations for the distribution of quota among its subjects.

Regional Governance

The current management system is regulated according to the federal law “On Fishery and Conservation of Aquatic Biological Resources” which was amended in 2008 to reflect changes regarding fishery of anadromous fish in inland waters of Russian Federation and territorial seas of Russian Federation (Article 291 of the Federal Law of December 20 2004 № 166-FZ). This law gave the government the authority to assign fishery sections to individual lease holders for up to 20 years, and salmon fisheries management was entrusted to the regional executive authorities. This regulation replaced the previous system, which was based on Total Allowable Catch allocations and centralized fishery management decisions through Moscow, with a much more responsive and effective regional system. The current system is widely viewed as an improvement for fisheries management as it can react more quickly to changes in run strength. In addition, fishing companies no longer have an incentive to under-report their catch, because management is now based on achieving spawning escapement rather than by quota limitations of a TAC.

Ministry of Fisheries of Kamchatka Kray

Under the new management system, the regional government has the responsibility for in-season management of fisheries (although SVTU has final approval). The Kamchatka Ministry of Fisheries is responsible for establishing and operating of the Commission on the Regulation of Harvesting (catch) of Anadromous Fishes, AFC and providing information on the fishery (such as catch and escapement data collected by KamchatNIRO.

Commission on the Regulation of Harvesting Anadromous Fishes

The AFC (Комиссия по регулированию вылова (добычи) анадромных видов рыб, Komissia po regulirovaniu vylova (dobychi) anadromnykh vidov ryb) has the responsibility for the distribution of recommended yearly catch of salmon among users and identifying areas of commercial fishery, recreational fishing, and traditional fishery of the indigenous population. The AFC was established by regional authorities in 2008 to implement management changes identified in new federal regulation. The AFC is chaired by the regional governor and consists of government, industry and interested stakeholders. These include representatives from Federal executive bodies, including the federal security and environment protection authorities, as well as representatives of the regional government, federal, public associations, consolidations of legal entities (associations and unions), and scientific organizations. The list of members of AFCs is suggested by the Governor and approved by the Territorial Administration of FAR (SVTU).

Upon the request of companies, the AFC sets up the recommended catch for a management unit area and accepts applications from the users, each of which cannot exceed the total recommended catch for management unit. In case of approaching recommended catch for some management unit, AFC can close fishing or increase the recommended catch following recommendations of KamchatNiro. The recommended catch is authorized by FAR and accounts for the number of salmon required for filling in the spawning areas and broodstock hatcheries, as well as quotas for sport fishing and harvest by the indigenous population. The AFC meets regularly (by October 2015, 21 meeting took place), and makes in season fishery management decisions. Based on the reports about filling of the spawning grounds, the AFC makes operational decisions on the time and duration of fishing by either closing fishing in spawning grounds in case of insufficient filling or by increasing the quotas in order to harvest excessive spawners from the mouths of rivers to avoid overflow of spawning grounds. The AFC's decisions are made through discussions and consultations with stakeholders. All meetings are open to the public. All decisions of AFCs on fisheries management are subject to final approval by Territorial Administrations of FAR. Meeting minutes and decisions are posted on the Territorial Administration website (http://www.terkamfish.ru).

Functioning of the Commission is regulated by the order of RF Ministry of Agriculture No. 170, dated April 8, 2013, "Concerning Approval of the Rules of Activity of the Commission on Regulation of Harvesting Anadromous Fish". The key items are the following:

Item 6. The Commission composed of the Chairman, Deputy Chairman, Executive Secretary and members of the Commission is formed.

Item 7. The Commission is headed by the highest official of a corresponding Russian Federation constituent (head of the supreme executive authority of the state government body of Russian Federation constituent) (hereinafter referred to as Commission Chairman). The Commission Chairman conducts meetings of the Commission, makes decisions on procedural issues and signs minutes of the meetings. In the absence of the Commission Chairman its activity is managed by the Deputy Commission Chairman. The Executive Secretary of the Commission assists the Commission Chairman and Deputy Commission Chairman in organization of work of the Commission and work group formed within the Commission, as well as keeps minutes of the meetings and organizes work on their filing to a territorial authority of the Russian Federal Fisheries Agency.

Item 8. The Commission consists of representatives of federal executive authorities, including a representative of the federal executive authority in the sphere of defense, a representative of the federal executive authority in the sphere of organization of safety of the Russian Federation, a

representative of the federal executive authority in the sphere of environmental protection, representatives of bodies of state power of Russian Federation constituents, public associations, alliances of legal entities (associations and unions), as well as scientific organizations under the jurisdiction of the Russian Federal Fisheries Agency.

Item 9. Public associations, alliances of legal entities (associations and unions), as well as scientific organizations under the jurisdiction of the Russian Federal Fisheries Agency file proposals related to composition of the Commission to the executive government body of a corresponding Russian Federation constituent. Federal executive authorities (their territorial bodies) and the executive government body of a corresponding Russian Federation constituent file proposals on composition of the Commission to the Ministry of Agriculture of the Russian Federation, who issues an order on approval of personal composition of the Commission for every Russian Federation constituent on the territory of which procurement (yield) of anadromous species of fish will be carried out.

Item 10. Commission's activity is carried out in a form of meetings organized as and when necessary.

Item 11. All members of the Commission have equal rights during discussion of issues being considered at a meeting.

Item 12. The Commission is authorized to make decisions in case more than half of its members are present at the meeting. A decision of the Commission is deemed made in case more than half of its members that are present at the meeting voted for. If votes of Commission's members divide equally, vote of a person chairing the Commission will be decisive.

Item 13. Commission's resolution is documented in a protocol no later than in 2 days after conduct of a regular meeting to be signed by the Commission Chairman or, in its absence, by Deputy Commission Chairman chairing the meeting, and initialed by the Executive Secretary, as well as by all members of the Commission present at the meeting.

Item 14. In case a member of the Commission does not agree with a decision made, it is entitled to express its special opinion in writing, which shall be added to the minutes of the meeting.

Item 15. Minutes of the meeting shall be sent to a territorial administration of the Russian Federal Fisheries Agency within 2 days after its signing to be approved within 2 business days.

In case the territorial body of the Russian Federal Fisheries Agency does not approve the minutes of the Commission, it shall notify the Commission thereof in writing within 2 days after receipt of the minutes, indicating reasons preventing approval of minutes of the meeting.

Item 16. After the minutes of the meeting is approved by the territorial body of the Russian Federal Fisheries Agency, it is published on its official website and sent to executive government bodies of Russian Federation constituent within 2 business days and is binding.

It is quite difficult to assess overall effectiveness of fishery management system in Russia in the framework of this certification, but for that can be useful to consider generalized economic indicators. Kauffman et al. (2013) reviewed governance indicators of numerous countries for period 1996-2012 for the World Bank: governance indicators follow a normal distribution where percentile rank varies from 0 to 100 and value equal to 50 refers the average country. The analysis concluded that Russia scores at lower than mean levels, with most scores ranging from 20 to 40.

2.5.2 Preseason Management

The local research fisheries institution, KamchatNIRO, plays a key role in producing fishery forecasts. The forecasts use a regression model of abundance of parental and progeny generations using equations of Ricker, Sheppard and others. The base for forecasts are data obtained by observers on commercial fisheries, surveys of number of spawners entering the river (visual foot counting, aerial visual and photo registration, hydro acoustic techniques, and marking) data on downstream migration of juveniles, and data on trawling of juveniles before feeding migration to high seas mouth during spawning migrations (Figure 38). Catch data are available for Bolshaya River from 1934. In the 1945,

the research station of KamchatNIRO begun to work at the Bystraya River, which is a tributary of Bolshaya River. This may be taken as a date of beginning of regular fishery-oriented research in this area. In general, most of data used for forecasts is available from 1957.

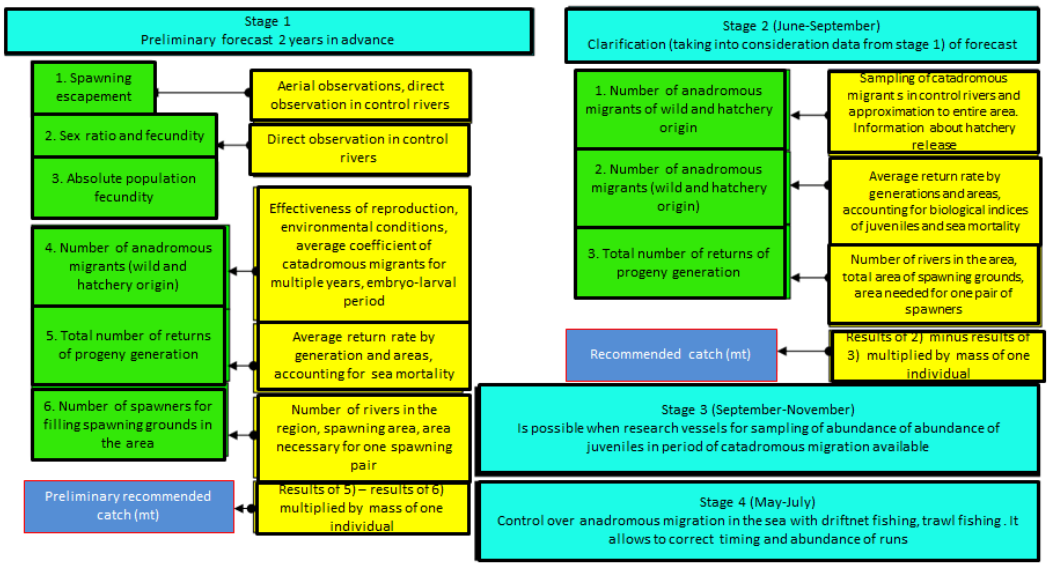

Figure 38. Main stages of issuing of the forecast (recommended catch) of Pacific salmon (Rassadnikov 2006).

The recommended catch is calculated as a difference between total number of returning fish estimated for a season and the target amount of spawners, taking in account a total area of spawning grounds in the district and optimal density of spawners, which depends on river and species. At higher than optimal spawning density on the spawning grounds, overspawning results in decrease of recruits per spawner due to resorbtion of gonads and destruction of redds by later spawners. An obvious overspawning event occurred in the northwestern Kamchatka in 1983, when huge amount of spawners entered rivers because fishing facilities of the companies were not sufficient to prevent them. As a result, mortality of progeny was very high, and the next generation was weak. Due to this, since this period odd generation of Pink depressed and even generation dominants until present.

Given that dynamics of populations in the same area is usually synchronous, several reference populations are studied in more details, at so-called fish monitoring stations, and then the forecast is extrapolated to the entire area. One of stations is situated in Bolshaya River. In the downstream part of Opala and Kikhchik Rivers there are seasonal stations where KamchatNIRO collects data from commercial catches. The proportion of each population in the area is considered to be constant and is determined based on long-term fisheries and research data.

The initial forecast provided by the local research team must be approved on different levels (Figure 39). Firstly, the Research Council of KamchatNIRO should approve. Then KamchatNIRO sends the annual forecast to the TINRO-Center; the latter summarizes the forecasts from all regional NIROs (Research Institutes for Fishery and Oceanography). Forecasts are discussed on the Far East Salmon Council, which was created within the TINRO-center with the goal of coordinating the research and forecasting of salmon in the Far Eastern basin. FESC decides on the final value of the forecast of recommended catch and sends the forecast to VNIRO. Because of the change from TAC management to recommended catch management, approval by the State Ecological Expertise on federal level has been also excluded from the process. This makes the process quicker and more transparent, but, at the same time, potentially less precautionary. During the period of approval, discussion with stakeholders takes place with active participation of representatives of fisheries companies, local administrations and federal ministries. On the basis of this forecast FAR approves the recommended annual catch for each fishery subzone. The pre-season forecast is used primarily for planning purposes and possibly to establish quotas for some non-commercial fisheries.

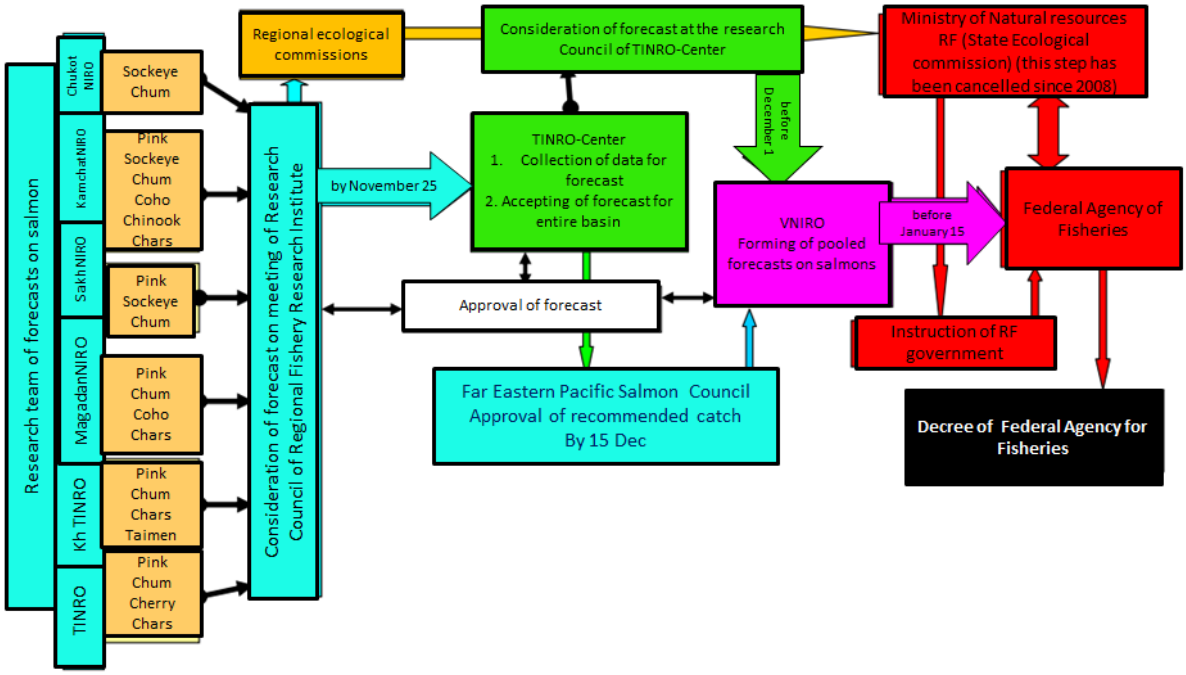

Figure 39. A procedure of issuing of the Pacific salmon recommended catch (Rassadnikov 2006).

Inaccuracy of fisheries forecast varies among species (Figure 40). In average, for entire Western Kamchatka area for period 1993 – 2009 it is equal to 73% for Pink, 16% for Chum, 14% for Sockeye, 34% for Coho and 101% for Chinook Salmon.

The Russian system does not have an explicit environmental policy for the salmon fisheries, but a number of Federal requirements apply to the protection of the environment. A number of regulations address environmental impact of business, but they are rather general. For instance, in the Law "On Protection of the Environment" (2001) (extracted from article 5) states that "Business activities of all subjects must follow such principles as:

- the right of a person on favorable environment;

- scientifically justified combination of interests of person, society and state with a goal of sustainable development and favorable environment;

- conservation, reproduction and rational use of natural resources as necessary preconditions of providing of favorable environment and ecological safety;

- presumption of ecological danger of planned business activities;

- compulsion of environmental assessment of planned business projects;

- priority of preservation of natural ecosystems, natural landscapes and natural complexes;

- protection of biodiversity;

- Prohibition of any activity with unpredictable environmental consequences, and realization of projects which may result in degradation of natural ecosystems and change or destruction of genetic diversity of plants, animals and other organisms, exhausting of natural resources and other negative changes of environment.

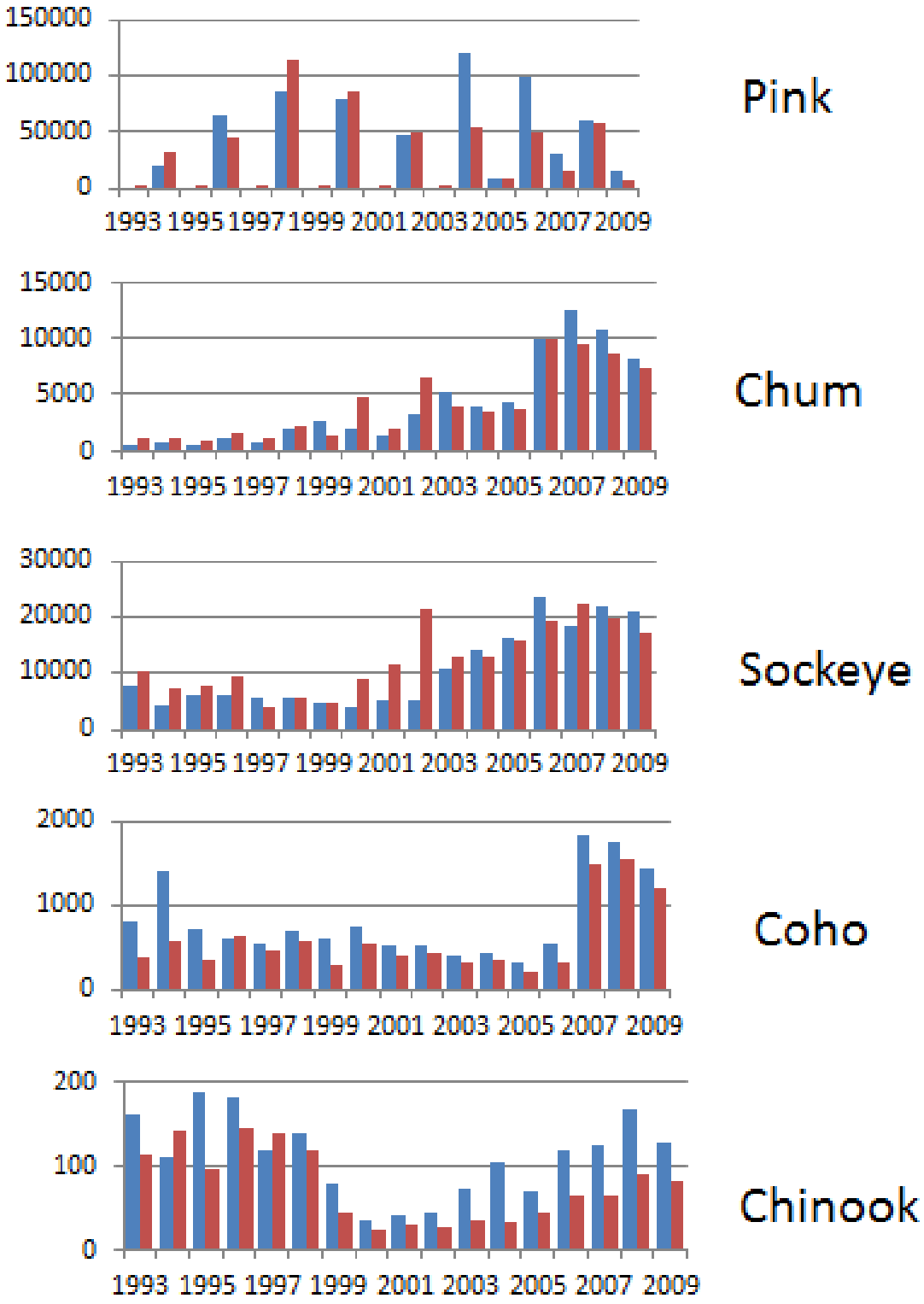

Figure 40. Forecasted (blue) and actual (red) catch of Pacific salmon in the Western coast of Kamchatka (data from Rassadnikov 2006, 2009; Rassadnikov and Starovoitov, 2007, Starovoitov and Rassadnikov, 2008).

Article 26 reads in part: The amount of admissible extraction of components of natural environment must be established in accordance with limitation of the amount of extraction with the aim to conservation of natural and nature-anthropogenic objects, providing of sustainable functioning of natural ecosystems and preventing their degradation.

The Law “On Animal World” (extracted from article 22): Any activity resulting in changes of animal environment and deterioration of condition of their reproduction, feeding, rest and migration routes must be performed in accordance with rules of nature conservation.

Extract from Article 35: Use of objects of animal world should be performed together with system of measures of conservation and reproduction of the animal world and protection of their environment.

The government fishing permits contain a requirement that the permit holder is responsible for the ecological sustainability of the area where fishing occurs. Discovery of destructive practices could lead to loss of the fishing permit, which provides an incentive for sustainable practices.

Some references concerning conservation of environment are contained also in federal laws directly related to fisheries: “On Fisheries and conservation of aquatic biological resources" and “The rules of fishing for the Far Eastern Fishery basin”.

Recently adopted State program “Development of fishery industry” (18 December 2014) (http://government.ru/media/files/ulCPlqzA6Nw.pdf) has a goal to enable the transition from export-commodity type to innovative development based on conservation, reproduction, rational use of aquatic biological resources, introduction of new technologies, the development of import-substitution sub-sectors; providing the sufficient amount of domestic fishery production and competitiveness of Russian fishery products on domestic and foreign markets. Although the main task of the program to increase fisheries production, quite high attention is also paid to conservation of aquatic biological resoures and expanding of scientific research, including ecosystem research.

2.5.3 In-season process

Each coastal set net or river beach seine is served by a crew of fishermen. The crew leaders report directly to the company’s Directors. Each crew keeps fishing log according to the template specified by the FAR. This log records:

- coordinates of seine;
- daily catch (in metric tons);
- species composition and by-catch;

Each company submits information on the catch volumes and species composition to SVTU daily which is then summarized for reporting to the AFC.

The AFC opens and closes fishery times and areas based on harvest and escapement relative to expectations and objectives (Figure 41). To allow sufficient amount of fish to approach spawning grounds, the management system introduces system of pass days when fishery is prohibited. The system of pass-days creates kind of moving window for fish to safely approach the spawning grounds (Shevliakov et al., 2011). It is known that pass-days are used in the river fishing parcels regularly (two-three per week). Moreover, if spawning escapement is not sufficient, additional off days are set up in the river, and, if needed, in the sea. Usually, all these operations are done by decisions of AFC based on recommendations of KamchatNIRO.

Approved value of annual recommended catch may be adjusted by AFC based on real-time data on the number of the salmon approaching the fishing areas and spawning grounds. In order to assist in this adjustment, KamchatNIRO monitors the dynamics of catches and biological indicators of Sockeye in the main areas of operation, in the migration routes and the reproduction of the species. The monitoring results are used for developing operational guidelines on salmon fishing.

The procedure of termination of fishing is not complex and can be done by AFC based on recommendations of KamchatNIRO. Following this decision, SVTU terminates all fishing activity if necessary, and may implement special closed days to obtain spawning escapement goals. Based on experience of last years, there are two free-of-fishing days per week in Bolshaya River (usually coincide with weekends). Increase of quota now, when approval by State Ecological Expertise is not necessary anymore, is also not difficult and can be done by AFC based on recommendations of KamchatNIRO. Such a management system existed during 1990s, before introduction of the State Ecological Expertise and was considered quite convenient.

Since 2009 regulations of salmon fisheries were changed not only due to introduction of 20-year lease for fishing parcels, but also due to changing from the Total Available Catch (TAC) system and introduction of "Olympic system" of management based on achieving spawning escapement. Due to this fisheries management became less complicated and more decisions can be accepted on local level.

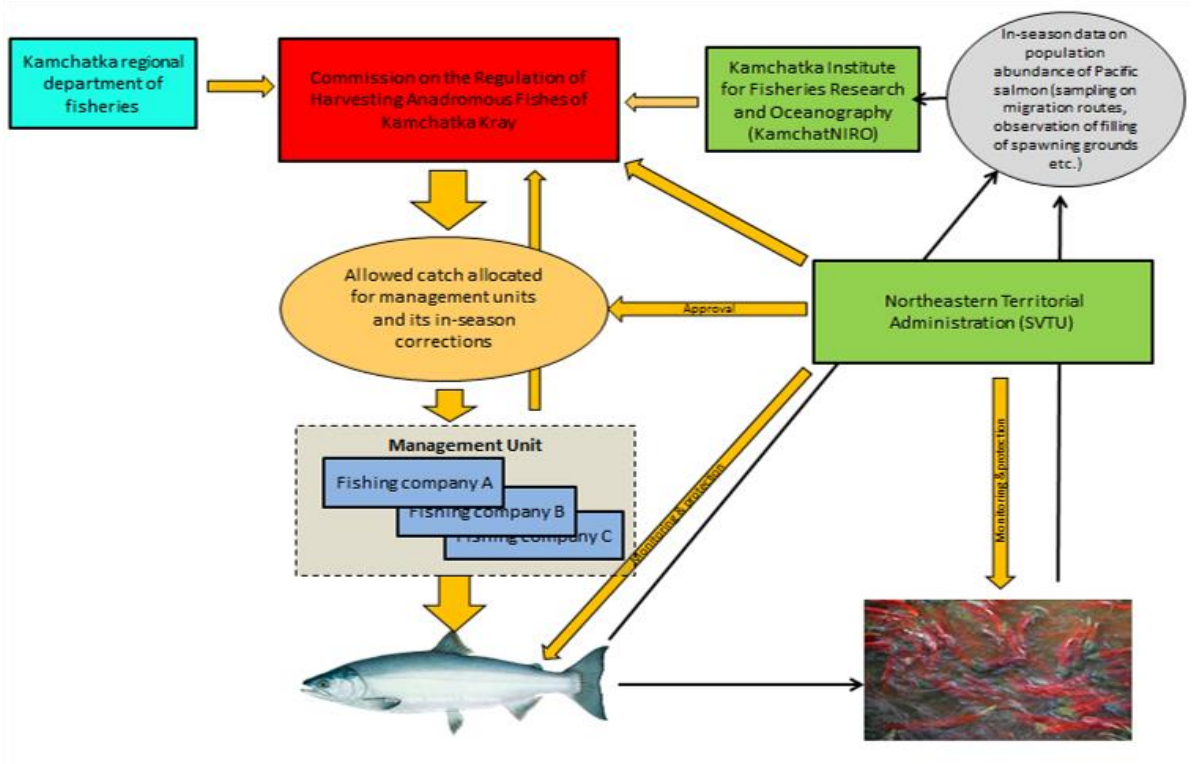

Figure 41. In-season management of Pacific salmon fishery.

In Kamchatka, the “Olympic system” was firstly introduced in 2010. The main principles of this management model are the following:

- determining a management unit as group of fishing parcels situated in close geographical area (usually combination of sea and river parcels) inhabited by salmon populations with similar biology;

- self-dependence of users in terms of use their gear, in particularly, they are not obliged to use all their gear but only some, depending on situation;

- user defines himself size of his quota which, however, cannot exceed total quota for management unit determined by AFC. The companies report their catches to SVTU on daily basis. After sum of catches of all companies fishing in the management unit achieved the total quota, the fishing terminated if AFC decided not to increase quota.

  The main advantage of this system of management is opportunity for users to plan their fishing operations and free competition between them. Moreover, it provides more operative reporting of catches.

  Disadvantages are possible exceeding of quota allocated for management unit if two or more companies simultaneously (in the same day) report catches which altogether increase total quota. Thus the companies do not have individual responsibility not to exceed the quota. Also, companies can report false catches (exceeding the actual) in order to have opportunity to buy illegally obtained caviar.

2.5.4 Enforcement

SVTU controls the compliance with the law and rules of fishing. SVTU contains in total 12 departments and among them the department of state control, supervision and protection of aquatic resources and habitats with enforcement functions. SVTU includes 12 local departments situated in every administrative district of Kamchatka Oblast. Fishing area assessed in this report is in the territory of Ust-Bolsheretsk and Sobolevo district departments. The level of protection depends on season. In the fishing season, in addition to usual 6 inspectors, the groups up to 15 inspectors are created. SVTU has responded to concerns of bribery and corruption of enforcement officers by monitoring agents through undercover surveillance of officers and monitoring changes in officer life styles; encouraging reporting by competitors and acquaintances; and by increasing penalties including fines and job loss for convictions. SVTU reports that corruption cases have declined to about one per year, with none in 2013-14.

SVTU reports that illegal fishing by fishing companies has diminished to low levels since the beginning of the Olympic System and the removal of individual quotas for the companies. Partly, it is explained just by change of organization of fisheries - now companies do not have incentives to hide their catch, and their reports are more objective. At the same time, sanctions on companies are severe, including fines and loss of fishing privileges (cancellation of leases), which reduce incentives to fish illegally or launder illegal roe. SVTU stated that inflated catches reported byfishing companies to cover purchases of illegal roe have not been detected, and that exchange of information with tax inspectors is used to compare roe production with reported fish quantities. However, other participants in the fishery did report knowledge of companies increasing reported landings to account for illegal roe purchases. The assessment team was unable to determine if such misreporting occurred or the quantity of misreported catch/illegal roe that may have occurred.

As the amount of illegal fishing and misreporting by fishing companies has decreased, the dominant component of illegal fishing comes through poachers from outside the region and from residents, including indigenous people. Most poaching occurs along the Bolshaya River, as a road provides access to much of the river. Shevlyakov (2013a) estimated that criminal poaching represents 5-10% of legal havest in Kamchatka and traditional poaching represents 3-5%, for a likely range of 8-15%. Rivers, included in this assessment (Vorvskaya, Kol, Opala, Golygina, Koshegochek, Ozernaya) are much more

difficult to acces by roads and therefore are less affected by poachers. In the Ozernaya river, only one record of poaching within the last 3 years was observed according to police log books. It was a case of poaching fish by tourists, who drifted by the river on the rafts (Semenov et al 2015).

The companies in this certification process take active part in the protection of salmon spawning grounds. Companies clearly understand that it is a must to protect their resource and SVTU understands it does not have sufficient resources to do this effectively without support from the companies. For instance, in Bolshaya River basin, which has comparatively good road access, and therefore poaching loading, SVTU coordinates activities of companies and subdivided entire Bolshaya River basin into several areas, each of which is under individual responsibility of some company. In Kol, Opala, Golygina, Koshegochek rivers, included in this assessment, there is no settlements, and protection is much easier. In the Ozernaya River, with Ozernovsky town on it, with its abundant population of Sockeye (subject of special MSC assessment, level of protection is very high (see more details at https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/ozernaya_river_Sockeye_salmon). The largest problems for enforcement exist in the Vorovskaya River with a village of Sobolevo (1721 inhabitants), but extremely poor transport infrastructure of this area and increasing level of enforcement limit level of poaching.

Legal challenges are not currently reported.

2.5.5 Protected, Endangered, or Threatened Species

The Ministry of Natural Resources and Ecology is responsible for managing sensitive species. Red lists of Russian Federation is regularly updated. The last edition was published in 2001, and the next one is issued in 2015. Leading experts are involved in the updating of the Red List. Including of a species in the Red List does not only certifies its official status, but also provides necessary basis for management decisions. Species included to the Red List are subdivided into the following categories: 0 – probably extinct, 1 – under threat of extinction, 2 – decrease of abundance, 3 – rare, 4 – status is unclear, 5 – recovering. Based on the Law of the Russian Federation “On animal world”, all the redlisted species are protected regardless the categories they belong to. If they are accidently caught in fishing gear, they should be recorded in logbooks and released with minimal possible damage.

Organizationally, the Red List is under responsibility of the Commission on rare and endangered animals, plants and fungi, which is created and operates in accordance with the procedure approved by Order of State Committee on Ecology of the Russian Federation from 24.09.1998 № 542 "On the maintenance work on keeping the Red Book of the Russian Federation." The Commission includes representatives of leading Russian scientific organizations, including the Institute of Ecology and Evolution of the Russian Academy of Sciences named by A.N. Severtsov and the State Organization "All-Russian Research Institute for Nature Conservation" The functions of this Commission is to provide recommendations on including endangered species in the Red Book of the Russian Federation or the exclusion of species (subspecies, populations) of wild animals, wild plants and fungi from the Red Book of the Russian Federation. Each region in Russia (oblast, autonomous republic) has its own Red lists. Red list of Kamchata was prepared by Pacific Institute of Geography and published in 2007. In total, it includes 123 species of animals – 13-invertebrates, 30 fish species, 60 birds and 23 terrestrial and marine mammals.

2.5.6 Environmental Protection

Protection of the salmon habitat is achieved through observance of the current laws of the Russian Federation. Any type of utilization either of natural resources directly or that impacts them indirectly, including fisheries, water and timber utilization, construction, etc., must be evaluated as to the extent of impact on the environment. The evaluation itself is performed by an expert commission having state ecological expertise, and the main federal agency responsible for conducting the state ecological expert review is the Rosprirodnadzor. In addition, activity related to natural utilization that has already been permitted is regulated to the extent to which it impacts the environment by a series of standards documents at the federal, departmental and local levels.

For the protection of fish habitat within the area of its competence, responsibility is borne by the Rosprirodnadzor under Ministry of Natural Resources and Ecology of Russian Federation, and the Federal Ecological, Technological and Atomic Oversight Service (Rostekhnadzor), the Agency of Fisheries of Russian Federation, and local governments of the territorial subjects of the Russian Federation. The Natural Protection Prosecutor's Office of the Russian Federation is responsible for enforcing laws relating to natural utilization.

Building/construction projects are regulated by a governmental agency (Rospotrebnadzor Sanitation Service) which requires completion of an environmental Impact Study (EIS) prior to approval of a project permit. Projects are monitored and can be delayed by the service if the builder does not fulfill the requirements. Assessments address discharges, disposal, drainage, soil pollution, the burial of wastes in the environment, accidents and catastrophes. The EIS includes a project description, descriptions of the environments subject to impact, and a characterization of the extent of the impact (based on a worst case maximum), including a determination of the subsequent value of the losses, the form of compensation both in kind and in monetary terms, and development of the engineering for loss compensation. Also included are descriptions of the extent to which the conditions for land use and the requirements issued by the respective government agencies of supervision and control have been followed, a study of the risks associated with possible accidents, as well as the adequacy of the anticipated material resources and financial reserves to localize and eliminate the effects of accidents, and a study of the fullness and effectiveness of the anticipated measures for protecting the health of the population living in the surroundings of the environmental area. Decisions adopted must conform to the laws and standards of the Russian Federation and the Kamchatsky Kray.

The main indicator of success with respect to actions aimed at protecting fish (salmon) habitat is the record size of the harvests of Pacific salmon. It should be noted, however, that other factors such as sea conditions also impact to stock abundance and therefore catches.

2.5.7 Research plan

Until mid-1990's the studies of salmon in the Far East Russian Federation were performed according to the complex target program "Salmon," which was controlled by the former Committee on Fisheries of Russian Federation (Federal Agency for Fishery). This program was designed for every 5 years starting with mid-1980s. Studies in second half of 1990s were performed according to 5-year programs, which took into account the basin and partly the ecosystem approaches. In 2005, the TINRO-center with the participation of regional NIROs, have developed "The concept of the Far East basin program for the complex study of Pacific Salmon for period 2006-2010", which was approved by Rosrybolovstvo (which is now FAR). In accordance with this concept TINRO-center has developed the "Far East basin program for complex study of Pacific Salmon for period 2007-2012".

According to the political course of FAR on the centralization of fisheries research in 2009, VNIRO has developed the departmental comprehensive target research program for fisheries of Russian Federation for 2010-2014 named "Scientific support and monitoring of conservation of reproduction and rational using of resources of fisheries base". Within that program the "Far East basin program of complex study of Pacific Salmon for period 2010-2014" was adopted in which the succession of approach and research directions was preserved. In accordance with this program, the TINRO-center develops its annual program of complex research of Pacific Salmon; and regional institutes, including KamchatNIRO, develop their own annual research salmon programs. All annual programs are approved by FAR.

Regional fishery research institutions carry out studies of salmon in the river and early marine life periods, which includes the study of biology, population structure, escapement monitoring, survival of eggs, downstream migration of fry, feeding of juveniles in estuarine period and the collection of statistics of salmon catch. TINRO-center directs and carries out research of marine life period of salmon, including the study of the state of ocean and marine biota in the feeding areas and migration routes of salmon, and total trawl counts of juvenile of salmon during catadromous migration and abundance of salmon in the period of anadromous migration.

At the end of the year, the results of these programs are discussed in the Far East Salmon Council at TINRO-center and published in the annual edition of The Bulletin of the Implementation of the "Concept of the Far East basin program for the complex study of Pacific Salmon". A total of 9 bulletins for the period 2006-2014 have been published (in 2011-2014 the books were entitled "Bulletin of study of Pacific salmon). Funding for all the programs is provided by FAR from the federal budget.

Research program "Habitat forming role of anadromous fish in formation of ecosystems of riverine and lacustrine ecosystems of the Far East" was strated in 2014, and data are partly collected in the Opala River in the area of certification. The ultimate goal of this program is analysis of quantitative relationships between biomass of anadromous fish entering the freshwater and production of rivers, estuaries and lakes of the Far East.

Fishing companies participating in this certification regularly help to workers of KamchatNIRO in terms of providing them infrastructure facilities (transportation, laboratory space etc.).

2.5.8 International Management

Russia is party to the Convention for the Conservation of Anadromous Fish Stocks in the North Pacific Ocean, and a member of the North Pacific Anadromous Fish Commission (NPAFC). The Commission promotes the conservation of anadromous fish in the Convention area, which includes the waters of the North Pacific Ocean and its adjacent seas north of 33° Latitude and beyond the 200 mile zones of the coastal states. The Commission requires member states to:

- Prohibit directed fishing for anadromous fish in the Convention Area.
- Minimize to the maximum extent of the incidental taking of anadromous fish
- Prohibit the retention on board a fishing vessel of anadromous fish taken as an incidental catch during fishing for non-anadromous fish.

The Convention authorizes research fishing for anadromous fish on the high seas if consistent with the NPAFC science program. The parties conduct joint research programs including exchange of information. The parties have an obligation to enforce the provisions of the Convention.

3 EVALUATION PROCEDURE

3.1 Harmonised Fishery Assessment

Scores of this assessment were compared with those of the Ozernaya sockeye assessment completed in 2012. The fisheries in this assessment and those for Ozernaya sockeye are subject to the same management system. In addition, several P2 species in the Ozernaya sockeye assessment are P1 species in this assessment. Scores and conditions between the two assessments were reconciled to the extent possible given changes in the Fisheries Certification Requirements. This assessment was completed under FCR 2.0 (SAMFAM) while the Ozernaya sockeye assessment was completed under FCR v1.3 (Salmon Modification). Differences also recognize specific circumstances in different rivers and additional or new information that has become available between assessments. In several cases, new information was provided as a result of conditions in the Ozernaya certification.

3.2 Previous assessments

This fishery was not subject to previous assessments except the Ozernaya sockeye fishery that was certified in 2012. Results of the Ozernaya assessment as modified in subsequent surveillances are summarized below.

Table 23. Revision of assessment scores based on closure of conditions for Ozernaya Sockeye (not addressed by this assessment).

Prin-ciple	Component	PI No.	Performance Indicator (PI)	Assessed score	Condition	Revised score
One	Outcome	1.1.1	Stock status	90		90
		1.1.2	Reference points	70	~~1~~	80
		1.1.3	Stock rebuilding	na		Na
	Management	1.2.1	Harvest strategy	95		95
		1.2.2	Harvest control rules & tools	90		90
		1.2.3	Information & monitoring	75	~~2~~	80
		1.2.4	Assessment of stock status	95		95
	Enhancement	1.3.1	Enhancement outcome	100		100
		1.3.2	Enhancement management	100		100
		1.3.3	Enhancement information	100		100
Two	Retained species	2.1.1	Outcome	80		80
		2.1.2	Management	80		80
		2.1.3	Information	70	~~3~~	80
	Bycatch species	2.2.1	Outcome	100		100
		2.2.2	Management	95		95
		2.2.3	Information	80		80
	ETP species	2.3.1	Outcome	75	~~4~~	80
		2.3.2	Management	80		80
		2.3.3	Information	70	~~5~~	80
	Habitats	2.4.1	Outcome	90		90
		2.4.2	Management	80		80
		2.4.3	Information	75	~~6~~	80
	Ecosystem	2.5.1	Outcome	100		100
		2.5.2	Management	95		95
		2.5.3	Information	90		90
Three	Governance and policy	3.1.1	Legal & customary framework	90		90
		3.1.2	Consultation, roles & responsibilities	85		85
		3.1.3	Long term objectives	80		80
		3.1.4	Incentives for sustainable fishing	80		80
		3.2.1	Fishery specific objectives	80		80
		3.2.2	Decision making processes	100		100

Prin-ciple	Component	PI No.	Performance Indicator (PI)	Assessed score	Condition	Revised score
	Fishery specific management system	3.2.3	Compliance & enforcement	75	~~7~~	80
		3.2.4	Research plan	70	~~8~~	80
		3.2.5	Management performance evaluation	60	9	60
Overall weighted Principle-level scores						
	Principle 1 - Target species			~~89.6~~		91.6
	Principle 2 - Ecosystem			~~84.0~~		86.0
	Principle 3 – Management			~~80.4~~		81.9

Table 24. List of conditions for Ozernaya sockeye assessment.

Condition	Indicator	Status
1	1.1.2. Reference points: Demonstrate that the target reference point is such that the stock is maintained at a level consistent with BMSY or some measure or surrogate with similar intent or outcome. Demonstrate that where the wild stock is a management unit comprised of more than one subcomponent, it is highly likely that the target and limit reference points are consistent with maintaining the inherent diversity and reproductive capacity of each stock subcomponent.	**Closed in 1st surveillance**
2	1.2.3. Information & monitoring: Demonstrate that the fishery has good information on all other fishery removals from the stock.	**Closed in 3rd surveillance**
3	2.1.3. Retained species information: Provide sufficient data continue to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).	**Closed in 3rd surveillance**
4	2.3.1. ETP species outcome: Demonstrate that indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	**Closed in 3rd surveillance**
5	2.3.3. ETP species information: Provide sufficient data to allow fishery-related mortality and the impact of fishing to be quantitatively estimated for protected species.	**Closed in 1st surveillance**
6	2.4.3. Habitat information: Provide sufficient data to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	**Closed in 2nd surveillance**
7	3.2.3. Compliance & enforcement: Provide evidence of systematic compliance.	**Closed in 3rd surveillance**
8	3.2.4. Research plan: Provide research plan.	**Closed in 1st surveillance**
9	3.2.5. Management performance: Provide annual sockeye run and fishery monitoring and evaluation information.	Open & on schedule

3.3 Assessment Methodologies

This assessment used FCR v2.0 (1 October 2014), with modifications to the default assessment tree for salmon fisheries as defined by the Marine Stewardship Council (MSC). The report was produced with MSC Full Assessment Reporting Template: Salmon fisheries v1.0 (8 October 2014). The default assessment tree for salmon fisheries was used without adjustments.

3.4 Evaluation Processes and Techniques

4.1.1 Site Visits

The site visit was conducted at in Petropavlovsk-Kamchatsky, Russian Federation on April 20-25, 2015 (concurrent with the second annual Ozernaya Sockeye surveillance audit). The clients and management systems are the same for both fisheries. The visit included Ray Beamesderfer and Dr. Dmitry Lajus. Meetings were conducted in the Vityaz Avto Company Offices and included a number of stakeholders. The team met with the following:

	Name	Affiliation	Subject
April 20	Andrei Bokov	Client – Head of Technology Department	Recent fishery information, progress on conditions, related information
	Serafima Garanina	Translator (supplied by client)	--
	Daria Smagina	St. Petersburg State University - RU	Student observer
	Natalia Novikova	Ocean Outcomes - U.S.	International stakeholder observer
	Denis Semenov	World Wildlife Fund-RU	Russian stakeholder observer
	Sergey Korostelev	World Wildlife Fund-RU Former Director of KamchatNIRO	Public involvement, Stock Assessment, Fishery Management
	Sergey Rafanov	World Wildlife Fund-RU	Public involvement & concerns
21	Alexander Bonk	Kamchatka State university	Fishery observer program
	Elena Ivanova	Federal Fishery Agency	Fishery enforcement
22	Segey Vakhrin	NGO Stakeholder	Public involvement process, Illegal Fishing
April 23	Vladimir Galytsin	Minister of Fisheries, Kamchatka Regional Administration	Management System
	Oleg Lapshin	KamchatNIRO Director	Stock Assessment, fishery management
	Alexander Tarasov	Vityaz Avto Deputy General Director	Certification

Additional information was obtained during a second site visit concurrent with the third annual Ozernaya Sockeye surveillance audit in Petropavlovsk-Kamchatsky, Russian Federation on March 30 – April 1, 2016. The visit included bothe team members Ray Beamesderfer and Dr. Dmitry Lajus. Meetings were conducted in the Vityaz Avto Company Offices and included a number of stakeholder observers. The team met with the following:

	Name	Affiliation	Subject
March 30	Andrei Bokov	Client – Head of Technology Department	Recent fishery information, progress on conditions, related information
	Olga Alderton	Translator (supplied by client)	--
	Alexander Goncharov	Client Technology Department	Logistical support
	Natalia Novikova	Ocean Outcomes - U.S.	International stakeholder observer
	Randy Ericksen	Ocean Outcomes - U.S.	International stakeholder observer

	Denis Semenov	World Wildlife Fund - RU	Russian stakeholder observer
April 1	Sergey Korostelev	World Wildlife Fund – RU Former Director of KamchatNIRO	Public involvement, Stock Assessment, Fishery Management
	Andrei Bokov	Client – Head of Technology Department	Recent fishery information, progress on conditions, related information
	Alexander Goncharov	Client Technology Department	Logistical support
	Natalia Novikova	Ocean Outcomes - U.S.	International stakeholder observer
	Randy Ericksen	Ocean Outcomes - U.S.	International stakeholder observer
	Denis Semenov	World Wildlife Fund - RU	Russian stakeholder observer

4.1.2 Consultations

The fishery was announced as entering assessment 19 March 2015 with posting to the MSC website. The assessment team was announced at the same time. Stakeholders (identified above) were interviewed during the site visit.

In the first site visit, a series of information needs were identified for completion of the assessment. The client subsequently contracted with the governmental fishery scientific agency (KamchatNiro) to provide this information. The lack of necessary information was expected to delay completion of the assessment and a revised timeline was announced 18 August 2015.

An English version of the KamchatNiro information report (Shevlyakov et al. 2016) was not received until 17 March 2016, which substantially delayed completion of this assessment. During a second site visit 30 March 2016, the team reviewed preliminary scores and conditions with the client and discussed a client action identified by the client.

4.1.3 Evaluation Techniques

The scoring elements chosen were based on information on the catch as well as stakeholder concerns. The scoring meetings included an evaluation of the information available relative to the assessment tree that was developed for this fishery. Discussions within the team reached scoring conclusions by consensus.

MRAG Americas compiled a stakeholder list based on interest expressed during the assessment and used that list plus any additions to directly notify stakeholders of the process. The Ocean Outcomes (formerly affiliated with the Wild Salmon Center) and WWF helped inform stakeholders in the region of the assessment, as the MRAG Americas announcements occurred in English and stakeholders primarily speak Russian.

The MRAG Americas assessment team met regularly to discuss the background information and the impact of that information on the scoring of each performance indicator. Through consensus, the team evaluated each scoring issue to determine which the fishery achieved, and agreed on a score.

The MRAG Americas assessment team followed the MSC CR that specified that each performance indicator must score 60 or higher and that each principle must have a weighted average of 80 or above. The team used the “few, many, most” protocol for scoring performance indicators as described in the MSC CR.

The MRAG Assessment Team prepared a list of Principle 2 species (Section 3.4) in advance of scoring. The species were assigned to Primary, Secondary, or ETP as described in Section 3.4.

The RBF was not used for this assessment.

Table 25. Scoring elements

Component	Scoring elements	Main/not main	Retained?	Data-deficient?
Principle 1	Pink Salmon[a]	--	Yes	No
Principle 1	Chum Salmon[a]	--	Yes	No
Principle 1	Coho Salmon (Kol River only)	--	Yes	No
Primary	Sockeye Salmon [b]	Main	Yes	No
Primary	Coho salmon (except Kol River)	Main	Yes	No
Primary	Chinook Salmon [a]	Not Main	No	No
Secondary	Char	Not Main	Yes	No
Secondary	Masu Salmon	Not Main	No	No
Secondary	Miscellaneous marine species	Not Main	No	No
ETP	Steelhead	--	No	No
ETP	Steller sea lion		No	No
Habitat	Sandy bottom	Main	No	No

[a] *Ozernaya, Koshegochek, Golygina, Opala, Kol, and Vorovskaya Rivers of the West Coast of Kamchatka*

[b] *Excluding Ozernaya River, where sockeye is subject to a separate assessment.*

4 TRACEABILITY

4.1 Eligibility Date

The actual eligibility date for product from the fishery to bear the MSC label will be the date of release of the PCDR, which will occur near the start of the fishing season.

4.2 Traceability within the Fishery

Daily catch of salmon from traps is delivered by boats to the shore, where it is weighed and reloaded to mobile containers that transport chilled fish. Catch from beach seines is brought ashore by the nets, and loaded to mobile containers that transport chilled fish. Ice is used for cooling the fish. While the catch is transported, it is accompanied by a document specifying the place and the crew that captured it, the weights of the transported fish, and the processing facility where the catch is being delivered. Upon delivery, the fish are weighted again by the processing facility and then the catch is sent for processing. The processing plants track numbers of salmon by species by day for each fishing parcel. Transhipment does not occur.

Table 26. Points of landing for fishing parcels permitted for use by Vityaz-Avto and Delta companies. All points of landing are adjacent to shoreline fishing sites.

Co.	Parcel	Water body	Point of landing	Ozernaya sockeye certification	Processing location
Vityaz-Avto	752	Ozernaya river	River shoreline	Yes	Ozernaya
	189	Sea of Okhotsk	Ocean beach	Yes	Ozernaya and Koshegochek
	191	Sea of Okhotsk	Ocean beach	Yes	Ozernaya and Koshegochek
	197	Sea of Okhotsk	Ocean beach	Yes	Ozernaya
	203	Sea of Okhotsk	Ocean beach	Yes	Ozernaya
	204	Sea of Okhotsk	Ocean beach	Yes	Ozernaya
	746	Golygina river	River shoreline	--	Ozernaya and Koshegochek
	747	Koshegochek river	River shoreline	--	Ozernaya and Koshegochek
	697	Kol river	River shoreline	--	Kol
	90	Sea of Okhotsk	Ocean beach	--	Kol
	89	Sea of Okhotsk	Ocean beach	--	Kol
	81	Sea of Okhotsk	at sea (vessels)	--	at sea (vessels)
	80	Sea of Okhotsk	at sea (vessels)	--	at sea (vessels)
	79	Sea of Okhotsk	at sea (vessels)	--	at sea (vessels)
	78	Sea of Okhotsk	Ocean beach	--	Ozernaya and Koshegochek
	77	Sea of Okhotsk	Ocean beach	--	Ozernaya and Koshegochek

Co.	Parcel	Water body	Point of landing	Ozernaya sockeye certification	Processing location
	76	Sea of Okhotsk	Ocean beach	--	Ozernaya and Koshegochek
	60	Sea of Okhotsk	at sea (vessels)	--	at sea (vessels)
Delta	755	Ozernaya river	River shoreline	Yes	Ozernaya
	740	Opala river	River shoreline	--	Opala
	177	Sea of Okhotsk	Ocean beach	--	Opala
	178	Sea of Okhotsk	Ocean beach	--	Opala
	179	Sea of Okhotsk	Ocean beach	--	Opala
	180	Sea of Okhotsk	Ocean beach	--	Opala
	181	Sea of Okhotsk	Ocean beach	--	Opala
	184	Sea of Okhotsk	at sea (vessels)	--	at sea (vessels)
	198	Sea of Okhotsk	Ocean beach	Yes	Ozernaya

Arriving catch is recorded in the log of the processing facility. The processing plants track numbers of salmon by species by day for each fishing parcel. The record contains the location of the catch and company which submits catch. Both the companies' logs and the processing facilities' logs are regularly checked by SKTU inspectors, sanitary-epidemiological control and territorial RosPrirodNadzor. The facts of such inspections are also being recorded in appropriate logs.

All fish delivered from landing sites have documentation that shows date, location, volumes, species, and fishing operator. Since each operator has a commercial fishing permit that also identifies gear type, documentation of the different gear types and operators would prevent substitution at delivery. Subsequent chain of custody would assure separation after the initial delivery.

Ozernaya sockeye are landed in the Ozernaya River and on coastal beaches for nearby fish traps in marine waters. Ozernaya sockeye is certified and independently tracked by fishing parcel (Table 26) which allows them to be distinguished from uncertified sockeye catches that occur in other rivers and marine parcels in west Kamchatka. All certified Ozernaya sockeye are delivered to the Ozernaya processing plant. Sockeye from other rivers and marine traps may also be delivered to the Ozernaya plant for processing but only those caught in sites identified in the Oernaya certification are certified. Certified catch is distinguished from ineligible catch of the same species based on fishing site. A similar situation exists for Kol River Coho salmon, which are included in this certification while coho salmon from other sites are not. No Chinook salmon caught in the West Kamchatka fishery is certified.

Some risk occurs that illegally harvested fish or fish harvested by a company not under the certificate sharing agreement could be accepted at a processing facility as certified. Substantial efforts by the certificate-sharing companies to enhance enforcement activities by supplying personnel, equipment, and funding to the authorities minimizes the opportunity for illegal harvest in the beach regions where legal fishing occurs. These companies also support enforcement activities further up river to minimize the opportunity of illegal harvest of roe. Therefore, the likelihood is low of illegal product entering the processing facilities with the proper documentation and weights that would pass inspections by the authorities.

MSC traceability requirements were checked only as far as salmon landed at authorized fishing parcels by legally permitted fishing companies under the certificate sharing agreement and delivered to processing facilities, where the landings can be monitored in accordance with MSC chain of custody requirements. Under the certificate sharing agreement, authorized fishing companies may use the certificate and apply the MSC logo if they deliver to a processing facility that holds MSC chain of custody certification.

The occurrence of illegal fishing in the Russian Far East suggests a need for robust chain of custody to mitigate the risk of product from a non-certified source entering the supply chain. Chain of custody would begin at the point of delivery of product from a company participating in the certificate sharing

agreement to a processing facility, whether the facility is owned by the participating company or by another entity.

Table 27. Traceability factors within the Fishery:

Traceability Factor	Description of risk factor if present. Where applicable, a description of relevant mitigation measures or traceability systems (this can include the role of existing regulatory or fishery management controls)
Potential for non-certified gear/s to be used within the fishery	Gillnets are used at one up-river fishing parcel controlled by the companies in the unit of assessment. Gillnet fish must be delivered by special transport, that is easy to distinguish from fish transported from beach seines or trap nets. Record keeping is strong under the current management system, due to government monitoring and because fishermen get paid based on catch, and they compare records from the parcel with the factory records to assure full pay.
Potential for vessels from the Unit of Certification to fish outside the Unit of Certification or in different geographical areas (on the same trips or different trips)	Not present – Vessels are owned by the companies and are assigned to the active fishing parcels. Vessels could not obtain fish from beyond company fishing activities without detection because the plants and the government inspectors compare logbook records from a parcel with landing at the plant.
Potential for vessels outside of the Unit of Certification or client group fishing the same stock	Client group companies do not accept fish from other companies, and process only their own fish. No legally caught fish from other companies could surreptitiously enter the processing plants of client group companies as all fish must have documentation checked frequently by federal authorities, and documentation of fish from other companies would easily be evident.
Risks of mixing between certified and non-certified catch during storage, transport, or handling activities (including transport at sea and on land, points of landing, and sales at auction)	Not present – all covered by chain of custody. All fish delivered from landing sites have documentation that shows date, location, volumes, species, and fishing operator. Since each operator has a commercial fishing permit that also identifies gear type, documentation of the different gear types and operators would prevent substitution at delivery.
Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)	Not present – chain of custody starts at delivery to the processing plan, with chain of custody documented in all subsequent processing steps
Risks of mixing between certified and non-certified catch during transhipment	Not present – No transhipment
Any other risks of substitution between fish from the Unit of Certification (certified catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required	Not present

4.3 Eligibility to Enter Further Chains of Custody

Salmon produced by fishing companies in the client group with authorization to fish with nets within the fishing district landed from authorized parcels are eligible to enter further chain of custody. Chain of custody begins at delivery of salmon to a processing facility in the client group or at a point of change in ownership of the fish. Members of the Client Group (VA and Delta) own the fish they catch, commencing at the point of fish catch. Fishing sites are leased and operated by the members of the Client Group, which also operate the processing plants. Documentation of the fish is sufficient (see section 5.2) such that chain of custody is not necessary for transport of wholly-owned fish from the point of catch to delivery at the processing plant. Should other companies share the certificate at some point in the future and sell fish to VA, Delta or other company holding chain of custody, chain of custody would start at the point of sale, but no later than delivery to a processing plant. Any

companies buying from processing facilities that receive certified product are required to have chain of custody certification for further sale and distribution. This certification did not evaluate other landing sites that are not part of the certification determination or subsequent distribution for chain of custody. To use the MSC logo, subsequent links in the distribution chain must enter into a separate chain of custody certification that proves they can track the salmon product to a chain of custody holder.

5 EVALUATION RESULTS

5.1 Principle Level Scores

Principle	Final Principle Scores		
	Pink Salmon	Chum Salmon	Coho Salmon
Principle 1 – Target Species	81.9	81.9	81.9
Principle 2 – Ecosystem	85.7		
Principle 3 – Management System	81.9		

5.2 Summary of PI Level Scores

Prin-ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score pink	Score chum	Score coho
One	1	Outcome	0.333	1.1.1	Stock status	0.5	0.167	70	70	70
				1.1.2	Stock rebuilding	0.5	0.167	80	80	80
		Management	0.333	1.2.1	Harvest strategy	0.25	0.083	85	85	85
				1.2.2	Harvest control rules & tools	0.25	0.083	70	70	70
				1.2.3	Information & monitoring	0.25	0.083	65	65	65
				1.2.4	Assessment of stock status	0.25	0.083	75	75	75
		Enhancement	0.333	1.3.1	Enhancement outcome	0.333	0.111	100	100	100
				1.3.2	Enhancement management	0.333	0.111	100	100	100
				1.3.3	Enhancement information	0.333	0.111	100	100	100
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.067	80		
				2.1.2	Management	0.333	0.067	90		
				2.1.3	Information	0.333	0.067	70		
		Bycatch species	0.2	2.2.1	Outcome	0.333	0.067	100		
				2.2.2	Management	0.333	0.067	80		
				2.2.3	Information	0.333	0.067	80		
		ETP species	0.2	2.3.1	Outcome	0.333	0.067	85		
				2.3.2	Management	0.333	0.067	90		
				2.3.3	Information	0.333	0.067	80		
		Habitats	0.2	2.4.1	Outcome	0.333	0.067	95		
				2.4.2	Management	0.333	0.067	95		
				2.4.3	Information	0.333	0.067	80		
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.067	90		
				2.5.2	Management	0.333	0.067	90		
				2.5.3	Information	0.333	0.067	80		
Three	1	Governance and policy	0.5	3.1.1	Legal & customary framework	0.3	0.150	100		
				3.1.2	Consultation, roles &	0.3	0.150	85		
				3.1.3	Long term objectives	0.3	0.150	80		
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.25	0.125	80		
				3.2.2	Decision making processes	0.25	0.125	75		
				3.2.3	Compliance & enforcement	0.25	0.125	70		
				3.2.4	Management performance	0.25	0.125	80		

5.3 Summary of Conditions

The fishery received seven conditions for performance indicators that scored less than 80.

Table 28. Summary of Conditions

Condition number	Condition	Performance Indicator	Related to previously raised condition?
1	Demonstrate that pink, chum and coho salmon escapements are at or fluctuating around target reference points established for each stream system.	1.1.1	NA
2	Demonstrate that harvest control rules are likely to be robust to the main uncertainties regarding future marine productivity regimes for Pink, Chum and Coho Salmon of the unit of certification. Demonstrate that well-defined harvest control rules are in place that ensure that the exploitation rate is reduced as the LRP is approached, and are expected to keep the SMU fluctuating around a target level consistent with MSY for component populations in different rivers and stocks (e.g. distinguish even and odd year runs for pink salmon).	1.2.2	NA
3	Provide sufficient information on wild spawning escapement for a representative range of wild Pink, Chum and Coho populations in the unit of certification to support the harvest strategy and demonstrate that wild abundance is regularly monitored at a level of accuracy and coverage consistent with the harvest control rule.	1.2.3	NA
4	Estimate stock status of Pink, Chum and Coho Salmon of the unit of certification relative to reference points that are appropriate to the SMU and demonstrate there is some evidence of coherence between the status of the indicator streams and the status of the other populations they represent within the management unit, including selection of indicator stocks with low productivity to match those of the representative SMU where applicable.	1.2.4	NA
5	Provide quantitative information on escapement of (non-Ozernaya) Sockeye and (non-Kol) Coho Salmon adequate to assess the impact of the UoA with respect to status.	2.1.3	NA
6	Demonstrate that information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	3.2.2	NA
7	Demonstrate that a monitoring, control and surveillance system has been implemented in the fishery and associated enhancement activities and has demonstrated an ability to enforce relevant management measures, strategies and/or rules, and that sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	3.2.3	NA

5.5 Determination, Formal Conclusion and Agreement

On the basis of this assessment of the fisheries, the Assessment Team recommends that the fisheries be certified.

Following this Recommendation of the assessment team, and review by stakeholders and peer-reviewers, a determination is hereby made by MRAG Americas to certify the fisheries.

5.6 Changes in the fishery prior to and since Pre-Assessment

Since the pre-assessment the management system completed extensive work to develop precautionary limit and target reference points related to this fishery (Shevlyakov et al. 2016). Stock-recruitment data was estimated by population based on annual escapement and harvest data. A theoretical framework was developed for deriving reference points and applying to the data. These reference points have not yet been incorporated into management practice but are expected to be evaluated for potential future application. The assessment team will monitor changes to science and management during surveillance.

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APPENDIX 1 – PERFORMANCE INDICATOR SCORING AND RATIONALES

Evaluation Table for PI 1.1.1 – Stock status

PI 1.1.1		**The stock management unit (SMU) is at a level which maintains high production and has a low probability of falling below its limit reference point (LRP)**		
Scoring Issue		SG 60	SG 80	SG 100
A	Stock status			
	Guidepost	It is **likely** that the SMU is above the limit reference point (LRP).	It is **highly likely** that the SMU is above the LRP.	There is a **high degree of certainty** that the SMU is above the LRP.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho - Yes	Pink – No Chum – No Coho – No
	Justification	SG 60 – See SG80. SG80 – Quantitative data on long-term production trends and escapement provide strong evidence that Pink, Chum and Kol coho are highly likely above the point where recruitment would be impaired by the current commercial fishery. Run sizes, harvest and escapement have all increased or remained at high levels for all three species over the last decade. In part, this is related to an extended period of favorable ocean conditions for these species throughout the northern Pacific. These stocks have also benefited by improvements in fishery management structures and enforcement which appear to have substantially reduced the illegal and unreported harvest which reduced spawning escapements. Productivity functions have been estimated and optimum spawning levels have been identified relative to the point where recruitment would be impaired. Stock assessment information indicates that spawning escapements consistent with optimum production levels are consistently achieved. KamchatNIRO reported that for the subject populations the escapement value did not go below the limit reference point, and the range of escapement values for the most species tends to or exceeds the target reference points (Shevlyakov et al. 2016). Management for optimum spawning escapement levels provides a conservative standard for protecting populations from critical low levels that impact diversity, resilience and future production. Management for these target reference points effectively provides an operational equivalent of a limit reference point in salmon management systems by effectively avoiding lower escapements to the extent that this is possible by regulating fisheries. Highly variable annual run sizes are characteristic of salmon. Thus, it is not always possible to meet optimum targets in every population and year. However, effective management for target reference points should ensure that average escapements will be maintained over the long term above the level at which there is an appreciable risk of impairing reproductive capacity. Consistent high levels of Pink, Chum and Kol Salmon production over the last decade confirm that the management strategy based on target reference points has effectively maintained the reproductive capacity of the aggregate stock of each species. Freshwater habitat conditions in western Kamchatka, with few exceptions, are excellent for salmon production. Watersheds are virtually pristine and support tremendous diversity of aquatic systems including rivers, streams, lakes and wetlands which provide ideal conductions for salmon production. These conditions are conducive to high levels of salmon productivity and inherent resilience to harvest which in turn can sustain robust levels of fishery exploitation. At the same time, fishery management intensity is scaled to the vast area of the region and the limitations of the available institutional resources for stock assessment and management. Stocks of each species are effectively managed as regional aggregates which is generally appropriate given the productivity of the habitat and the normal covariation		

PI 1.1.1		The stock management unit (SMU) is at a level which maintains high production and has a low probability of falling below its limit reference point (LRP)		
Scoring Issue		SG 60	SG 80	SG 100
		among substocks resulting from shared freshwater and ocean productivity patterns. System-specific regulatory mechanisms are implemented based on local abundance and fishery dynamics. Potential improvements in population-specific management with population-specific escapement objectives are also being explored. Occasional poor run years and escapements into portions of some systems are characteristic of salmon. Long term population viability and fishery sustainability for salmon is maintained under these circumstances by a diverse meta-population structure including multiple, interacting populations and subpopulations, and by only a portion of each population or brood year Cohort returning to spawn in any given year (McElhany et al. 2000). SG100 – A high degree of certainty is precluded for the SMU because specific limit reference points have not been incorporated into management practice and not every population is fished at optimum levels in every year. A complex mixed species and stock fishery results from substantial overlap in run timing of salmon species, interannual variation in run sizes of different species, different fishing capacity and intensity in different systems, and a higher incidence of illegal, unaccounted, non-industrial fishing in some areas. The management system has developed a methodology for identifying precautionary limit reference points at a population scale for the UoA and it is expected that the applicability and utility of these reference points will be further evaluated in coming years.		
B	Stock status in relation to target reference point (TRP, e.g. target escapement goal or target harvest rate)			
	Guidepost		The SMU is at or fluctuating around its TRP.	There is a **high degree of certainty** that the SMU has been fluctuating around its TRP, or has been above its target reference point over recent years.
	Met?		Pink – No Chum – No Coho – No	Pink – No Chum – No Coho – No
	Justification	The SG 80 standard is not achieved because of uncertainty regarding stock status relative to TRPs due to the aggregate nature of the stock assessment to derive goals, reductions in annual assessments of spawning escapement due to recent funding constraints and differences in fishing intensity in different systems. In aggregate, species are fished at levels consistent with high yields (and low probability of recruitment overfishing) but this may not always be the case for some populations. Under the current management system which was adopted in 2008, quantitative stock assessments indicate that aggregate stocks in the Unit of Assessment are generally fluctuating in the past decade around spawning escapements that were historically demonstrated to produce high sustained yields in conventional spawner stock-recruitment analyses. However, corresponding production functions were generally based on regional aggregates by species. Spawning escapement goals were then derived for specific river systems by apportioning aggregate values based on the relative sizes of the respective populations in each system. Salmon escapement goals are managed based on production functions defined by stock-recruitment curves relating spawner numbers with adults produced in the next generation of return. Escapements greater than the habitat capacity will reduce productivity due to density-dependent regulating factors involving competition for limited space and food. Escapements substantially less than capacity reduce fishery yields. Maximum sustainable yield typically occurs somewhere between 50% and 100% of the habitat capacity where capacity is defined based on the point of maximum production in the stock recruitment		

PI 1.1.1		**The stock management unit (SMU) is at a level which maintains high production and has a low probability of falling below its limit reference point (LRP)**		
Scoring Issue		SG 60	SG 80	SG 100
		curve (Ricker 1975). Stock-recruitment curves are utilized to derive escapement objectives for western Kamchatka salmon consistent with a biomass that produces high levels of sustained yields and high rates of replacement in the historical dataset. Spawning escapements were historically assessed each year relative the target values and in-season management is used to regulate fishing intensity in order to achieve spawning objectives. However, objective values may not be met in every system and every year. It is unclear whether objectives maximize sustained yield.		
C	Status of component populations			
	Guidepost			The **majority** of component populations in the SMU are within the range of expected variability
	Met?			Pink – No Chum – No Coho – No
	Justification	While the majority of the component populations are within the range under the expected variability under the aggregate stock assessment approach, it cannot be concluded that target reference points provide a precautionary standard sufficient to meet the 100 scoring guidepost without explicit consideration of stock and system-specific escapement goals derived independently for each system. The management system has developed a methodology for identifying precautionary target reference points at a population scale for the UoA and it is expected that the applicability and utility of these reference points will be further evaluated in coming years.		
References		See Section 3.3.4 Management - Assessment Methods		
Stock Status relative to Reference Points				
See sections 3.3.1 Pink Salmon, 3.3.2 Chum Salmon, and 3.3.3 Coho Salmon for specific reference points				
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 70 Chum – 70 Coho – 70
CONDITION NUMBER (if relevant): **Condition 1.** **Demonstrate that pink, chum and coho salmon escapements are at or fluctuating around target reference points established for each stream system.**				

Evaluation Table for PI 1.1.2 – Stock rebuilding

PI 1.1.2		Where the stock management unit (SMU) is reduced, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	**Rebuilding timeframes**			
	Guidepost	A rebuilding timeframe is specified for the SMU **that is the shorter of 20 years or 2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.		The shortest practicable rebuilding timeframe is specified which does not exceed **one generation time** for SMU.
	Met?	Pink – Yes Chum – Yes Coho - Yes		Pink – No Chum – No Coho - No
	Justification	Although scoring of PI 1.1.2 is required for scores less than 80 in PI 1.1.1, there is no information that any stock management unit is reduced. Reduced spawning escapement surveys have led to underestimates of abundance. Non-quantitative information suggests that Pink and Chum Salmon are currently fluctuating in a range that exceeds historical levels of abundance. Coho Salmon (Kol) are fluctuating in a range comparable to historical abundance. A condition for PI 1.2.3 requiring increased information on abundance is expected to close the condition for PI 1.1.1, and demonstrate that the SMUs are at target levels.		
b	Rebuilding evaluation			
	Guidepost	Monitoring is in place to determine whether the fishery-based rebuilding strategies are effective in rebuilding the SMU within the specified timeframe.	There is **evidence** that the fishery-based rebuilding strategies are being implemented effectively, or it is likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the SMU within the specified timeframe.	There is **strong evidence** that the rebuilding strategies are being implemented effectively, or it is highly likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the SMU within the specified timeframe.
	Met?	Pink – Yes Chum – Yes Coho - Yes	Pink – Yes Chum – Yes Coho - Yes	Pink – No Chum – No Coho - No
	Justification	There is no information that any stock management unit is reduced. Reduced spawning escapement surveys have led to underestimates of abundance, but the surveys are useful as an index. Non-quantitative information suggests that Pink and Chum Salmon are currently fluctuating in a range that exceeds historical levels of abundance. Coho Salmon (Kol) are fluctuating in a range comparable to historical abundance. The passing day strategy and non-quantitative observations demonstrate implementation. A condition for PI 1.2.3 requiring increased information on abundance is expected to close the condition for PI 1.1.1, and demonstrate that the SMUs are at target levels.		
c	Use of enhancement in stock rebuilding			

PI 1.1.2		Where the stock management unit (SMU) is reduced, there is evidence of stock rebuilding within a specified timeframe		
	Guidepost	Enhancement activities are **not routinely used** as a stock rebuilding strategy but may be temporarily in place as a conservation measure to preserve or restore wild diversity threatened by human or natural impacts.	Enhancement activities are **very seldom used** as a stock rebuilding strategy.	Enhancement activities are **not used** as a stock rebuilding strategy.
	Met?	Not applicable	Not applicable	Not applicable
	Justification	Enhancement does not occur.		
References		See sections 3.3.1 Pink Salmon, 3.3.2 Chum Salmon, and 3.3.3 Coho Salmon		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guidepost	The harvest strategy is **expected** to achieve SMU management objectives reflected in PI 1.1.1 SG80 including measures that address component population status issues.	The harvest strategy is responsive to the state of the SMU and the elements of the harvest strategy **work together** towards achieving SMU management objectives reflected in PI 1.1.1 SG80 including measures that address component population status issues.	The harvest strategy is responsive to the state of the SMU and is **designed** to achieve SMU management objectives reflected in PI 1.1.1 SG80 including measures that address component population status issues.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No
	Justification	SG60 - See SG80 SG80 - The harvest strategy in place is responsive to the state of the SMU and works effectively to achieve escapement-based management objectives. The strategy involves establishing fishing seasons, scheduled passing days of no fishing to limit exploitation rates and distribute escapement throughout the season, in-season monitoring of harvest, species composition, biological indicators, and spawning escapements, and in-season fishery management based on this information. Fishery times and areas are designed and regulated specifically to fill the available natural spawning areas and to achieve corresponding escapement objectives. For instance, fishing areas, specific nets or dates may be closed to ensure escapement. Management occurs on a river by river basis with meeting escapement targets as a primary priority of the management system. SG100 – The SG100 standard is not met because the aggregate SMU-based strategy employed in Western Kamchatka may not meet population-specific objectives in every case (although it generally achieves goals at the SMU level).		
b	Harvest strategy evaluation			
	Guidepost	The harvest strategy is **likely** to work based on prior experience or plausible argument.	The harvest strategy may not have been **fully tested** but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain SMUs at target levels.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No
	Justification	SG60 - See SG80 SG80 - Direct evidence including documentation of in-season restrictions based on abundance and assessments of spawning escapement, demonstrates that the harvest strategy is generally achieving its objectives. Fishery restrictions based on time and area closures are regularly adopted in-season based on real-time information on run size and catch composition. Recent fishery actions are detailed in Section 3.3.4. Established regulations and in-season measures have consistently distributed spawning escapements		

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
		around established goals. SG100 - The current harvest strategy has been in place since only 2008 and may not have been fully tested under a wide range of conditions including the inherent variability in abundance and run timing of salmon. In particular, it is not clear whether the system has been challenged by an extended interval of low salmon productivity. The current system may not have effectively regulated harvest of Coho Salmon to achieve escapement objectives in many area rivers outside the Kol. Non-Kol Coho are not included as a target species in this assessment, in part due to this issue.		
c	Harvest strategy monitoring			
	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Pink – Yes Chum – Yes Coho – Yes		
	Justification	SG60 - The harvest strategy involves extensive in-season monitoring of harvest, catch per unit effort, biological indicators (sex and age), and spawning escapement. These indicators are compared with historical values and patterns to determine run size and timing, and make corresponding adjustments in fishing times and areas. The harvest strategy is grounded in a well-developed system of scientific assessment and monitoring. Run forecasts are made based on brood year escapements and recent production patterns to identify recommended harvest levels as preseason planning tools. Once the fishing season begins, management to control exploitation rates is based on in-season data. Data are referenced to seasonal patterns in previous years to distinguish run timing and strength. Forecasts are typically uncertain and run timing may also vary from year to year. Overfishing might occur when run timing effects are mistaken for run size (for instance, mistaking a strong earlier-than-average return for a larger-than-forecast number). In-season management utilizes indicators based on biological characteristics of the harvest to avoid this potential problem. For instance, the early portion of each run typically includes a larger percentage of males which declines as the run progresses. Average fish size varies in tandem as male and female sizes are different.		
d	Harvest strategy review			
	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			Pink – Yes Chum – Yes Coho – Yes
	Justification	SG100 - The harvest strategy is periodically reviewed and improved as necessary. Extensive changes in the strategies adopted by the regional management system since 2008 provide for more local and responsive regulation are evidence to this effect. Recent work to develop population-specific limit and target reference points based on river-specific stock-recruitment data provide more evidence to this effect.		
e	Shark finning			
	Guidepost	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Justification	No sharks are caught in this fishery.		
f	**Review of alternative measures**			
	Guidepost	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	Not applicable	Not applicable	Not applicable
	Justification	There is no unwanted catch of the target stock		
References		See Section 3.3.4. Management		
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 85 Chum – 85 Coho – 85
CONDITION NUMBER (if relevant):				--

Evaluation Table for PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
A	HCRs design and application			
	Guidepost	**Generally understood** HCRs are in place or available which are expected to reduce the exploitation rate as the SMU LRP is approached.	**Well defined** HCRs are in place that ensure that the exploitation rate is reduced as the LRP is approached, are expected to keep the SMU fluctuating around a target level consistent with MSY.	The HCRs are expected to keep the SMU fluctuating at or above a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No	Pink – No Chum – No Coho – No
	Justification	SG60 – Generally understood control rules include season dates, establishing passing days, and time/area closures based on real time escapement monitoring data in conjunction with other indicators of run strength and timing based on harvest and biological composition of the harvest. Recent fishery actions are detailed in Section 3.3.4. Operation of the fishing gear is modified in response to whether escapement goals are being met. Harvest control rules are specifically defined in licenses issued for commercial fishery operation and in-season regulation changes adopted by an Anadromous Fish Commission as appropriate at the recommendation of scientific and fishery management authorities. In-season management has the effect of reducing exploitation rates at low abundance. SG80 – The SG80 is not met because it is not clear that escapement levels consistent with MSY are consistently met for stocks in some rivers and years. In addition, Pink salmon do		

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
		not meet the SG80 standard because escapement goals do not distinguish odd and even years. SG100 – Not scored.		
b	HCRs robustness to uncertainty			
	Guidepost		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a **wide range** of uncertainties including the ecological role of the SMU, and there is evidence that the HCRs are robust to the main uncertainties.
	Met?		Pink – No Chum – No Coho – No	Pink – No Chum – No Coho – No
	Justification	SG80 – The SG80 standard is not met because it is unclear whether harvest control rules are sufficiently robust to maintain appropriate levels of escapement in the event of a prolonged period of reduced ocean productivity. HCR's appear to be generally effective in regulating exploitation rates during the current period of high salmon productivity in West Kamchatka corresponding to a period of favorable marine conditions. High productivity makes these stocks extremely resilient and capable of sustaining high harvests and harvest rates. Production remains high even in the face of periodic low escapements that sometimes occur among exploited salmon populations as a result of normal annual variability in returns and inexact forecast and assessment methods. However, high harvests create an expectation for continuing high harvest and a fishery infrastructure consistent with supporting demands. Salmon productivity has been observed to increase and decrease in long term cycles related to periodic shifts in marine productivity patterns. These shifts can pose significant challenges to harvest control rules in the implementation of timely restrictions of fisheries consistent with reduced stock productivity. The risk is significant overfishing relative to yield potential. This concern is compounded by uncertainty in stock assessments associated with recent reductions in aerial survey efforts. Reduced certainty in stock assessments will make it difficult to recognize reduced returns in-season and to implement timely fishery restrictions necessary to protect spawning escapement. Reduced certainty in stock assessments may also make it difficult to recognize extended productivity downturns which warrant more conservative preseason measures. These concerns are acknowledged by the management system. Uncertainties in population-specific escapement goals are recognized with the development of precautionary escapement reference points but these reference points have not yet been fully incorporated into annual management.		
c	**HCRs evaluation**			
	Guidepost	There is **some evidence** that tools used or available to implement HCRs are appropriate and effective in controlling exploitation.	**Available evidence** indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
	Justification	SG60 - see SG80 SG80 – Significant escapements of target stocks are consistently achieved and continuing high levels of salmon production provide evidence that harvest control rules are effective in producing appropriate exploitation rates. The fishery is managed on a daily basis using real time stock assessment information to regulate harvest consistent with escapement targets. Fisheries are restricted as appropriate based on actual run size and escapement. For instance, the harvest strategy for summer chum in Opala River was revised to allow two passing days after every two fishing days to protect escapement for below average returns in 2013-2014 and harvesting was suspended in 2015 for the same reason during the period of spawning run of autumn chum (Shevlyakov et al. 2016). SG100 - It remains to be seen whether harvest control rules will be adequate to control exploitation during poor runs or extended periods of reduced salmon productivity. Tools for implementing harvest control rules for Coho do not appear to have been sufficiently effective in controlling exploitation to achieve escapement objectives of that species in systems outside the Kol River although Coho assessment challenges and reduced survey intensity make it difficult to make a definitive assessment of Coho status in some systems.		
d	Maintenance of wild population components			
	Guidepost	It is **likely** that the HCRs and tools are consistent with maintaining the diversity and productivity of the wild component population(s).	It is **highly likely**, that the HCRs and tools are consistent with maintaining the diversity and productivity of the wild component population(s).	There is a **high degree of certainty** that the HCRs and tools are consistent with maintaining the diversity and productivity of the wild component population(s).
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No
	Justification	SG60 – See SG80 SG80 – Diversity in salmon is represented among populations inhabiting different rivers within a species management unit and substocks returning to different areas within each river, often with different run timing (early vs. late for instance). Current harvest control rules maintain this diversity by managing to protect escapements in all rivers and across the duration of the run. Stock assessment data indicates this system is generally effective. SG100 – The SG 100 is not met because specific objectives for component populations and substocks are not explicitly incorporated in management.		
References		See Section 3.3.4 Management		
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 70 Chum – 70 Coho – 70
CONDITION NUMBER (if relevant): **Condition 2.** **Demonstrate that harvest control rules are likely to be robust to the main uncertainties regarding future marine productivity regimes for Pink, Chum and Coho Salmon of the unit of certification. Demonstrate that well defined HCRs are in place that ensure that the exploitation rate is reduced as the LRP is approached, and are expected to keep the SMU fluctuating around a target level consistent with MSY for component populations in different rivers and stocks (e.g., distinguish even and odd year runs for pink salmon).**				

Evaluation Table for PI 1.2.3 – Information and monitoring

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Range of information			
	Guidepost	**Some** relevant information related to SMU structure, SMU production and fleet composition is available to support the harvest strategy. Indirect or direct information is available on some component populations.	**Sufficient** relevant information related to SMU structure, SMU production, fleet composition and other data is available to support the harvest strategy, including harvests and spawning escapements for a representative range of wild component populations.	A **comprehensive range** of information (on SMU structure, SMU production, fleet composition, SMU abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available, including estimates of the impacts of fishery harvests on the SMU and the majority of wild component populations.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No	Pink – No Chum – No Coho – No
	Justification	SG60 - A large amount of relevant information is collected to support the harvest strategy. This includes extensive data on stock structure, stock productivity, fleet composition and other data on biological characteristics of the run, run timing, spawning distribution, and spawning escapement. Assessments also include direct estimates of natural stock productivity on a regional and population-specific. SG80 - Concern for the sufficiency of information on spawning escapements for a representative range of component populations in the future is raised by the continuing reductions in aerial survey effort which is the basis for inseason and post season stock assessment, thereby not meeting SG80.		
b	Monitoring			
	Guidepost	SMU wild abundance and UoA removals are monitored and at **least one indicator** is available and monitored with sufficient frequency to support the harvest control rule.	SMU wild abundance and UoA removals are **regularly monitored** at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	**All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No	Pink – No Chum – No Coho – No
	Justification	SG60 - Detailed information is collected on harvest in the commercial salmon fishery. Numbers are estimated multiple stages of the harvest and processing chain. Detailed records are required and kept by the fishery and the government. Changes in the management system over the previous decade ensure accuracy of catch reporting by		

PI 1.2.3		Relevant information is collected to support the harvest strategy		
		removing incentives for inaccurate accounting to avoid taxes or remain within a designated allocation. Catch data are reported on a real time basis during the fishing season. SG80 - The SG80 standard is not met due to substantially reduced accuracy and precision of wild abundance estimates that will result from recent reductions in aerial survey efforts. Uncertainties in information required by the harvest control rule, especially including stock assessments, are generally understood but formal consideration of the effects of uncertainty on assessments and management have not been reported.		
c	Comprehensiveness of information			
	Guidepost		There is good information on all other fishery removals from the SMU.	
	Met?		Pink – Yes Chum – Yes Coho – Yes	
	Justification	SG 80 – KamchatNIRO has conducted extensive study on historical and current levels of salmon removals by illegal fishing in Kamchatka Rivers (Shevlyakov 2013; Shevlyakov et al. 2016). Illegal harvest has long been a very significant problem in Kamchatka salmon fisheries but the incidence has been greatly reduced by changes in the management system. KamchatNiro has estimated that illegal harvest substantially reduced historical spawning escapements in many rivers. However, industrial levels of poaching have been largely eliminated by changes in the management system. In 2008, with introduction of the Olympic system, individual quotas disappeared. With that change, incentives to exceed the quota disappeared too, thus eliminating industrial illegal fishing which a significant problem before 2008. Illegal harvest remains a concern in areas with a significant local populace and reported abuses of the indigenous permitting system. This problem is most significant in rivers outside the UoC such as the Bolshaya due to its local population and road accessibility (the Bolshaya in not in the unit of assessment). Harvest of Kamchatka salmon also historically occurred outside the UoC in commercial drift gillnet fisheries in marine waters of the Russian Exclusive Economic Zone. These catches were subject to a reporting and monitoring system which estimated catch levels for high value species such as sockeye. This fishery has now been closed.		
References		See section 3.3.4 Management		
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 65 Chum – 65 Coho – 65
CONDITION NUMBER (if relevant): **Condition 3. Provide sufficient information on wild spawning escapement for a representative range of wild Pink, Chum and Coho populations in the unit of certification to support the harvest strategy and demonstrate that wild abundance is regularly monitored at a level of accuracy and coverage consistent with the harvest control rule.**				

Evaluation Table for PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status of the SMU		
Scoring Issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guidepost		The assessment **is appropriate** for the SMU and for the harvest control rule.	The assessment **takes into account** the major features relevant to the biology of the species and the nature of the UoA.
	Met?		Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No
	Justification	SG 80 - The assessment includes in-season estimation of harvest, catch per effort, biological characteristics, timing and distribution of harvest and returns, and spawning escapement. This in-season information is used in real time to guide harvest control rules designed to optimize harvest and ensure escapement sufficient to sustain future production. Spawning escapement is estimated for representative samples of stock management units for each species. SG100 – Not all major features of stock structure are fully addressed by the stock assessment. In many cases, assessments and management actions are based on aggregate rather than component stock considerations. For instance, production curves used to identify optimum escapement levels are historically based on data aggregated over multiple component stocks for a species.		
b	Assessment approach			
	Guidepost	The assessment estimates stock status relative to generic reference points appropriate to salmon.	The assessment estimates stock status relative to reference points that are appropriate to the SMU and can be estimated.	The assessment estimates with a high level of confidence both stock status and reference points that are appropriate to the SMU and its wild component populations.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No	Pink – No Chum – No Coho – No
	Justification	SG 60 - Stock status is estimated by species, river system, and sometimes major substock. These escapement estimates are evaluated relative to target spawner numbers for each system. Spawning escapement goals are historically established based on production functions for the aggregate return of western Kamchatka salmon by species apportioned by the relative size of the respective populations. The management system is exploring the development of goals based on population-specific analyses. SG80 - The SG80 standard is not met because of uncertainty in the accuracy and precision of future stock assessments due to a continuing reduction in aerial spawning ground survey effort. Current assessments also provide low resolution on major stock subcomponents and limited precision due to a reliance on peak escapement counts in selected index areas. Standardized aerial surveys have been much reduced over the years due to limitations in resources and the current survey intensity may not be adequate to avoid significant imprecision or bias in escapement estimates during any given year due to abnormal run timing or fish distribution. Estimates likely include sufficient precision to distinguish large and small runs but lack the resolution to avoid estimation bias due to abnormal run timing		

PI 1.2.4		There is an adequate assessment of the stock status of the SMU		
		or unrepresentative fish distribution. Assessments may not be adequate for timely recognition of significant downturns in production cycle should they occur.		
c	Uncertainty in the assessment			
	Guidepost	The assessment **identifies major sources** of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No
	Justification	SG60 - The stock assessment has identified major sources of uncertainty including normal environmentally-driven variability in productivity, normal annual variability in run timing and distribution, and heterogeneity in productivity of major stock subcomponents. SG80 – Major uncertainties are taken into account in management. Harvest is controlled in-season based on real-time data on spawning escapement in aerial spawning ground surveys as well as numbers and characteristics of fish entering the fishery. In-season assessments allow fisheries to be regulated based on normal annual variability in productivity and run timing. Assessments incorporate spatial patterns which address heterogeneity in major stock subcomponents. The management system is also exploring the development of goals based on population-specific stock-recruitment analyses. These goals include explicit precautionary safety factors based on statistical analysis uncertainty in population-specific stock-recruitment relationships. SG100 - Stock status is not evaluated relative to reference points in a probabilistic way. Uncertainty in escapement estimates has not been quantified.		
d	Evaluation of assessment			
	Guidepost			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Pink – No Chum – No Coho – No
	Justification	A rigorous exploration of alternative hypotheses and approaches has not been reported.		
e	Peer review of assessment			
	Guidepost		The assessment of SMU status, including the choice of indicator populations and methods for evaluating wild salmon in enhanced fisheries is subject to peer review.	The assessment, including design for using indicator populations and methods for evaluating wild salmon in enhanced fisheries, has been **internally and externally** peer reviewed.
	Met?		Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No

PI 1.2.4		There is an adequate assessment of the stock status of the SMU		
	Justification	SG80 - The stock assessment is subject to extensive peer review within the management system. KamchatNIRO scientists regularly review and improve assessment methodologies and results which are subject to additional review by the regional scientific institute (VNiro). In-season assessment information receives extensive review as part of the annual management process overseen by the Anadromous Fish Commission. SG100 - External peer review is limited.		
f	Representativeness of indicator populations			
	Guidepost	Where indicator stocks are used as the primary source of information for making management decisions on SMUs, there is **some scientific basis** for the indicators selection.	Where indicator stocks are used as the primary source of information for making management decisions on SMUs, there is **some evidence of coherence** between the status of the indicator streams and the status of the other populations they represent within the management unit, including selection of indicator stocks with low productivity (i.e., those with a higher conservation risk) to match those of the representative SMU where applicable.	Where indicator stocks are used as the primary source of information for making management decisions on SMUs, the status of the indicator streams are **well correlated** with other populations they represent within the management unit, including stocks with lower productivity (i.e., those with a higher conservation risk).
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No	Pink – No Chum – No Coho – No
	Justification	SG60 – The stock assessment historically surveyed representative areas of most river systems for each salmon species. Index reaches were selected based on their representative nature based on analysis of a fuller complement of historical survey areas. SG80 – The SG 80 guidepost is not met due to the introduction of substantial uncertainty in interpretation of index areas introduced by recent reductions in aerial survey efforts. Stock assessment has become increasingly reliant on indicator streams with the reduction in sampling rate but changing distribution pattern over time at different scales of abundance can confound interpretation of index samples. Reliance on index areas may not provide representative estimates for a full spectrum of strong and weak stock subcomponents within a system. Peak spawner counts from the most productive habitats may not be representative of the total stock under conditions of low productivity or declining returns. Further, escapement goals are generally based on production functions for aggregate stock and river populations of a species. Curves and goals thus represent an average stock and may be disproportionately driven by large strong stocks in the aggregate.		
g	Definition of Stock Management Units (SMUs)			
	Guidepost	The majority of SMUs are defined with a clear rationale for conservation, fishery management and stock assessment requirements.	The SMUs are **well-defined** and include definitions of the major populations with a clear rationale for conservation, fishery management and stock assessment requirements.	There is an **unambiguous description** of each SMU that may include the geographic location, run timing, migration patterns, and/or genetics of component populations with a clear rationale for conservation, fishery

PI 1.2.4		There is an adequate assessment of the stock status of the SMU		
				management and stock assessment requirements.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – No Chum – No Coho – No
	Justification	SG60 – See SG 80 SG80 - Stocks of west Kamchatka salmon are comprised of subcomponents including substocks (e. g., early and late runs), demographically-independent populations (e.g. species returning to home rivers or lakes), and with a spectrum of natural diversity expressed in run timing and spatial distribution. Stocks including major populations are well defined based on river system, run timing, and spawning distribution. Major substocks include five groups of Pink Salmon; summer and fall runs of Chum Salmon, and early and late coho runs. Substocks can be distinguished over the course of the fishing season based on run timing, size and sex ratio. Assessments are made of the major component stocks and management and include considerations for each. SG100 - Descriptions and rationale for stock management are not unambiguous. Harvest and escapement of stock components are understood based on run timing and spatial distribution, respectively. Information is generally sufficient to estimate the significance of fishery harvest at the species and river system level but not at the substock level within a river system. Substock-specific estimates of harvest and escapement are limited.		
References		See section 3.3.4 for description of stock assessment methodology. See chapters 3.3.1 (Pink Salmon), 3.3.2 (Chum Salmon), and 3.3.3 (Coho Salmon) for species specifics.		
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 75 Chum – 75 Coho – 75
CONDITION NUMBER (if relevant): **Condition 4.** **Estimate stock status of Pink, Chum and Coho Salmon of the unit of certification relative to reference points that are appropriate to the SMU and demonstrate there is some evidence of coherence between the status of the indicator streams and the status of the other populations they represent within the management unit, including selection of indicator stocks with low productivity to match those of the representative SMU where applicable.**				

Evaluation table for PI 1.3.1 – Enhancement outcomes

PI 1.3.1		**Enhancement activities do not negatively impact wild stock(s)**		
Scoring Issue		SG 60	SG 80	SG 100
a	Enhancement impacts			
	Guidepost	It is **likely** that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.	It is **highly likely** that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.	There is a **high degree of certainty** that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes
	Justification	No hatchery enhancement of Pink, Chum or Coho Salmon occurs in unit of certification systems.		
References		See Section 2.3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 100 Chum – 100 Coho – 100
CONDITION NUMBER (if relevant):				--

Evaluation table for PI 1.3.2 – Enhancement management

PI 1.3.2		Effective enhancement and fishery strategies are in place to address effects of enhancement activities on wild stock(s).		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guidepost	**Practices and protocols** are in place to protect wild stocks from significant negative impacts of enhancement.	There is a **partial strategy** in place to protect wild stocks from significant negative impacts of enhancement.	There is a **comprehensive strategy** in place to protect wild stocks from significant negative impacts of enhancement.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes
	Justification	No hatchery enhancement of Pink, Chum or Coho Salmon occurs in unit of certification systems.		
b	Management strategy evaluation			
	Guidepost	The practices and protocols in place are **considered likely** to be effective based on plausible argument.	There is **some objective basis for confidence** that the strategy is effective, based on evidence that the strategy is achieving the outcome metrics used to define the minimum detrimental impacts.	There is **clear evidence** that the comprehensive strategy is successfully protecting wild stocks from significant detrimental impacts of enhancement.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes
	Justification	No hatchery enhancement of Pink, Chum or Coho Salmon occurs in unit of certification systems.		
References		See Section 2.3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 100 Chum – 100 Coho – 100
CONDITION NUMBER (if relevant):				--

Evaluation table for PI 1.3.3 – Enhancement information

PI 1.3.3		Relevant information is collected and assessments are adequate to determine the effect of enhancement activities on wild stock(s).		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy			
	Guidepost	**Some** relevant information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced), and hatchery broodstock.	**Sufficient** relevant qualitative and quantitative information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced) and hatchery broodstock.	A **comprehensive range** of relevant quantitative information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced) and hatchery broodstock.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes
	Justification	No hatchery enhancement of Pink, Chum or Coho Salmon occurs in unit of certification systems.		
b	Use of information in assessment			
	Guidepost	The effect of enhancement activities on wild stock status, productivity and diversity are taken into account qualitatively.	A **moderate-level analysis** of relevant information is conducted and used by decision makers to quantitatively estimate the impact of enhancement activities on wild-stock status, productivity, and diversity.	A **comprehensive analysis** of relevant information is conducted and routinely used by decision makers to determine, with a high degree of certainty, the quantitative impact of enhancement activities on wild-stock status, productivity, and diversity.
	Met?	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes	Pink – Yes Chum – Yes Coho – Yes
	Justification	No hatchery enhancement of Pink, Chum or Coho Salmon occurs in unit of certification systems.		
References		See Section 2.3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				Pink – 100 Chum – 100 Coho – 100
CONDITION NUMBER (if relevant):				--

Evaluation Table for PI 2.1.1 – Primary species outcome

PI 2.1.1		The UoA aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI.		
Scoring Issue		SG 60	SG 80	SG 100
A	Main primary species stock status			
	Guidepost	Main Primary species are **likely** to be above the PRI OR If the species is below the PRI, the UoA has measures in place that are **expected** to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are **highly likely** to be above the PRI OR If the species is below the PRI, there is either **evidence of recovery** or a demonstrably effective strategy in place **between all MSC UoAs which categorise this species as main**, to ensure that they collectively do not hinder recovery and rebuilding.	There is a **high degree of certainty** that main primary species are above PRI and are fluctuating around a level consistent with MSY.
	Met?	Yes	Yes	No
	Justification	Primary species include coho salmon (in rivers except for Kol River where they are a P1 species), sockeye salmon (in rivers except for Ozernaya River where they are subject to a separate certification), and Chinook salmon (all rivers). Coho and sockeye in the commercial catch are retained, processed and sold. Chinook are not subject to commercial fishing or sale but small numbers may occasionally be caught during early season fisheries in some rivers. Sockeye and (non Kol) coho are main primary species. Chinook is a minor primary species. SG60 – see SG80 SG80 –Quantitative data on long-term production trends and escapement provide strong evidence that Sockeye and Coho are highly likely above the point where recruitment would be impaired by the current commercial fishery. Run sizes, harvest and escapement have varied but observed escapements have continued to produce substantial returns and harvests over the last decade. Sockeye in particular are at generally at record high levels of production throughout western Kamchatka. In part, this is related to an extended period of favorable ocean conditions for these species throughout the northern Pacific. These stocks have also benefited by improvements in fishery management structures and enforcement which appear to have substantially reduced the illegal and unreported harvest which reduced spawning escapements. Management for optimum spawning escapement levels provides a conservative standard for protecting populations from a point of recruitment impairment. Highly variable annual run sizes are characteristic of salmon, with occasional poor run years and escapements into portions of some systems. Long term population viability and fishery sustainability for salmon is maintained under these circumstances by a diverse meta-population structure including multiple, interacting populations and subpopulations, and by only a portion of each population or brood year cohort returning to spawn in any given year. Freshwater habitat conditions in western Kamchatka, with few exceptions, are excellent for salmon production. Watersheds are virtually pristine and support tremendous diversity of aquatic systems including rivers, streams, lakes and wetlands that provide ideal conditions for salmon production. These conditions are conducive to high levels of salmon productivity and lead to inherent resilience to harvest which in turn can sustain robust levels of fishery exploitation.		

PI 2.1.1		**The UoA aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI.**		
		Closure of the commercial fishery to harvest of Chinook salmon effectively ensures that the fishery does not impede recovery of this species. Stock assessment data indicate that Chinook numbers are increasing as a result of fishery restrictions. SG100 – Coho escapements in rivers other than the KoI are uncertain and inconsistent in recent years. It cannot be concluded with a high degree of certainty that non-KoI coho populations are fluctuating around MSY at this time (although they generally appear to be above the point of significant long-term recruitment impairment).		
B	Minor primary species stock status			
	Guidepost			Minor primary species are highly likely to be above the PRI OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species
	Met?			No
	Justification	While an increasing trend in escapement makes it likely this stock is above the point of recruitment impairment, this guidepost is not met because reductions in monitoring make it difficult to support this conclusion with an 80% probability. A downturn in Chinook salmon productivity related in part to an extended period of unfavorable marine conditions and historical commercial exploitation appears to have reduced abundance relative to historical levels. However, commercial fisheries for Chinook have been closed and abundance has increased substantially over the last decade. Sport harvest of Chinook is allowed as stock assessments indicate this species is currently above the point of reproductive impairment. Because of commercial fishery closures for Chinook, this fishery does not hinder rebuilding of this stock from historical low levels.		
References		See Section 2.4.1 Primary Species		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.1.2 – Primary species management

PI 2.1.2		**There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.**		
Scoring Issue		SG 60	SG 80	SG 100
A	**Management strategy in place**			
	Guidepost	There are **measures** in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to above the point where recruitment would be impaired.	There is a **partial strategy** in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the point where recruitment would be impaired.	There is a **strategy** in place for the UoA for managing main and minor primary species.
	Met?	Yes	Yes	Yes – Chinook;

PI 2.1.2		**There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.**		
				No Coho and Sockeye
	Justification	SG60 - See SG80 SG80 - The harvest strategy in place is designed to achieve escapement-based management objectives consistent with production of sustained yields of Sockeye and Coho in commercial fisheries. The strategy involves establishing fishing seasons, scheduled passing days of no fishing to limit exploitation rates and distribute escapement throughout the season, in-season monitoring of harvest, species composition, biological indicators, and spawning escapements, and in-season fishery management based on this information. Fishery times and areas are designed and regulated specifically to fill the available natural spawning areas and to achieve corresponding escapement objectives. Management occurs on a river by river basis with meeting escapement targets as a primary priority of the management system. SG100 – This standard is not met for Sockeye and Coho because the aggregate SMU-based strategy employed in Western Kamchatka may not meet population-specific objectives for Sockeye and Coho in some rivers. In many cases, status is uncertain because aerial survey efforts have been reduced substantially from historical levels. There is an effective management strategy for protection and rebuilding of Chinook salmon involving closure of the commercial fishery during the period of Chinook return that meets the SG100.		
B	**Management strategy evaluation**			
	Guidepost	The measures are considered **likely** to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Yes	Yes	Yes – Chinook; No – Coho and Sockeye
	Justification	SG60 - See SG80 SG80 –Documentation of in-season restrictions based on abundance and assessments of spawning escapement, provide an objective basis for confidence that management measures are effective for sustaining Sockeye and Coho. Fishery restrictions based on time and area closures are regularly adopted in-season based on real-time information on run size and catch composition. Recent fishery actions are detailed in Section 3.3.2. Measures have consistently produced significant spawning escapements in most years. SG100 - The current harvest strategy has been in place since only 2008 and may not have been fully tested under a wide range of conditions including the inherent variability in abundance and run timing of salmon. In particular, it is not clear whether the system has been challenged by an extended interval of low salmon productivity. The current system may not have effectively regulated harvest of Coho Salmon to achieve MSY escapement objectives in many area rivers outside the Kol and Sockeye from rivers other than the Ozernaya. Non-Kol Coho are not included as a target species in this assessment, in part due to this issue. Management measures for Chinook salmon based on closure of the commercial fishery during the period of Chinook return have practically eliminated commercial harvest of Chinook salmon. Experience with salmon plus evidence of increasing Chinook spawning escapement has demonstrated that eliminating commercial harvest and limiting recreational harvest will lead to successful rebuilding. Stock assessments indicate that a higher percentage of the annual run is escaping to spawning grounds under these regulations which were adopted in 2010.		
	Management strategy implementation			

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
c	Guidepost		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its overall objective as set out in scoring issue (a**).
	Met?		Yes	Yes –Chinook; No - Coho and Sockeye
	Justification	SG80 –Documentation of in-season restrictions based on abundance and assessments of spawning escapement, provide evidence that management measures are being implemented successfully to maintain Sockeye and Coho above a point of recruitment impairment. Increases in Chinook abundance following closure of the commercial fishery provide clear evidence that measures are being effectively implemented, SG100 – The current system may not have effectively regulated harvest of Coho Salmon outside the Kol or Sockeye outside the Ozenaya to achieve yield-based escapement objectives in many area rivers. Non-Kol Coho are not included as a target species in this assessment, in part due to this issue.		
d	**Shark finning**			
	Guidepost	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	NA	NA	NA
	Justification	No sharks are caught in this fishery.		
e	**Review of alternative measures**			
	Guidepost	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	Default 60	Default 80	No
	Justification	SG60 & SG80 - There is no unwanted catch of main primary species (Coho and Sockeye). Both are target species of the commercial fishery, SG100 – Regular review of the effectiveness of management measures for the protection of Chinook is incorporated in the current management program. These measures were adopted following extensive review of the previous management strategy which included commercial harvest, but biennial review does not occur.		
References		See Section 2.4.1 Primary Species		
OVERALL PERFORMANCE INDICATOR SCORE:				85
CONDITION NUMBER (if relevant):				--

Evaluation Table for PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a	**Information adequacy for assessment of impact on main primary species**			
	Guidepost	Qualitative information is **adequate to estimate** the impact of the UoA on the main primary species with respect to status. OR **If RBF is used to score PI 2.1.1 for the UoA:** Qualitative information is adeqaute to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is **adequate to assess** the impact of the UoA on the main primary species with respect to status. OR **If RBF is used to score PI 2.1.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptiblity attributes for main primary species.	Quantitative information is available and is **adequate to assess with a high degree of certainty** the impact of the UoA on main primary species with respect to status.
	Met?	Yes	No	--
	Justification	SG60 - A large amount of quantitative information is collected to support the harvest strategy. This includes extensive data on stock structure, stock productivity, fleet composition and other data on biological characteristics of the run, run timing, spawning distribution, and spawning escapement. Detailed information is collected on harvest in the commercial salmon fishery. Numbers are estimated multiple stages of the harvest and processing chain. Detailed records are required and kept by the fishery and the government. Changes in the management system over the previous decade ensure accuracy of catch reporting by removing incentives for inaccurate accounting to avoid taxes or remain within a designated allocation. Catch data are reported on a real time basis during the fishing season. Assessments also include direct estimates of natural stock productivity on a regional and population-specific. SG80 –However, continuing reductions in aerial survey effort which is the basis for inseason and post season stock assessment raises concern for the sufficiency of information on spawning escapements for a representative range of component populations in the future. The SG80 standard is not met due to reductions in the accuracy and precision of wild abundance estimates resulting from recent reductions in aerial survey efforts.		
b	**Information adequacy for assessment of impact on minor primary species**			
	Guidepost			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			Yes
	Justification	SG100 – Quantitative information on the effectiveness of commercial season closures for reducing catch of Chinook in the form of harvest reports. Spawning escapement data has demonstrated an increase in abundance following these measures. Recent reductions in aerial survey efforts will potentially reduce the accuracy and precision of escapement estimates if low survey efforts continue into the future. However, escapement continued to be assessed and will provide some quantitative information on status based on index area surveys.		
	Information adequacy for management strategy			

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
c	Guidepost	Information is adequate to support **measures** to manage **main** primary species.	Information is adequate to support a **partial strategy** to manage **main** Primary species.	Information is adequate to support a **strategy** to manage **all** primary species, and evaluate with a **high degree of certainty** whether the strategy is achieving its objective.
	Met?	Yes	Yes	No
	Justification	SG60 – See SG80 SG80 - Information on harvest and escapement is generally adequate to support measures and a partial strategy for to manage main primary species. SG100 – SG100 is not met because future management abilities to regulate exploitation based on abundance to achieve established escapement goals with a high degree of certainty is jeopardized by reductions in aerial survey effort.		
References		See Section 2.4.1 Primary Species		
OVERALL PERFORMANCE INDICATOR SCORE:				**70**
CONDITION NUMBER (if relevant): **Condition 5.** **Provide quantitative information on escapement of (non-Ozernaya) Sockeye and (non-Kol) Coho Salmon adequate to assess the impact of the UoA with respect to status.**				

Evaluation Table for PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit.		
Scoring Issue		SG 60	SG 80	SG 100
a	**Main secondary species stock status**			
	Guidepost	Main Secondary species are **likely** to be within biologically based limits. OR If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding.	Main secondary species are **highly likely** to be above biologically based limits OR If below biologically based limits, there is either **evidence of recovery** or a **demonstrably effective partial strategy** in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are **considerable**, there is either **evidence of recovery** or a, **demonstrably effective strategy in place between those MSC UoAs that also have considerable catches of the species**, to ensure	There is a **high degree of certainty** that main secondary species are within biologically based limits.

PI 2.2.1		**The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit.**		
			that they collectively do not hinder recovery and rebuilding.	
	Met?	Not applicable	Not applicable	Not applicable
	Justification	There are no main secondary species. Secondary species in this fishery predominately include char which are retained for commercial use. No secondary species comprises anywhere near 5% of the total catch which would categorize it as a main retained species. Char typically comprise less than 2% of the catch on average. No secondary species is less resilient or otherwise vulnerable. Non-retained catch includes a variety of species, none of which comprise a significant volume of catch. A large proportion of the non-retained catch is released alive from trapnets and beach seines.		
b	**Minor secondary species stock status**			
	Guidepost			Minor secondary species are highly likely to be above biologically based limits OR If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species.
	Met?			Yes
	Justification	SG100 – Secondary species comprise a very small proportion of the catch. Fishing methods, locations, and periods are very highly selective for migrating salmon. Char are highly likely to be above biologically based limits corresponding to a point of recruitment impairment based on historical trends in catch volume and age composition estimated by KamchatNiro from commercial catch sampling (Shevlyakov et al. 2016). Catches appear to be fluctuating around long term average values. KamchatNiro has also concluded that current harvest levels are sustainable based on a broad and relatively stable size and age composition of this iteroparous species. (Overfishing would truncate the age structure because high mortality would reduce survival to older ages.) The low incidence of other secondary species documented in this fishery provides a high degree of certainty that the fishery does not significantly affect production of these species. Species-specific biologically-based limits have not been established for non-salmonid species in this fishery because exploitation rates in the salmon fishery are deemed to be so low as to constitute no discernable impact on the status of these lightly or unexploited species. Other secondary finfish species have no commercial value, are widespread throughout the region, and the fishery footprint from ocean traps and river beach seines is very small relative to the distribution of the species. This information provides qualitative justification that other finfish bycatch in the fishery satisfies high degree of certainty outcome guideposts at the 100 scoring level.		
References		See Section 2.4.2 Secondary Species		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.2.2 – Secondary species management

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
Scoring Issue		SG 60	SG 80	SG 100
a	**Management strategy in place**			
	Guidepost	There are **measures** in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **partial strategy** in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **strategy** in place for the UoA for managing main and minor secondary species.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 – There is a partial strategy for managing and minimizing catch of secondary species in the commercial salmon fishery by use of fixed trap nets and beach seines, which have a low capture rate of secondary species, and monitoring catch of some secondary species. These gears are very effective in concentrating harvest on salmon during spawning migrations while also avoiding significant catches of other non-migratory local fish species. There are no main secondary species. Catch monitoring demonstrates use of gears with low capture rate and ensures that incidental harvest levels of minor secondary species such as char in the salmon fishery do not substantially reduce sustainability. Other minor secondary species are generally not retained and many are released alive in order to limit fishery impacts. SG100 – The SG100 is not met because a comprehensive strategy for managing main and minor secondary species has not been defined. The management systems regards bycatch reduction strategies beyond current levels unnecessary because current exploitation rates are considered to be monor (Shevlyakov et al. 2016).		
B	**Management strategy evaluation**			
	Guidepost	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	There is **some objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - The very low incidence of secondary species in the catch, based on information directly about the fishery and the species involved, provides a strong objective basis that this strategy is effective. Information from independent observer efforts of the Ozernaya sockeye fishery and similar fisheries on Iturup and Sakhalin islands supports high confidence that the fishery strategy is effective for managing bycatch. There is also an objective basis for confidence that the strategy is effective for flatfish and other finfish, for which there is a management strategy for these species in the Sea of Okhotsk. The nearshore salmon fishery comprises a negligible portion of the total harvest of flatfish. SG100 – Catch monitoring and biological sampling of char retained and sold by the fishery provides sound testing to support high confidence that the management strategy is effective for this species. SG100 is not met because the strategy has not been tested		

PI 2.2.2		**There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.**		
		directly with a regular quantitative bycatch sampling program for other species, many of which are not retained or only partially retained.		
c	**Management strategy implementation**			
	Guidepost		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully** and is **achieving its objective as set out in scoring issue (a).**
	Met?		Yes	No
	Justification	SG80 – Periodic observer observations of the Ozernaya sockeye fishery provide evidence that the fishing strategy is being implemented successfully to harvest salmon with minimal catch of other secondary species, as the trap nets inherently have low bycatch rates and allow for live releases of some bycatch species. SG100 - Catch monitoring and biological sampling of char retained and sold by the fishery provides some evidence that the partial management strategy is effective for this species. However, a regular quantitative bycatch sampling program is not conducted for other species, many of which are not retained or only partially retained.		
d	**Shark finning**			
	Guidepost	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justification	Scoring issue need not be scored if no secondary species are sharks.		
e	**Review of alternative measures to minimise mortality of unwanted catch**			
	Justification	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of all secondary species, and they are implemented, as appropriate.
	Met?	Default Yes	Default Yes	No
	Guidepost	SG60 – See SG80 SG80 – There are no main secondary species. Very small numbers of unwanted catch of minor secondary species occur. SG100 - There is no biennial review of alternative measures for these minor species because the level of exploitation is negligible.		
References		See Section 2.4.2 Secondary Species		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.		
Scoring Issue		SG 60	SG 80	SG 100
a	**Information adequacy for assessment of impacts on main secondary species**			
	Guidepost	Qualitative information is **adequate to estimate** the impact of the UoA on the main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and **adequate to assess** the impact of the UoA on main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and **adequate to assess with a high degree of certainty** the impact of the UoA on main secondary species with respect to status.
	Met?	Not applicable	Not applicable	Not applicable
	Justification	There are no main secondary species in this fishery.		
b	**Information adequacy for assessment of impacts on minor secondary species**			
	Guidepost			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.
	Met?			No
	Justification	Quantitative information is available on the level of harvest of char in this fishery. Sustainability of current char harvest levels is inferred from long term trends in catch and age structure. However, estimates of abundance are not available for use in estimating exploitation rates of char. Qualitative information on the amount of other minor secondary species affected by the fishery is available from limited observer sampling. This information is sufficient to confirm that there catch of other secondary species in relatively insignificant. However, catch and the status of bycatch species is not quantified in regular management practice.		
c	**Information adequacy for management strategy**			
	Guidepost	Information is adequate to support **measures** to manage **main** secondary species.	Information is adequate to support a **partial strategy** to manage **main** secondary species.	Information is adequate to support a **strategy** to manage **all** secondary species, and **evaluate** with a **high degree of certainty** whether the strategy is **achieving its objective**.
	Met?	Yes	Yes	No
	Justification	SG60 - There are no main secondary species in this fishery. SG80 - There are no main secondary species in this fishery. SG100 - Qualitative information on the amount of other minor secondary species affected by the fishery is available from limited observer sampling. This information is sufficient to		

PI 2.2.3		**Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.**
		confirm that the catch of other secondary species in relatively insignificant. However, catch and the status of bycatch species is not quantified in regular management practice.
References		See Section 2.4.2 Secondary Species
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**--**

Evaluation Table for PI 2.3.1 – ETP species outcome

PI 2.3.1		**The UoA meets national and international requirements for the protection of ETP species. The UoA and associated enhancement activities do not hinder recovery of ETP species**		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stocks within national or international limits, where applicable			
	Guidepost	Where national and international requirements set limits for ETP species, the effects of the UoA and associated enhancement activities on the population/stock are known and likely to be within these limits.	Where national and/ or international requirements set limits for ETP species, the **combined effects of the MSC UoAs and associated enhancement activities** on the population/stock are known and **highly likely** to be within these limits.	Where national and/ or international requirements set limits for ETP species, there is a **high degree of certainty** that the **combined effects of the MSC UoAs** and associated enhancement activities are within these limits.
	Met?	Yes	Yes	Yes
	Justification	SG60 - See SG100 SG80 - See SG100 SG100 – National legislation requires that fishing operations avoid adverse impacts on steelhead and sea lions, the only red listed species present in this area. No limits on impacts, such as through setting Potential Biological Removal Level (the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population), has been set for either species. Additionally, rookeries for Steller sea lions have been protected in Russia. The low occurrence of ETP species in the area of this fishery provide a high likelihood that the effects of the fishery are within limits of national and international requirements for protection of ETP species. Neither of these species interact with the fishery to any significant degree. Steelhead run timing is outside the period of the fishery. Sea lions sometimes enter the trap or fish well where they feed on fish. Sea lions are protected and zero mortality of sea lions has been reported. This same information applies for the Ozernaya Sockeye Fishery, the only other certified salmon fishery in the area. Therefore, there is a high degree ofcertainty that the combined effects of the MSC UoAs are within national requirements. Other marine animals present in the area, including seals, killer whales, white whales, sea eagles, and cormorants, are managed or protected by federal regulation.		
b	Direct effects			
	Guidepost	Known direct effects of the UoA including enhancement activities are **likely to not hinder recovery** of ETP species.	Direct effects of the UoA including enhancement activities are **highly likely to not hinder recovery** of ETP species.	There is a **high degree of confidence** that there are no **significant detrimental direct effects** of the UoA including enhancement activities on ETP species.

PI 2.3.1		**The UoA meets national and international requirements for the protection of ETP species. The UoA and associated enhancement activities do not hinder recovery of ETP species**		
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Direct effects of the fishery on ETP are highly unlikely to create unacceptable impacts to these ETP species. Effects are negligible due to a lack of significant interactions of most species with the fishing gear. Incidental take of these species by tangling in gear has not been observed due to the nature of the gear. Seals are the only species regularly observed to encounter gear. These seals constantly enter net traps, eat or damage fish, and then freely leave the nets. Entanglements have not been reported. Seals are regarded as a nuisance by fishers. KamchatNIRO scientists report that fisherman drive off sea lions from nets by making noise. While shooting seals is illegal, it is reportedly an occasional practice in some areas. However, the fishing companies in the UoC have prohibited firearms on fishing vessels and independent observation has verified compliance. Seals are not depleted – they may be hunted with the proper license but the harvest allocation is considerably underused because of degradation of hunting infrastructure. Licenses can be obtained for commercial harvest but have not by the assessment companies. SG100 – The SG100 guidepost is not met due to the lack of a systematic observer program for the portion of the fishery in marine waters and limited availability of direct impact assessments and status monitoring information for Steller Sea Lions.		
c	Indirect effects			
	Guidepost		Indirect effects have been considered for the UoA including enhancement activities and are thought to be **highly likely** to not create unacceptable impacts.	There is a **high degree of confidence** that there are no significant detrimental indirect effects of the UoA including enhancement activities on ETP species.
	Met?		Yes	No
	Justification	SG80 - No significant indirect effects of fisheries have been identified which might pose unacceptable risk to these species. The likelihood of significant indirect effects of the fishery on protected species is considered to be very low due to the low degree of interaction. Any indirect effects would likely result from ecosystem effects of salmon harvest. However, management of fisheries to maintain high levels of salmon production might be regarded as beneficial from a food chain perspective for species such as sea lions and seals. KamchatNIRO is conducting feeding studies of seal which have demonstrated that salmon are a primary seasonal food item. SG100 - The SG100 guidepost is not met due to the lack of indirect impact assessments and status monitoring information for Steller Sea Lions.		
References		See Section 3.5.5 Protected, Endangered or Threatened Species		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.3.2 – ETP species management strategy

PI 2.3.2		**The UoA and associated enhancement activities have in place precautionary management strategies designed to:** • **meet national and international requirements** • **ensure the UoA does not hinder recovery of ETP species** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.**		
Scoring Issue		SG 60	SG 80	SG 100
A	Management strategy in place (national and international requirements)			
	Guidepost	There are **measures** in place that minimise the UoA-related mortality of ETP species due to the UoA including enhancement activities, and are **expected to be highly likely** to achieve national and international requirements for the protection of ETP species.	There is a **strategy** in place for managing the UoA and enhancement activities' impact on ETP species, including measures to minimise mortality, which is **designed to be highly likely** to achieve national and international requirements for the protection of ETP species.	There is a **comprehensive strategy** in place for managing the UoA and enhancement activities' impact on ETP species, including measures to minimise mortality, which is **designed to achieve** above national and international requirements for the protection of ETP species.
	Met?	Yes	Yes	Yes
	Justification	SG60 - See SG100 SG80 - See SG100 SG100 - National legislation provides for protection of ETP species identified in the Russian Federation Red Data Book. In addition to general protection of ETP species, in particularly, implying fines for their retaining, the timing and operation of the fishery assure minimal adverse interactions with ETP species. The strategy involves fishery times and areas where ETP species are uncommon and a ban on retention of these species. Catch of any Red listed species in Russia is prohibited and in case of catch, they must be immediately released. Steelhead are also largely protected from significant catchharvest in the commercial salmon fishery by season dates. Run timing of adults in fall is outside the period of the fishery. Emigration timing of adults and juveniles is prior to beginning of the fishing season.		
B	Management strategy in place (alternative)			
	Guidepost	There are **measures** in place that are expected to ensure the UoA including enhancement activities do not hinder the recovery of ETP species.	There is a **strategy** in place that is expected to ensure the UoA including enhancement activities do not hinder the recovery of ETP species.	There is a **comprehensive strategy** in place for managing ETP species, to ensure the UoA including enhancement activities do not hinder the recovery of ETP species.
	Met?	Not applicable	Not applicable	Not applicable
	Justification	See scoring issue A. This issue applies only where species are recognized as ETP but requirements are not defined in legislation or agreements.		
C	Management strategy evaluation			
	Guidepost	The **measures** are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an **objective basis for confidence** that the measures/strategy will work, based on information directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a **quantitative analysis supports high**

PI 2.3.2		**The UoA and associated enhancement activities have in place precautionary management strategies designed to:** • **meet national and international requirements** • **ensure the UoA does not hinder recovery of ETP species** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.**		
				confidence that the strategy will work.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Observations of a low incidence of ETP catch in the fishery, consistent with timing of availability of the ETP species not coinciding with the timing of the fishery, provide an objective basis for confidence that the fishery strategy based on qualitative information directly about the fishery and/or the species involved. SG100 - Information is not specifically collected on ETP species in this fishery due to the low incidence of these species in the fishery and the corresponding low level of concern.		
d	Management strategy implementation			
	Guidepost		There is some **evidence** that the measures/strategy is being implemented successfully.	There is **clear evidence** that the strategy/comprehensive strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) or (b).
	Met?		Yes	Yes
	Justification	SG80 – See SG100 SG100 - The available information from KamchatNiro and independent observer reports provides clear evidence that the strategy is being implemented successfully. The incidence of interactions with endangered or threatened species is reportedly very low.		
e	Review of alternative measures to minimize mortality of ETP species			
	Guidepost	There is a **review** of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a **regular review** of the potential effectiveness and practicality of alternative measures to minimise UoA and enhancement related mortality of ETP species and they are implemented as appropriate.	There is a **biennial review** of the potential effectiveness and practicality of alternative measures to minimise UoA and enhancement related mortality ETP species, and they are implemented, as appropriate.
	Met?	Yes	Yes	No
	Justification	SG60 – see SG80 SG80 – Effective protection of ETP species is regularly reviewed in the normal course of activity by regional fishery management and environmental protection agencies of the Government. SG100 – Formal reviews are not scheduled in the normal course of events given the low level of concern.		
References		See Section 3.5.5 Protected, Endangered or Threatened Species		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.3.3 – ETP species information

PI 2.3.3		**Relevant information is collected to support the management of UoA and enhancement activities impacts on ETP species, including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guidepost	Qualitative information is **adequate to estimate** the impact of the UoA and associated enhancement on ETP species. OR if RBF is used to score PI 2.3.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species.	Some quantitative information is **adequate to assess** the UoA related mortality and impact and to determine whether the UoA and associated enhancement may be a threat to protection and recovery of the ETP species. OR if RBF is used to score PI 2.3.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.	Quantitative information is **available to assess with a high degree of certainty** the magnitude of UoA- and associated enhancement related impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Information on the negligible incidence of interaction of the fishery with ETP species is sufficient to determine that any related mortality or impact is sufficiently low as to not threaten protection or imped recovery. Although no ongoing observer program exists for the fisheries, federal scientists, managers, and inspectors regularly visit the fishing sites and processing plants throughout the season. Over the course of the many years of fishing operations, none of these species are observed to have adverse impacts from the fishery. The fishing authorities have determined that the fishery has such low impacts that it needs no specific data collections on interactions with ETP species. SG100 – Impacts, mortalities and injuries are not explicitly quantified.		
b	Information adequacy for management strategy			
	Guidepost	Information is adequate to support **measures** to manage the impacts on ETP species.	Information is adequate to measure trends and support a **strategy** to manage impacts on ETP species.	Information is adequate to support a **comprehensive strategy** to manage impacts, minimize mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Information from observations by scientists, managers, and inspectors, though not from a formal observer program, on the lack of impacts is adequate to support the management strategy for ETP species.		

PI 2.3.3		**Relevant information is collected to support the management of UoA and enhancement activities impacts on ETP species, including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.**
		SG100 - Impacts, mortalities and injuries are not explicitly quantified.
References		See Section 3.5.5 Protected, Endangered or Threatened Species
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**--**

Evaluation Table for PI 2.4.1 – Habitats outcome

PI 2.4.1		**The UoA and its associated enhancement activities do not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guidepost	The UoA is **unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	Yes	Yes	Yes
	Justification	The only habitats commonly encountered is the coastal sand shoreline and the riverine sand bed. SG60 - See SG100 SG80 - See SG100 SG100 – The allocation of parcels to fishing companies requires that fishing activities occur at the same locations year after year. This limits the benign impacts of the gear to a small portion of the available habitat. The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. No significant marine habitat impacts are associated with marine trap net use. The only conceivable effects would involve highly localized and temporary disturbances of the substrate due to net anchors or possibly occasional movement of weighed lead lines. Any related damage to the bottom communities is minor and local relative to redistribution of sediments during storms. Limited habitat effects result from beach seine site preparation activities in river fishing parcels prior to the fishing season. These might include removal of snags such as boulders or trees which might snag nets. Beach seines operation can impact the bottom, but this damage is considered minor compared to spring flooding in the rivers. Site preparation activities a reregulated and monitored by the government.		
b	VME habitat status			
	Guidepost	The UoA is **unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where

PI 2.4.1		**The UoA and its associated enhancement activities do not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.**		
				there would be serious or irreversible harm.
	Met?	Not relevant	Not relevant	Not relevant
	Justification	No Vulnerable Marine Ecosystems are identified in the area of the unit of assessment.		
c	**Minor habitat status**			
	Guidepost			There is **evidence** that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			No
	Justification	Limited habitat effects result from beach seine site preparation activities in river fishing parcels prior to the fishing season. Estuarine areas where these activities occur can be considered minor habitats. Serious or irreversible harm is not observed from these fishery-related activities. This conclusion is supported by evidence from habitat assessments in the Ozernaya River completed as a condition of the separate sockeye certification for that system. However, similar assessments have not been completed in other fishery areas.		
d	Impacts due to enhancement activities associated with the UoA			
	Guidepost	The enhancement activities are **unlikely** to have adverse impacts on habitat.	The enhancement activities are **highly unlikely** to have adverse impacts on habitat.	There is a **high degree of certainty** that the enhancement activities do not have adverse impacts on habitat.
	Met?	Yes	Yes	Yes
	Justification	No enhancement occurs in the area of this unit of assessment		
References		See section 3.4.4 Habitat		
OVERALL PERFORMANCE INDICATOR SCORE:				**95**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.4.2 - Habitats management

PI 2.4.2		**There is a strategy in place that is designed to ensure the UoA and associated enhancement activities do not pose a risk of serious or irreversible harm to the habitats**		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guidepost	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a **partial strategy** in place if necessary that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a **strategy** in place for managing the impact of all MSC UoAs/non-MSC fisheries UoA and associated enhancement activities on habitats.

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA and associated enhancement activities do not pose a risk of serious or irreversible harm to the habitats		
	Met?	Yes	Yes	Yes
	Justification	SG60 - See SG100 SG80 - See SG100 SG100 - The fishing strategy involves use of trap nets and beach seines, neither of which has significant physical habitat effects; fishing gear has *di minimis* impact relative to natural disturbances such as storms and floods. The enhancement strategy involves operation of hatcheries on only small number of rivers not included in the UoAs.		
b	Management strategy evaluation			
	Guidepost	The measures are **considered likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/ enhancement activities/habitats).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on information directly about the UoA, enhancement activities and/or habitats involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the UoA, enhancement activities and/or habitats involved.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - The limited scale of fishery and enhancement relative to the available habitat provides an objective basis for confidence that the partial strategy will work and is being implemented successfully. SG100 - Testing does not occur.		
c	Management strategy implementation			
	Guidepost		There is **some quantitative evidence** that the measures/partial strategy is being implemented successfully.	There is **clear quantitative evidence** that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		Yes	Yes
	Justification	SG80 - See SG100 SG100 - Information from observations by scientists, managers, and inspectors, though not from a formal observer program, demonstrate that the fishing operations occur within parcels and with the gear authorized. Observations of habitat conditions in the fishery zone provide clear evidence that habitat impacts are very low or negligible at a regional scale. Quantitative evidence on the successful implementation of habitat protection measures is provided for the Ozernaya in the form of a physical habitat assessment.		
d	**Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs**			

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA and associated enhancement activities do not pose a risk of serious or irreversible harm to the habitats		
	Guidepost	There is **qualitative evidence** that the UoA complies with its management requirements to protect VMEs.	There is some **quantitative evidence** that the UoA and associated enhancement activities comply with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is **clear quantitative evidence** that the UoA and associated enhancement activities comply with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	Not relevant	Not relevant	Not relevant
	Justification	There are no vulnerable marine ecosystems in the area of the unit of assessment.		
References		See section 3.4.4 Habitat		
OVERALL PERFORMANCE INDICATOR SCORE:				**95**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.4.3 – Habitats Information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and associated enhancement activities and the effectiveness of the strategy to manage impacts on the habitat.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guidepost	The types and distribution of the main habitats are **broadly understood**. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the types and distribution of the main habitats.	The nature, distribution and **vulnerability** of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - The nature and distribution of habitat types, including vulnerable areas, in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery. The operation of the fishing gear requires the proper kind of substrate, and exploration early in the development of the fishery determined suitable sites. The distribution and quality of available spawning habitat is well known from ongoing spawning ground surveys. Streams have been mapped at a regional scale. An in-stream habitat assessment has been completed of the Ozernaya River estuary.		

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and associated enhancement activities and the effectiveness of the strategy to manage impacts on the habitat.		
		SG100 – Habitat quantity and quality have not been formally detailed for all known habitats in the region.		
b	Information adequacy for assessment of impacts			
	Guidepost	Information is adequate to broadly understand the nature of the main impacts of gear use and enhancement activities on the main habitats, including spatial overlap of habitat with fishing gear. OR **If CSA is used to score PI 2.4.1 for the UoA:** Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	Information is adequate to allow for identification of the main impacts of the UoA and enhancement activities on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	The physical impacts of the gear and enhancement activities on all habitats have been quantified fully.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG100 SG80 - Habitat types are identified and there is reliable information on the spatial extent, timing and location of use of the fishing gear. Fishing gear impacts on the sand bottom in coastal and riverine fishing areas is known to be minimal and to have all signs of fishing obliterated during natural events such as storms and floods. Sufficient information is available to determine that fishery activities do not have a quantifiable impact on habitat. Grading activities and physical river characteristics in the Ozernaya have been assessed and are likely representative of other rivers where similar activities may occur at a lower intensity. All such activities are licensed and monitored by the government. SG100 – Quantitative evidence of required assessment of habitat related impact as per SA3.13.1 and SA3.13.2 is limited, in particular, with respect to river grading activities in rivers other than the Ozernaya. As a result, the 100 scoring guidepost for this indicator is not met.		
c	Monitoring			
	Guidepost		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in habitat distributions over time are measured.
	Met?		Yes	No
	Justification	SG60 - See SG80 SG80 - Risks of fishery impacts to habitat may be assessed based on the number and location of fishing parcels which are licensed and regulated by the government. Similarly, all fishery construction and operation are regulated by the government. There is a special agency, State Sanitary-epidimeological inspection which controls whether the fishery effects the fishing operation zone. In a case of violations, it is a usual practice to imply fines to the company. This information is sufficient to detect any risk to habitat due to changes in the fishery.		

PI 2.4.3		**Information is adequate to determine the risk posed to the habitat by the UoA and associated enhancement activities and the effectiveness of the strategy to manage impacts on the habitat.**
		SG100 – With the exception of the Ozernaya River estuary, physical habitat assessments have not been conducted (due to the lack of significant impacts).
References		See section 3.4.4 Habitat
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**--**

Evaluation Table for PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA and associated enhancement activities do not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Ecosystem status			
	Guidepost	The UoA is **unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 *SG80* – Information on the distribution, scale and effect of the fishery provides justification for a conclusion that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. North Pacific Ecosystem - Potential ecosystem concerns related to fishing might involve effects of changes in salmon abundance on ecosystem structure, trophic relationships, and biodiversity. For instance, decreases in salmon abundance due to fishing might favor prey species of salmon and harm predator species of salmon. However, the salmon fishery has complex short and long term effects on salmon abundance. Salmon fishery management to provide escapements consistent with maximum sustained yield generally increases average abundance in the ocean and return relative to what can be expected in an unmanaged system. Conversely, high exploitation rates and management for optimum rather than equilibrium escapements will substantially reduce the average number of fish escaping to freshwater. Effects of salmon abundance on ecosystem productivity in the ocean have been the subject of extensive research over the last 20 years and the scientific literature generally suggests that high abundance of salmon on the high seas due to the net effects of fishery management and hatchery enhancement throughout the north Pacific Rim has may have contributed to ecosystem changes. However, the contribution from any specific area to total salmon abundance in the ocean is relatively small. Therefore, the UoAs are highly unlikely to serious or irreversible harm to the structure and function of the North Pacific ecosystem. Riverine Ecosystem - Effects of salmon abundance on ecosystem productivity in freshwater have also been well documented in other systems. Larger escapements provide more food for salmon predators such as bears and eagles and also more marine derived nutrients to support primary and secondary productivity. However, while fishery management may affect abundance, it also reduces the variability in abundance relative to what can be expected in an unmanaged system, thus providing a more stable resource and avoiding catastrophic extremes. On balance these effects are not expected to result in serious or irreversible harm to any other component of the ecosystem. Therefore, the UoAs are highly unlikely to serious or irreversible harm to the structure and function of the riverine ecosystem. SG100 - The governmental scientific agency is conducting a series of ecosystem assessments in western Kamchatka. These include evaluations of the effects of salmon abundance by species on individual characteristics and population dynamics of other salmon species, assessments of food marine derived nutrient contributions and effects of salmon to freshwater ecosystems, and food web productivity. These assessments provide a basis for evaluating fishery effects on ecosystem structure and function. However, a specific analysis of the likelihood of the fishery to disrupt key elements underlying North Pacific or riverine		

PI 2.5.1		**The UoA and associated enhancement activities do not cause serious or irreversible harm to the key elements of ecosystem structure and function**		
		ecosystem structure and function to a point where there would be a serious or irreversible harm has not been reported.		
b	Impacts due to enhancement			
	Guidepost	Enhancement activities are **unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	Enhancement activities are **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is **evidence** that the enhancement activities are **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Yes	Yes	Yes
	Justification	No salmon enhancement activities occur in the unit of certification.		
References		See Section 3.4.5 Ecosystem Structure and Function		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.5.2 – Ecosystem management

PI 2.5.2		**There are measures in place to ensure the UoA and enhancement activities do not pose a risk of serious or irreversible harm to ecosystem structure and function**		
Scoring Issue		SG 60	SG 80	SG 100
A	Management strategy in place			
	Guidepost	There are **measures** in place, if necessary which take into account the **potential impacts** of the UoA on key elements of the ecosystem.	There is a **partial strategy** in place, if necessary, which takes into account **available information and is expected to restrain impacts** of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a **strategy** that consists of a plan, in place which contains measures to **address all main impacts of the UoA** on the ecosystem, and at least some of these measures are in place
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Measures include fishery management for spawning escapements adequate an additional to provide for ecosystem needs in freshwater including bears and marine derived nutrients. This strategy also involves significant monitoring and research of ecosystem components at a regional scale. The partial strategy takes into account available information, monitors new information from the extensive research, and is expected to restrain impacts of the fishery activities on the ecosystem should the research identify any need. SG100 - It is not apparent that the strategy involves a specific plan containing measures to address all main impacts of the fishery on the North Pacific and riverine ecosystems, nor that all functional relationships between the fishery and the components and elements of the ecosystem are well understood.		
B	Management strategy evaluation			
	Guidepost	The **measures** are considered likely to work,	There is **some objective basis for confidence** that	**Testing** supports **high confidence** that the partial

PI 2.5.2		There are measures in place to ensure the UoA and enhancement activities do not pose a risk of serious or irreversible harm to ecosystem structure and function		
		based on plausible argument (e.g., general experience, theory or comparison with similar UoA/ ecosystems).	the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved	strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - General experience and information from other systems indicate that the fishery measures are likely to minimize risks of serious or irreversible harm to ecosystem structure and function. Salmon populations are inherently dynamic with large interannual variation on run sizes due to normal environmental variation in abundance. Related ecosystems are affected by these same dynamic conditions. Management of fisheries to provide significant natural spawning escapements and minimal disruption from enhancement ensure future production of salmon to fuel future fisheries while also providing fish and marine derived nutrients critical to sustaining freshwater and nearshore marine ecosystems. SG100 – Systematic testing of the ecosystem effects of fishery is limited.		
C	**Management strategy implementation**			
	Guidepost		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its objective as set out in scoring issue (a).**
	Met?		Yes	Yes
	Justification	SG80 - See SG100 SG100 – Monitoring of new information from the extensive research regularly occurs. Qualitative information and observations readily indicate that stream and nearshore ecosystems are intact, diverse, and productive. Western Kamchatka is one of the most remote and pristine areas in the eastern Pacific.		
d	Management of enhancement activities			
	Guidepost	There is an **established** artificial production strategy in place that is expected to achieve the Ecosystem Outcome 60 level of performance.	There is a **tested and evaluated** artificial production strategy with sufficient monitoring in place and evidence is available to reasonably ensure with high likelihood that the strategy is effective in achieving the Ecosystem Outcome 80 level of performance.	There is a **comprehensive and fully evaluated** artificial production strategy to verify with certainty that the Ecosystem Outcome 100 level of performance.
	Met?	Yes	Yes	Yes
	Justification	No enhancement occurs in the area of the Unit of Assessment		
References		See Section 3.4.5 Ecosystem Structure and Function		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA and associated enhancement activities on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guidepost	Information is adequate to **identify** the key elements of the ecosystem.	Information is adequate to **broadly understand** the key elements of the ecosystem.	
	Met?	Yes	Yes	
	Justification	SG60 - See SG80 SG80 - The salmon life cycle encompasses a vast ecosystem including natal rivers and lakes, the nearshore ocean, and the high seas of the North Pacific Ocean. Key ecosystem elements include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g. upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity. Key elements of the salmon ecosystem are broadly understood based on extensive work by scientists associated with the management system. Extensive research has been conducted on freshwater and marine aquatic ecosystems. This information consists of Kamchatka-specific research and research conducted in other salmon-producing regions.		
b	Investigation of UoA impacts			
	Guidepost	Main impacts of the UoA and associated enhancement activities on these key ecosystem elements can be inferred from existing information, and **have not been investigated in detail**.	Main impacts of the UoA and associated enhancement activities on these key ecosystem elements can be inferred from existing information and **some have been investigated in detail**.	Main interactions between the UoA and associated enhancement activities and these ecosystem elements can be inferred from existing information, and **have been investigated in detail**.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Marine-derived nutrients from salmon carcasses can have a significant impact on freshwater communities as well as those communities in the freshwater to terrestrial interface. The relationships between salmon and the population dynamics of their terrestrial predators has been well documented in other systems. It has been reported that these nutrients also form a base for rich development of zooplankton in coastal area, which serves a food for young salmon just after downstream migration. Many aspects of ecosystem dynamics have been investigated in detail. For instance, estimates of the contribution of marine derived nutrientsfrom salmon carcasses have been made for the Bolshaya system and research is underway on food web productivity. SG100 - Of particular concern to salmon fishery management throughout the North Pacific Region is the effect of ocean environmental conditions on stock productivity. Short term and long term variability in stock productivity is now understood to be strongly related to patterns of ocean productivity. Ocean productivity regimes have been observed shift periodically to more or less favorable conditions. The region is currently in a very productive ocean regime for many northern salmon stocks including Kamchatka pink and chum salmon. These patterns and their effects are generally understood but future patterns are cannot be forecast. Thus salmon productivity and sustainability would be negatively affected by a shift to a less favorable regime. It remains unclear whether knowledge of fishery-ecosystem interactions is sufficient to recognize changes and to revise management objectives and practices in a timely fashion. Thus while information on fishery-ecosystem functions and elements is sufficient to meet 80 scoring guideposts, it does not rise to the standard of the 100 scoring guideposts.		

PI 2.5.3		There is adequate knowledge of the impacts of the UoA and associated enhancement activities on the ecosystem		
c	Understanding of component functions			
	Guidepost		The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are **known**.	The impacts of the UoA and associated enhancement activities on P1 target, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are **understood**.
	Met?		Yes	No
	Justification	SG80 - It is clear that salmon influence the food webs in the North Pacific although the effect varies widely between systems and is dependent on many factors like timing, scale and alternative nutrient sources, etc. SG100 - Like most large marine ecosystems, resolving interactions strengths among food web constituents is made difficult by limited data and confounding effects of environmental forcing.		
d	Information relevance			
	Guidepost		Adequate information is available on the impacts of the UoA and associated enhancement activities on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the fishery and associated enhancement activities on the components **and elements** to allow the main consequences for the ecosystem to be inferred.
	Met?		Yes	No
	Justification	SG80 - Sufficient information is available on the impacts of the fishery on these components to allow some of the main consequences for the ecosystem to be inferred. Main consequences include changes in competition levels between salmon species and nutrient contributions to freshwater food webs from marine derived nutrients delivered by salmon carcasses. Scientists of the government research institutes have collected substantial information on pink salmon and their role in the ecosystem. Information on salmon ecosystems throughout the Pacific rim has also provided a good understanding of the salmon's function in freshwater ecosystem, particularly for supporting aquatic and terrestrial food webs either directly by feeding predators and scavengers or indirectly by the delivery of marine derived nutrients. Active fishery management might also help stabilize returns by avoiding excessively large escapements which can depress future returns under some conditions. Enhancement with hatcheries can substantially increase salmon numbers in certain times and areas although hatchery contributions to chum salmon runs remain uncertain. Enhancement of Pacific salmon across the Pacific Rim since the 1970s has resulted in very large abundance in the North Pacific Ocean. There is some evidence that high salmon abundances in the ocean might adversely affect wild salmon through competition. As hatchery production from the UoAs is minimal, little contribution to adverse impacts is expected. SG100 – Information is not sufficient to evaluate fishery impacts on all ecosystem elements.		
e	Monitoring			
	Guidepost		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of

PI 2.5.3		There is adequate knowledge of the impacts of the UoA and associated enhancement activities on the ecosystem		
				strategies to manage ecosystem impacts.
	Met?		Yes	No
	Justification	SG80 - Extensive research has been conducted on salmon ecosystems in western Kamchatka, particularly for sockeye but also for other salmon species. In marine waters, extensive research has been conducted by the Russian Scientific Institutes on (1) Juvenile Anadromous Stocks in Ocean Ecosystems; (2) Anadromous Stocks in the Bering Sea Ecosystem (BASIS); and (3) Anadromous Stocks in the Western Subarctic Gyre and Gulf of Alaska Ecosystems (Temnykh et al. 2010). SG100 – Detailed strategies for managing ecosystem impacts have not been identified.		
References		See Section 3.4.5 Ecosystem Structure and Function		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**--**

Evaluation Table for PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: • **Is capable of delivering sustainability in the UoA; and** • **Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and** • **Incorporates an appropriate dispute resolution framework.**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Compatibility of laws or standards with effective management**			
	Guidepost	There is an effective national legal system and **a framework for cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and **organised and effective cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and **binding procedures governing cooperation with other parties** which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	SG60 - See SG100 SG80 - See SG100 SG100 - The Russian Federation has an effective salmon fishery management system. Section 3.5.1 provides details of the Russian management system, including federal and state scientific and management agencies and the laws under which they operate. Management of Kamchatka salmon fisheries is administered by Federal and Regional governmental agencies. Kamchatka Kray, which includes Kamchatka Oblast and Koryak Autonomous Okrug is the subject of the Russian Federation and is a part of Far Eastern Federal Region (Okrug). It is under the direction and control of the Government of the Russian Federation. Fisheries of Russia are managed and controlled by Federal Fishery Agency (FAR) of the Russian Federation, which located in Moscow and also represented by a local office in Kamchatka. Operational management of all activities is performed by the Governor of the Kamchatsky Kray. The Federal Law “On fisheries…” sets that all citizens, public organizations, and associations have the right to participate in decision making process. For these purposes the FAR maintains a multi-level system of public (community)		

<table>
<tr><td colspan="2">PI 3.1.1</td><td colspan="3">The management system exists within an appropriate legal and/or customary framework which ensures that it:
• Is capable of delivering sustainability in the UoA; and
• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and
• Incorporates an appropriate dispute resolution framework.</td></tr>
<tr><td></td><td></td><td colspan="3">and scientific fishery councils providing opportunities to participate and influence on decision process and regulations.</td></tr>
<tr><td rowspan="4">b</td><td colspan="4">Resolution of disputes</td></tr>
<tr><td>Guidepost</td><td>The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.</td><td>The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the UoA.</td><td>The management system incorporates or subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the UoA and has been tested and proven to be effective.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">SG60 - See SG80

SG100 - The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the fishery. The legal system is based on civil law system with judicial review of legislative acts. The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges (SG 80). An example of effectiveness of system of resolution of legal disputes is provided in the previous MSC assessment of the Vitaiz-Avto & Delta companies of their Sockeye fisheries in the Ozernaya River (https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/ozernaya_river_Sockeye_salmon/assessment-downloads-1/20120904_PCR_SAL281.pdf) and has a direct relation to this assessment as well. This eample demonstrated that the management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges (SG 100). The description of the example is as follows.

Several years ago a company, Kolkhoz Krasnyi Truzhennik, that owns a fishing parcel in Ozernaya River initiated legal processing against SVTU, Federal Agency for Fisheries and company “Vityaz –Avto” regarding incorrect determination of daily capacity of fish processing factory. According to Kolkhoz Krasnyi Truzhennik, their daily capacity was underestimated, and capacity of Vityaz-Avto was overestimated. Due to this, at the competition for distributing fishing parcels in May 2008, Kolkhoz Krasnyi Truzhennik failed while competing for the best fishing parcels. In fact, the results of the distribution of fishing parcels are very important because the best fishing parcels (one of them belongs now to Vityaz-Avto) are situated in the very downstream part of the river and are the most productive. Kolkhoz Krasnyi Truzhennik was given a fishing parcel situated upstream and thus is less productive. Arbitration court of the Kamchatka Kray considered these accusations in December 2008 and after a detailed investigation of the circumstances decided to reject the claim by Krasnyi Truzhennik (decision accepted 19 December 2008). In total, the court investigated and accepted decisions on five cases regarding not only Ozernaya River, but also four fishing parcels in the coastal area of Sea of Okhotsk.

The accusations continued with two publications in the newspaper “Rybak Kamchatka” 22 and 29 July 2010 (web addresses are http://www.fishnews.ru/mag/articles/8348 and http://www.fishnews.ru/mag/articles/8364). The Kolkhoz Krasnyi truzhennik accused Vityaz-Avto of violating fishery regulations: fishing during off-days and fishing outside theirofficially determined fishing parcel. Kolkhoz appealed to the local police department, which performed special investigations, but the investigation did not find evidence in support of the accusations. Therefore, all accusations against Vityaz-Avto by Kolkhoz Krasnyi Truzhennik were investigated and not supported by the governmental authorities.</td></tr>
</table>

PI 3.1.1		**The management system exists within an appropriate legal and/or customary framework which ensures that it:** • **Is capable of delivering sustainability in the UoA; and** • **Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and** • **Incorporates an appropriate dispute resolution framework.**		
		29 April 2011 Kolkhoz accused "Vityaz-Avto" in violation of Nature Conservation legislation by dragging near their fishing parcel which influences fishing parcel of Krasnyi Truzhenik (http://www.fishkamchatka.ru/?cont=long&id=29245&year=2011&today=29&month=04). During Ozernaya Sockeye assessment, the assessment team discussed this issue with company Vityaz Avto and with a head of Kolkhoz Krasnyi Truzhennik, chairman Mikhail Puzyrev, during site visit in May 2011 and tried to get all available information. Based on these discussions the assessment team has no basis to dispute the official investigations. Social changes in the Russian system seem to be at the root of this conflict. Under the Soviet Union socio-economic model, Kolkhoz Krasnyi Truzhennik operated as a government entity prosecuting the entire fishery, providing employment, and also maintaining housing, schools, library and stores. After the Soviet Union was disbanded in the 1990s, market-based companies came in taking a share of the fishing quotas and income, and in the process displacing the old way of life.		
c	**Respect for rights**			
	Guidepost	The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Yes	Yes	Yes
	Justification	SG60 - See SG100 SG80 - See SG100 SG100 - The management system has a mechanism to formally commit to the legal rights created explicitly and practicing by people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2 (SG 100). The federal law on indigenous peoples of the Far North applies to the management system to ensure their traditional fisheries and livelihoods. In accordance with the law, every district establishes fishing sites for indigenous peoples near their homes. While distributing quotas for salmon fishing, the Anadromous Fish Commission first sets a quota for indigenous peoples (the rate of 100 kg per person per year of aquatic biological resources for local population has been established by the government of Kamchatka Kray). The remainder of the quota is distributed among the other users of water resources. Representatives of the Association of Indigenous Peoples of Kamchatka are involved in the distribution of the quota. In the case the interests of the indigenous peoples are violated, the legal system intervenes.		
References		See Section 3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	**Roles and responsibilities**			
	Guidepost	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **generally understood**.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for all areas** of responsibility and interaction.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction, thus should be scored at least SG80. However, functions, roles and responsibilities related to some responsibilities and interactions remain somewhat uncertain, which does not allow to score 100. In accordance with Federal Law on Fisheries, all stakeholders are included in the decision-making process. This includes fishing companies and public organizations. All interested parties are part of main management body – The Anadromous Fish Commission on local Kamchatka level. On higher levels, also there tructures which allow to participate interested partics such as Public Coulncil for FAR. Each representative has the right to vote and can influence the decision. This collective body bears the responsibilities for the decisions made.		
b	**Consultation processes**			
	Guidepost	The management system includes consultation processes that **obtain relevant information** from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information and **explains how it is used or not used**.
	Met?	Yes	Yes	Yes
	Justification	SG60 - See SG100 SG80 - See SG100 SG100 - The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used through public discussions in the Anadromous Fish Commission (AFC) with decisions publicized on the internet. Consultations with stakeholders are conducted on the regional level via the AFC. As part of the consultation process AFC sends information used for pre-season management to all stakeholders. During its meeting, the AFC examines data on the intensity of salmon runs, hydrological regime in the spawning grounds and fill rate of spawning ground by spawners, as well as recommendation of KamchatNIRO on the timing and regulation of fishing (Section 3.5.3). AFC decisions are recorded. The protocols of the AFC meetings are sent to all interested parties and published on web site of Federal Fishery Agency (SG 100).		

PI 3.1.2		**The management system has effective consultation processes that are open to interested and affected parties.** **The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties**		
c	**Participation**			
	Guidepost		The consultation process **provides opportunity** for all interested and affected parties to be involved.	The consultation process provides **opportunity and encouragement** for all interested and affected parties to be involved, and **facilitates** their effective engagement.
	Met?		Yes	No
	Justification	SG80 - The consultation process provides opportunity for all interested and affected parties to be involved, and facilitates their effective engagement (SG80). However, the process does not appear to always encourage and facilitate effective engagement by nongovernmental or industry interests. Mechanisms for involvement of environment and different interest groups as well as the broader community are not well developed, but there are number of non-governmental organizations that are interested in salmon fisheries in Kamchatka area. Stakeholders may have an opportunity for involvement, but may have reluctance to participate as a carryover from Soviet days. SG100 - While internal information from the management agencies is technically available to the public, the process for obtaining it can be involved making access difficult. This does not allow to score this PI 100.		
References		See Section 3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.1.3 – Long-term objectives

PI 3.1.3		**The management policy for the SMU and associated enhancement activities has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach**		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guidepost	Long-term objectives to guide decision-making, consistent with the MSC fisheries standard and the precautionary approach, are **implicit** within management policy	**Clear** long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach are **explicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach, are **explicit** within **and required by** management policy.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy. The over-arching fisheries and resource regulations cited earlier in this report lay out long-term objectives and long-term goals for the salmon fisheries of the Russian Far East. The regional fisheries management demonstrates its strategy towards sustainable use of fish resources by contribution to fisheries research, increasing control over poaching, development of modern fish-processing factory, contribution to social sphere, and organization of protected areas. SG100 - However, objectives consistent with MSC Principles and Criteria and the precautionary approach are not always required by management policy.		
References		See Section 3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.1 – Fishery-specific objectives

PI 3.2.1		**The fishery-specific and associated enhancement management system(s) activities have clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2**		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guidepost	**Objectives,** which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery and associated enhancement management system(s).	**Short and long-term objectives**, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery and associated enhancement management system(s).	**Well defined and measurable short and long-term objectives**, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery and associated enhancement management system(s).
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system and enhancement activities. These include short term objectives for spawning escapements intended to provide for maximum sustained yield and long term objectives for fishery sustainability reflected in management regulation. Objectives consistent with Principles 1 and 2 are also reflected in the absence of enhancement of species in areas which are under scope of this certification. All the rivers – Vorovskaya, Kol, Opala, Golygina, Koshegochek and Ozernaya Rivers are completely free of hatcheries. According to overall strategy of development salmon fisheries in Russia, hatcheries are among the priorities to increase fishery productivity. At the moment, however, there are no specific plans to further develop hatchery system nearest years in the area. A minor number of hatchery originated fish (operating at Bolshaya river and its basin) may be caught due to intercept fishery in sea set nets near mouth of Opala, Golygina and Koshegochek Rivers. SG100 - Short and long term objectives do not always provide clear measurable standards with respect to effects of fisheries on the ecosystem. Objectives are explicit with respect to protecting spawning escapement, but are less clear on the environmental/ecosystem end. If ecosystem changes were observed, a response would be expected; but no substantive changes have ococurred at the level of current monitoring. In particularly, fishing with beach seines considerably changes of mouth area of Ozernaya River area which had large wetland areas before large scale fishing began. Therefore, this performance indicator might partially meet the SG100 for hatchery objectives, but does not meet the SG100 for specific objectives related to fishery effects on the ecosystem.		
References		See Section 3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.2 – Decision-making processes

PI 3.2.2		**The fishery-specific and associated enhancement management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guidepost	There are **some** decision-making processes in place that result in measures and strategies to achieve the fishery-specific and enhancement objectives.	There are **established** decision-making processes that result in measures and strategies to achieve the fishery-specific and enhancement objectives.	
	Met?	Yes	Yes	
	Justification	SG60 - See SG80 SG80 - Previous sections provide information demonstrating the high degree of sophistication of the decision making process in the fishery. The fishery-specific and hatchery management systems include effective decision-making processes that result in measures and strategies to achieve the objectives. There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.		
b	Responsiveness of decision-making processes			
	Guidepost	Decision-making processes respond to **serious issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to **all issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	Yes	Yes	No
	Justification	SG60 - See SG80 SG80 - Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. KamchatNIRO uses relevant information to provide pre-season forecasts so that fishermen, buyers, processors, and the Anadromous Fish Commission can plan for the upcoming season. The Anadromous Fish Commission considers a wide range of issues regularly reported by federal and regional agencies and those brought up by stakeholders to make in-season decisions. All stakeholders have an opportunity to attend the Anadromous Fish Commission meetings. SG100 - It cannot be concluded that decision-making processes respond to all issues due to the lack of transparency regarding many internal decisions by Russian governmental agencies. For instance, information on run size, harvest by time and area, fishery management actions, and escapement is not typically reported outside the management system except in summary form in the case of serious and other important issues addressed during public processes.		
c	Use of precautionary approach			
	Guidepost		Decision-making processes use the precautionary	

PI 3.2.2		The fishery-specific and associated enhancement management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
			approach and are based on best available information.	
	Met?		Yes	
	Justification	SG80 - Decision-making processes use the precautionary approach and are based on best available information by KamchatNIRO and SVTU. The use of optimum spawning escapement as both target and limit reference points demonstrates a precautionary element to decision making. Information received in-season assures that the management system uses current information. The target reference point occurs approximately at the midpoint of the optimal escapement range. Higher levels of precaution would occur as the target moved toward the upper end of the range.		
d	Accountability and transparency of management system and decision-making process			
	Guidepost	Some information on fishery performance and management action is generally available on request to stakeholders.	**Information on fishery performance and management action is available on request**, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders **provides comprehensive information on fishery performance and management actions** and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Yes	No	No
	Justification	SG60. Formal reporting to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. This is achieved by transparent decision-making in the Anadromous Fish Commission, which gathers for meetings once per several days during a fishing season. For instance, in 2015 the Commission carried out 13 meetings from 17 June 21 August. Decisions are available for all interested parties and immediate (usually within few hours after the meeting) publication of its decisions at the SVTU website (http://www.terkamfish.ru/index.php/deyatelnost/info/protokols/protokolsanadromkam). The protocols contain information about participants of the meeting, questions discussed, results of voting and decisions have been made accompanying by relevant information. Moreover, significant amount of information about current situation is available from the SVTU website. SG80 - At the same time, monitoring of decision making for the fishery is limited by the inconsistent availability of information outside the local governmental management system. Results of fishing season and effectiveness of management actions undertaken are discussed at the both management agencies such as AFC, SVTU and FAR, and also at Research Councils of fisheries institutes such as KamchatNIRO, TINRO-Center and VNIRO on a regular basis. However, information on run size, harvest by time and area, fishery management actions, and escapement is not typically reported outside the management system except in rare cases. Occasional publications of related information (e.g. Shevliakov 2013b) provide a historical perspective but are not sufficient to allow tracking action associated with findings and relevant recommendations. Inconsistent availability of annual fish run and fishery information outside the local governmental management system limits the availability of information for actions or lack of action associated with findings and relevant recommendations; therefore the fishery does not score 80.		

PI 3.2.2		**The fishery-specific and associated enhancement management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.**		
e	Approach to disputes			
	Guidepost	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Yes	Yes	Yes
	Justification	SG60 - See SG100 SG80 - See SG100 SG100 - The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges. The previous assessment of the same Client, which received MSC certificate for Ozernaya River Sockeye in June 2012, provides a good example of such disputes investigated in a court of Kamchatka Kray http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/ozernaya_river_Sockeye_salmon/assessment-downloads-1/PCDR.pdf. This dispute is directly relevant for this certification as well. After the court procedures, this conflict has been resolved. The example demonstrates that the management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenge, thus deserving SG100 for this element.		
References		See Section 3.5		
OVERALL PERFORMANCE INDICATOR SCORE:				**75**
CONDITION NUMBER (if relevant): **Condition 6.** **Demonstrate that information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.**				

Evaluation Table for PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery and associated enhancement activities are enforced and complied with.		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guidepost	Monitoring, control and surveillance **mechanisms** exist, and are implemented in the fishery and associated enhancement activities and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance **system** has been implemented in the fishery and associated enhancement activities and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A **comprehensive** monitoring, control and surveillance system has been implemented in the fishery and associated enhancement activities and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Yes	No	No
	Justification	SG60 - A monitoring, control and surveillance system has been implemented in the fishery under assessment. All the enforcement agencies and stakeholders report reduction of level of illegal fishing in all the areas of Kamchatka during the last decade in comparison with extremey high level of illegal fishing during 1990s-early 2000s. Reforms in the management system have effectively addressed high historical levels of under-reported on misreported catches by commercial fishing companies. Well-run and profitable fishing companies, including Vitiaz-Avto and Delta, reportedly demonstrate a very high rate of compliance and also support enforcement efforts throughout the fishery. Valuable long term leases provide a large incentive for sustainable management and for compliance. SG80 - However, significant enforcement problems still exist in some systems due to poaching by local residents and abuse of the indigenous fishery permitting system. Among the rivers included in this assessment, information available from stackeholders, evidences practical absence of poaching in the Opala, Golygina and Koshegochek rivers, which are strongly protected by the companies under certification and by other fisheries operating in these areas in combination with absence of roads. At the same time, there is information about poaching in the Kol river, and especially in Vorovskaya River, which is easily accessible from villages Sobolevo and Ustievoe (total population 2005 inchabitants). It is important also that these rivers are connected to Petropavlovsk-Kamchatsky by so-called technological road constructed to build up and maintain gase pipeline. Quality of this road is not good, but it is nevetherless actively used for transportation of illegal roe from this area to Petropovlovsk-Kamchatsky (http://www.chaspik41.ru/wp-content/uploads/2015/01/1-67.pdf). Other sources also confirm high level of poaching in Vorovskaya River (http://regnum.ru/news/society/1402567.html; https://news.mail.ru/incident/4284561/; http://pressa41.ru/crime/putina3/; http://www.kamchatinfo.com/news/ecology/detail/3067/; http://www.kamchatinfo.com/news/ecology/detail/3272/; http://www.regnum.ru/news/1725345.html. Effective enforcement is only possible with considerable funding and cooperation among companies fishing companies depending on local fish resources. The chronic nature of this problem indicates that the monitoring, control and surveillance system has not demonstrated a complete ability to enforce relevant rules throughout the system. Enforcement cannot be considered comprehensive because the notable level of illegal fishing is apparently still significant.		
b	Sanctions			

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery and associated enhancement activities are enforced and complied with.		
	Guidepost	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, **are consistently applied** and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and **demonstrably** provide effective deterrence.
	Met?	Yes	No	No
	Justification	SG60 - Sanctions to deal with noncompliance exist, are consistently applied and thought to provide effective deterrence for well-run fishing companies including Vitiaz-Avto and Delta. For example, loss of opportunity to fish when convicted of serious offenses provides a major incentive for fishery operators to stay within the rules. SG80 - Questions remain regarding the consistency of application and the effectiveness of deterrence for illegal harvest activities in freshwater by non-commercial fishers. Sanctions do not appear to provide effective deterrence to components of illegal fishing which remains significant in accessible systems including the Vorovskaya and Kol rivers.		
c	Compliance			
	Guidepost	Fishers and hatchery operators are **generally thought** to comply with the management system for the fishery and associated enhancement activities under assessment, including, when required, providing information of importance to the effective management of the fishery.	**Some evidence exists** to demonstrate fishers and hatchery operators comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery and associated enhancement activities.	There is a **high degree of confidence** that fishers and hatchery operators comply with the management system under assessment, including, providing information of importance to the effective management of the fishery and associated enhancement activities.
	Met?	Yes	Yes	Yes
	Justification	SG60 - See SG80 SG80 – See SG100 SG100 - There is a high degree of confidence that commercial fishing companies included in this assessment comply with the management system under assessment, including providing information of importance to the effective management of the fishery and its enhancement activities. No evidence of systematic noncompliance by commercial fishing companies included in this assessment has come to the attention of the assessment team regarding monitoring, control, and surveillance activities in the freshwater portion of this fishery. Authorities and stakeholders confirm compliance of the companies participating in this certification. The fishery closely cooperates with SVTU to protect salmon populations from illegal activities and funds enforcement hiring people to help state fish inspection. Moreover, incentives for illegal fishing for companies considerably reduced after introduction of Olympic system of management in 2010.		
d	Systematic non-compliance			
	Guidepost		There is no evidence of systematic non-compliance.	
	Met?		Yes	
	Justification	SG80 - No evidence of systematic noncompliance has come to the attention of the assessment team regarding monitoring, control, and surveillance activities in the commercial sector of this fishery. Authorities and stakeholders confirm compliance of the companies participating in this certification.		
References		See Section 3.5		

PI 3.2.3	Monitoring, control and surveillance mechanisms ensure the management measures in the fishery and associated enhancement activities are enforced and complied with.	
OVERALL PERFORMANCE INDICATOR SCORE:		**70**
CONDITION NUMBER (if relevant): **Condition 7.**	**Demonstrate that a monitoring, control and surveillance system has been implemented in the fishery and associated enhancement activities and has demonstrated an ability to enforce relevant management measures, strategies and/or rules, and that sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.**	

Evaluation Table for PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific and enhancement management system(s) against its objectives There is effective and timely review of the fishery-specific and associated enhancement program(s) management system		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guidepost	The fishery and associated enhancement program(s) has in place mechanisms to evaluate **some** parts of the management system.	The fishery and associated enhancement program(s) has in place mechanisms to evaluate **key** parts of the management system	The fishery and associated enhancement program(s) has in place mechanisms to evaluate **all** parts of the management system.
	Met?	Yes	Yes	No
	Justification	SG80 - The fishery has in place mechanisms to evaluate key parts of the management system. Key elements such as allowed catch monitoring process and the stock assessment that determine the level of removals occur during the annual fishing season and at the end to ensure the possibility of allowed catch over-run are minimised. There are mechanisms in place to adjust allowed catch or the allocation of allowed catch between management units these are evaluated annually. At the same time, available information does not prove that all parts of the management system are evaluated, which does not allow to score this element 100.		
b	Internal and/or external review			
	Guidepost	The fishery-specific and associated enhancement program(s) management system is subject to **occasional internal** review.	The fishery-specific and associated enhancement program(s) management system is subject to **regular internal and occasional external** review.	The fishery-specific and associated enhancement program(s) management system is subject to **regular internal and external** review.
	Met?	Yes	Yes	No
	Justification	SG60 – See SG80 SG80 – Guidance for this indicator considers whether there are opportunities and/or forums for decision-makers to receive feedback on the management system. The fishery has in place mechanisms to evaluate key parts of the management system and are subject to regular internal review. Results of fishing season and effectiveness of management actions undertaken are discussed at the both management agencies such as AFC, SVTU and FAR, and also at Research Councils of fisheries institutes such as KamchatNIRO, TINRO-Center and VNIRO on a regular basis (Shevlyakov et al. 2016). Methodical approaches to stock evaluation and the recommended volumes are discussed by a specialized Salmon Council of the Far East industry institutes within the research and engineering association of the Pacific Institute of Fishery and Oceanography (NTO TINRO), then assessed by the		

PI 3.2.4		**There is a system of monitoring and evaluating the performance of the fishery-specific and enhancement management system(s) against its objectives** **There is effective and timely review of the fishery-specific and associated enhancement program(s) management system**
		Scientific Council of KamchatNIRO, then by the Scientific Council of TINRO-Center and VNIRO (Russian Federation Research Institute of Fishery and Oceanography). After that the recommended regional volumes of Pacific salmon are reviewed and approved by the Industry Council of Rosrybolovstvo (Russian federal Fisheries Agency). The fishery also has in place mechanisms for occasional external review. External review means external to the fishery management system. This could occur by another department within an agency, another agency or organization, an external government audit, a peer organization or expert peer reviewers. The FAR interacts with various agencies at the federal level while controlling its territorial departments and provides oversight of departments under its jurisdiction. The FAR evaluates the management system through its responsibility for defining the rules and the areas of fisheries and for preparation of federal-level and agency-level reports on the fishing industry. Federal review provides periodic external review of fishery programs implemented by the FAR. The operation of this system was demonstrated by changes in the system of fishery allocation from an assigned quota by fishing company to the Olympic system where the harvestable surplus is not allocated by fishing company prior to the fishing season. This change occurred in response to regional and Federal review processes working on concert. SG100 – The fishery is not subject to regular external review as part of an established process.
References		See Section 3.5
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**--**

APPENDIX 2 - CONDITIONS & CLIENT ACTION PLAN

Condition 1

Performance Indicator	**<u>1.1.1. Stock status</u> - The stock management unit (SMU) is at a level which maintains high production and has a low probability of falling below its limit reference point (LRP)**
Score	70 (all species)
Rationale	The SG 80 standard is not achieved because of uncertainty regarding stock status relative to TRPs due to the aggregate nature of the stock assessment to derive goals, reductions in annual assessments of spawning escapement due to recent funding constraints and system-specific differences in fishing intensity. Objective values may not be met in every system and every year and in some cases may not have been identified. It is unclear whether objectives maximize sustained yield.
Condition	Condition 1. Demonstrate that the species management unit is at or fluctuating around its target reference point.
Milestones	By the first annual surveillance, the client must present evidence that a plan is in place to address this condition. By the second annual surveillance, the client must present evidence that the plan has been implemented. By the third annual surveillance, the client must demonstrate that the condition has been met, at which time the fishery will rescore at least 80. Recommendation: Annually report spawning escapements by species and river system in relation to an established escapement goal. Include goals for even and odd year pink salmon and other stocks as appropriate based on run timing.
Client action plan	The Client will provide an analysis of the relationship between historical escapement monitoring data to actual escapements during the first surveillance audit (see Condition 3). For example, are they estimates of total escapement abundance or are they relative indicators of abundance. If they are estimates, the analysis will include a description of how escapements are extrapolated from aerial surveys and why this is appropriate. The Client will also provide a justification for the revised escapement monitoring plan during the first surveillance audit. For example, if only select “indicator” streams/stream sections are surveyed, the analysis will include a rationale for why they are representative of unsurveyed streams in the unit of certification. Starting with the first surveillance audit, the Client will provide annual information on escapements compared to the relevant escapement targets, by species.
Consultation on condition	Client will work with KamchatNiro to provide the analysis of historical escapement monitoring and graphs of escapement compared to escapement targets. Client will work with Ocean Outcomes and KamchatNiro to provide reporting of this information.

Condition 2

Performance Indicator	**<u>1.2.2. Harvest control rules and tools</u> -There are well defined and effective harvest control rules (HCRs) in place**
Score	70 (all species)
Rationale	The SG80 standard is not met because it is unclear whether harvest control rules are sufficiently robust to maintain appropriate levels of escapement in the event of a prolonged period of reduced ocean productivity. HCR's appear to be generally effective in regulating exploitation rates during the current period of high salmon productivity in West Kamchatka corresponding to a period of favorable marine conditions. High productivity makes these stocks extremely resilient and capable of sustaining high harvests and harvest rates. Production remains high even in the face of periodic low escapements that sometimes occur among exploited salmon populations as a result of normal annual variability in returns and inexact forecast and assessment methods. However, high harvests create an expectation for continuing high harvest and a fishery infrastructure consistent with supporting demands. Pink salmon do not meet the SG80 standard because escapement goals do not distinguish odd and even years.
Condition	Condition 2. Demonstrate that harvest control rules are likely to be robust to the main uncertainties regarding future marine productivity regimes for Pink, Chum and Coho Salmon of the unit of certification. Demonstrate that well-defined harvest control rules are in place that ensure that the exploitation rate is reduced as the LRP is approached, and are expected to keep the SMU fluctuating around a target level consistent with MSY for component populations in different rivers and stocks (e.g. distinguish even and odd year runs for pink salmon).
Milestones	At each surveillance, By the first annual surveillance, the client must present evidence that a plan is in place to address this condition. By the second annual surveillance, the client must present evidence that the plan has been implemented. By the third annual surveillance, the client must demonstrate that the condition has been met, at which time the fishery will rescore at least 80. Recommendation: Need annual information on passing days, exploitation rates/index and escapements in response to run size. After five years of demonstrated effectiveness condition can close. Need separate escapment goals for even and odd year pink runs.
Client action plan	The Client will provide an annual report summarizing management actions taken by the Anadromous Fish Commission (establishment and modification of passing days) relevant to the certified fisheries during the previous fishing season at each surveillance audit, and identify steps to assure the harvest control rule is robust to main uncertainties. In addition, the report will include: the catch of salmon by the Client fisheries by species and river/fishing parcel; and escapement data by species and river. The report will include results of any independent observer program in place in this fishery. See action plan for conditions 1 and 3 regarding pink salmon escapement goals.
Consultation on condition	Client will work with KamchatNiro to provide the necessary information.

Condition 3

Performance Indicator	**<u>1.2.3. Information and monitoring</u> - Relevant information is collected to support the harvest strategy**
Score	65 (all species)
Rationale	Concern for the sufficiency of information on spawning escapements for a representative range of component populations in the future is raised by the continuing reductions in aerial survey effort that is the basis for inseason and post season stock assessment, thereby not meeting SG80.
Condition	Condition 3. Provide sufficient information on wild spawning escapement for a representative range of wild Pink, Chum and Coho populations in the unit of certification to support the harvest strategy and demonstrate that wild abundance is regularly monitored at a level of accuracy and coverage consistent with the harvest control rule.
Milestones	By the first annual surveillance, the client must present evidence that a plan is in place to address this condition. By the second annual surveillance, the client must present evidence that the plan has been implemented. By the third annual surveillance, the client must demonstrate that the condition has been met, at which time the fishery will rescore at least 80. Recommendation: One alternative would be to implement systematic annual escapement surveys for all species in selected index streams and reaches.
Client action plan	The Client will provide a plan to improve escapement monitoring during the first annual surveillance audit. The plan will include the methodology (e.g. aerial surveys, weir counts, etc.), approximate time period (e.g. mid-August to early September), frequency (e.g. weekly surveys), streams/stream sections for each species, and identify steps to provide sufficient information on wild spawning escapement to support the harvest strategy and demonstrate monitoring of abundance. Annual escapement data for the previous season will be provided during each audit.
Consultation on condition	Client will work with Ocean Outcomes and KamchatNiro to develop the plan. The plan presented during the first surveillance will include agreement with KamchatNIRO to provide information.

Condition 4

Performance Indicator	**<u>1.2.4. Assessment of stock status</u> - There is an adequate assessment of the stock status of the SMU**
Score	75 (all species)
Rationale	Current assessments also provide low resolution on major stock subcomponents and limited precision due to a reliance on peak escapement counts in selected index areas. Stock assessment has become increasingly reliant on indicator streams with the reduction in sampling rate but changing distribution pattern over time at different scales of abundance can confound interpretation of index samples. Reliance on index areas may not provide representative estimates for a full spectrum of strong and weak stock subcomponents within a system. Peak spawner counts from the most productive habitats may not be representative of the total stock under conditions of low productivity or declining returns. Further, escapement goals are generally based on production functions for aggregate stock and river populations of a species. Curves and goals thus represent an average stock and may be disproportionately driven by large strong stocks in the aggregate.
Condition	Condition 4. Estimate stock status of Pink, Chum and Coho Salmon of the unit of certification relative to reference points that are appropriate to the SMU and demonstrate there is some evidence of coherence between the status of the indicator streams and the status of the other populations they represent within the management unit, including selection of indicator stocks with low productivity to match those of the representative SMU where applicable.
Milestones	By the first annual surveillance, the client must present evidence that a plan is in place to address this condition. By the second annual surveillance, the client must present evidence that the plan has been implemented. By the third annual surveillance, the client must demonstrate that the condition has been met, at which time the fishery will rescore at least 80. Recommendation: Need description of the extrapolation methodology for escapement estimates. Why is it underestimated at low run sizes? How do escapements compare to the goals? Provide justification for selection of index areas. For instance, one stream each in north and south. Could include correlations in historical abundance to justify rationale for representative sampling. Peak sampling based on historical timing and sex ratio monitoring. The statistical basis for descripting relationships and related applications should be included. Develop methodology of spawning escapement estimations based on sampling areas, where average estimates of spawners would not directly depend on intensity of aerial observations (recognizing that sampling error will probably increase with decrease of flight hours).
Client action plan	The Client will provide an analysis of the relationship between historical escapement monitoring data to actual escapements during the first surveillance audit. For example, are they estimates of total escapement abundance or are they relative indicators of abundance. If they are estimates, the analysis will include a description of how escapements are extrapolated from aerial surveys and why this is appropriate. The Client will also provide a justification for the revised escapement monitoring plan (Condition 2) during the first surveillance audit. For example, if only select “indicator” streams/stream sections are surveyed, the analysis will include a rationale for why they are representative of unsurveyed streams in the unit of certification. Starting with the first surveillance audit, the Client will annually provide information comparing annual escapements (for at least the previous 15 years) compared to the relevant escapement targets, by species, and identify steps to assure an estimate of stock status relative to reference points and demonstrate coherence between the status of the indicator streams and the status of the other populations they represent.

Consultation on condition	Client will work with KamchatNiro to provide the analysis of historical escapement monitoring and graphs of escapement compared to escapement targets. Client will work with Ocean Outcomes and KamchatNiro to provide justification for the revised escapement monitoring plan.

Condition 5

Performance Indicator	**2.1.3. Primary species information - Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species**
Score	70
Rationale	Primary species include coho salmon (in rivers except for Kol where they are a P1 species), sockeye salmon (in rivers except for Ozernaya where they are subject to a separate certification), and Chinook salmon (all rivers). Assessments also include direct estimates of natural stock productivity on a regional and population-specific. Continuing reductions in aerial survey effort, which is the basis for inseason and post-season stock assessment, raise concern for the sufficiency of information on spawning escapements for a representative range of component populations in the future. The SG80 standard is not met due to reductions in the accuracy and precision of wild abundance estimates resulting from recent reductions in aerial survey efforts.
Condition	Condition 5. Provide quantitative information on escapement of (non-Ozernaya) Sockeye and (non-Kol) Coho Salmon adequate to assess the impact of the UoA with respect to status.
Milestones	By the first annual surveillance, the client must present evidence that a plan is in place to address this condition. By the second annual surveillance, the client must present evidence that the plan has been implemented. By the third annual surveillance, the client must demonstrate that the condition has been met, at which time the fishery will rescore at least 80. Recommendation: survey abundance and compare to goals (same info as in PI for other species.
Client action plan	Starting with the first surveillance audit, the Client will annually provide graphs comparing annual escapements of Coho and Sockeye (for at least the previous 15 years) compared to the relevant escapement targets, by species.
Consultation on condition	Client will work with KamchatNiro to provide the necessary information.

Condition 6

Performance Indicator	**<u>3.2.2. Decision-making processes</u> - The fishery-specific and associated enhancement management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.**
Score	75
Rationale	Monitoring of decision making for the fishery is limited by the inconsistent availability of information outside the local governmental management system. Results of fishing season and effectiveness of management actions undertaken are discussed at the both management agencies such as AFC, SVTU and FAR, and also at Research Councils of fisheries institutes such as KamchatNIRO, TINRO-Center and VNIRO on a regular basis. However, information on run size, harvest by time and area, fishery management actions, and escapement is not typically reported outside the management system except in rare cases. Occasional publications of related information (e.g. Shevliakov 2013b) provide a historical perspective but are not sufficient to allow tracking action associated with findings and relevant recommendations.
Condition	Condition 6. Demonstrate that information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. Recommendation: The client report should include information used to make decisions plus the final outcome such as final spawning escapements and harvests in the watersheds, age of chum and coho salmon.
Milestones	By the first annual surveillance, the client must present evidence that a plan is in place to address this condition. By the second annual surveillance, the client must present evidence that the plan has been implemented. By the third annual surveillance, the client must demonstrate that the condition has been met, at which time the fishery will rescore at least 80. Recommendation: Annual report to assessment team summarizing management actions and rationales based on fishery data. We will need to provide more guidance on what exactly we are looking for. Transparency.
Client action plan	Beginning with the first surveillance audit, the Client will provide annual reports documenting the rationale behind fishery management actions taken the previous fishing season affecting the unit of certification. In addition to reporting on Anadromous Fish Commission protocols establishing opening dates, initial passing days, modifications to passing days, season closures, etc., the report will provide rationale for the actions. For example, pre-season run forecasts, inseason catch/escapement information may have been used to set or modify passing days based on projected run strength. The report will include results of any independent observer program in place in this fishery regarding regulatory compliance.
Consultation on condition	Client will work with KamchatNiro to provide the necessary information.

Condition 7

Performance Indicator	**<u>3.2.3. Compliance and Enforcement</u> - Monitoring, control and surveillance mechanisms ensure the management measures in the fishery and associated enhancement activities are enforced and complied with.**
Score	70
Rationale	Effective enforcement is only possible with considerable funding and cooperation among companies fishing companies depending on local fish resources. The chronic nature of this problem indicates that the monitoring, control and surveillance system has not demonstrated a complete ability to enforce relevant rules throughout the system. Enforcement cannot be considered comprehensive because the notable level of illegal fishing is apparently still significant.
Condition	Condition 7. Demonstrate that a monitoring, control and surveillance system has been implemented in the fishery and associated enhancement activities and has demonstrated an ability to enforce relevant management measures, strategies and/or rules, and that sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.
Milestones	By the first annual surveillance, the client must present evidence that a plan is in place to address this condition. By the second annual surveillance, the client must present evidence that the plan has been implemented. By the third annual surveillance, the client must demonstrate that the condition has been met, at which time the fishery will rescore at least 80.
Client action plan	The Client will provide a detailed plan for assessing the magnitude of illegal fishing in the unit of certification by the first surveillance audit. In addition, to independent fishery observer reports, enforcement activities, and media reports, the plan will include some methodology to evaluate the relative quantity of fish illegally harvested. For example, this may include anthropological/sociological studies of local communities to assess the types and scale of different illegal activities, potential trade routes, and strategies for reducing incentives for these activities. The Client will present evidence that the plan has been implemented during the second surveillance audit. A final report on the results demonstrating an effective monitoring, control, and surveillance system will be provided during the third surveillance audit.
Consultation on condition	Client will work with Ocean Outcomes and academic consultants to develop and implement the plan. The Plan provided at the first surveillance will include agreement with relevant contractors to collect and analyse information.

APPENDIX 3 - PEER REVIEW REPORTS

Reviewer 1

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**No**	**CAB Response**
Justification: The background text provides good information on the fishery. However, this information raises concerns about the management of the pink and chum salmon fisheries, assuming the data provided in the report are adequate. However, even if the data are not accurate, the findings show that the management system is not responding to key information that should be used to manage the fisheries. The issues mentioned below and in the review of each PI caused me to raise the same basic issue over and over for the various PIs. *Table 16 shows that the average harvest rate on chum salmon during 2009-2013 was 89%. This is much too high for chum salmon, the salmon species that is most susceptible to overharvest (see papers by Carl Walters). Furthermore, Fig. 17 shows that chum salmon in some watersheds experience nearly 100% harvest rate in even numbered years when harvests of pink salmon are also high. Also, the data in this table indicates that spawning escapement did not reach 800,000 spawners, which seems to be the current management target (the TRP in this fishery was vague). Other possible reference points were mention but it was stated that these are not currently used for management.* *Additionally, spring, summer, and fall chum salmon runs were identified, yet management seemed insensitive to these timing groups, which are often genetically distinct and often have unique TRPs in other salmon regions. It was not clear how the aggregate spawning escapement supported these three timing groups. TRPs are likely needed for each timing group in each large watershed.* *One problem with the management system is that the there is only one spawning escapement goal for the entire UoA. This approach means that overharvest in one watershed might be compensated (in the view of managers) by low harvest in another watershed while still meeting the spawning objective. TRPs are needed for each major watershed in order to guide harvest management. It is not clear how managers decide to open and close fisheries based on inseason information as a means to achieve the TRP.* *For pink salmon, it was stated that odd-year pinks do not have a TRP/LRP. This is a major problem because MSC guidelines require a TRP/LRP. The text stated that fishing effort is lower in odd versus even year pinks; however, prior to 1983, odd year pink salmon were the dominant pink salmon stock in this region. Odd and even year pink salmon are typically genetically distinct due to their fixed two year life cycle, and therefore both stocks must have a TRP/LRP. Although the report indicated that*		*This section provides a general response to peer reviewer summary comments. More detailed responses to specific points are addressed under performance indicator comments.* *A fishing strategy based on terminal fishery locations and passing days (closed to fishing) is the key to sustaining high production in the Kamchatka salmon fishery management system despite limited and uncertain information. Most rivers are fished in a pattern of two days on and two days off. In years of large returns and some rivers, numbers of passing days might be reduced. Regular passing days in terminal fisheries are a precautionary management strategy that ensures substantial escapements over the course of the run even when escapement survey data are uncertain. The limited area of the fishery ensures that substantial numbers of fish transit the fishing area during passing days.* *The Kamchatka strategy is different than the typical Alaska strategy with which we are well acquainted of high-value salmon fisheries. The Alaska strategy relies on intensive monitoring of harvest and escapement to maximize take of harvestable surpluses in any given year and regulate system-specific escapements to optimize future production around maximum yield. This system is costly and labor intensive to implement.* *The Kamchatka strategy is more "extensive" in nature due to limitations in management resources relative to the scale of the region. The passing day strategy is closer to a fixed exploitation rate than the fixed escapement strategy generally employed in Alaska. Surveys conducted at a broad regional level are generally sufficient to support this strategy by distinguishing low, average, and large run patterns.* *The Kamchatka strategy is appropriate to the scale of the region, the current productivity of these stocks, stock resilience in pristine habitat and favourable ocean regimes and the constraints of the management system. The system has demonstrated the ability to sustain high yields while accepting tradeoffs in annual production and spatial patterns of escapement. Run sizes of pink and chum salmon are currently fluctuating around levels substantially greater than the historical average. Run sizes of Kol salmon are fluctuating around the historical average.* *KamchatNIRO is moving toward more-intensive management with the identification of stock and river-specific target and limit reference points. However, this*

fishing pressure was lower in odd year pink salmon, Table 13 shows that 97% of the pink run was harvested in 2009 and 87% was harvested in 2013. Millions of odd year pink salmon were harvested—this is not a small fishery and TRPs are needed for mamagement.	*information has not been fully incorporated into management.* *A key problem influencing the reliability of stock assessment is decrease of funding needed for aerial observation of spawning escapement. This decrease results in reduction of observed spawners because the methodology provides only direct number of observed fish, but not their estimate based on sample of surveyed spawning groundes with eventual extrapolation on all potential spawning grounds. Authors of KamchatNIRO report indicate this directly and write that they cannot estimate magnitude of uncertainities involved.* *Based on peer reviewer comments regarding interpretation and application of TRPs in this fishery, PI 1.1.1 was rescored downward from 80 to 70 in recognition of uncertainty regarding whether SMU's are at or fluctuating around its TRP.*

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCR 7.11.1 and sub-clauses]	**No**	**CAB Response**
<u>Justification:</u> The existing conditions are a good start. However, for the reasons identified above, the conditions need to be much more comprehensive to ensure that the UoA has clearly defined and appropriate TRPs and that evidence demonstrates that the management system is achieving the TRPs. The TRPs should reflect the approach for controlling fisheries and allowing appropriate spawning escapement into each major watershed, including consideration of run timing groups, rather than an aggregate TRP that cannot be responsive to the escapements needed to sustain runs and timing groups in each major watershed. Harvest rates must be appropriate for each species and run timing group in each watershed.		*A condition was added with under PI 1.1.1 with rescoring from 80 to 70 based on peer review comments regarding interpretation and application of TRPs.*

Do you think the client action plan is sufficient to close the conditions raised? [Reference FCR 7.11.2-7.11.3 and sub-clauses]	**No**	**CAB Response**
<u>Justification:</u> For the reasons identified above, the conditions and the action plan need to be much more comprehensive to ensure that the UoA has clearly defined and appropriate TRPs and that evidence demonstrates that the management system is achieving the TRPs and adequate harvest rates. *For condition 5, the client report should include information used to make decisions plus the final outcome such as final spawning escapements and harvests in the watersheds, age of chum and coho salmon. An example that the client should strive to achieve is the Area Management Report for Bristol Bay Alaska salmon (http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareabristolbay.salmon#management). The Alaska report includes data tables that span multiple decades.*		*The client action plan was modified to address a new condition identified under PI 1.1.1 regarding interpretation and application of TRPs for all salmon species.* *A recommendation was added to condition 6 (formerly 5) to the effect that the annual client report should include information used to make decisions plus the final outcome such as final spawning escapements and harvests in the watersheds, age of chum and coho salmon.*

Performance Indicator Review

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
1.1.1	No	No, see comment	The lack of clear reference points may require a condition to cleary identify reference points & to provide reference point for odd year pink salmon	The scoring text says "KamchatNIRO reported that for the subject populations the escapement value did not go below the limit reference point, and the range of escapement values for the most species tends to or exceeds the target reference points". However, Table 16 shows that the apparent escapement target for chum, which is defined here as both the LRP & TRP, has not been achieved during 2009-2013. Escapement has averaged only 527,000 chum compared with the apparent management spawning target of 800,000 chum. Also, the harvest rate for chum, based on Table 16, has averaged 89% which is much too high for chum salmon which is typically the least productive of Pacific salmon species. Fig. 17 shows that harvest rate of chum in some watersheds during the past few yearts is very close to 100% in even years. Reference points do not appear to be well-define: a variety of values are described without specific identification of the TRP for chum. Also, spring, summer and fall runs of chum salmon were described. These are likely genetically distinct populations and therefore may need separate LRPs and TRPs. Also, there is reportedly no TRP for odd year pink salmon which is likely genetically distinct from even-year pink slmon. Odd year pink salmon were highly abundant in western Kamchatka in the past & were the dominant run prior to 1984 (see NPAFC records).	KamchatNIRO reports that spawning escapement estimates are substantially underestimates salmon due to incomplete spawning surveys, particularly in recent years. As a result, exploitation rates derived from harvest and escapement numbers are substantial overestimates. For instance, rates of 100% are reported in years when no spawning escapement data are available due to a reduction in aerial survey funding. As a result, numbers reported for escapement in Table 16 should be considered indices rather than than absolute estimates. For instance, Chum Salmon escapement index counts averaging 500,000 for 2009-2013 are less than the 800,000 reported by KamchatNIRO to produce MSY. However, chum salmon production is currently at record high levels throughout Western Kamchatka based on harvest and escapement which demonstrates the efficacy of current management. Based on peer reviewer comments regarding interpretation and application of TRPs in this fishery, PI 1.1.1 was rescored downward from 80 to 70 in recognition of uncertainty regarding whether SMU's are at or fluctuating around their TRPs. This included a recommendation to include identification of target reference points for even and odd year pink salmon.

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
1.1.2	No	Maybe not	NA	No depleted stocks have been identified, but my concern is that Figure 17 shows that some chum rivers experienced nearly 100% harvest rates in recent even numbered years. Is this the result of managing for an aggregate spawning goal rather than specific goals for the larger watersheds? What was the escapement into these individual rivers?	See PI 1.1.1 explanation
1.2.1	No	No		The text says "The harvest strategy in place is responsive to the state of the SMU and works effectively to achieve escapement-based management objectives." How can this be true when there is no TRP for odd year pink salmon? For chum salmon, how can the harvest strategy be appropriate when the harvest rate in some rivers is very close to 100%. Chum are well-known to have low productivity and therefore, as a species, cannot support high harvest rates. See papers by Carl Walters. The text implies that management opens and closes the fisheries to allow escapement into each watershed but the evidence in Fig 17 does not support this. TRPs are needed for the major watersheds.	The harvest strategy for odd-year (subdominant) pink runs is to limit exploitation rates by provided regular passing days for inriver fisheries and substantially reducing use of trapnets in marine waters. Odd-year fisheries are focused on chum salmon rather than pink salmon. Specific escapement objectives have not been identified for odd-year pink runs but are identified in conditions and client action plans. See explanation of chum exploitation rates under 1.1.1. Actual exploitation rates are substantially less than 100% - these values are an artifact of limited survey information in some years. The situation is the same for pink salmon. Conditions and the client action plan address the need for species, stock and system-specific target reference points. The need for more rigorous escapement surveys is recognized by condition 3 for PI 1.2.4. Therefore, the assessment team has made no change in score.
1.2.2	No	No	No	If there is no TRP for odd year pink salmon, then it is very difficult to pass SG80 for these PIs. For example,	The PI score was reduced from 75 to 70 reflecting the lack of separate target reference points for

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
				Table 13 shows very few pink salmon were allowed to spawn in 2009 (0.12 million spawners) and 2013 (.21 million spawners) and the harvest rates during these years was 97% and 87%, respectively. These harvest rates are too high even for pink salmon. They probably occur because there is no TRP for odd year pink salmon, assuming the data are reasonably accurate. For chum, it is apparent that the current harvest control rules are not appropriate because they allowed such high harvest rates in some rivers, perhaps because TRPs are not set for major watersheds. I agree that a condition is needed here. But the need for a condition goes way beyond the concern that harvest control rules may not be robust during periods of low productivity in the future. Please see comments here and above.	even and odd year pink runs and the condition and action plan were revised accordingly. The chum salmon issue has been explained under earlier responses.
1.2.3	Partially	Partially	Yes, partially.	I agree that the decline in spawning survey effort is a key problem that needs to be fixed. This PI mentions component populations and the text notes the important of run timing. For chum salmon, the text states that there are early, summer and fall run timing groups for chum salmon, as is common. These timing groups are often genetically distinct. No information was provided on how the harvest strategy protects these timing groups and whether or not they are sustainable. Good to see that poaching has declined. I have investigated Russian salmon for many years. Unfortunately, the methods used to monitor spawning escapements and to document those escapements by watershed is poorly documented. This MSC fishery	The assessment team agrees that more rigorous survey data will be essential in meeting conditions of the certification. The need for annual reporting is specifically identified in condition 2 and reflected in other conditions and the client action plan. Therefore, the assessment team has made no change in score. Stock structure is most significant among rivers and in large systems like the Bolshaya (which is not included in this assessment). Stocks identified by run timing differences are recognized by the management system and addressed by spawning index areas in different parts of the river systems that produce them and passing days distributed

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
				should strive to provide annual documentation such as that provided by the Bristol Bay Alaska Area Management Report.	throughout the duration of the run.
1.2.4	Partially	Partially	Yes, partially.	The scoring text and condition identifies some important issues that need to be fixed. But as stated above some additional basic management issues should also be address: 1) develop a TRP/LRP for odd year pink salmon so that pink salmon do not experinence harvest rates up to 97% (Table 13), 2) clarify the TRP/LRP for chum salmon, 3) develop separate TRP/LRP for spring, summer, and fall chum salmon for each major watershed so that some chum stocks do not experience harvest rates approaching 100% as shown in Fig. 17. I agree with a condition that requires a return to more comprehensive monitoring of spawning escapements.	Conditions and client action plans address the need for identifying specific TRPs by species, system and stock where appropriate. However, it is more appropriate to address the the issues identified by the peer reviewer in the PIs for reference points, harvest strategy, and harvest control rules that here in stock assessment. Therefore, the assessment team has made no change in score.
2.1.1	Yes	Yes	NA	Chinook escapement in some areas has been below the optimum range in some watersheds (Tabl 21) but the numbers suggest that that are above the PRI, which is a low bar to achieve.	None required
2.1.2	Yes	Yes	NA		
2.1.3	Yes	Yes	Yes		
2.2.1	Yes	Yes	NA		
2.2.2	Yes	Yes	NA		

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
2.2.3	Yes	Yes	NA		
2.3.1	Yes	Yes	NA		
2.3.2	Yes	Yes	NA		
2.3.3	Yes	Yes	NA		
2.4.1	Yes	Yes	NA		
2.4.2	Yes	Yes	NA		
2.4.3	Yes	Yes	NA		
2.5.1	Yes	Yes	NA		
2.5.2	No	No		Salmon are recognized as keystone species in the ecosystem, as indicated in the report. However, data in the report also shows that up to 97% of odd-year pink salmon may be removed by the fishery and nearly 100% of chum salmon in some large watersheds is removed. Assuming these data are accurate, these harvest rates are too high for the salmon species and for the biological community that depends of salmon for food and nutrients.	Exploitation rate estimates derived from harvest and escapement information are not accurate in recent years due to a reduction in survey intensity, as previously addressed. The need for additional surveys is recognized in conditions and the client action plan. The mangement system recognizes the role of salmon in the ecosystem, as described in the text and scoring tables. The passing day system addresses this need. Therefore, the assessment team has made no change in score.
2.5.3	No	No		Same as above. Salmon are recognized as keystone species in the ecosystem, as indicated in the report.	Same as above

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
				However, data in the report also shows that up to 97% of odd-year pink salmon may be removed by the fishery and nearly 100% of chum salmon in some large watersheds is removed. Assuming these data are accurate, these harevst rates are too high for the salmon species and for the biological community that depends of salmon for food and nutrients. The effect on the freshwater ecosystem of removing such high percentages of salmon has not been investigated.	
3.1.1	No	No	NA	3.1.1a. Text seems fine. It is good that illegal fishing has reportedly declined to a great extent. 3.1.1b Disputes. The good description of the dispute between two companies and the accusation of illegal leads me to question whether this issue should receive the perfect score of 100 even though the team could not find problem (was the company that filed the accusation interviewed?) 3.1.1c Looking at historical accounts of susbsistence fishing by Indians in the Columbia Basin, a limit of 100 kg per person is much lower that what NW Indians required.	The assessment team concluded that the effective dispute resolution between the fishing companies is evidence that the legal/customary framework for the fishery is appropriate and effective. The company which submitted the accusation was interviewed during earlier assessments (Ozernaya River sockeye salmon). A special investigation undertaken by governmental structures confirmed that the certified company did not violate the fishing rules. The 100 kg allocation is under current social and economic conditions as opposed to the predevelopment number referenced for the indigenous hunter-gatherer culture. Therefore, the assessment team has made no change in score.
3.1.2	Yes	Yes	NA		
3.1.3	No	No		The long-term objectives are not clear because there odd year pink salmon do not have a TRP to guide fisheries management. It is not clear that a	This issue has been answered previously. The objectives exist for maintaining robust levels of productivity of salmon stocks. Improvements in

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
				precautionary approach is used when nearly 100% of some chum and pink runs are harvested as shown by data provided in the report.	implementing the objectives will improve with the further development of reference points and surveys. Therefore, the assessment team has made no change in score.
3.2.1	No	No		The short and long-term objectives are not expicit because there odd year pink salmon do not have a TRP to guide fisheries management. It is not clear that a precautionary approach is used when nearly 100% of some chum and pink runs are harvested as shown by data provided in the report. The apparent spawning target of 800,000 chum was not clearly identified by managers. Additionally, a spawning target for a large region with multiple large watersheds is not conducive to sustainable fisheries management given that the fishing gear locations are fix and therefore they may overharevst one stock while overescaping another.	These issues were addressed under Principle I. Also the terminal fishery/passing day management strategy are effective at meeting objectives consistent with maintaining escapements which sustain productivity of all stocks. Therefore, the assessment team has made no change in score.
3.2.2	No	No	Yes, partially.	If decision making processes are good, how could the managers allow nearly 100% harvest of some pink and chum runs? I agree 100% with the condtion that calls for greater reporting of fisheries information such as stock specific catch, harvest, runs, age composition, migration timing, data collection methods—information that is needed for basic fisheries management. This information is needed to demonstrate transparency in the management process.	These issues were addressed under Principle I. The terminal fishery/passing day management strategy are effective for maintaining escapements which sustain productivity of all stocks. The terminal fishery/passing day management strategy are effective at allowing decision making consistent with maintaining escapements which sustain productivity of all stocks. Therefore, the assessment team has made no change in score.
3.2.3	Partially	Partially	Yes	If there is abuse of the indigenous fishery permitting system, how does 3.1.1c (respect for rights) score 100?	The system respects the legal rights of indigenous fishing by providing special provisions and quota

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
				The condition is appropriate. 3.2.3c If one company was accusing another company of illegal fishing, how can we be highly confident that fishers and hatchery operators comply with the management system, e.g., SG100?	for harvest. Abuse is largely in the form of non-qualified participants and illegal sale of subsistence harvest. This issue has been effectively adjudicated by the system. The current system for allocating fishing rights have practically reduced historically widespread abuses in the commercial sector. Therefore, the assessment team has made no change in score.
3.2.4	Yes	Yes	NA		

Reviewer 2

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**No**	**CAB Response**
Justification: I believe some additional explanations are necessary to show how the fishery meets SG 80 under P1.		*Additional explanations were incorporated into the report. Based on peer review comments, two PI scores were reduced, conditions and recommendations were added and the client action plan was modified accordingly.*

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? ***[Reference: FCR 7.11.1 and sub-clauses]***	**No**	**CAB Response**
Justification: I believe that some Conditions need further explanation/requirement.		*Additional explanations were incorporated into the report. Based on peer review comments, two PI scores were reduced, conditions and recommendations were added and the client action plan was modified accordingly.*

Do you think the client action plan is sufficient to close the conditions raised? ***[Reference FCR 7.11.2-7.11.3 and sub-clauses]***	**Yes/No**	**CAB Response**
Justification: Not sure. It will be necessary to know how the Assessment Team and CB answer my concerns to know whether the Action Plan is adequate. On the face of it, it seems OK for now.		*See PI responses*

This report is well formatted and designed to allow the reader to see where and what decisions have beenmade. I thoroughly enjoyed reading the report. However, as with all previous salmon assessments in Russia as well as in the US and Canada, there is a concern that indices are chosen without adequate analysis and explanation. In addition, alternative sampling schemes do not seem to be examined and compared to see if the chosen scheme is the best one for the job. As a result, it is very difficult to determine if indices are chosen well and implemented with adequate oversight. To add to this problem, the MSC PIs and SGs require that population components get adequately addressed. To me this would mean first identifying the components, then choosing a method of data gathering and monitoring such that any indices used to protect the components has some statistical validity. None of the salmon assessment reports seems to address this issue very robustly, and I speak from experience in Alaska, Canada, and Russia. It may simply be that the report lacks the information, even though there is an adequate assessment available. If so, it would be nice to see a better explanation of the issues related to population components. Otherwise, this is a well done job.

Performance Indicator Review

PI	Available relevant information used?	Score supported?	Condition(s) adequate?	Justification	CAB Response
1.1.1	yes	Not Yet - Need further explanation	No	Escapements are generally consistent with those recommended on a regional basis. River specific goals are not as well controlled or met, but these do not appear to be in general use. This seems acceptable for 80 on this indicator, but not having river specific control may be problematic in other indicators. For example, river specific controls and goals may be much more important for chum than pink due to river fidelity and straying rates. The problem I see is that the report does not do an adequate job of explaining why the escapement goals reported meet yearly expectations when the reported numbers do not meet the goals. Chum - For example, for chum the report states that escapements only met goals on average over a 6 year period (2009-2013). This is for 500,000, not the 800,000 goal. If either 2009 or 2012 are excluded, the average would not even meet 500k. Furthermore, the report states, "KamchatNIRO believes that in order to provide enough eggs to adequately seed available habitat, the total Chum Salmon escapement to Western Kamchatka must not be fewer than 800,000 fish (based on forecast materials from KamchatNIRO)."Information available from the North Pacific Anadromous Fish Commission suggests that escapements have been below 800,000 fish since 2007." Even if you accept 50% of optimal is within range (400,000), the annual escapements for 2010 are lacking and there are no escapements for 2014 or 2015 to show that current escapements are meeting goals, This seems problematic for scoring a full 80.	Based on peer reviewer comments regarding interpretation and application of TRPs in this fishery, PI 1.1.1 was rescored downward from 80 to 70 in recognition of uncertainty regarding whether SMU's are at or fluctuating around their TRPs. This included a recommendation to include identification of target reference points for even and odd year pink salmon. Pink, Chum and Coho Salmon production is currently at record high levels throughout Western Kamchatka based on harvest and escapement estimates, which demonstrates the efficacy of current management based on terminal fishing areas and passing days. Much of the issue with reported escapements results from underestimation due to a reduction in survey effort in recent years. However, escapements continue to sustain high returns. Thus, it is clear that the stock is maintained above levels of significant recruitment impairment under the current strategy. Issues with definition of escapement goals and reporting are addressed by conditions and the client action plan. Issues with definitiion and management for TRPs are also addressed with conditions for PI 1.2.2 and 1.2.4.

				Pink – the repeort states “Fisheries on the west coast of Kamchatka are managed to achieve region-wide escapement goals of 40-50 million Pink Salmon during even years.” Yet the report shows that annual goals are not met unless using an average over 5 years. Even then the average is just barely at the minimum of 40 million. If 1 good year is excluded (2010), then the average is only 38.8 million. And there is no indication of the escapement goals for 2014 and 2015 which are very pertinent to this assessment. In addition the report states, “Specific goals are not identified for the subdominant odd-year run….” This could be a problem but here is no assessment of its importance, even though annual escapements on average do not meet goals as 3 out of 5 of the even years come up short. Coho – the report states, “Spawning escapement of Coho Salmon is estimated based on expansions of aerial counts in a series of index areas. Estimates are made for only the early portion of the run due to the protracted run timing of Coho and difficulty of conducting surveys later in the year. As a result, KamchatNIRO estimates that counts include only 50 to 70% of the total number.” “Spawner-recruitment analysis of the aggregate western Kamchatka return has estimated that maximum sustained yield (MSY) is produced by spawning escapements of approximately 300-350 thousand Coho Salmon (Shevlyakov 2004). “	
				“Total runs of Coho Salmon have been increasing in recent years, although data reported to the NPAFC suggests that escapement targets have not been reached since 2009 (Figure 11).” The authors need to explain: Why escapements based on multiyear averages are acceptable, rather than meeting annual goals regulalry? Why escapements do not appear to be met each year? Why there are no escapement numbers for coho for the	

				region? Why there are no numbers for years 2014 and 2015 which seem very important to this assessment?	
1.1.2	Yes	yes			
1.2.1	yes	No	No	I am concerned that the statement under the indicator that says "…including measures that address component population status issues." is not adequately explained. The rational for the indicator says "Management occurs on a river by river basis with meeting escapement targets as a primary priority of the management system." (page 109). However, the report clearly states that river by river management by escapement goals is not in practice. Rivers are generally looked at, but no explanation is provided on how this is done and whether there is any indication of protecting component population status. Since an 80 score suggests this is done, an explanation is required.	A fishing strategy based on terminal fishery locations and passing days is the key to sustaining high production in the Kamchatka salmon fishery management system despite limited and uncertain information. Most rivers are fished in a pattern of two days on and two days off. In years of large returns and some rivers, numbers of passing days might be reduced. Regular passing days in terminal fisheries are a precautionary management strategy that ensure substantial escapements over the course of the run even when escapement survey data are uncertain. The limited area of the fishery ensures that substantial numbers of fish transit the fishing area during passing days. The Kamchatka strategy is appropriate to the scale of the region, the current productivity of these stocks, stock resilience in pristine habitat and favourable ocean regimes and the constraints of the management system. The passing day strategy is closer to a fixed exploitation rate than the fixed escapement strategy generally employed in Alaska. Surveys conducted at a broad regional level are generally sufficient to support this strategy by distinguishing low, average, and large run patterns. The system has demonstrated the ability to sustain high yields while accepting tradeoffs in annual production and spatial patterns of escapement. Therefore, the assessment team has made no change in score.

1.2.2	yes	no	Yes for what it currently requires.	The data/info for meeting SG80 appears to be inadequate. It does not explain how component population status is addressed and managed. The report barely mentions this issue but the Scoring guideposts require it be addressed more fully. Consequemtly, the Condition may need to address the population component issues if the report is not able to adequately address these issues more specifically. If the report handles these better, no additional Conditions may be needed. If not, additional Conditions may be needed to address deficiencies ion meeting SG 80 on component population status.	The PI score was reduced from 75 to 70 reflecting limitation in current management for system and stock-specific target reference points. The condition and action plan were revised accordingly.
1.2.3	yes	yes	yes	One note – does the recommendation include a better understanding of how individual rivers are statistically analyzed as part of the aggregate. The issue of using index areas to manage an entire region is important to understand and determine if indexes are reasonable for managing non-sampled areas/populations.	Conditions 1-4 and the client action plan specifically address the need for improvement in definition of stock and river-specific objectives and related monitoring.
1.2.4	yes	Yes	No	I believe the Condition should specifically say something about reduced sampling and its negative effect. Although you may not be able to require any specific level of sampling, you can at least require the analyses to use current data and show the statistical relationships. Do not let them use the older data that may be more comprehensive.	The MSC requirements preclude writing prescriptive condition. A recommendation was added to condition 4 to the effect that the statistical basis for descripting relationships and related applications should be included.
2.1.1	Yes	Yes	Yes		
2.1.2	Yes	Yes	Yes		
2.1.3	Yes	Yes	No	The Condition seems to restrictive. The justification states “However, continuing reductions in aerial survey effort which is the basis for inseason and post season stock assessment raises concern for the sufficiency of information on spawning escapements for a	Principle 2 addresses salmon stocks that are not part of the units of certification (non Ozernaya sockeye and non Kol coho). The related issue for UoC stocks was addressed under PI 1.2.3 and condition 3.

				representative range of component populations in the future. The SG80 standard is not met due to reductions in the accuracy and precision of wild abundance estimates resulting from recent reductions in aerial survey efforts." The Condition should reflect this system wide or the justification needs to show why only non-Ozernaya Sockeye and (non-Kol) Coho Salmon should be addressed.	
2.2.1	yes	Yes	Yes		
2.2.2	Yes	Yes	Yes		
2.2.3	yes	Yes	yes		
2.3.1	Yes	Yes	Yes		
2.3.2	Yes	Yes	Yes		
2.3.3	Yes	Yes	Yes		
2.4.1	Yes	Yes	Yes		
2.4.2	Yes	Yes	Yes		
2.4.3	Yes	Yes	Yes		
2.5.1	Yes	Yes	Yes		
2.5.2	Yes	Yes	Yes		
2.5.3	Yes	Yes	Yes		
3.1.1	Yes	Yes	Yes		

3.1.2	Yes	Yes	Yes		
3.1.3	Yes	Yes	Yes		
3.2.1	Yes	No	No	I am concerned that the management strategies do not adequately address population components and how to protect them in future years. Since population components are considered under MSC P1, and I have called into question the adequacy of the assessments in addressing population components, it seems they need to be addressed here as well. I do not see how they are addressed generally or explicitly in the management system. This coupled with the reduction in sampling suggests there may be a problem with the language and interpretation of the management rules and regulations.	The assessment team may not rescore harvest strategy and related issues in the fishery specific objectives section. The terminal fishery/passing day management strategy is effective at meeting objectives consistent with maintaining escapements which sustain productivity of all stocks. Details of stock-specific interpretation and application are addressed under Principle I. Therefore, the assessment team has made no change in score.
3.2.2	Yes	Yes	Yes		
3.2.3	Yes	Yes	Yes		
3.2.4	Yes	Yes	Yes		

APPENDIX 4 - STAKEHOLDER SUBMISSIONS

No Stakeholder submissions received, other than Technical Oversight from the MSC.

MSC Technical Oversight

MainID	SubID	Page Reference	Grade	Requirement Version	OversightDescription	Pi	CAB Comment
17968	20656	90	Minor	FCR-7.12.1.3 v2.0	Points of landing are not explicitly listed (there is reference to Processing Locations in Table 6 on p 13) but nothing in the Traceability section. This should be ammended.		Added new table (#26) identifying point of landing by fishing site.
17968	20657	89	Guidance	FCR_7.12.1 v2.0	The catch of two other species not part of the UoC is mentioned on on p15. Whatt happens to the small amounts of Sockeye and Chinook caught and how is it kept separate from eligble catch? This is not clearly dealt with in the Traceability section.		Additional explanation added to section 5.2 regarding separate tracking of sockeye and coho salmon by area.
17968	20658	89	Minor	FCR_7.12.1 v2.0	On p89 it is stated that there is some risk for illegal harvested salmon to be "accepted" at processing facilities "as certified". There is also lack of information about the traceability measures in place between points of landing, and during subsequent transport up to delivery at the processing facilities. As such, it is not clear how chain of custody is determined not to be required prior to delivery (Table 26). This needs clarification.		Clarification added to Table 26 of traceability factors clarifying that all fish delivered from landing sites have documentation that shows shows date, location, volumes, species, and fishing operator.
17968	20659	91	Guidance	FCR-7.12.2.1 v2.0	It is not clear what is meant by the statement: "This certification did not evaluate other landing sites or subsequent distribution for chain of custody." Does this refer to landing sites that are not part of the certifciation determination?		Yes. Statement was revised to clarify.
17968	20660	91	Guidance	FCR-7.12.1.5b v2.0	CoC is stated as beginning "at delivery of salmon to a processing facility in the client group or at a point of change of ownership of the fish." The report is not clear on when intended change of ownership takes place, and if and when it takes place before arrival at the processing facility.		Ownership occurs at the point of fish catch as fishing sites are leased and operated by the same fishing companies that operate the processing plants. The report was revised to clarify this point.
17968	20673	136	Major	FCR-7.10.6 v2.0	2.4.3.b has been scored at SG100. However, evidence of required assessment of habitat related impact as per SA3.13.1 and SA3.13.2 is limited, in particular, with respect to river grading activities. For example, a habitat impact study was conducted on one river (as a part of another certification) but it is not clear as how this study is representative of other parts of the fisheries subject to this assessment.		2.4.3b was rescored from 100 to 80. The resulting PI score was reduced from 85 to 80. Princile I score changed from 86.0 to 85.7.
17968	20674	158	Major	FCR-7.11.1.2 v2.0	The condition set for PI 1.2.2. does not follow the narrative or metric form of PISG for scoring issue a.	1.2.2	Condition text was revised to follow approriate form of PISG for scoring
17968	20675	106	Guidance	FCR-7.10.6.1 v2.0	The rationale starts with "SG60 - See SG80". Given that SG80 is not met, this adds unnecessary confusion.	1.2.2	Edited text to clarify

APPENDIX 5 - SURVEILLANCE FREQUENCY

Table 29. Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
1	Sept 2017	May 2017	Previous year's fishery information will be available and precedes current year fishery
2	Sept 2018	May 2018	
3	Sept 2019	May 2019	
4	Sept 2020	May 2020	

Table 30. Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 6	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit & re-certification site visit

APPENDIX 6 – CLIENT AGREEMENT

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ

ДЕЛЬТА

Юридический адрес: 684110, Камчатский край, Усть-Большерецкий район, п. Озерновский, ул. Рабочая, 25;
Почтовый адрес: 683031г. Петропавловск-Камчатский, ул. Топоркова 9Б;
ОГРН 1024101222716; ИНН 4108002794; КПП 410801001; кор/сч 30101810000000000804;
р/сч 40702810315020000771; в операционном офисе в г.Петропавловске-Камчатском филиала ОАО банк ВТБ в г. Хабаровске; БИК 043002804;; Тел/факс (4152) 280-694; 280-748.
E-mail: secretar.va@gmail.com

Robert J. Trumble, PhD
MRAG Americas
10051 5th Str. N, Suite 105
St. Petersburg, Florida 33702

September 8, 2016

Re: Full MSC assessment of VA-Delta Kamchatka Salmon Fisheries

Dear Dr. Trumble,

On behalf of Vityaz-Avto Co Ltd and Delta Co Ltd I am happy to formally accept the Public Certification Report for VA-Delta Kamchatka Salmon Fisheries. We have read the Final MSC Report and agree with the certification decision.

We would like to thank you and your hard-working team for the effort and knowledge you have put into the assessment of our fisheries.

Best regards,

Alexander Tarasov

General Director,
Vityaz-Avto Co Ltd and Delta Co Ltd

Общество с ограниченной ответственностью

«ВИТЯЗЬ-АВТО»

Юридический адрес: 683032 г. Петропавловск-Камчатский, ул. Степная,5.
Почтовый адрес: 683031 г. Петропавловск-Камчатский, ул. Топоркова,9/2
ОГРН 1024101019865 ИНН 4101081250 КПП 410101001;
кор./счёт 30101810400000000727, р/сч. 40702810015020000505 в операционном офисе в г. Петропавловске-Камчатском филиала ОАО банк ВТБ в г. Хабаровске, БИК 040813727
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Best regards,

Alexander Tarasov

General Director,
Vityaz-Avto Co Ltd and Delta Co Ltd