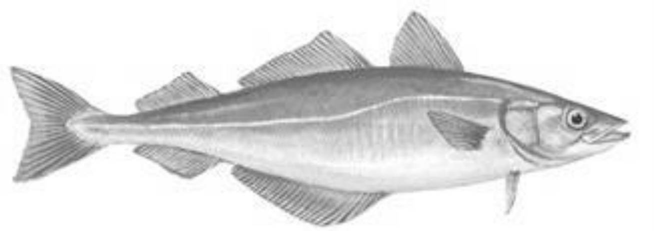
MSC SUSTAINABLE FISHERIES CERTIFICATION



Russia Sea of Okhotsk Pollock

Public Comment Draft Report

May 2018

Prepared For: Russian Pollock Catchers Association
Prepared By: Acoura Marine Ltd
Authors: Andrew I.L. Payne, Robert O'Boyle, David W. Japp

Fishery name	Russia Sea of Okhotsk Pollock Fishery	
Species and Stock	Walleye pollock (*Gadus chalcogrammus*)	
Date of Site Visit	Week beginning 2 October 2017	
Assessment team	Lead assessor: Andrew I.L. Payne (TL & P3) Assessor(s): Robert O'Boyle (P1) David W. Japp (P2)	
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Contents

Glossary

ABRs	Aquatic Biological Resources
B	Biomass
BSAI	Bering Sea / Aleutian Islands
CAB	MSC Conformity Assessment Body
CITES	Committee on International Trade in Endangered Species
CFMC	Centre for Fisheries Monitoring and Communications
CPUE	Catch per unit effort
CV	Coefficient of Variation
DVR	Daily Vessel Report
DVNPS	Far Eastern Scientific and Technical Council
EEZ	Exclusive Economic Zone
ETP	Endangered, Threatened, Protected species
F	Fishing mortality
FAM	MSC Fisheries Assessment Methodology
FAO	Food and Agriculture Organization (of the UN)
FFA	Federal Fishery Agency (or *Rosrybolovstvo)*
FMS	Fishery Monitoring System (operated by CFMC)
FSB	Federal Security Service (Coastguard)
GOA	Gulf of Alaska
GMI	State Marine Inspectorate of Northeastern Border Control Department (now the Coastguard)
HCR	Harvest Control Rule
HS	Harvest Strategy
ICES	International Council for the Exploration of the Sea
IUCN	International Union for the Conservation of Nature and Natural Resources
IUU	Illegal, Unreported and Unregulated fishing
IWC	International Whaling Commission
KamchatNIRO	Russian Research Institute for Fisheries and Oceanography, covering Russian Far Eastern seas and the open Pacific Ocean, based in Kamchatka
kt	Thousand tonnes (kilotonnes)
LME	Large Marine Ecosystem
M	Natural mortality
MCS	Monitoring, Control and Surveillance
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
mt	Metric tonnes
NGO	Non-Governmental Organization
NPFC	North Pacific Fisheries Commission
NPAFC	North Pacific Anadromous Fisheries Commission
PC	Possible Catch
PCA	Pollock Catchers Association (the Client, based in Vladivostok)
PCDR	Public Comment Draft Report
PI	Performance Indicator
PICES	North Pacific Marine Science Organisation
PRI	Point of Recruitment Impairment
RBF	Risk-Based Framework (MSC)
RFE	Russian Far East
SG	Scoring Guidepost (60, 80, 100)
SI	Scoring Issue (individual performance criteria under each SG)
SOO	Sea of Okhotsk

SSB	Spawning Stock Biomass
TAC	Total Allowable Catch
TINRO	Russian Research Institute for Fisheries and Oceanography, covering Russian Far Eastern seas and the open Pacific Ocean, based in Vladivostok
UK	United Kingdom of Great Britain and Northern Ireland
UoA	Unit of Assessment (MSC)
UoC	Unit of Certification (MSC)
VMS	Vessel Monitoring System
VNIRO	All-Russian Research Institute for Fisheries and Oceanography (Moscow)
VPA	Virtual Population Analysis
WBS	Western Bering Sea
WWF	Worldwide Fund for Nature

1 Executive Summary

This report provides details of the MSC assessment process for the Russian Sea of Okhotsk Pollock Fishery for the Russian Pollock Catchers Association (PCA). The assessment process began 31st August 2017 and was concluded on (to be stated and determined later).

A comprehensive programme of stakeholder consultations was carried out as part of this assessment, complemented by a full and thorough review of relevant literature and data sources. A rigorous assessment of the wide-ranging MSC Principles and Criteria was undertaken by the assessment team and a detailed and fully referenced scoring rationale is provided in the assessment tree provided in **Appendix 1.1** of this report. The **Target Eligibility Date** for this assessment is 24 September 2018.

The assessment team for the fishery assessment consisted of Andrew I.L. Payne, who acted as team leader and primary Principle 3 specialist; David W. Japp, who was primarily responsible for evaluation of Principle 2, and Robert [Bob] O'Boyle, who was primarily responsible for evaluation of Principle 1. Paul MacIntyre was the traceability expert advisor.

1.1 Client strengths

A notable strength of the UoC fishery is the long time-series of data available on pollock, and indeed many other species, habitats and environments across the whole Russian EEZ ecosystem, including in the Sea of Okhotsk. These data underpin good science in support of management, as well as a still-evolving but wholly adequate by international standards administrative and scientific management system that has improved both legislatively and in terms of what and how it delivers, transparently since first certification. Another strength is the client organisation itself, an umbrella representative advocacy body that covers the majority of pollock catches in the Sea of Okhotsk, but also has noticeably strongly embraced the principles underlying MSC certification.

1.2 Client weaknesses

As with many fisheries, a weakness lies in a possible lack of confidence in the knowledge of what constitutes bycatch, be it juvenile pollock, other species, or other members of the ecosystem, such as seabirds and marine mammals. Although the formal fleet movement and compliance control is demonstrably sound, the independent scientific observer system can still only cover a (representative) portion of the catch despite being beefed up since first certification and statistically analysed positively in terms of whether the observation level currently in place is adequate. Without greater levels of coverage and observer placement, however, there will always be questions asked by some about the adequacy of the observer information.

1.3 Determination

On completion of the assessment and scoring process, the assessment team concluded that the fishery met the requirements for MSC certification, with on this occasion no conditions. However, the team did feel moved to make two recommendations for consideration by the client, the first relating to incidental seabird mortality (though not of ETP species) arising from bird interactions with fishery operations at sea, and the second relating to the perceived need for an occasional but regular review of the non-stock-assessment part of the management system for the stock, to be independent and provided in English. The latter would generate confidence that the Russian Federation is indeed following international best practice in fisheries management and administration, something that is definitely seen to be the case at the moment but will still be regarded as somewhat opaque to critics who see that most pertinent documentation is in the Russian language.

1.4 Rationale

There are a number of areas which reflect positively on the fishery:

- the fact that the fish catch is ~98% the target species and prosecuted with consistent midwater trawl gear;
- the notable advances made in the management system since first certification;
- the continuity and consistency in UoC fishery membership and involvement;
- the historical and still-emerging strength of the scientific basis for decision-making;
- the country's adherence to UN and international conventions;
- the formal Open Government and Open Agency initiatives bringing information to a wider audience than one that speaks only Russian;
- the willingness with which the client invests in and supports regional and federal initiatives to support the development of a sound basis for sustainable management.

1.5 Conditions and Recommendations

Unlike at first certification, no criteria that contribute to the overall assessment score scored less than the unconditional pass mark, so it was deemed unnecessary to trigger binding conditions for placement on the fishery.

The assessment team made two recommendations (see Determination above). As these are not the result of a failure to meet the unconditional pass mark, they are non-binding; however in the opinion of the assessment team, they would make a positive contribution to ongoing efforts to ensure the long term sustainability of the fishery. Details of these recommendations are provided in **Section 6.4** of this report.

For interested readers, the report also provides background to the target species and fishery covered by the assessment, the wider impacts of the fishery and the management regime, supported by full details of the assessment team, a full list of references used and details of the stakeholder consultation process.

Acoura Marine Ltd confirm that the fishery is within scope.

2 Authorship and Peer Reviewers

2.1 Assessment Team

All team members listed below have completed the requisite training and signed all relevant forms for assessment team membership on this fishery.

Assessment team leader: Dr Andrew I.L. Payne
Primarily responsible for assessment under Principle 3, has passed MSC training and has no Conflict of Interest in relation to the fishery.

Andrew Payne is an honours graduate of the University of London and completed post-graduate degrees at the Universities of Stellenbosch and Port Elizabeth in South Africa. He worked in Namibia for five years, South Africa for 25 years (eventually leaving in 2000 as Director of the Sea Fisheries Research Institute), and retired in 2013 from the Centre for Environment, Fisheries and Aquaculture Science (Cefas), UK, where he was first Science Area Head for Fisheries and then "roving" international fisheries consultant in which role he *inter alia* managed a large commercial contract evaluating sites for future nuclear power stations to be built in the UK, and the Fisheries Science Partnership, an initiative bringing scientists and fishers together in a common aim to produce information of use to those charged with managing the UK’s and Europe's fish stocks. He is now Director of the small UK consultancy A&B Word Ltd. Most of his original research work was conducted in South Africa, and he has published widely in the scientific literature, mainly about fisheries management and demersal fish ecology in particular. He was an active player in the Benguela Ecology Programme, was involved in drafting South Africa's first democratic fisheries policy (which later became enshrined as the Marine Living Resources Act), and was a leading player in the establishment of the Benguela Current Large Marine Ecosystem project and the BENguela Environment, Fisheries, Interaction, and Training (BENEFIT) project, the latter two concentrating on three countries, Angola, Namibia and South Africa. From 2003 to 2011, he was Editor-in-Chief (and from 2000 to 2003 editor) of the ICES Journal of Marine Science, was the founding editor/editor-in-chief (and now international panel member) of the (South) African Journal of Marine Science, and is Series editor of the Springer book series Humanity and the Seas. He has also conducted peer expert review of fisheries in Argentina, South Africa and the USA, and was involved in the EU's TACIS project on Sustainable Management of Caspian Fisheries, among many other EU projects. He has conducted several accreditation exercises for the Marine Stewardship Council, full ones being for the Antarctic krill continuous pumping fishery (twice, the second being a recertification assessment), a similar one for a separate Norwegian midwater trawl fishery for Antarctic krill, this one for Russian pollock, has acted as expert peer reviewer *inter alia* of the report on US Limited Entry Groundfish Trawl fishery recertification and for SA deepsea hake trawl fishery recertification, has led or participated in several surveillance audits for different fisheries and CABs, and has twice acted as condition-meeting evaluator for the client for the SA deepsea hake trawl fishery. He was also part of a three-man international team that formally evaluated the ICCAT bluefin tuna research programme. Finally, he has personally written/edited one book − "Oceans of Life off Southern Africa", and lead-edited and contributed to two more − "Management of Shared Fish Stocks", and "Advances in Fisheries Science; 50 years on from Beverton and Holt", the latter two both for Cefas, and provides editorial services (including formal instruction courses in scientific writing) for a variety of clients.

Expert team member: David W. Japp
Primarily responsible for assessment under Principle 2, has passed MSC training and has no Conflict of Interest in relation to the fishery.

David Japp is a Fisheries Scientist with an undergraduate degree in Zoology and Oceanography and a Masters degree in Fisheries Science. He is Director of Capricorn Fisheries Monitoring (CapFish) in South

Africa, working for all sectors of the fishing industry including the state authority, the fishing industry, international organizations and numerous other groups. Prior to studying, Mr Japp worked at sea for 10 years as a deck officer and navigator in the Merchant Marine. His experience in fisheries management and related research is extensive and now covers more than 20 years. He was previously employed at the Sea Fisheries Research Institute (now The Department of Agriculture Forestry and Fisheries, DAFF) from 1988 to 1997 as a biologist and manager and at the time he left the institution was head of the offshore resources section (demersal and pelagic stocks). His role at DAFF was primarily management, biology and resource assessment, and he was responsible for the submission of management advice on hake and other demersal stocks. He was also responsible for, planned and led many demersal, mainly hake-directed biomass surveys. Mr Japp has retained an intimate knowledge of all aspects of demersal and other fisheries including the trawling methods and has authored many fisheries-related papers as well as numerous technical reports for the FAO (including high-seas guidelines for fishing, Marine Protected Areas and the Ecosystem Approach to Fisheries). Further, he has provided expert reports for Environmental Impact Assessments relating to fisheries and has a good knowledge of Southern African and global fisheries including project appraisals for the World Bank in the East African and West Indian Ocean regions. Regarding the Marine Stewardship Council (MSC), Mr Japp was an assessor of the South African hake fishery from 2002 through to reassessment in 2009. He is currently on the assessment team for Tristan da Cunha lobster, has conducted pre-assessments for Kenya lobster, Tanzanian octopus, Mozambique shrimp, Patagonian toothfish, South Africa tuna pole (albacore), conducted the first certification exercise and all annual surveillances for this Russian pollock fishery, has peer-reviewed numerous MSC assessments and also supervises MSC-related Chain of Custody audits in South Africa.

Expert team member: Robert (Bob) O'Boyle
Primarily responsible for assessment under Principle 1, has passed MSC training and has no Conflict of Interest in relation to the fishery.

Robert O'Boyle received his BSc and MSc from McGill and Guelph Universities in 1972 and 1975, respectively. He was with Canada's Department of Fisheries and Oceans (DFO) at the Bedford Institute of Oceanography (BIO) in Dartmouth, Nova Scotia, during the years 1977–2007. During that time, he conducted assessments and associated research on the region's fish resources (e.g. herring, capelin, cod, haddock, pollock, flatfish, sharks) and developed the analytical tools required to undertake the assessments. He was responsible for the research programmes and assessment-related activities of more than 80 scientific and support staff. He subsequently coordinated the regional science peer review and advisory process for fisheries and ocean uses and, as Associate Director of Science, managed science programmes at regional and national levels. He has been involved in a number of national and international reviews, ranging from resource assessment and management to science programmes. He is currently president of Beta Scientific Consulting Inc. (betasci.ca) which provides technical review, analyses and assessment of ocean resources and their management. Projects have included analyses and assessments of groundfish species (e.g. cod, haddock, flatfish), forage fish (e.g. herring and menhaden), deepwater fish (e.g. cusk) and endangered species (e.g. leatherback turtle). He has been and is currently the Principle 1 or 2 expert in >40 MSC certifications in the Northwest and Northeast Atlantic, Arctic, and Pacific oceans for a range of species – from large (swordfish and tuna) to small pelagics (herring and sardine) and groundfish (cod, haddock, pollock, saithe, hake, flatfish). He was involved in the CR2 standard Calibration Workshops and is a member of the MSC Peer Review College. He has been the chair and/or reviewer of numerous stock assessments and has prepared special reports on ocean management issues for government, industry and NGO groups. He was a member of the Scientific and Statistical Committee of the New England Fisheries Management Council from 2008 to 2016. He pursues research related to resource and ocean management and assessment and has published >100 primary papers, special publications and technical reports. Recent projects include the impact of climate change on New England groundfish assessments, the trophic dynamics of the Eastern Scotian Shelf ecosystem, the impact of fish migrations on assessed fishery selectivity patterns, risk analysis in data-poor assessments and the interaction of cod and grey seals in the Northwest Atlantic.

Expert advisor: Paul Macintyre

Paul Macintyre is Acoura's traceablity expert.

2.1.1 Peer Reviewers

Peer reviewers used for this report were Gudrun Gaudian and Rainer Thomas. A summary CV for each is available in the **Assessment downloads** section of the fishery's entry on the MSC website.

Gudrun Gaudian

Dr Gudrun Gaudian is an experienced marine ecologist and taxonomist, including coastal and marine surveys, EIA's for development and tourism, and research projects in tropical and temperate seas. Work experience also includes coastal and marine management issues, such as identifying sustainable coastal development projects, as well as addressing conservation issues, including selection and planning of marine parks and reserves, sustainable utilisation of natural resources and community based management programmes. Projects have been undertaken in temperate, polar and tropical marine regions. For some years now, Dr Gaudian has been working in fisheries certification applying the Marine Stewardship Council standard for sustainable fisheries, currently concentrating on Principle 2 of the Standard. Furthermore, Dr Gaudian holds an LLM degree in Environmental Law and Management, giving a deeper understanding of law and policy dealing with such relevant issues as the Common Fisheries Policy, water and waste management, and international environmental law including EU environmental policy.

Rainer Thomas

Mr. Rainer Thomas (MSc) is a fisheries biologist with over 30 years experience in marine and freshwater fisheries research / aquaculture management in Germany, Suriname, Nigeria, Indonesia, Bulgaria, Bangladesh, Georgia and Uganda. He has worked on stock assessments in the North Atlantic and Baltic Sea for both pelagic and demersal species, as well as participating in international multi-disciplinary research cruises. In Suriname, Nigeria and Indonesia he worked with universities and the national Governments to design an oceanography institute building and to develop fish stock assessment procedures, and to implement aquaculture techniques between 1981 and 1992. From 1992 until 2003 he worked on fisheries and environmental research projects (e.g. herring migration) at the University of Kiel, and lectured in training courses on fish stock assessment procedures to postgraduate students. He acted as liaison officer for the diplomatic formalities for the German Research vessels at the Institute of Marine Science (IFM Kiel today GEOMAR) and was responsible for the logistics of the research cruises. For the German Carl Duisberg Centre in Hamburg he made several international project evaluations for oceanography scholarship students. He provided feasibility studies on sport fishing for the WWF and for the GFA Consulting Group on a production line for fish sauce in Poland. More recently he has been working as a freelance consultant providing advice on aquaculture management within the EU. He worked as consultant for trout farms in Bulgaria and Georgia in 2011 / 2014 and was as well as responsible for training peasant in Tilapia aquaculture in Bangladesh and Uganda 2012 / 2015. He was involved in several audits of the saith fishery (MSC certification) made a peer review for a proposal of a herring certification.

2.1.2 RBF Training

At least one of the expert team members has been fully trained in the use of the MSC's Risk Based Framework (RBF), although the framework was not used for this fishery assessment.

3 Description of the Fishery

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

3.1.1 Eligible Fishers

In 2017, these included the 31 pollock fishing organizations (down from 45 at first certification, as a consequence of rationalisation in the fleet and fishery) represented by the client group, the Pollock Catchers Association (PCA). The association membership holds some 74% of the total quota share of pollock in the Russian Far East (RFE, see below), but 80% of the quota share of pollock in the Sea of Okhotsk.

3.1.2 Rationale for Unit of Certification (UoC)

The unit of certification was chosen on the basis of scientific knowledge, which has defined the currently applied Sea of Okhotsk pollock stock structure, and the management system, which manages the fishery and collects data on the basis of four management subzones in the SOO.

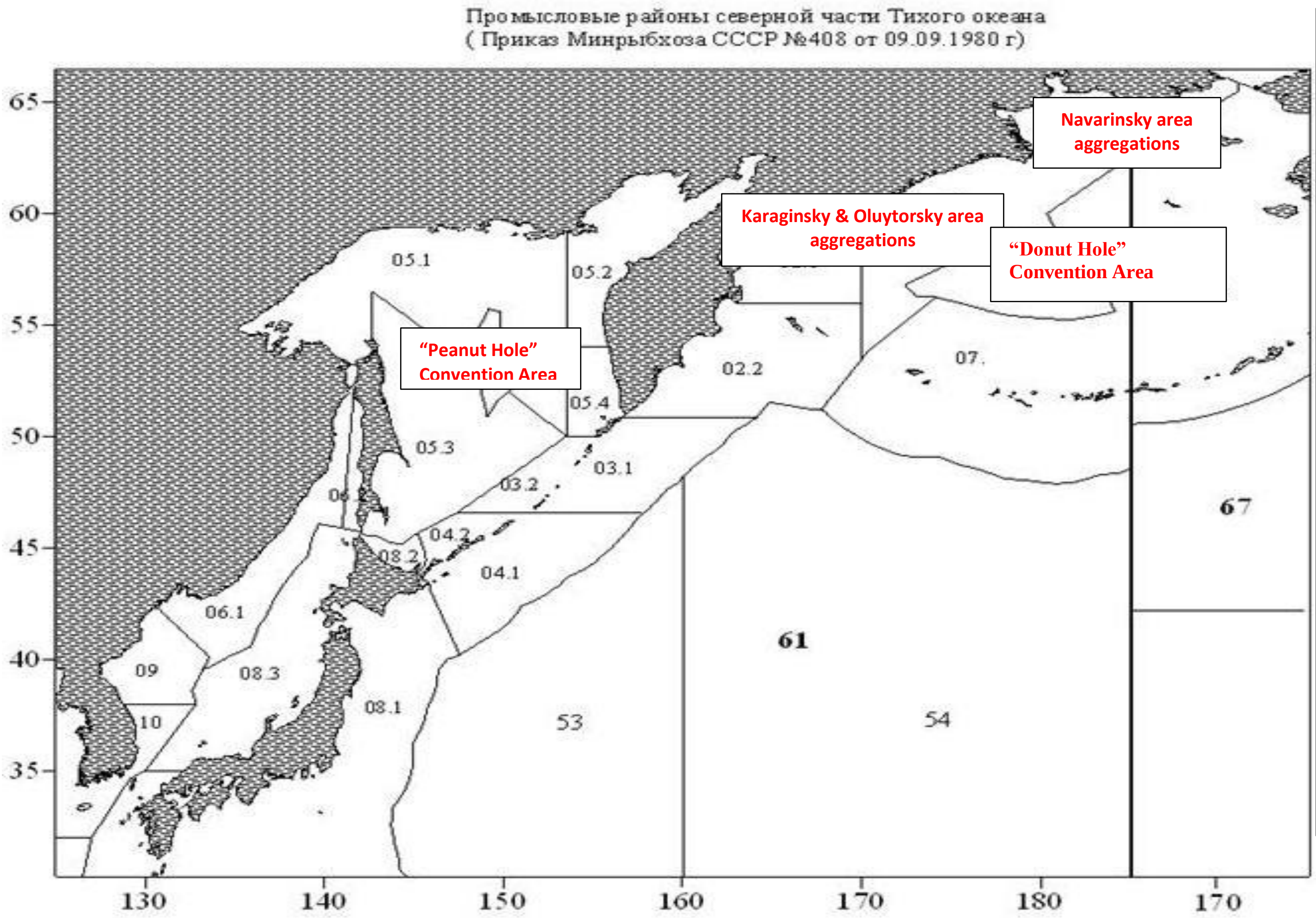
3.2 Unit of Assessment (UoA) and Proposed Unit of Certification

Acoura Marine Ltd confirm that the fishery is within scope of the MSC certification sought following the assessment as defined below. MSC certification methodology defines a candidate fishery Unit of Certification (UoC) as "The fishery or fish stock (= biologically distinct unit) combined with the fishing method/gear and practice (= vessel[s] pursuing the fish of that stock) and management framework."
The client originally proposed certification of three UoCs in the Russian Far East (RFE) – the Sea of Okhotsk, the Navarinsky Area and the Western Bering Sea (WBS) – but only the first of these was certified and is here re-evaluated.

The proposed Unit of Certification for this fishery is therefore as listed below:

Species	Walleye pollock (*Gadus chalcogrammus*), also sometimes referred to as Alaska or Russian pollock
Stock	TINRO scientists consider that the most appropriate stock structure for the (northern) Sea of Okhotsk is that described by Zverkova (2003) – a large population with complex organization
Geographic area	SOO pollock are found throughout the northern part of the Sea of Okhotsk. There are four Russian fishery management subzones, including the northern SOO subzone (05.1), reported in statistics as the western part (northern SOO subzone) of the SOO. The Western Kamchatka (05.2) and Kamchatka–Kuril (05.4) subzones are reported in statistics as the eastern part of the SOO. Finally, the Eastern Sakhalin (05.3) subzone (see Figure 1) is reported separately and is not part of this certification
Harvest method	Midwater pelagic trawl
Client Group	Pollock Catchers Association (PCA), representing all pollock fishing companies harvesting pollock with pelagic midwater trawls that are active members of the PCA
Other Eligible Fishers	None

This UoA was used because it is both compliant with client wishes for assessment coverage and in full conformity with MSC criteria.



61 – NORTHWEST PACIFIC OCEAN

01 – Western Bering Sea zone
02 – Eastern Kamchatka zone
- 02.1 – Karaginskaya subzone
- 02.2 – Petropavlovsk-Komandorskaya subzone

03 – Northern Kuril Zone
- 03.1 –Pacific Ocean subzone
- 03.2 – Sea of Okhotsk subzone

04 – Southern Kuril zone
- 04.1 – Pacific Ocean subzone
- 04.2 – Sea of Okhotsk subzone

05 – Sea of Okhotsk zone
- 05.1 – Northern Sea of Okhotsk subzone
- 05.2 – Western Kamchatka subzone
- 05.3 – Eastern Sakhalin subzone
- 05.4 – Kamchatka-Kuril subzone

06 – Sea of Japan
- 06.1 – Primorye subzone
- 06.2 – Western Sakhalin subzone

Fishery areas of other countries

08 – Japan zone
- 08.1 – Pacific Ocean subzone
- 08.2 – Sea of Okhotsk subzone
- 08.3 – Japan Sea subzone

09 – North Korea zone
10 – South Korea zone

Open part of district

51 – Centre Bering subdistrict
52 – Centre part Sea of Okhotsk subdistrict
53 – Kuril subdistrict
54 – Hawaiian range subdistrict

Рыболовная зона России
01 - Чукотская

Figure 1. Russian Far East (RFE) Fishery Management Zones

3.3 Final UoC(s)

(PCR ONLY)

The final Unit of Certification has not changed throughout the process, so is as defined in the tabulation above.

3.3.1 Total Allowable Catch (TAC) and Catch Data

Table 1. TAC and catch data for the Sea of Okhotsk walleye (or Russian) pollock fishery.

Total TAC for most recent and current fishing years (2016 and 2017):	966 700 t (both years)
Unit of Assessment (UoA) share of the total TAC established for the fishery in most recently completed fishing year (2016)	**889 054 t**
Unit of Certification (UoC) share of the total TAC established for the fishery in most recent completed fishing year (2016):	**782 551 t**
Total greenweight catch taken by the client group in the Unit of Certification (UoC) fishery in the two most recent calendar years (2015 + 2016):	**681 179 (2015)** **716 120 (2016)**

Sources: TAC and quota – Ministry of Agriculture and FFA; catch statistics – Fishery Monitoring System database

3.3.2 Scope of Assessment in Relation to Enhanced Fisheries

The fishery is not an enhanced one, so this section is not applicable.

3.3.3 Scope of Assessment in Relation to Introduced Species Based Fisheries

The fishery is not based on introduced species, so this section is not applicable.

3.4 Overview of the fishery

The walleye (or Alaska or Russian) pollock (*Gadus chalcogrammus*[1]) is a gadoid that is distributed in the Northwest Pacific from the NW Bering and Chukchi seas down the coast of the Kamchatka Peninsula into the Seas of Okhotsk and Japan and in the Northeastern Pacific from California north through the Gulf of Alaska and out to the Aleutian Islands (Figure 2).

Pollock fisheries across the species' entire area of distribution constitute the largest whitefish fisheries by volume in the world. The two main fisheries for the species are in the Sea of Okhotsk and the Bering Sea, the latter within both the US and the Russian Exclusive Economic Zones (EEZs). Pollock are considered to be mainly pelagic fish, schooling in midwater. They live down to 1000 m deep (Allen and Smith 1988), but typically concentrate at depths of 100–300 m, and are found both offshore and nearshore.

[1] Taxonomically, the species has until relatively recently (and during the first certification) been known as *Theragra chalcogramma*, but throughout this report text except where importation of reference material made it impossible to adjust, the new name is preferred

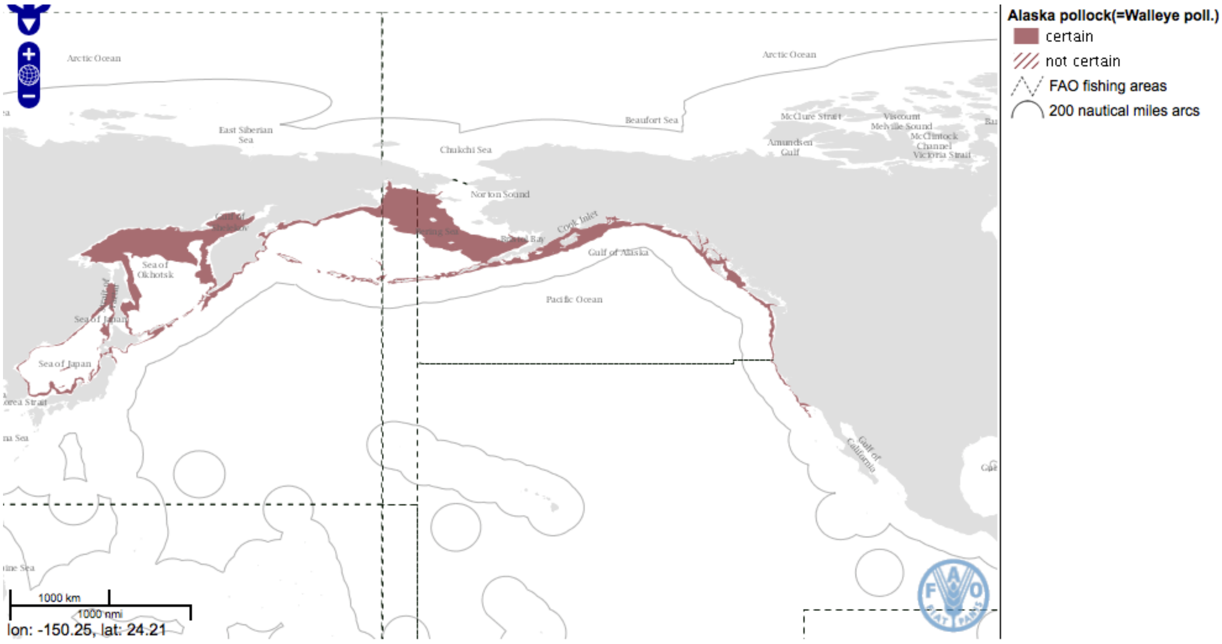


Figure 2. **Distribution of walleye pollock in the Sea of Japan, Sea of Okhotsk, Bering Sea and Gulf of Alaska (Source: FAO 2012; http://www.fao.org/figis/geoserver/factsheets/species.html).**

3.4.1 Area under Evaluation

The UoC fishery takes place only in the Sea of Okhotsk, where knowledge of stock structure and fishing activity is supported by good understanding of spawning and migratory patterns. There are several spawning "hotspots", the most important of which are on the west Kamchatka shelf in the northern SOO and in Shelikhov Bay; other smaller spawning areas are also known. Spawning takes place annually in a counter-clockwise direction around the SOO, starting on the West Kamchatka shelf between January and May, peaking during late March/April and always finishing by July, although summer spawning is sporadic and rare. Spawning fish and hence the fishery concentrate on the shelf and in shallow waters between 50 and 250 m deep. Further information on the biology of the SOO pollock stock can be found in Intertek (2013) and on the biology of walleye pollock specifically in the Eastern Pacific in MRAGS (2016a, 2016b).

Sea of Okhotsk pollock live throughout the northern part of the Sea, and there are four Russian fishery management subzones, the Northern Sea of Okhotsk (subzone 05.1), sometimes described as the western part of the Sea, plus western Kamchatka (05.2) and Kamchatka–Kuril (05.4), which together constitute the areas defined as the eastern part of the Sea; the eastern Sakhalin (05.3) subzone is not part of the certification.

3.4.2 Fishery Ownership and Organizational Structure

Eligible fishers in the UoC fishery in 2017 include 31 pollock fishing companies represented by the client group, the Pollock Catchers Association (PCA), which has its head office in Vladivostok (Table 2). That number of companies has decreased from the total of 45 listed during the site visit for the original certification as a consequence of mergers and rationalization within the fishery.

Table 2. PCA member companies and vessels active in the midwater trawl (Russian or walleye) pollock fishery in the Sea of Okhotsk eligible as of 22 December 2017 to use the MSC certificate and to enter the Chain of Custody as primary producers.

№	PCA member company (listed alphabetically)	Vessel type	Vessel name
1	**Akros**, JSC	BMRT	Boris Trofimenko
		SRTM	Aleksey Chirikov
		SRTM	Petr Iljin
		SRTM	Viktoria I
		SRTM	Vilyuchinsky
2	**Atoll-B Co.**, LTD	-	-
3	**Blaf**, JSC	RTMS	Petropavlovsk
4	**Collective Farm Fishery by V.I. Lenin**	Mothership	Planeta
		BMRT	Mikhail Staritsyn
		BMRT	Sergey Novosyolov
		BMRT	Seroglazka
		Mothership	Victor Gavrilov
		STR	Karymskiy
		STR	Karpinskiy
		STR	Putyatin
		STR	Gromoboy
5	HC **Dalmoreproduct**, JSC	STR	Imatra
		STR	Kataevo
		Mothership	Petr Zhitnikov
		STR	Reyneke
		STR	Sadovsk
		STR	Surovsk
		STR	Sychyovo
6	**Dalryba**, JSC	BMRT	Siglan
7	**DMP-RM**, JSC	RTMS	Prostor
		BMRT	Pavel Batov
8	**Intraros**, JSC	BMRT	Berezina
		BMRT	Borodino
		BMRT	Georgiy Moskovskiy
9	**Kurilskiy Rybak, JSC**	BMRT	Langusta
		BATM	Ostrov Shikotan
10	**Magadantralflot**, Co., Ltd.	RTMKS	Maironis
11	**Mercury**, Co., Ltd.	RTMS	Mlechnyi Put
12	**Nakhodka Active Marine Fishery Base** (NBAMR), PJSC	BMRT	Aeronavt
		BMRT	Seawind-1
		BMRT	Aleksandr Belyakov
		BMRT	Astronom
		BMRT	Ilya Konovalov
		BMRT	Kapitan Maslovets
		BMRT	Mekhanik Bryzgalin

		BMRT	Nikolay Chepik
		BMRT	Pelagial
		BMRT	Ardatov
		BMRT	Kapitan Faleyev
13	FCF **Novyi Mir**, OJSC	STR	Kireevka
		STR	Salma
		STR	Sedanka
		STR	Kalinovsk
		STR	Kostroma
		STR	Nogliki
		STR	Plastun
		STR	Kalinovka
		STR	Dmitriy Shevchenko
		STR	Sterlyad
14	**Okeanrybflot**, JSC	BMRT	Vladimir Babich
		BMRT	Aleksandr Ksenofontov
		BMRT	Anatoliy Ponomarev
		BMRT	Baklanovo
		BMRT	Borisov
		BMRT	Irtyshsk
		BMRT	Khotin
		BMRT	Matyev Kuzmin
		BMRT	Ministr Ishkov
		BMRT	Moskovskaya Olimpiada
		BMRT	Polluks
		BMRT	XX Syedz VLKSM
		BMRT	XXVII Syedz KPSS
		BMRT	MYS Olyutorskiy
15	**Ostrov Sakhalin**, JSC	BMRT	Altair
		BATM	Aniva
		BATM	Ostrov Sakhalin
16	**Ozernovsky FCP # 55**, JSC	SRTM	Geroi Damanskogo
17	**Pilenga**, JSC	BATM	Pilenga
		BATM	Pilenga-2
18	**Pileng-MS** Co., Ltd	-	-
19	**Poseydon** Co., Ltd.	SRTM	MYS Kurbatova
20	**Poronay** LLC	FT	MYS Datta
		RTMKS	Vasiliy Kalenov
		FV	Ostrov Iturup
21	**Preobrazhenskaya Basa of Trawling Fleet** (PBTF), PJSC	STR	Sedanka
		BMRT	Bukhta Preobrazheniya
		BMRT	General Troshev
		RKTS	Kapitan Demidyuk
		RKTS	Kapitan Kolesnikov
		STR	Kapitan Vitaliy Kononets

		BMRT	Kokand
22	**Roliz**, LLC	BMRT	Vladimir Starzhinsky
		BMRT	Kapitan Kayzer
23	PA **Sakhalinrybaksoyuz**, LLC	SRTM	MYS Dokuchaeva
		SRTM	MYS Levenorna
		SRTM	MYS Menshikova
		SRTM	Iolanta
24	**Sakhalin Leasing Flot**, JSC	SRTM	MYS Lovtsova
		SRTM	MYS Muravjeva
		SRTM	MYS Kruzenshterna
25	**Sofco** Co., Ltd	BMRT	Admiral Kolchak
		SRTM	Sergey Bochkarev
26	**Sovgavanryba** Co., Ltd.	BMRT	Ivan Kalinin
27	**Tikhrybcom** Co., Ltd.	SRTM	Sea Hunter
		RTM	Morskoy Volk
28	**Tralflot**, JSC	BMRT	Vasilyevskiy Ostrov
		MRKT	Petr 1
29	**Tranzit Co., Ltd**	BMRT	Dersu Uzala
30	**TURNIF**, JSC	RKTS	Kapitan Oleynichuk
		BMRT	Pioner Nikolaeva
		BMRT	Vladivostok
		BMRT	Porfiriy Chanchibadze
31	**Vostokrybprom** Co., Ltd.	BMRT	Bazhenovsk
		BMRT	Geroi Shironintsy
		BMRT	Novouralsk
		BMRT	Pavel Panin

Source: MSC website

Association membership currently (i.e. in late 2017) accounts for 80% of the total allocation for pollock in the Sea of Okhotsk (773 395 t out of a total Sea of Okhotsk TAC of 966 700 t in 2017) and 74% of the total allocation for pollock in the whole Russian Far East (the PCA share is 1 358 758 t out of a total TAC for the Russian Far East of 1 837 020 t – Table 3 shows the breakdown by area). The industrial trawl fishery ("industrial" is defined here as being on a large scale with full utilization of the raw material inclusive of direct human consumption) for pollock in the Sea of Okhotsk is carried out by a reasonably stable number of vessels of large and medium tonnage, most of which are 20–30 years old. They catch the fish, process it on board into frozen whole and gutted product, plus in some cases fillets (an annually increasing percentage as more vessels install filleting lines or are replaced), rendering the non-edible bycatch and fish processing waste into meal and oil. Some vessels also produce canned fish and unfinished medical fish oil, but all vessels store the production on board until the vessel docks or the material can be transshipped at sea to reefer vessels and brought ashore. At-sea frozen whole or gutted product is also reprocessed by onshore processors, some external to Russia, but such product falls under traceability audits so is not dealt with further here.

Table 3. Walleye (Russian) pollock TAC in the Sea of Okhotsk, and PCA allocations and company shares for the 2017 season.

Area	Allocation/TAC (t)	PCA allocation/quota (t)	PCA share
Northern Sea of Okhotsk Subzone	348 000	302 653	87%
West Kamchatka Subzone	348 000	277 152	80%
Kamchatka-Kuril Subzone	270 700	193 590	72%
Sea of Okhotsk total	966 700	773 395	80%
Russian Far East total	1 837 020	1 358 758	74%

3.4.3 History of the Fishery, and the Current Fleet

The pollock fishery in the Sea of Okhotsk has existed for some 55 years and catches have fluctuated considerably over the years (Figure 3).

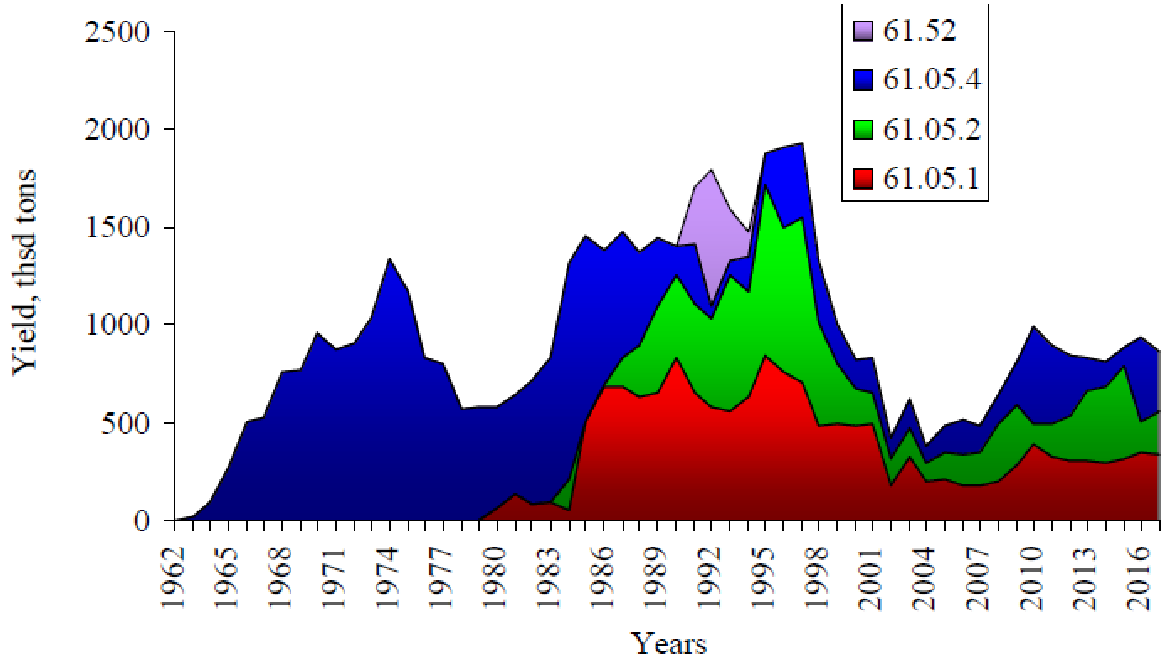


Figure 3. Sea of Okhotsk pollock catches by subzone since 1962, with the 2017 catch record incomplete because Season A only was complete at the time of the site visit; North Sea of Okhotsk, red (61.05.1); West Kamchatka, green (61.05.2); Kamchatka–Kuril, blue (61.05.4); high seas, purple (61.52), which is not part of the UoC – after Varkentin and Ilyin (2017); the sum of SOO subzone catches is shown more clearly in
Figure 4 **below.**

Starting in about 1962, the fishery developed rapidly and, within a decade, annually exceeded one million metric tonnes (mt). Initially, the main fishing grounds were off western Kamchatka, and fish were caught by both local and Japanese fishers. The annual catch in 1974/75 reached almost 1.3 million tonnes, but it then decreased in accord with a rigidly applied quota system and the introduction of a 200-mile economic zone. In 1984, the pollock fishery in the northeastern Sea of Okhotsk started to develop. Total annual catches in the Sea of Okhotsk varied between 450 000 and 950 000 t, but with a foreign fishery starting up in the central area in 1991, it soon exceeded one million tonnes again. However, in 1992/93, the Russian fishery was restrained because part of the recommended TAC was reserved for foreign fleets. That unregulated foreign fishery (including fleets from Poland, China, the Republic of Korea and Japan) in the central area was stopped in 1995 after bilateral agreements between Russia and the other countries were entered into in exchange for other pollock quota allocations within the Russian economic zone (Fadeyev and Wespestad 2001). Overall, however, as a consequence of the extensive fleet deployments in the northern Sea of Okhotsk, annual catches burgeoned to 1.6–1.7 million tonnes, and peaked at 2.0 million tonnes in 1996. Then, however, the annual catch there started to decline, and by 2002, had dropped by some two-thirds, a level maintained for several years before rising again modestly to the present level of just less than one million tonnes.

The industrial fishery for pollock in the SOO (where, again, the term industrial fishery is here interpreted as being a large-scale, total utilization of raw material inclusive of direct human consumption fishery rather than one that reduces all material to meal and/or oil) is carried out by vessels of mainly large or medium tonnage, operating midwater otter trawls off the seabed. The number of vessels harvesting the resource has not changed substantially over the pre-certification and certification periods, although there has been some rationalization of companies and some older vessels have been replaced by fewer, more-efficient newer vessels. Most of the fishing fleet consists of trawlers capable of operating far from port for several months. All the UoC fleet are freezers that can process fish into frozen whole and gutted product, and some process the bycatch and waste material into fishmeal and oil, but all tranship the product under rigorous inspection into reefers or motherships that bring the product into port, or land the fish into Russian ports themselves. The FFA (Federal Fisheries Agency) tracks all vessel activity and the Coastguard, the Federal Security Service or FSB, is present for all transshipments and landings. Some of the large vessels also fillet the catch at sea, with further expansion of this capability aimed for the domestic market during 2018 (Stupachenko 2018; note that the Russian Fishery Company referred to in that article is a management company that oversees several of the PCA fishing companies listed in Table 2). The much sought-after pollock roe is also produced at certain times of the year.

3.4.4 Management of the Fishery

This subject is covered comprehensively under 3.7 below, mainly referring to the responsibilities of the various agencies mandated to carry out different aspects of management, but for the purpose of completeness within this overview, a brief resume of the system is presented here. The management system for the Russian (walleye) pollock fishery is virtually unchanged from what it was during the pre-assessment and subsequently the original MSC certification evaluation (Intertek 2013). Licensing, control and inspection of all product is under the jurisdiction of the FFA (Federal Fisheries Agency of the Russian Ministry of Agriculture, which trains and contracts scientific and technical staff) and the FSB (the Coastguard, which trains and employs military personnel for the purpose of fisheries control and surveillance), each with their own inspection capability and direction, with independent scientific observations of fishing activities collated under the direction of TINRO, Vladivostok, and implemented through its own and sister (e.g. KamchatNIRO) scientific organizations' trained and contracted staff. There is now also an active Observer Working Group consisting of scientists, administrators, educationists and stakeholders, including representatives independent of the fishery, operating under the direction of TINRO in the RFE with a view to increasing the representivity, capacity and penetration of the scientific observer system involved in the fishery. The data these scientific observers collect underpin the crucial stock information used in the formal assessment, as well, in 2017, as contributing data of ecosystem (mainly seabirds and marine mammals, including ETP species) relevance. The data they contribute, however, are additional to those collected by the compliance inspectors in the Coastguard.

The *modus operandi* for determining the annual level of TAC is the same as determined during the assessment that led to first certification of the fishery, with all catch and effort and scientific survey data being made available and subjected to rigorous scientific analysis by KamchatNIRO and TINRO before the output is evaluated under the auspices of VNIRO in Moscow (VNIRO takes the lead on this overview analysis for all Russian fisheries). The advice and input of academics and experts on many scientific disciplines other than direct fisheries science, particularly of ecosystem components, is solicited in that overarching evaluation, which is conducted annually before the TAC is announced.

3.5 Principle One: Target Species Background

3.5.1 Stock Status

Intertek (2013) used the 2010 assessment of SOO pollock stock in its MSC certification evaluation. Stock assessments have been conducted by officials at KamchatNIRO every year since then. The 2017 assessment used to determine stock status in this MSC assessment (Varkentin and Ilyin 2017) was part of the 2018 TAC-setting process.

As stated in 3.4.3 above, the fishery commenced in the early 1960s in the Kamchatka–Kuril subzone where it was mainly prosecuted until the early 1980s (Figure 3 and
Figure **4**). Then, during the 1990s, fishing in the northern Sea of Okhotsk and West Kamchatka subzones dominated the annual catch, which peaked at almost 2.2 million tonnes in 1997 before declining. Since 2002, the catch has been relatively evenly distributed among the three subzones, and since 2010 has been relatively stable, ranging between 1 and 1.2 million tonnes.

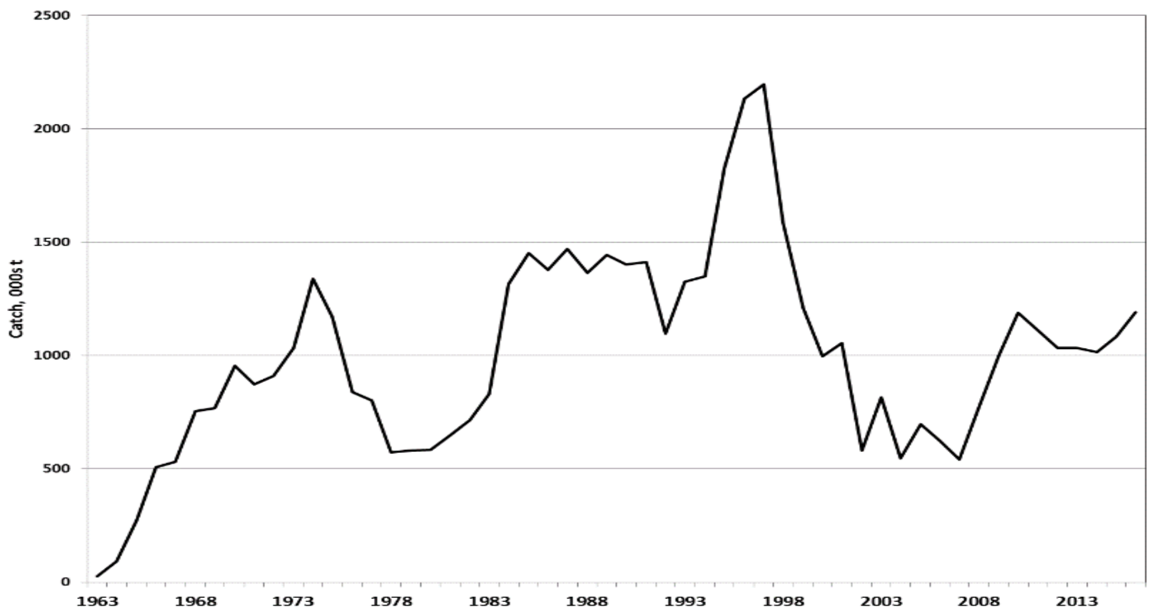


Figure 4. Overall trend in the SOO pollock catch (000s t) – data provided by TINRO.

Fishing mortality of fully recruited individuals (ages 7–12) has closely followed the trend in the catch (Figure 5). Prior to the 1990s, the mean rate rarely exceeded F_{LIM} (0.31) and fluctuated around F_{TR} = F_{MSY} = 0.24. With the subsequent increase in catch, however, fishing mortality increased dramatically in the late 1990s, rising above F_{LIM} but subsequently declining to below F_{TR}. It rose again during the period 2009–2013, in 2009 exceeding F_{LIM}, but subsequently declined to well below F_{TR}. Fishing mortality has increased in recent years, but the mean rate is still below F_{TR}. F_{2016} = 0.22.

Spawning stock biomass (SSB) was estimated to have been below B_{LIM} (2.583 million tonnes) during the 1960s and steadily rose to above B_{TR} (5.089 million tonnes) by the mid-1980s, where it remained until the late 1990s, when it declined to below B_{LIM} (Figure 6). From 2001, in response to the lowering of fishing mortality, SSB increased steadily to above B_{TR} by 2009. Then it declined up until 2014, since when it has been increasing again. Summarily, SSB has been above B_{TR} and therefore B_{LIM} with 95% probability since 2009. SSB_{2016} = 5.991 million tonnes.

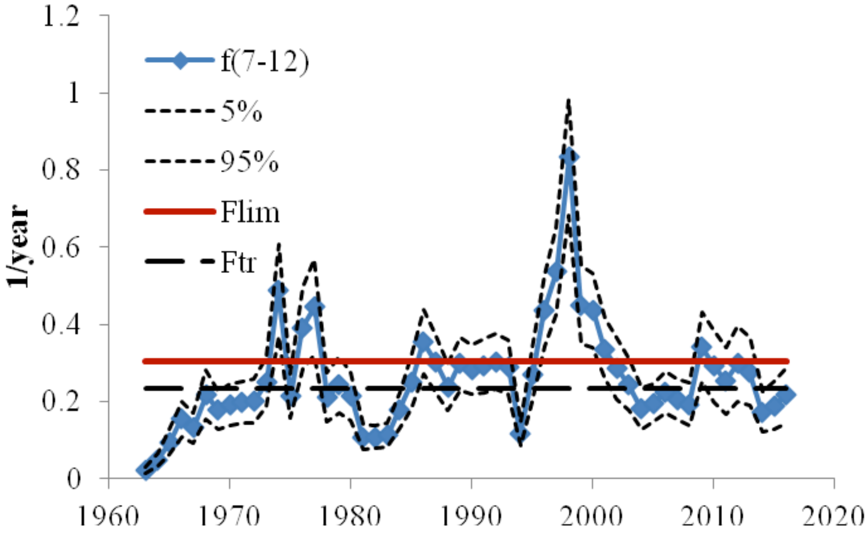


Figure 5. Trend in SOO pollock fully recruited (ages 7–12) fishing mortality since 1963; blue line, median F; red line, F_{LIM}; dashed lines, F_{TR}; dotted line, 95% CI around estimated F; after Varkentin and Ilyin (2017).

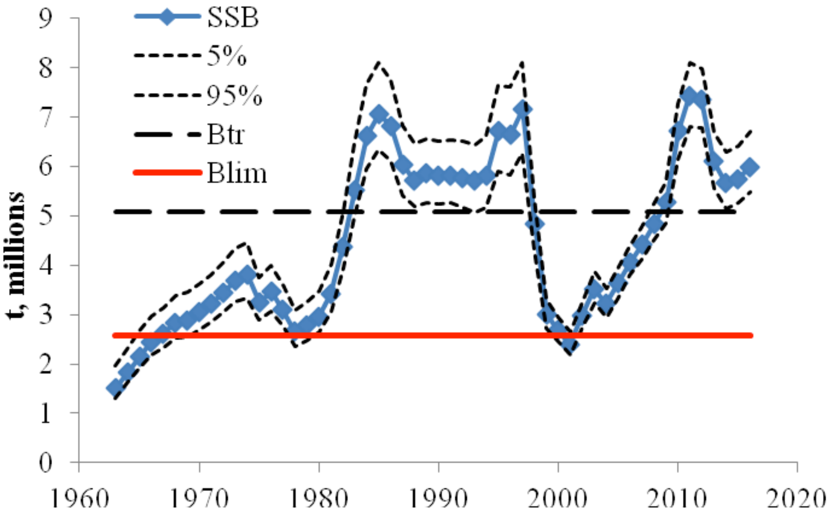


Figure 6. Trend in SOO pollock spawning stock biomass (SSB) since 1963; blue line, median SSB; red line, B_{LIM}; dashed line, B_{TR}; dotted lines, 95% CI around estimated SSB; after Varkentin and Ilyin (2017).

The trend in SSB over the long term can be partially explained by the trend in incoming recruitment (age 2) to the stock (Figure 7). During the 1960s and 1970s, there was a series of poor year classes which, combined with high fishing mortality, resulted in SSB staying low. Recruitment to the stock was generally strong during the 1980s and was the primary driver of stock growth. Year-class strength declined during the 1990s but has subsequently increased, although it does exhibit great variability. After strong 2004 and 2005 year classes, those of 2006–2010 were weak. Although the 2012 year class was also weak, those of 2011 and 2013 were strong and those of 2014 and 2015 were of moderate strength (Varkentin and Ilyin 2017). According to Varkentin and Ilyin (2017), the recent increase in biomass is due to maturation of the 2011 year class, the size of which was underestimated in recent past assessments.

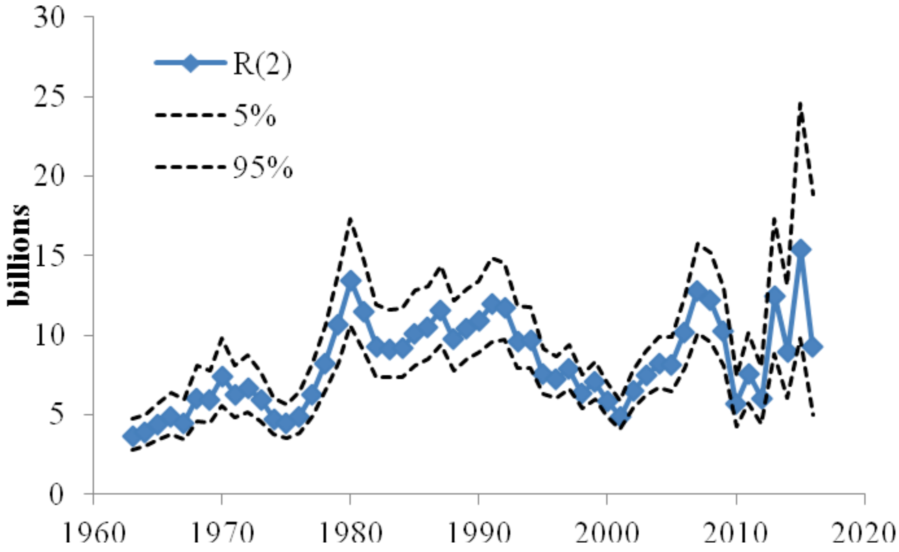


Figure 7. Trend in SOO pollock age 2 numbers (billions) since 1963; blue line, median numbers; dotted lines, 95% CI around estimated F; after Varkentin and Ilyin (2017).

The two-year stock projections undertaken as part of the 2018 TAC-setting process indicate that, given the TAC_{2017} = 967 000 t, there is negligible probability that fishing mortality in 2018 (F_{2018}) will exceed F_{LIM} (Figure 8) or that SSB by the start of 2019 (SSB_{2019}) will decline below B_{LIM} assuming a total 2018 catch <1.1 million tonnes. Over the longer term (to 2026), assuming similar recruitment patterns as over the past 10 years and fishing mortality set according to the harvest control rule (HCR), SSB is expected to increase initially and then to stabilize above B_{TR} with >95% probability (Figure 9). Overall, the SOO pollock stock is considered to be in a healthy state.

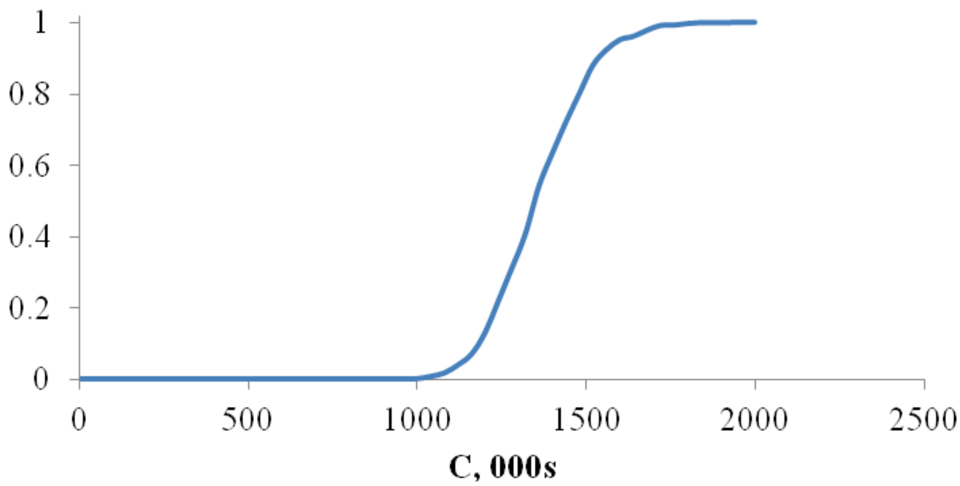


Figure 8. The probability that SOO pollock F_{2018} will exceed F_{LIM} over a likely range of 2018 annual catches, given TAC_{2017} = 967 kt; after Varkentin and Ilyin (2017).

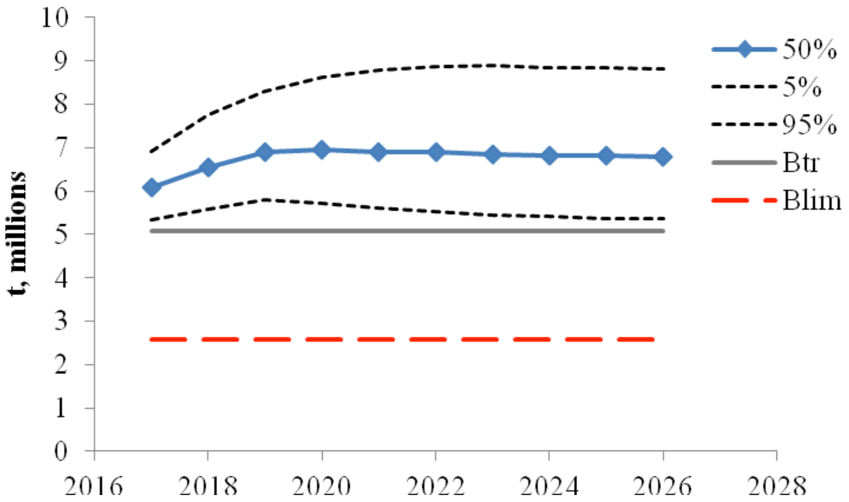


Figure 9. Trend in SOO pollock SSB during the years 2017–2026 assuming similar recruitment patterns as seen over the past 10 years and fishing mortality set as per the HCR; blue line, median SSB; red line, B_{LIM}; grey line, B_{TR}; dotted lines, 95% CI around estimated SSB; after Varkentin and Ilyin (2017).

3.5.2 Reference Points

A number of biomass and fishing mortality reference points (RPs) have been estimated for SOO pollock. The key ones used in the HCR are B_{LIM} and B_{TR}, the limit and target biomass reference points, respectively, and F_{LIM} and F_{TR}, the limit and target fishing mortality reference points, respectively.

Intertek (2013) reported that target fishing mortality (F_{TR} = 0.23) was based on Caddy (1998), who used life history characteristics as a guide for optimal harvest rates. Limit fishing mortality (F_{LIM} = 0.31) was based upon ages 7–11 fishing mortality at 35% of maximum spawning potential ($F_{35\%}$), consistent with the derivation of fishing mortality limit reference points used elsewhere (Quinn and Deriso 1999). The biomass target (B_{TR} = 5.096 million tonnes) was based upon the long-term (1963–2010) average of the start-of-year spawning biomass determined by the assessment model. Although the intent was to use B_{MSY} as determined using a stock model with a Ricker stock–recruitment relationship, the Russian peer review process considered that the fit of the relationship was too uncertain to permit use of a model-based estimate of B_{MSY}, so the long-term average was used (see Intertek 2013 for the full rationale). The limit biomass (B_{LIM} = 2.632 million tonnes) was chosen as the lowest value in the assessment time-series (B_{LOSS}), the rationale being that that was a biomass level from which recovery of the stock had been observed. That limit reference point was approximately half (52%) the biomass target, consistent with the MSC guidance on setting of B_{LIM}.

Intertek (2013) stated that, in contrast to the situation for the Western Bering Sea (WBS) pollock HCR in which precautionary buffers are built into the reference points, such was not the case with the biomass reference points for SOO pollock as of December 2010. TINRO considered that the good agreement between model results and observations in the Sea of Okhotsk assessment did not warrant such buffers, although if this situation were to change, consideration would be given to the use of precautionary buffers in the SOO pollock reference points.

Varkentin and Ilyin (2017) report the reference points used to inform current management decisions as updates to those reported in Intertek (2013). The target fishing mortality (F_{TR}) is set equal to F_{MSY} = 0.24, based on an equilibrium stock model employing a Ricker stock–recruitment relationship; notwithstanding this change, the updated F_{TR} is consistent with the previous target. The limit fishing mortality (F_{LIM} = 0.31) continues to be based on $F_{35\%}$. The minimum fishing mortality (F_0 = 0) to allow scientific research fishing when the stock is below B_{LIM} is also unchanged.

A review of the reference points was conducted in 2012, during which a Ricker stock–recruitment relationship along with equilibrium yield curves were used to estimate F_{MSY} = 0.235 and B_{MSY} = 5.089 million tonnes (Thompson and Bell 1934, Sissenwine and Shepherd 1987). The parameters of the Ricker model (α = 3.14 and $\beta = 1.32*10^{-4}$) were estimated in the 2012 stock assessment model, and it used similar data and model structure as did Varkentin and Ilyin (2014). Given that the estimate of B_{MSY} was very close to the proxy based upon the long-term biomass (5.096 million tonnes), the Russian peer review agreed to adopt the model-based estimates of B_{MSY} and F_{MSY} as target reference points (PCA 2018). These have been used to inform TAC setting since 2014.

In the 2012 review, B_{LIM} was estimated based upon 20%B_0 with an adjustment for added precaution, with the new $B_{LIM} = B_{20\%}\exp(t \times SE)$ = 3.416 million tonnes (Varkentin and Ilyin, 2017). Simulation work conducted in 2014 indicated that this value was leading to high sensitivity of the TAC to small fluctuations in biomass around B_{TR}, so the limit reference point was re-established at B_{LOSS} (the assessed biomass in 2001 which is the lowest since the 1970s) with account taken of uncertainty: $B_{LIM} = B_{LOSS}\times\exp(t\times SE)$ = 2.583 million tonnes, or 51% of B_{MSY}; this has been used as B_{LIM} since then. More recent assessments have confirmed that the stock is able to recover from biomass at $B_{LIM} = B_{LOSS}$, providing evidence that B_{LIM} is an appropriate estimate of the Point of Recruitment Impairment (PRI).

Varkentin and Ilyin (2017) state that the reference points are reviewed about every five years. The reference points were reviewed in 2012 and, as noted above, were changed. At the December 2016 of the Pollock Council (see Section 3.5.5), the reference points were carefully reviewed again and it was agreed that they be unchanged. Therefore, since the report of Intertek (2013), the target fishing mortality and biomass reference points have been changed to be based on stock-model-derived estimates of F_{MSY} and B_{MSY}. The basis of the limit reference points is unchanged, with that of fishing mortality still based on the relatively conservative $F_{35\%}$ and that of biomass (B_{LIM}) based on B_{LOSS}, as in Intertek (2013). These reference points and their derivation are consistent with MSC guidance on reference point determination.

Sea of Okhotsk pollock is not a low trophic level (LTL) species. Numerous studies demonstrate their trophic status as the dominant pelagic top predator in the Sea of Okhotsk ecosystem (e.g. Lapko 1994, Sorokin and Sorokin 1999, Aydin e*t al.* 2002, Heileman and Belkin 2010,). Pollock is not in Box CB1 of CR1.3 and does not meet the criteria of CB2.3.13b. Its mean age at maturity is 5 years with a generation time of about 10 years (see 3.5.4 below), with fish as old as age 20 years having been observed in the catch.

3.5.3 Harvest Strategy

Intertek (2013) provide a description of the SOO pollock harvest strategy that has been modestly updated as summarized below. The harvest strategy has stated ***objectives***, progress towards which is controlled by a ***harvest control rule*** (HCR) and the ***implementation*** of regulations, which are informed by an annual ***stock assessment***. Whereas a harvest strategy has been a key feature of the fishery's management for some time, elements of the strategy were relatively new when it was considered by Intertek (2013). The HCR was used for the first time in December 2010 as the basis of the 2012 TAC and had not been tested. Also, a new assessment model was used in December 2010 as the basis for the 2012 TAC. Since then, the overarching objectives have not changed. The HCR has been enhanced with a long-term (10 year) projection evaluation in addition to the initially configured short-term (2 year) projection evaluation. Stock assessments have been conducted annually and have evolved to use new data and modelling techniques.

The suite of regulatory tools has largely remained unchanged since the 2013 report, as stated elsewhere in this report (see Section 3.7), but parts of it are summarized here for the purposes of completeness. The 2004 Federal Fisheries Act on Fisheries and Conservation of Aquatic Biological Resources Fisheries Act remains the overarching legislation governing the fishery, and under it, the focus of fisheries is the protection and rational use of aquatic biological resources. Russia has ratified and is party to several international conventions such as the 1992 UN ban on driftnet fishing and the 1995 Fishery Code of Conduct, including Article 6, Annex II of the Fish Stocks Agreement. Intertek (2013) and section 3.7 provide the background on the legislation governing the fishery. The TAC planning and approval procedure and related plans of action are defined in FFA Order No. 104 dated 6 February 2015 (as amended). Prior to this, the TAC planning and approval procedure was defined in FFA Order No. 88 dated 10 February 2011. Order 104 provides the legislative basis of the harvest strategy; it sets out the procedure for TAC planning and approval, determines the requirements for TAC setting, establishes the level of forecast information support, and specifies the revision procedures for TACs. It also defines the areas of responsibility and aquatic living resources zones among Russian institutions, and it sets out the mechanism for submission of materials and interaction with national agencies. These orders provide the legislative basis of the harvest strategy including the harvest control rule (PCA 2017a).

The elements of the harvest strategy are subjected to an annual multistage internal and external peer review which is summarized in Figure 46 in Section 3.7.3 (see also Section 3.5.5). The first stage is the stock assessment undertaken by scientists at KamchatNIRO with a draft TAC estimated as per the agreed HCR. During December, this assessment and draft advice is reviewed by the Far Eastern Pollock Council organized under TINRO's NTO ("Scientific and Technical Association"). In late January of the year preceding the TAC year under consideration, the assessment and advice are reviewed by the Scientific Council of each fishery research institute whose experts participated in the development of the forecast (for SOO pollock, this is the Councils of KamchatNIRO, TINRO and MagadanNIRO). Following that review, the assessment and advice is provided to the national (i.e. federal, all-Russia) research institute (VNIRO), whose experts examine and check the forecast, ask questions and make comments to which the forecast developers provide detailed responses. If necessary, amendments are made to the forecast, the models re-run, and so on. This review takes approximately one month. As pollock is a priority for the Russian fishing industry, the forecast is again reviewed in early March by a dedicated working group under VNIRO consisting of the experts from the various institutes. In mid-April, the draft TAC is considered by the Fishing Industry Council under the FFA. Then, the TAC proposal is subjected to a mandatory procedure of public hearings, which consider testimony from scientific agencies, management agencies, fishing companies, individuals, NGOs and the media. Finally, before the FFA issues an order on TAC approval for the upcoming year, all materials justifying the TAC are subjected to approval by the independent State Environmental Expert Review. During the site visit, TINRO emphasized that once the TAC advice as per the HCR has been reviewed for its scientific veracity, the draft TAC can only be reduced, perhaps for economic reasons, but not increased. PCA (2017a) and Varkentin and Ilyin (2017) state that the HCR has to be reviewed at least every five years and improved as necessary. The next review should take place during 2018 as part of the 2019 TAC-setting process.

Intertek (2013) describe the HCR, which was new at the time of first certification but has since been updated. To summarize, it consists of determination of the TAC based on the status of fishing mortality and spawning biomass in relation to limit and target reference points (
Figure 10). It consists of four primary reference points, B_{LIM}, B_{TR}, F_{LIM} and F_{TR}, as well as F_0, which is set to allow scientific fishing below B_{LIM} (see 3.5.4 below). When stock biomass is above B_{TR}, fishing mortality is set at F_{TR}. Fishing mortality is reduced as stock biomass decreases between B_{LIM} and B_{TR}, but below B_{LIM}, it is set at F_0. The analytical form, by exploitation regime (I, II or III), of the HCR is therefore:

I: $F_i = F_0$ at $B_i < B_{LIM}$

II: $F_i = (F_{TR} - F_0)(B_i - B_{LIM}) / (B_{TR} - B_{LIM}) + F_0$ at $B_{LIM} < B_i < B_{TR}$

III: $F_i = F_{TR}$ at $B_i > B_{TR}$

The HCR works in concert with the results of the annual stock assessment as part of a two-year projection process in which the current stock biomass along with the upcoming year's TAC is used to project the following year's TAC. For instance, Varkentin and Ilyin (2017) provide estimates of start-of-year biomass at age for 2017. The 2017 TAC had been established by the previous year's decision-making process, using the HCR. Updates to this TAC are possible and have been made previously based on new survey and fishery observations considered during the annual assessment.

Advice for the 2018 TAC is based on two-year (e.g. 2017 and 2018) probalistic projections based on the uncertainty in the current year's (e.g. 2017) start-of-year numbers at age, age 2 recruitment (based on the last 10 years of assessment) and fishery selectivity at age. This produces a probability distribution of fishing mortality during and spawning stock biomass at the end of the second year of the projection period (e.g. 2018), which is then tested against F_{LIM} and B_{LIM} (e.g. see Figure 8 for the probability that F_{2018} is greater than F_{LIM} given TAC_{2017} = 967 000 t for a range of 2018 TACs). If the joint probability of fishing mortality and biomass being above and below F_{LIM} and B_{LIM}, respectively, is <5% (one-tailed test), then the forecast using the HCR can be adopted. Otherwise, the fishing mortality and hence the TAC in the second year of the projection are adjusted down such that the probability that projected fishing mortality and biomass are below and above F_{LIM} and B_{LIM}, respectively, is <5%. This approach ensures that biomass does not fall below B_{LIM} and fishing mortality does not exceed F_{LIM}.

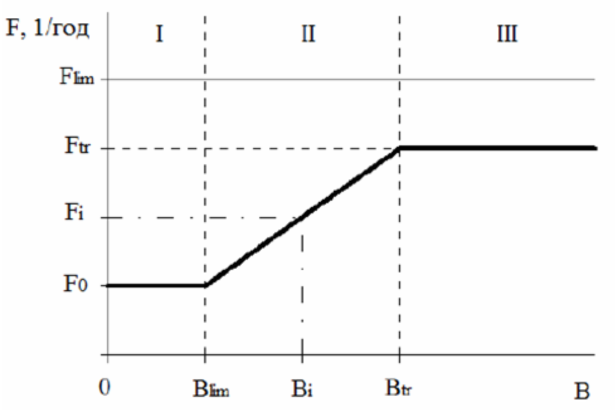


Figure 10. Harvest control rule for the SOO pollock fishery (reference points are described in Section 3.5.2 above); after Varkentin and Ilyin (2017).

Sharov (2016) describes in detail how the HCR takes account of the uncertainties in the SOO pollock stock. It allows for the F_{TR} only when biomass is at or above B_{TR} and reduces fishing mortality to near zero when biomass declines from B_{TR} to B_{LIM}, allowing for precautionary reduction in fishing mortality attributable to the heightened risk of crossing the unknown "true" value of B_{LIM} attributable to uncertainty in understanding pollock stock dynamics. The 5% criterion is considered to be a strong precautionary feature of the HCR in ensuring that biomass does not fall below B_{LIM} and is kept above B_{TR} with a high degree of certainty. To estimate uncertainty in the stock numbers at age inputs of the TAC projections, non-parametric bootstrap sampling of the assessment-model-derived residuals associated with the catch at age and stock abundance indices (e.g. CPUE and survey indices) is used in repeated assessment model runs (>100) to estimate abundance uncertainty in each year of the assessment time-series, including the most recent. Parametric bootstrapping of the latter (current age 3+ numbers at age) along with sampling of age 2 recruitment based on the 10 years prior to the projection period and the fishery selectivity at age coefficients is undertaken in repeated projection runs (>100) to characterize the uncertainty in the projections. Greater assessment uncertainty translates into greater uncertainty in the projection inputs, which has the effect of making the slope of the risk curve (Figure 8) more gradual. This would trigger the 5% criterion of B < B_{LIM} at a lower range of the second year's TAC. In this manner, greater uncertainty in the assessment translates to lower advised TACs. As and when the uncertainty in the assessment inputs changes, the updated estimates of uncertainty are incorporated into the HCR and hence the TAC advice.

Intertek (2013) noted that as the HCR was introduced in 2010 (for the 2012 fishing season), evidence was lacking that it was working and achieving its objectives. Since then, the HCR has been used to provide TAC advice for the years 2012–2017 and at the time of writing a 2018 TAC under review. The results of the most recent stock assessment (Varkentin and Ilyin 2017) indicate that fully recruited fishing mortality (F) was above target (F_{TR} = F_{MSY}) until 2013 and was reduced to below target by 2014 (Figure 11). Since then, the fishing mortality has been maintained at or below F_{TR} by the HCR. In 2009, SSB was just above B_{TR} and thereafter it increased significantly until 2012, after which it decreased towards B_{TR}. Since 2015, SSB has been increasing again. The two-year projections undertaken as per the HCR indicate that there is negligible risk of fishing mortality exceeding F_{LIM} and SSB falling below B_{LIM} during the projection period at TAC_{2017} = 967 000 t and a 2018 TAC at or below current levels (see subsection 3.5.1).

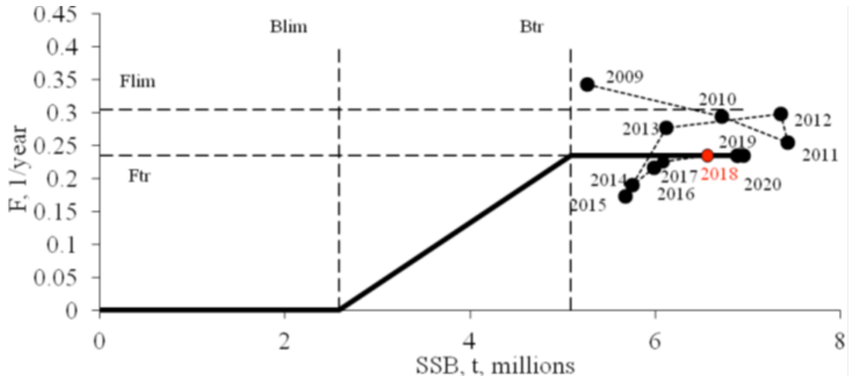


Figure 11. Trend of SOO pollock fishing mortality (F) and spawning stock biomass (SSB, million tonnes) during the period 2009–2020; after Varkentin and Ilyin (2017).

In 2014, to confirm the long-term behaviour of the HCR, 10-year projections were added to the annual TAC advisory process (Varkentin and Ilyin 2017). In these, the two-year Monte Carlo simulations to evaluate the probability of F and SSB being within management targets and limits were extended for 10 years. These projections rely on the same stock conditions and uncertainties used in the short-term projections and indicate that as long as the HCR is observed, there is 95% probability that SSB will be maintained above both B_{LIM} and B_{TR} in the long term (see subsection 3.5.1).

Both short- and long-term projections are considered tests of the HCR that show its robust performance under the assessed stock conditions and uncertainties. To date, SOO pollock biomass has not fallen below B_{TR} since implementation of the HCR. During the site visit, it was queried whether or not the HCR had been tested assuming a depleted stock in order to judge stock recovery times from below B_{TR} to B_{TR}. It was stated that this had not yet been undertaken, but if the 10-year projections were to indicate that the HCR was not sufficiently precautionary, it would be updated. Evidence of such a management response is available for the West Kamchatka Shelf Greenland halibut stock, which uses a HCR similar to that of SOO pollock. For that stock, it was recently determined that although fishing mortality was at F_{TR}, SSB was declining as a consequence of highly variable recruitment (TINRO 2017a). Therefore, the HCR was deemed not suitably precautionary and requiring change. A simulation study was undertaken that tested the robustness of the HCR to a number of uncertainties, particularly that in recruitment. Based upon this, the HCR was changed from a linear to a logistic F/SSB relationship, the latter being considered highly precautionary (Figure 12). This also had the effect of reducing variability in the long-term catch. The modified HCR was adopted and implemented to set the 2018 TAC for that stock.

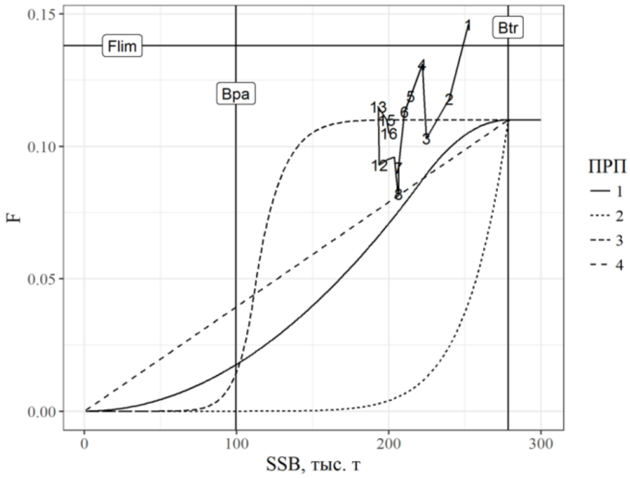


Figure 12. HCR options for the West Kamchatka Shelf Greenland halibut stock; the solid line (1) is the optimal HCR taking account of uncertainty in recruitment based upon Beverton and Holt dynamics; lines (2) and (3) reflect boundaries of HCRs assuming constant recruitment ranging from 40 to 70 million individuals; dotted line (4) is the *status quo* HCR; the line with numbers is the stock status based on most recent assessment with years as 20nn; after TINRO (2017a).

Intertek (2013) describe the ***regulatory tools*** for implementation of the HCR, the highlights of which are provided here. The primary tool is the annual TAC, which is based on short-term projections of assessed current stock conditions. These are first allocated, in a tiered process, to various sectors (see section 3.7.2), of which the industrial fishery sector is just one.

Since 2000, the TAC-allocation process for the industrial sector has undergone considerable change, with evolution from a competitive to the current quasi-property-rights fishery. This has been paralleled by regulatory and enforcement reforms that have led to both better catch monitoring and fleet management. For instance, an effective system of sanctions of fishery regulatory violations has been put in place which include criminal responsibility of captains, vessel confiscation and irrevocable forfeiture of company quota (see Section 3.7). The overall TAC is divided by season and subzone, which in the case of SOO pollock are Northern Sea of Okhotsk, West Kamchatka and Kamchatka–Kuril. Although the specific dates of the seasons vary by subzone and are stated in the fishery regulations, they are generally January–April (season A) and October–December (season B). A fishing company can catch 100% of its quota during season A. If it fails to do this and catches, say, 80% during season A, it has the opportunity to catch the remaining 20% of its company quota in season B.

The subzone allocations have to sum to the overall TAC (Table 4, but see PCA allocations specifically in Table 3). The subzone allocations are not hard limits but rather guidelines to distribute fishing effort across the distributional range of the pollock stock, which is an important consideration given its metapopulation structure (see 3.5.4 below). Catches in the northern part of the West Kamchatka subzone tend to be dominated by juveniles. Hence, since 2009, to limit the catch of juvenile pollock, vessels can move freely between the subzones, searching for pollock concentrations, to optimize the size distribution for particular product types. This is indicated in the relative catch in the West Kamchatka and Kamchatka–Kuril subzones, which has varied considerably around their allocations. The allocation of the TAC among these subzones used to be based upon historical catch, but since

2014, TINRO has also examined the stock's distribution described by its surveys to determine whether a change in allocations is needed. During the site visit, TINRO indicated that, so far, this has not been the case.

Table 4. SOO pollock subzone allocations and catch; data after Varkentin and Ilyin (2017).

	North Sea of Okhotsk			West Kamchatka			Kamchatka-Kuril			Stock		
Year	Allocation	Catch	%	Allocation	Catch	%	Allocation	Catch	%	TAC	Catch	%
2008	204	201	98.7%	308	297	96.5%	146	143	98.1%	658	642	97.5%
2009	290	286	98.8%	311	292	93.9%	220	216	98.3%	821	795	96.8%
2010	390	386	99.0%	366	114	31.1%	254	490	192.9%	1010	990	98.0%
2011	335	328	98.0%	328	168	51.2%	257	404	157.3%	920	901	97.9%
2012	314	307	97.9%	307	231	75.3%	241	306	126.8%	862	844	97.9%
2013	302	301	99.8%	302	363	120.3%	237	168	70.9%	840	832	99.0%
2014	296	295	99.7%	296	387	131.0%	230	134	58.1%	821	815	99.3%
2015	325	322	98.9%	325	470	144.5%	253	91	35.8%	904	883	97.6%
2016	348	346	99.5%	348	159	45.6%	271	437	161.6%	967	943	97.5%
2017	348	336	96.6%	348	228	65.5%	271	297	109.6%	967	861	89.1%

Discarding of pollock of commercial size (>35 cm) is illegal and there are regulations to minimize the capture of juvenile (<35 cm) pollock. Gear regulations for pollock permit only midwater trawling with a codend mesh of 100 mm. In 2001, a regulation was introduced requiring large square-mesh panels between the body of the trawl and the codend. Prior to 2001, the weight of <20 cm pollock was limited to a maximum of 8% of the total catch by haul. Since 2001, this regulation has been changed so that the numbers, not the weight, of <35 cm pollock caught is limited to a maximum of 20% of the total catch by haul (except in the West Sakhalin subzone, where the maximum percentage is maintained at 8%). Associated with this regulation is a move-on rule that stipulates that when the maximum percentage of juvenile pollock in a haul is exceeded, the captain must change the vessel's location by at least 5 nautical miles from any previous trawling location, describe his actions in the vessel's fishing logbook and report such information to the FFA. Since 2006, the overall percentage by numbers of <35 cm pollock in the total annual catch has averaged 17.2%.

Closed seasons are imposed during the spawning season: for West Kamchatka/Kuril, once spawning starts but no later than 1 April to 1 November; for the Northern Sea of Okhotsk, once spawning starts but no later than 10 April to 15 October. The overall effect of these management tools and enforcement efforts has been the limitation of illegal fishing with its consequent overfishing of TACs, primarily since 2007/2008, such that the unreported catch of pollock in recent years is reported to be negligible or at least greatly reduced (Intertek 2013).

It is of interest too to note the ***linkage between the various components of the harvest strategy***. A comparison of the scientific advice (based on 2-year projections), TAC and reported catch (total and subzone) is provided in Table 5. Since 2012, TACs have been set according to the scientific advice and catch has been at or below the TAC, except perhaps for 2015.

The initially projected 2015 TAC from the 2013 assessment was 789 000 t. At that time, there was uncertainty in the size of the 2011 year class and stock indices based upon the biostatistical method indicated declining biomass. However, data from TINRO surveys in 2014 and 2015 indicated that biomass had been underestimated, so the 2015 TAC was increased to 904 000 t. The two-year projection for 2017 (Varkentin and Ilyin 2016) as per the HCR indicated that 1.084 million tonnes could be taken. Further, the projected catch for 2018 from the latest assessment could be 1.078 million tonnes. In both cases, during the annual deliberations of the Fishing Industry Council, the industry decided to maintain the TAC at the 2016 level (i.e. 967 000 t) because of the then pollock product prices in the world markets (PCA 2018). The components of the harvest strategy are therefore working effectively together.

Table 5. Comparison of scientific advice (based upon 2-year projections), TAC and reported catch; data provided by PCA and in Varkentin and Ilyin (2014, 2015, 2016, 2017).

Year	2-year Projection	TAC	Catch	%
2012	862	862	844	97.9%
2013	840	840	832	99.0%
2014	821	821	815	99.3%
2015	789	904	883	97.6%
2016	967	967	943	97.5%
2017	1084	967	861*	89.1%
2018	1078	967		

* Catch in Season A

3.5.4 Information and Monitoring

In terms of ***stock structure and distribution***, Intertek (2013) provide a comprehensive description of historical research and the then-current understanding of SOO pollock stock structure, and it provides the basis of the boundaries of the subzone and other areas still used in management. Some of the information is also provided as relevant elsewhere in this report, but for convenience to the reader and to summarize, the stock is considered to consist of a single large population with a complex organizational structure rather than a collection of small isolated ones. There are several centres of spawning and hence concentrations of spawning fish in the Sea of Okhotsk, the most important being located on the West Kamchatka Shelf, in the northern part of the Sea and in Shelikhov Bay (
Figure 13).

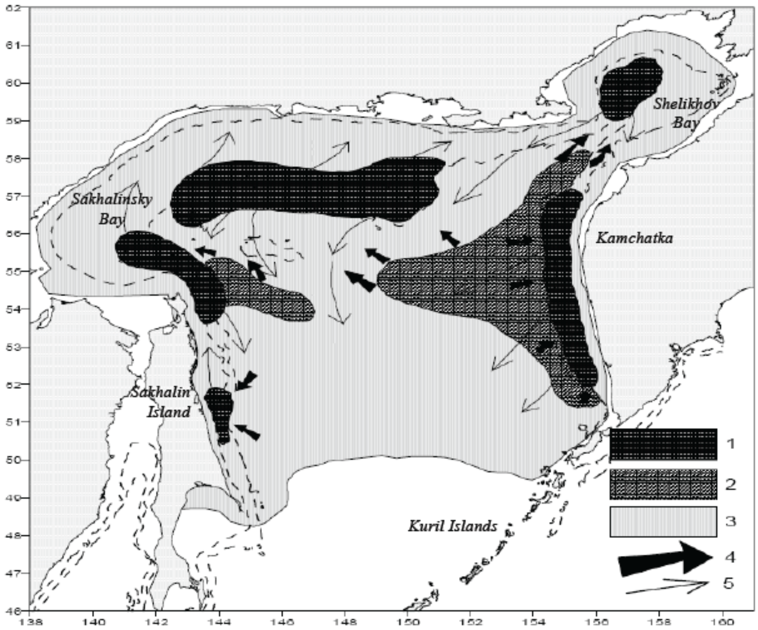


Figure 13. Main locations during the life history of SOO pollock: 1, spawning; 2, overwintering concentrations; 3, feeding range; 4, spawning migrations; 5, feeding migrations; after Intertek (2013).

Spawning takes place over the shelf and in shallow areas at depths ranging from 50 to 200–250 m. There are also smaller concentrations of spawners in waters northwest and southwest of Iona Island and near the eastern coast of Sakhalin. Overwintering areas are associated with these spawning areas, but the groups seemingly mix during the feeding period of the species. Genetic studies on SOO pollock have been performed since 2010 with the first results published in 2012 (PCA 2018). In 2017, a team of KamchatNIRO scientists presented their latest findings at a conference in Zvenigorod (Savenkov *et al*. 2017), and they confirm the current view of SOO pollock stock structure. A full scientific article with the results of multi-year research on pollock stock structure is planned for publication by KamchatNIRO soon. Spawning generally takes place in a counter-clockwise direction around the Sea of Okhotsk, and this trend largely governs the seasonal progression of the fishery (Figure 14).

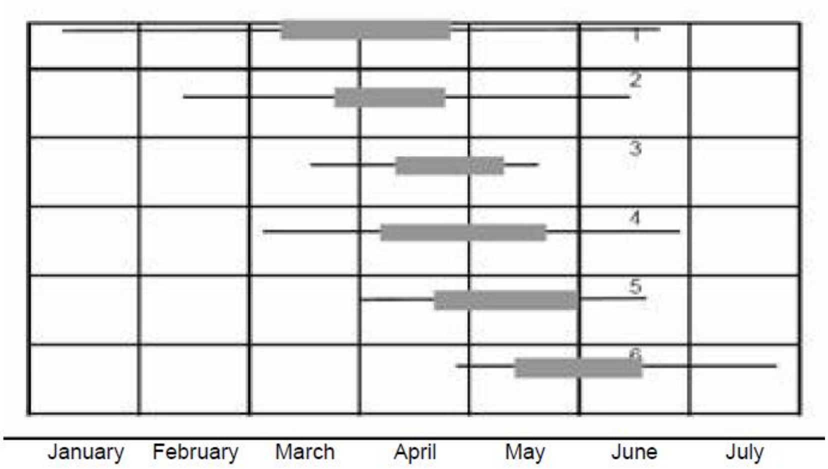


Figure 14. Spawning periods of SOO pollock: 1, Southwest and West Kamchatka; 2, Northwest Kamchatka; 3, Shelikhov Bay; 4, Lebed's height; 5, Iona–Kashevaroskiy area; 6, Northeast Sakhalin; dark rectangles indicate the man spawning period; after Intertek (2013).

Spawning is on the West Kamchatka shelf from January to June, with a peak during March/April. It starts later in Shelikhov Bay, then extends out to the northwestern part of the Sea of Okhotsk. Peak spawning time in each of the neighbouring spawning areas generally differs by about 2–3 weeks. Latest spawning each year is on the Eastern Sakhalin shelf with a peak during May, rarely extending into early June.

Varkentin and Ilyin (2017) emphasize that meteorological and ice conditions in the Sea of Okhotsk play key roles in determining spatial and vertical distribution of pollock, the formation of fishable concentrations, spawning behaviour and early development. Therefore, as part of the annual stock assessment process, descriptions of the Sea of Okhotsk's ocean climate conditions are provided along with information on the spatial progression of the fishery during each season and the associated changes in the age/size composition of the catch and spawning stage. Since about 2000, there has been a declining trend in ice coverage of the Sea of Okhotsk during the months January–March (Figure 15). Long-term trends in sea suface temperature (SST) are less evident. During the site visit, TINRO scientists reported that there have been spatial, though not necessarily vertical, changes in pollock distribution linked to these ocean climate events. That was the motivation behind the development of a commercial trawl catch rate (CPUE) standardization including ice cover and other environmental factors (see Section 3.5.5).

Stock productivity is evaluated robustly using an array of information and indices. Trawl survey and scientific observer monitoring provide the information used to provide estimates of growth, maturity and natural mortality (M). Intertek (2013) noted that annual estimates of weight at age are not available to the stock assessment, so the assessment model uses a long-term average weight at age to compute spawning biomass, rather than annual estimates. During the site visit, it was clarified that the real issue was the lack of reliable at-sea weighing equipment to determine weight–length relationships, meaning that annual weights at age are not available in all years. Therefore, as necessary, average length–weight relationships are used to convert length to weight at age. Intertek (2013) describe long-term variation in fish growth, showing both increases and decreases on a decadal scale with no long-term trend, either increasing or decreasing, apparent.

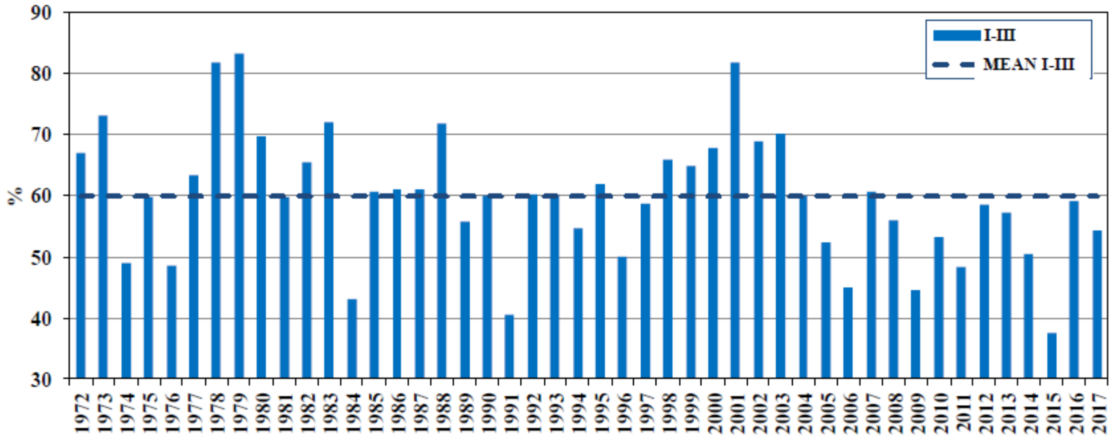


Figure 15. Trend in annual percentage ice cover in the Sea of Okhotsk during the months January–March; after Varkentin and Ilyin (2017).

Intertek (2013) state that prior to 1996, age determination of fish was undertaken through the reading of scales, but that between 1996 and 2003, a transition was made to age determination through otoliths by reading both scales and otoliths for a number of years and comparing the results. Since 2004, only otolith reading has been undertaken. Comparative studies conducted during the transition period indicated that there were no differences in age determined from scales and otoliths up to at least age 6. Varkentin and Ilyin (2016) state that for age data since 1996, separate age–length keys are used for each year, but for the years prior to 1996, an average key based on the period 1998–2016 is used. During the site visit, it was clarified that in fact an age–length key is used separately for all years.

There has been no change to the average age at 50% maturity (5 years) since the report of Intertek (2013). As with weights at age, year-on-year variation in maturity at age does not appear to be notable.

Age-specific natural mortality (M) is estimated as described by Intertek (2013) and Varkentin and Ilyin (2017). Annual estimates of the gonad index (WGSI) for female maturity state IV during the years 1996 to present are averaged and used to estimate a long-term M by the method of Gunderson and Dygert (1988). This is taken to represent M on the most abundant ages in the catch (6–8 years). The method of Blinov (1977) is used to obtain M for all ages. Natural mortality on age 5+ individuals ranges from 0.18 to 0.29, averaging 0.21. This, along with the 50% age at maturity implies a generation time (TGEN) of 5 + 1/0.21 = 9.8 years. During the site visit, TINRO scientists stated that, based on historical studies, sealions are well known to feed on pollock and represent an important source of natural mortality; the input of Kornev *et al*. (2017) is the most recent source of information on the subject.

Sources of recruitment variation have been the subject of research over the years, with both Beverton and Holt and Ricker stock–recruitment relationships employed in assessment models. In Varkentin and Ilyin (2014), a stock–recruitment relationship was attempted that included age 2 pollock numbers as a function of SSB, mean annual Wolf's number (index of sunspot activity), ice coverage and gross zooplankton weight. That relationship explained 74% of the variability in recruitment, compared with about 7% using the Beverton and Holt and Ricker models. However, the relationship has not been pursued since 2014 because it resulted in underestimates of projected stock biomass. During the site visit, TINRO scientists stated a general understanding that environment and specifically large zooplankton influence pollock recruitment, but there has not been a recent formal analysis of this.

Fleet composition and fishery removals together comprise crucial information underpinning the assessment process, and Intertek (2013) provide a comprehensive description of the types of vessel, the operation of the fishery and its monitoring. Supplementary and updated information is also provided elsewhere in this report, mainly in Sections 3.4 and 3.7.3, but it is necessary to provide a summary of the present monitoring effort here, for purposes of completeness.

Scientific observers (managed by TINRO) are deployed to the catcher and catcher–processor vessels to collect information on the composition of the catch, including discards of directed species and bycatch species. According to Russian Law, a vessel is only obliged, not required, to carry a scientific observer and there has been creditable willingness to take observers on board all vessels in the UoC fleet. The observers record information on length composition of catch by species, weight–length data, gut contents, sex and maturity stages of pollock and other relevant observations. Each research institute receives funding for observer coverage from the Federal Fishery Agency. Once the budget is received, deployments are made according to an annual plan by each science institute. The annual progression of the fishery is important to understand when considering the allocation of observer coverage. The fishery is highly targeted with the majority (~95%) of the catch being pollock (Smirnov *et al*. 2014). The annual cycle of the fishery is relatively consistent and is governed by the time of appearance of commercial aggregations in each particular fishing subzone. Major pollock aggregations appear in the Kamchatka–Kuril subzone during January and early February when the main fleet is first deployed there; thus, most observers are initially deployed on board vessels engaged in fishing in this limited area. Then, starting in the latter half of February and in March, the fleets move to northern areas (West Kamchatka and the area near the mouth of Shelikhov Bay, so the scientific observers monitor the fishery in those areas. The target pollock fishery in the Kamchatka subzone is permitted until 31 March and thereafter the fleet moves to the Northern Sea of Okhotsk subzone during the first 10 days of April where one of the largest pollock spawning grounds is found and, accordingly, scientific observers monitor the fishery there. Thus, biological and catch data are collected throughout the entire fishing season in the areas of the densest pre-spawning pollock aggregations and greatest fishing activity. Good coverage of fishing activities can be achieved using a limited number of observers, given that many vessels operate in close proximity to each other on these aggregations. Since 2007, the number of observers engaged in the fishery by TINRO, KamchatNIRO, MagadanNIRO and VNIRO has ranged from 10 to 21 (Table 6).

Table 6. Number of scientific observers engaged in SOO pollock fishery monitoring by Russian research institutes; data from PCA.

	TINRO	KamchatNIRO	MagadanNIRO	VNIRO	Total
2007	14	3	2	2	21
2008	7	3	2	3	15
2009	3	3	2	2	10
2010	7	3	2	2	14
2011	8	3	3	1	15
2012	6	3	2	1	12
2013	5	3	3	2	13
2014	5	3	3	3	14
2015*	4	5	2	1	12
2016	8	4	2	0	14
2017	12	5	1	0	18

* In 2015, 3 extra observers from KamchatNIRO and the Pacific Institute of Geography, Russian Academy of Science, monitored the fishery and collected information on seabirds and marine mammal by-catch and interactions with the fishery. In 2016, the 8 TINRO observers, and in 2017 the 12 TINRO observers and one of the observers from KamchatNIRO also made dedicated seabird and marine mammal observations during their directed pollock trawling observation trips. Finally, during the whole period covered here, KamchatNIRO also deployed observers annually to the Danish seine fishery for pollock and to the herring fishery in which pollock can be taken as a by-catch (neither of these being part of the UoC fishery), but those observers are not reflected in the third column here.

In 2017, the total number of observers increased to 18 and the PCA committed to supporting increasing this to 22[2] in 2018 (PCA 2017b). Smirnov *et al.* (2014) note that although the Russian system

[2] Commitment met: 23 observers from all organisations operated in Season A of 2018, 21 on midwater trawlers and 2 on Danish seiners.

of catch monitoring does not have large numbers of observers, the quality of the scientific information being collected is high: observers are devoted solely to scientific observation and are often highly skilled scientists. They also collect much information beyond merely catch data and length measurements (Table 7).

Table 7. Summary of 1996–2017 (2017, season A only) observer data collected during pollock harvesting on midwater trawl and Danish seine fisheries in the Sea of Okhotsk.

Year	Number of operations (tows)	Length measures	Complete biological analysis	Special analysis	Samples for age determination	Samples for fecundity
Northern Sea of Okhotsk subzone						
1996	82	23579	27		24	0
1997	38	9783	604		17	4
1998						
1999	19		34		34	34
2000	93	24435	1578		548	20
2001	169	3604	1262		700	28
2002	44	8795	226		118	0
2003	64	5438	464	12	464	100
2004	140	16569	1243		1239	101
2005	86	7504	932		651	43
2006	42	6703	274		0	42
2007	16	2674	200		200	0
2008	78	6451	2148		350	0
2009	126	13292	825	3602	543	71
2010	77	14093	1095	5414	1048	25
2011	70	10847	1100	5870	1095	45
2012	29	7833	575	1	573	0
2013	102	18147	1350	4071	1345	77
2014	95	16343	1570	1879	1309	0
2015	135	15256	1400	6070	1000	50
2016	119	15685	1530		1526	0
2017	89	17537	1390			0
Total	**1713**	**244568**	**19827**	**26919**	**12784**	**640**
Western Kamchatka subzone						
1996	299	53054	3872		528	89
1997	440	100310	8482	1	972	191
1998	359	62268	4561		1263	213
1999	195	20856	549	31	390	148
2000	195	47443	3412	4	1629	228
2001	96	5625	2286		1772	128
2002	29	7988	474		0	25
2003	28	2824	657	90	300	41
2004	93	14178	757	209	744	17
2005	99	9239	978		627	60
2006	63	8411	401		248	44
2007	32	3797	350		347	0
2008	131	16944	1235		520	94
2009	68	6892	650	1200	439	36
2010	27	5115	749	3300	749	11
2011	14	1622	305	569	299	10
2012	4	307	50	4	50	0
2013	74	14131	1765	6081	1755	67

2014	205	34489	2573	5031	2223	0
2015	248	22612	3135	9865	2279	145
2016	49	7385	859	37	219	0
2017	83	8416	519	30		0
Total	**2831**	**453906**	**38619**	**26452**	**17353**	**1547**
Kamchatka–Kuril subzone						
1996	72	12336	884		738	21
1997	107	17204	1949		154	27
1998	29	7971	632		294	2
1999	58	9611	902		848	120
2000	111	25504	1243		776	58
2001	133	10690	1693		384	40
2002	611	22540	894	746	444	29
2003	241	11596	1191	363	1156	181
2004	133	16952	1338	381	962	65
2005	93	8597	740		353	7
2006	44	8370	300		286	1
2007	138	7352	507		100	0
2008	362	43946	4412	6	1363	112
2009	238	20783	2145	5701	1238	44
2010	273	44354	3146	7386	3137	67
2011	316	54488	4728	23365	4661	114
2012	98	17458	1326		1319	0
2013	52	13506	1135	2161	1047	72
2014	95	19397	948	1247	460	0
2015	46	12861	592	605	496	0
2016	201	25641	1577		1566	0
2017	139	31653	1610			0
Total	**3590**	**442810**	**33892**	**41961**	**21782**	**960**

As part of efforts to improve sampling efficiency, Smirnov *et al*. (2017) undertook an analysis of the spatial extent of observer coverage to confirm that deployments comprehensively sampled the main areas of the fishery throughout the fishing season. This analysis indicated that observers covered the core part of the fishery's distribution during 2017 (
Figure 16). Spatial coverage was considerably better in 2017 than in 2016, being 74% in the Northern SOO subzone (23% in 2016), 86% in the West Kamchatka subzone (31% in 2016) and 93% in the Kamchatka–Kuril subzone (90% in 2016).

Much of the scientific observer coverage has focused on the midwater trawlers (the UoC fleet) which dominate the fishery (see Table 16 in Section 3.7.3). In summary, from 2006 to 2017, observer coverage of the number of hauls in the fishery was up to 6.1%. The analysis of Smirnov *et al*. (2014) of scientific observer coverage levels of the SOO pollock fishery made a performance evaluation of the existing monitoring system and looked to determine the number of observers required for effective monitoring of both target (pollock) and non-target species. The haul-by-haul observer dataset since 2010 was expressed as the number of non-target species individuals and undersized pollock (<35 cm) per one hour haul (TDPUE). This represents the most variable component of the dataset, so conclusions drawn from the analysis appropriately address monitoring requirements of non-target species and juvenile pollock but generally overstate those for the target species, adult pollock. The analysis distributed the observed variance in the TDPUE by vessel, subzone and trip and indicated that, to meet the European Union Data Collection sampling standard of CV = 25%, 46 trips would be needed to be observed which, if one observer is assumed per trip, equates to 46 observers. Smirnov *et al*. (2014) noted, however, that if every observer had an opportunity to move from one vessel to another during a change of a subzone at least once, the target number of observers would be reduced to 20–22. During the site visit, TINRO (i.e. Smirnov and his colleagues) remarked that their analysis indicated that observer coverage was more than adequate to address monitoring of the target species, but needed to be slightly enhanced to address that of non-target species and juvenile pollock. Further work on observer coverage will therefore be undertaken by the Observer Working Group (see below and Section 3.7.4) to update the target level of observation coverage for the SOO pollock fishery in regards to different goals and aspects of monitoring (PCA 2017b, 2018).

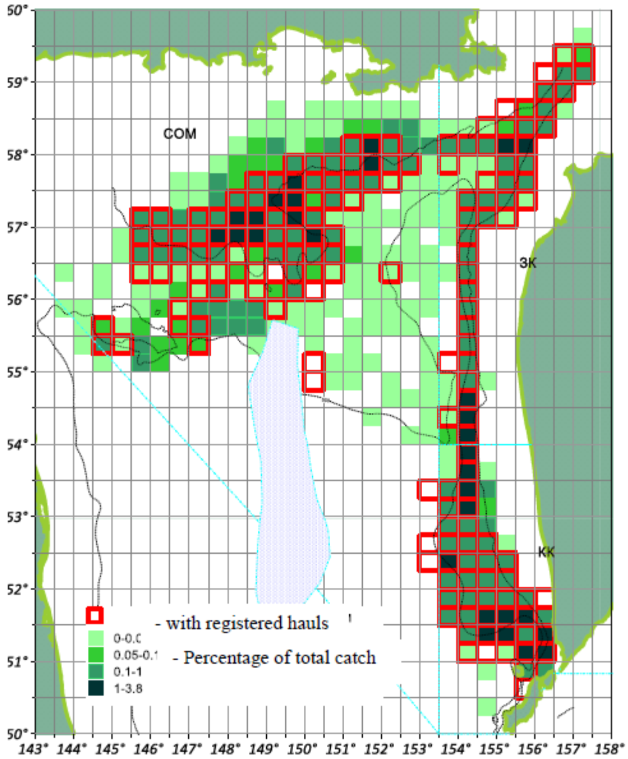


Figure 16. Percentage of total catch in 30 × 15 min squares with registered hauls during the period January–April 2017; after Smirnov *et al*. (2017).

Succinctly, the Observer Working Group's activities are described in Acoura (2015, 2016, 2017). The group coordinates the training of new observers and facilitates the allocation of observers to vessels throughout the fishing seasons. Since the 3rd surveillance audit in October 2016, there have been at least two meetings of the OWG; their minutes and findings are available at www.russianpollock.com.

The research institutes also undertake scientific fishing. Vessels owned and operated by the institutes fish as do commercial vessels against a specific share of the annual TAC. Prior to 1990, TURNIF operated the scientific fleet (it became a private company in 1995), but when it was privatized, the institutes took ownership of the fleet. These vessels collect data similar to that of the observers. Since 2008, the institutes have maintained the operation of this fleet through their small quota share. During the site visit, TINRO experts estimated that about 80% of catch composition information comes from scientific observers and 20% from scientific fishing.

At-sea compliance monitoring is conducted by the FSB's Coastguard (formerly known as Government Marine Inspectors or GMI) on board catcher and catcher–processor vessels (see Section 3.7.3, FSB). They check for compliance of gear and reporting regulations and observe trawl hauls before discarding to confirm compliance with *Fishing Rules* (Ministry of Agriculture 2017), such as juvenile bycatch, 2%/49% bycatch rules, marine mammal and seabird interactions, benthic interaction (seafloor samples or bottom species), and full and proper recording of bycatch and catch. The inspectors move from vessel to vessel on the fishing grounds and it is mandatory to allow them on board when they request access. The inspectors verify the weight of landings delivered to transshipment vessels and ports; verification of the landings and transshipments has been 100% since 2010.

A summary of inspection activity since 2008 and appropriate comment is provided in Table 17 in Section 3.7.3 and discussions with local FSB personnel during the 2017 site visit confirmed the rigour and appropriateness of the system. Such monitoring of catch is used in regulating juvenile bycatch, for example. Prior to 2001, the percentage of vessels producing fish fillets in the fishery was large and their freezers could not handle large numbers of juveniles. Hence, the weight of <20 cm pollock in the catch was limited to a maximum of 8% of the total catch per haul. Since 2001, the main product types are headed and whole frozen pollock (although filleting capacity has recently started to increase again). The juvenile size regulation was then changed so that the number, not the weight, of <35 cm pollock caught was limited to a maximum of 20% of the total catch per haul. The *Fishing Rules* also state (paragraph 21.4) that if the pollock juvenile catch exceeds 20%, all harvested juveniles are to be processed and entries made in fishing and processing logs. Every trawl hauled onto a vessel is subject to mandatory sampling for juvenile percentage. Designed to minimize benthic interactions, the *Fishing Rules* prohibit the use of bottom trawls, specify net sizes and construction, and establish fishing zones for operation. The Coastguard issues fines when there is evidence of bottom interaction, such as the presence of crabs, starfish, flatfish and other benthic species in the catch.

Intertek (2013) discussed the issue of unobserved catch, particularly the discarding of juveniles, which has been an issue in the history of this fishery, particularly during the 1990s and in the early 2000s, when there were multiple violations of fishery regulations such as young fish discards, concealment of harvest, and fishing activities in prohibited areas and periods, which resulted in TAC overages in the order of 15–20% per year. Estimates from other reports of unobserved juvenile discards ranged from 8 to 42% above the official statistics. Intertek (2013) state that as a consequence of changes in markets, monitoring, regulations, enforcement and the stock, discarding had already been greatly reduced, a situation which has continued since first certification and is covered in the surveillance reports of the fishery (see Acoura 2015, 2016, 2017).

There are a number of reporting obligations on the fishery comprehensively described by Intertek (2013); they are comparable with and often exceed those of monitoring and compliance systems elsewhere in the world. They include logbooks and Daily Vessel Catch reports, plus satellite-based vessel monitoring system output (VMS, monitored by the CFMC with information shared with the Coastguard).

The other main source of pollock catch is the coastal Danish seine fishery on the West Kamchatka shelf. During the years 2006–2016, pollock landings of that fishery initially rose from 5.9% to a maximum of 9.0% of the SOO pollock TAC in 2012, but they had since declined back to 5.5% by 2016 (PCA 2018). At-sea observer coverage of the Danish seine catch is less than that of the much larger directed midwater trawl fishery for pollock (Table 16 in Section 3.7.3) mainly owing to the difficulty in accommodating observers on the relatively small vessels. Prior to 2012, observer coverage of the fishery averaged 1.2%, though it subsequently increased to 2.0%. These data are used to construct annual values of Danish seine fishery catch at age for incorporation into the stock assessment. The catch is dominated by the same age/size groups as the directed pollock fishery, but with fewer juveniles (2–9% of the catch, depending on season; Intertek 2013). As at first certification (Intertek 2013), pollock discards in the fishery are rare and the entire catch is processed.

Stock abundance indices, many fishery-independent, are vital to the stock assessment process, and Intertek (2013) comprehensively described the survey programme used to provide such indices. During the site visit, TINRO personnel stated that the survey programme has been largely unchanged since original certification given the importance of the SOO pollock fishery nationally.

➢ *Winter/spring ichthyoplankton, trawl and acoustic surveys*

An ichthyoplankton survey in the Sea of Okhotsk started in the 1930s, but only since 1972 has it been used to evaluate pollock spawning biomass to inform fisheries management. Ichthyoplankton surveys have been conducted by KamchatNIRO on the West Kamchatka shelf since 1972 (
Figure 17). The gear used is an IKS-80 cone net towed vertically from either 200 or 400 m depending on where spawning is taking place. Using methods described by Varkentin and Ilyin (2017) and Intertek (2013), two indices of SOO pollock are produced – SSB and total eggs. The surveys are particularly important given their great length and consistency of methodology.

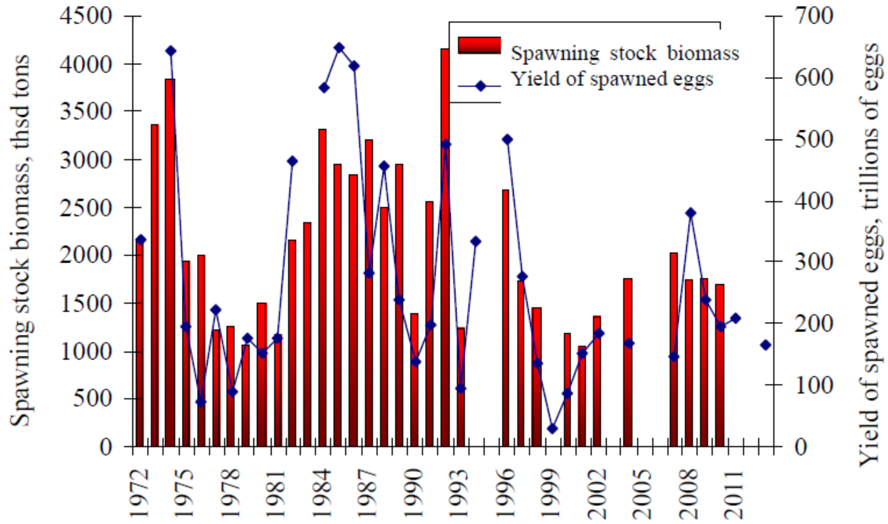


Figure 17. Trend in SSB and egg abundance for SOO pollock estimated from KamchatNIRO ichthyoplankton surveys during the period 1972–2010; after Varkentin and Ilyin (2017).

Since 1984, all known spawning areas of SOO pollock are sampled annually in an ichthyoplankton survey by TINRO using a fixed station design of >380 locations (Figure 18). Sampling starts in the West Kamchatka subzone at the beginning of April, in Shelikhov Bay in early May and in the north central – west parts of the Sea in late May. The duration of the survey in each area is about 15–17 days. The gear is again an IKS-80 cone net towed vertically from either 200 or 400 m depending on spawning depth. Two indices, SSB and total stock biomass (TSB), are produced based on the surveys using methods described by Kachina and Sergeeva (1978), Intertek (2013) and TINRO (2017b).

Since 1998, the TINRO ichthyoplankton survey has been accompanied by trawl sampling. Protocols for the trawl component of the winter/spring sampling are standardized using a RT/TM–57/360 midwater trawl with 10-mm mesh codend and the addition of hydrological sampling. During the site visit, it was clarified that this part of the survey is conducted using a stratified random design and that the distribution of sampling is similar to that for ichthyoplankton. The surveys produce estimates of both SSB and TSB (Varkentin and Ilyin 2017). Intertek (2013) noted that the trawl data can be adjusted using a voluminosity adjustment for the abundance of pollock observed above the trawl during a set, based on echosounder traces. TINRO stated at the time that typically no such adjustment is required in depths of 0–200 m, but that in deeper water, the adjustment can be two times (by day) and three times (by night) the set's catch to account for uncaught fish above the trawl. However, a statistical analysis of trawl survey data (Kulik and Gerasimov 2017) concluded that the survey index trend without the adjustment was more consistent with the stock biomass trend estimated by the 2017 assessment (Figure 19). The model did not fit the high voluminosity-adjusted survey biomass indices in the later part of the time-series, suggesting limited influence of those data years in the assessment.

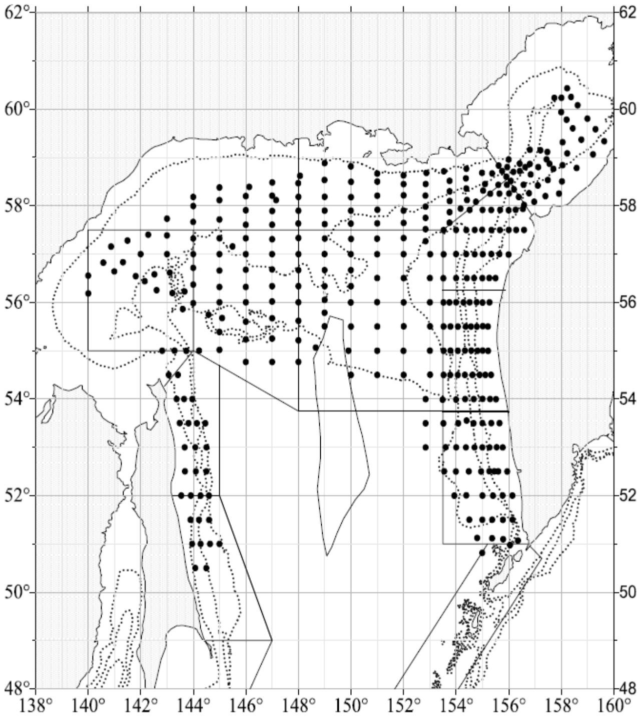


Figure 18. Station distribution of the annual TINRO ichthyoplankton survey in the northern part of the Sea of Okhotsk; after TINRO (2017b).

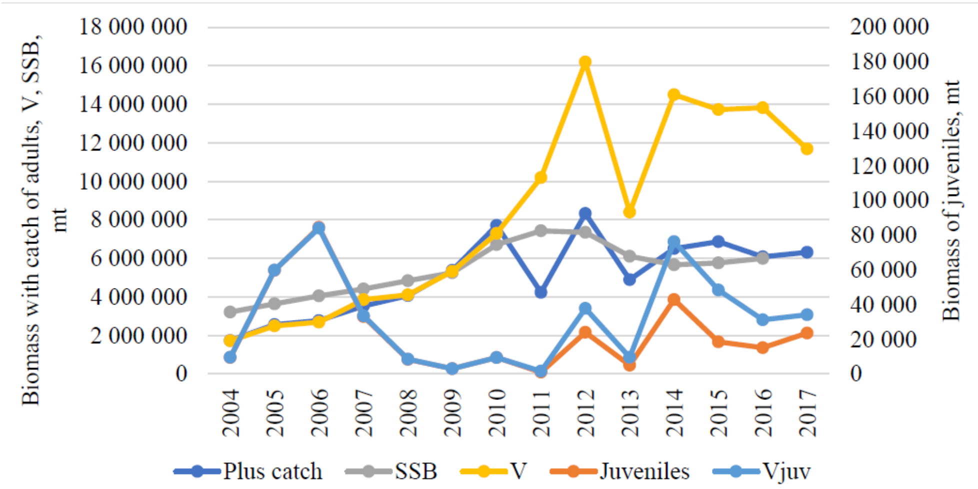
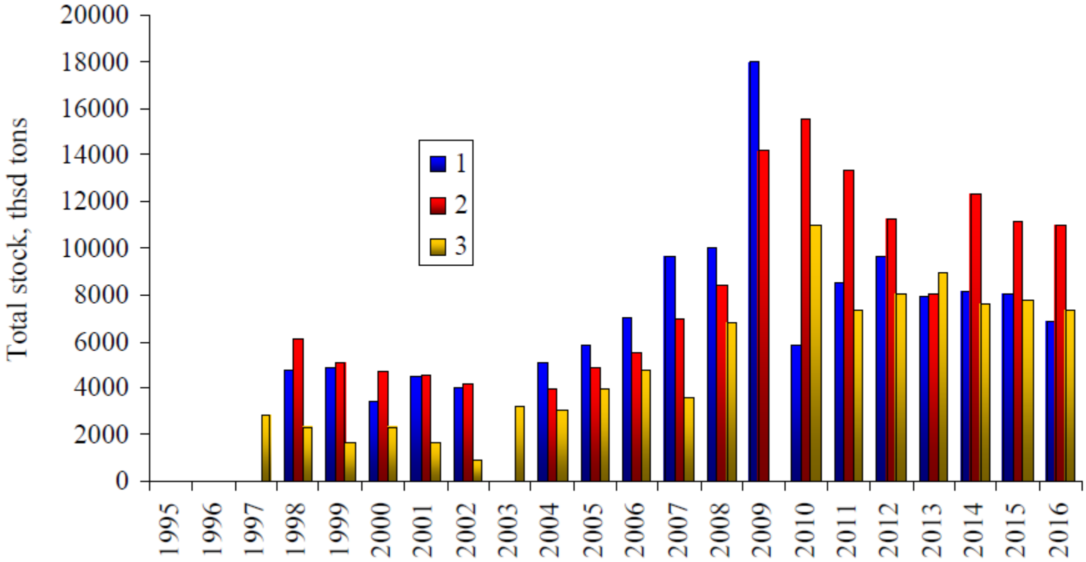


Figure 19. Trends in TINRO trawl survey biomass during the period 2004–2017; dark blue line, SSB excluding the voluminosity adjustment (VA); yellow line, SSB including VA; grey line, SSB from 2017 stock assessment; after TINRO (2017b).

Since 1998, the TINRO winter/spring survey has also been accompanied first with a Simrad EK500 and now an EK600 acoustic system. Considerable effort has been spent on standardizing the design and protocol of this survey, and an acoustic index of TSB is now used in the stock assessment (TINRO 2017b; Varkentin and Ilyin 2017). The trends in TSB and SSB estimated by the above TINRO surveys are shown in
Figure 20.

a. TSB



b. SSB

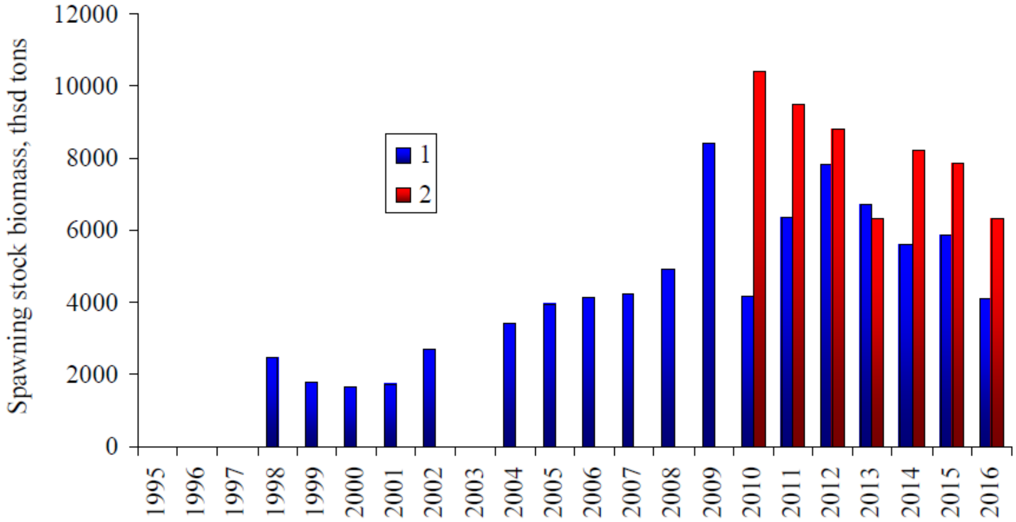


Figure 20. Trend in (a) TSB and (b) SSB of SOO pollock estimated from TINRO ichthyoplankton (1), trawl (2) and acoustic (3) surveys during the years 1998–2016; after Varkentin and Ilyin (2017).

➢ *Fall (autumn) ecosystem survey*

During the years 1995–2008 (since discontinued), TINRO conducted an autumn ecosystem trawl survey using the same design and protocol as that used in the winter/spring survey. The survey (

Figure 21) was designed to monitor broad changes in ecosystem biodiversity and environmental conditions and to provide the stock assessment with an additional index of TSB.

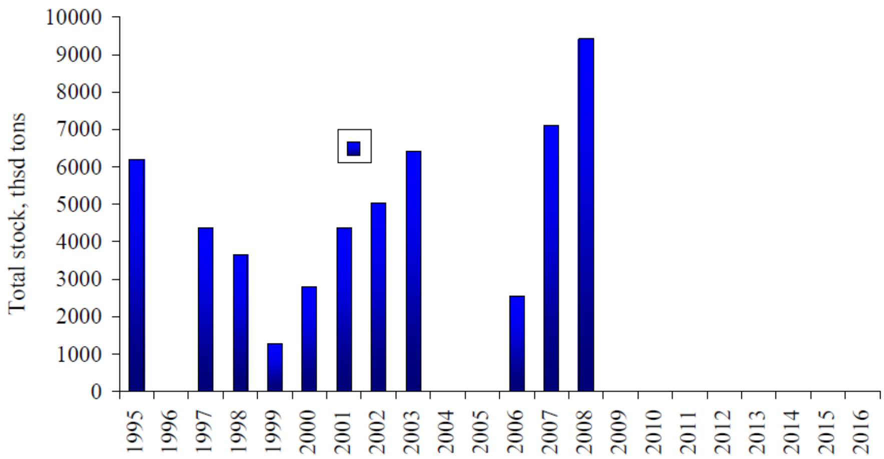


Figure 21. Trend in total spawning biomass (TSB) of SOO pollock estimated from TINRO ecosystem surveys during autumn of the years 1995–2008; after Varkentin and Ilyin (2017).

➢ *Commercial Indices*

Since 2001, a catch rate (CPUE) index has been estimated for the large trawler fleet and used as an index of fishable biomass in the annual stock assessments. Owing to the potential and increasing influence of ocean climate on fishing activity, a catch rate standardization was performed on data for 38 vessels involved in the target pollock fishery in the northern part of the Sea of Okhotsk between January and the first 10 days of April. The GLM included daily values of sea surface temperature (SST) and ice concentration (ICE) as covariates (TINRO 2017c, Varkentin and Ilyin 2017). The trend in standardized CPUE is similar to that of the survey biomass, with an associated CV of 20.5% (Figure 22).

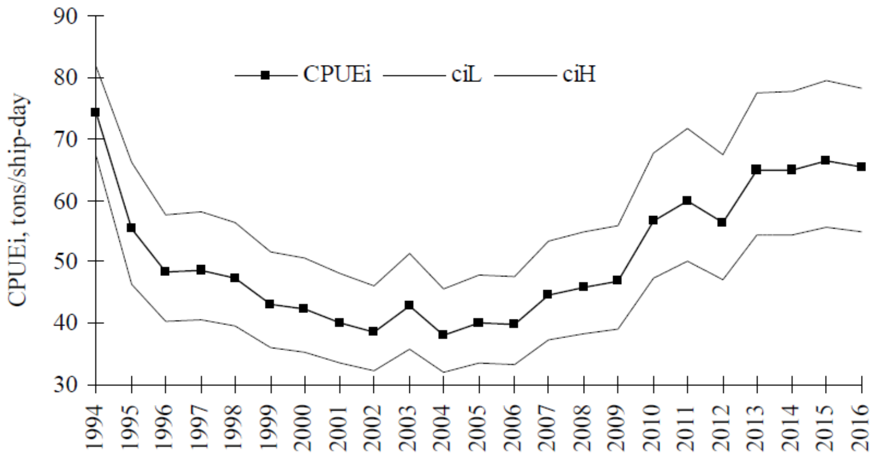


Figure 22. Trend in GLM-standardized CPUE in the target pollock fishery in the northern part of the Sea of Okhotsk; after Varkentin and Ilyin (2017).

An additional CPUE index was developed using the KamchatNIRO observer data for the same observers, vessels, gear and operating conditions. During the site visit, this index was described as that for an index commercial fleet. Although it is only available since 2009, it does indicate a relative stability in the catch rates (Figure 23).

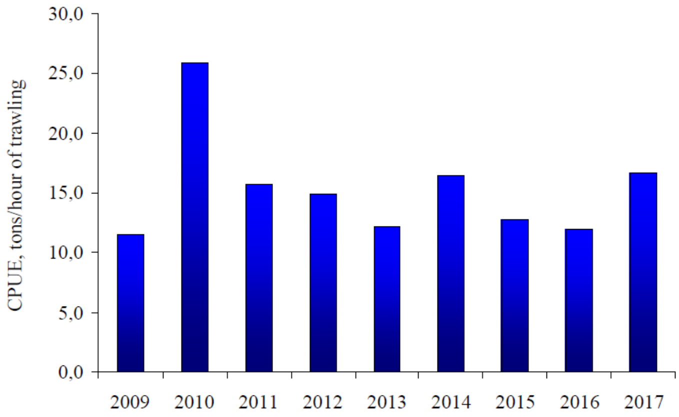


Figure 23. Trend in mean catch per hour of trawling in the northern part of the Sea of Okhotsk in March, based on FSBRI "KamchatNIRO" observer data; after Varkentin and Ilyin (2017).

➢ *Other Data*

Varkentin and Ilyin (2017) describe ocean climate (e.g. temperature, salinity) data collected during the scientific surveys. These and other environmental data are collected to monitor oceanographic processes potentially influencing pollock recruitment and broader changes in the ecosystem (see also Section 3.6), some of which have been reported in PICES reports.

3.5.5 Stock Assessment

Intertek (2013) used the 2010 assessment of the SOO pollock stock (report published in 2011), which assessed stock status up until 2010, assumed a 2011 TAC of 920 000 t, and projected start-2013 status for a range of 2012 TACs. Since then, assessments have been conducted annually using the same assessment Statistical Catch at Age (SCAA) approach, termed "Synthesis" in Russian reports but distinct from the Stock Synthesis procedure of Methot and Wetzel (2013). The most recent assessment (Varkentin and Ilyin 2017) assessed stock status up until 2016, and assuming a 2017 TAC of 967 000 t, projected start-2019 status under a range of 2018 TACs. Changes in the assessment since Intertek (2013) are reported below.

➢ *Data*

The fishery and stock dynamic inputs of the SCAA model of Varkentin and Ilyin (2017) are similar to those of Intertek (2013) and consist of:

- Catch at age (1963–2016) for ages 2–20;
- Annual weight at age for ages 2–20;
- Annual maturity at age for ages 2–20 based in January–March survey observations;
- Long-term average natural mortality (M) at age for ages 2–20, based on the methods of Blinov (1977) and Gunderson and Dygert (1988).

The 2010 stock assessment used two fishery-independent indices of abundance to calibrate the SCAA model: spawning stock biomass (SSB), and the total eggs derived from the KamchatNIRO winter/spring ichthyoplankton survey (1972–2009). The KamchatNIRO ichthyoplankton survey represents the longest time-series, having been conducted almost every year since 1972, but was discontinued after 2013. The survey provides two indices to the most recent assessment:

- KamchatNIRO ichthyoplankton survey SSB (I1);
- KamchatNIRO ichthyoplankton survey total eggs (I2).

The methods to estimate SSB and total eggs from survey tow data are outlined in Intertek (2013). The assessment takes account of these indices covering a part, albeit a significant one, of the main spawning areas by including estimation of survey catchability (q) for each index. During the period 1998–2017, estimated SSB on the West Kamchatka Shelf in the TINRO winter/spring survey averaged 57.4% of the total pollock biomass (PCA 2018).

Direct estimates of SSB based upon the TINRO surveys have been considered an alternative to those estimated by the Synthesis model, although the latter has been used through the HCR to inform management advice. As of 2015, it was decided to combine all existing stock indices into a single model-based approach which, in accordance with FFA Directive No. 104 (06/02/2015), is now mandatory for the high priority data-rich (level 1) stocks (PCA 2018). Thus, as of Varkentin and Ilyin (2015), a number of additional fishery-independent indices, based upon the TINRO survey, have been added to the assessment. The annual TINRO winter/spring ichthyoplankton/trawl survey provides four indices:

- TINRO ichthyoplankton survey SSB since 1998, but excluding 2003 (I3);
- TINRO trawl survey SSB since 2010 (I4);
- TINRO ichthyoplankton survey total stock biomass (TSB) since 1998, but excluding 2003 (I5);
- TINRO trawl survey TSB since 1998 (I6).

The methods to estimate SSB from survey ichyoplankton data are as per the KamchatNIRO survey noted above. Although the TINRO surveys have been conducted since 1984, it is only since 1998 that the surveys have been accompanied by trawl and hydroacoustic sampling which allows estimation of immature and mature numbers and biomass over the whole size-at-age range (PCA 2018). Therefore, only the TINRO indices since at least 1998 are included in the Synthesis model. The estimates of SSB and TSB from the survey trawl data are based on the swept area of the stratified random design. These indices cover the entire stock range, so the index catchability is assumed to be one.

The acoustic component of the TINRO survey provides a seventh index and the TINRO autumn ecosystem survey provides the eighth index:

- TINRO acoustic survey TSB since 2001, but excluding 2003 (I7);
- TINRO ecosystem trawl survey TSB during the period 1995–2007 (I8).

Sharov (2016), in his review of the stock assessment of Varkentin and Ilyin (2015), felt that not all available information was being fully utilized in the uncertainty characterization, so he concluded that the uncertainty was likely being underestimated. For instance, the information on age composition of the TINRO trawl index was not explicitly included in the objective function. Therefore, Varkentin and Ilyin (2017) included an additional fishery-independent index of abundance, this being:

- TINRO trawl survey catch rate at age (2–20) since 1998, but excluding 2003 (I11); note that this index was based on survey catch rate at age, rather than assumed as representing total stock numbers at age.

The 2010 stock assessment used two fishery-dependent indices of abundance to calibrate the SCAA model: large trawler fishing effort and catch rates (2001–2010), standardized for fishing capacity. The effort index has been discontinued in the most recent assessment and the CPUE index has been replaced by two indices:

- CPUE based on the KamchatNIRO-observed BATM-type large tonnage vessels employing the same observer, vessel, gear and operations since 2009 (I9);

- CPUE based on a GLM analysis of catch per ship-day of 38 vessels operating during the months January–March using SST and ice coverage as covariates, since 1994 (I10).

Overall, therefore, since Intertek (2013), there have been a significant number of additional indices added to the assessment.

➢ *Model and uncertainties*

Intertek (2013) noted that the pollock fishery in the Sea of Okhotsk had been assessed using a number of approaches, the most consistently used being a "biostatistical" method that uses the TINRO ichthyoplankton/trawl survey data to estimate spawning biomass by subzone directly. Assessment modelling methods were initially based upon the assumption of negligible error in the catch at age (e.g. Virtual Population Analysis, VPA). For the West Kamchatka subzone, methods such as VPA, ICA and XSA have all been used, generally conducted by the scientists at KamchatNIRO. For the northern Sea of Okhotsk subzone, both XSA and ISVPA (Instantaneous Separable VPA) have been used.

Since 2007, a Statistical Catch at Age (SCAA) approach, termed 'Synthesis' (not related to the Stock Synthesis process of Methot and Wetzel 2013), initially similar to CAGEAN and ICA, has been employed, and since 2010, it has replaced the biostatistical method as the basis for management advice. The model has undergone a number of enhancements with that of Varkentin and Ilyin (2017) being the most developed. The parameters of the most recent model consist of:

- 1963 start of year numbers at ages 3–20 and age 2 for the years 1963–2016;
- fully recruited fishing mortality (ages 7–11) for the years 1963–2016;
- selectivity at age in two time blocks (1963–2001 and 2002–2010) for ages 2–6 and 14–20 with that on ages 7–13 assumed equal to one;
- catchability coefficients (q) for each of survey indices I1, I2 and I11;
- catchability coefficients (q) for each of CPUE indices I9 and I10;
- parameters (α and β) of the logistic selectivity at age relationship for index I11;
- standard deviation (σ) of catch at age and all indices.

Many of the assumptions of the most recent model are similar to those used in the 2010 assessment (Intertek 2013). The use of the two selectivity at age/time blocks to characterize the fishery's fishing mortality (F) at age is the same (with one year shift from 2000/2001 to 2001/2002). The survey catchability coefficients are applied to the KamchatNIRO surveys but not to the TINRO surveys (except the age-based index, I11) because the latter are assumed to represent stock size fully. The logistic selectivity at age for index I11 is assumed to apply across its entire time-series, an assumption often made for fishery-independent indices. On the other hand, parameters (a and b) of a Ricker stock–recruitment relationship are not employed, which were used in the 2010 assessment but have not been incorporated since 2015, with age 2 recruitment numbers freely estimated each year.

A significant change since the evaluation of Intertek (2013) is how data uncertainty is used in the model to weight the contribution of each to model fit. This issue is also discussed by Sharov (2016). In the 2010 model, the relative weighting of the data components was incorporated in the objective function through the use of a lambda term applied to each of the components, these ranging from 1 to 10. These lambda terms were based on expert judgement of the analysts and discussed during the peer review. Since the assessment of Varkentin and Ilyin (2015), the lambda terms have been discontinued with explicit estimation of the uncertainty (σ) in each input dataset (Table 8). These are assumed to be time- and age-invariant (Varkentin and Ilyin 2017).

Table 8. Estimates of uncertainty (σ) for datasets of the SOO pollock assessment; after Varkentin and Ilyin (2017).

Time Series	Index	SD
Catch		0.66
KamNIRO Ichthyo	SSB	0.31
	Eggs	0.57
TINRO Ichthyo	SSB	0.26
	TSB	0.21
TINRO Trawl	SSB	0.41
	TSB	0.28
TINRO Acoustic	TSB	0.24
TINRO Ecosystem	TSB	0.59
CPUE	GLM	0.20
	Observer	0.22
TINRO Trawl	By age	0.55

Varkentin and Ilyin (2017) indicate that optimization of the objective function (negative log-likelihood) is undertaken primarily using the Levenberg–Marquardt algorithm. Derivatives are numerically estimated rather than by automatic differentiation as in applications such as ADMB (Fournier *et al*. 2012). The main data components influencing the likelihood function are catch at age and the TINRO survey catch rate at age index (I11), with some influence of the KamchatNIRO ichthyoplankton indices (I1 and I2) and TINRO ecosystem survey (I8) (Figure 24).

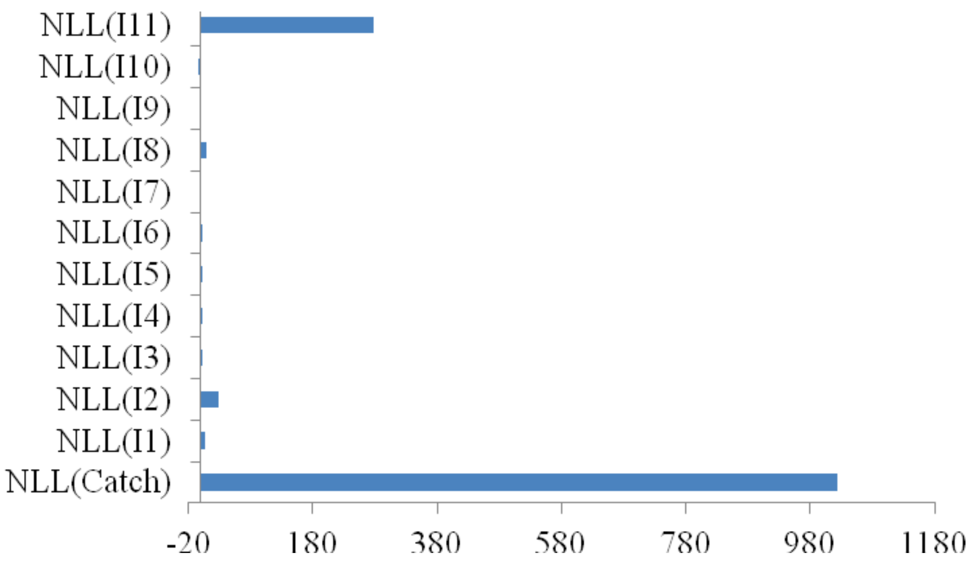


Figure 24. Values of target function components (negative log-likelihood); after Varkentin and Ilyin (2017).

The parameter estimates of the model in Varkentin and Ilyin (2017) are provided in Table 9. Regarding the index catchability coefficients, that of the KamchatNIRO ichthyplankton total egg index I2) is understandingly low (exp(–2.896) = 0.055), whereas that of that survey's SSB index (I1) (exp–0.662 = 0.52), is consistent with the estimated fraction (57%) of the stock resident on the West Kamchatka shelf since 1998, as noted above. The calibration coefficient of the oldest pollock in the survey catch rate at age index (I11) is understandly low (exp(–5.754) = 0.0033) given that it is not intended to represent total stock numbers at this age but rather a constant fraction of these. The catchabilities of the other survey indices are assumed to be one, based upon how these indices are calculated.

Table 9. Sea of Okhotsk parameter estimates from the SCAA model of Varkentin and Ilyin (2017).

Parameter	value	SE	Parameter	value	SE	Parameter	value	SE	Parameter	value	SE	Parameter	value	SE
ln(s1,2)	-3.955	0.134	ln(f1972)	-1.636	0.169	ln(f2007)	-1.610	0.163	ln(R1988)	9.190	0.130	ln(N1963,9)	5.558	0.228
ln($s_{1,3}$)	-2.737	0.133	ln(f1973)	-1.420	0.164	ln(f2008)	-1.710	0.169	ln(R1989)	9.254	0.128	ln(N1963,10)	5.020	0.248
ln($s_{1,4}$)	-2.089	0.133	ln(f1974)	-0.745	0.154	ln(f2009)	-1.092	0.163	ln(R1990)	9.300	0.126	ln(N1963,11)	4.422	0.271
ln($s_{1,5}$)	-1.098	0.133	ln(f1975)	-1.581	0.175	ln(f2010)	-1.291	0.190	ln(R1991)	9.397	0.125	ln(N1963,12)	3.868	0.300
ln($s_{1,6}$)	-0.078	0.121	ln(f1976)	-0.985	0.175	ln(f2011)	-1.423	0.216	ln(R1992)	9.373	0.124	ln(N1963,13)	3.322	0.335
ln($s_{1,13}$)	0.022	0.007	ln(f1977)	-0.865	0.181	ln(f2012)	-1.270	0.210	ln(R1993)	9.177	0.123	ln(N1963,14)	2.850	0.380
ln($s_{1,14}$)	-0.339	0.135	ln(f1978)	-1.605	0.193	ln(f2013)	-1.319	0.198	ln(R1994)	9.177	0.123	ln(N1963,15)	2.351	0.426
ln($s_{1,15}$)	-0.207	0.160	ln(f1979)	-1.462	0.185	ln(f2014)	-1.803	0.193	ln(R1995)	8.935	0.113	ln(N1963,16)	1.801	0.476
ln($s_{1,16}$)	-0.275	0.203	ln(f1980)	-1.596	0.182	ln(f2015)	-1.715	0.193	ln(R1996)	8.890	0.110	ln(N1963,17)	1.450	0.534
ln($s_{1,17}$)	-0.748	0.254	ln(f1981)	-2.277	0.182	ln(f2016)	-1.581	0.199	ln(R1997)	8.975	0.106	ln(N1963,18)	1.211	0.599
ln($s_{1,18}$)	-0.786	0.294	ln(f1982)	-2.265	0.174	ln(R1963)	8.214	0.163	ln(R1998)	8.761	0.102	ln(N1963,19)	1.022	0.690
ln($s_{1,19}$)	-0.867	0.342	ln(f1983)	-2.216	0.168	ln(R1964)	8.276	0.160	ln(R1999)	8.868	0.100	ln(N1963,20)	0.769	0.869
ln($s_{1,20}$)	-1.218	0.383	ln(f1984)	-1.762	0.164	ln(R1965)	8.392	0.161	ln(R2000)	8.681	0.104	ln(q1)	-0.662	0.066
ln($s_{2,2}$)	-6.307	0.216	ln(f1985)	-1.429	0.161	ln(R1966)	8.503	0.163	ln(R2001)	8.498	0.109	ln(q2)	-2.896	0.106
ln($s_{2,3}$)	-4.235	0.214	ln(f1986)	-1.068	0.152	ln(R1967)	8.416	0.164	ln(R2002)	8.777	0.110	ln(q9)	-5.689	0.103
ln($s_{2,4}$)	-2.843	0.212	ln(f1987)	-1.225	0.153	ln(R1968)	8.705	0.172	ln(R2003)	8.919	0.115	ln(q10)	-4.239	0.069
ln($s_{2,5}$)	-1.523	0.210	ln(f1988)	-1.461	0.154	ln(R1969)	8.694	0.170	ln(R2004)	9.006	0.119	ln(qa)	-5.754	1.506
ln($s_{2,6}$)	-0.368	0.204	ln(f1989)	-1.245	0.149	ln(R1970)	8.908	0.176	ln(R2005)	8.992	0.127	ln(σC)	-0.418	0.023
ln($s_{2,13}$)	0.011	0.007	ln(f1990)	-1.285	0.149	ln(R1971)	8.740	0.162	ln(R2006)	9.213	0.135	ln(σ1)	-1.186	0.135
ln($s_{2,14}$)	-0.363	0.187	ln(f1991)	-1.260	0.147	ln(R1972)	8.803	0.160	ln(R2007)	9.444	0.134	ln(σ2)	-0.554	0.124
ln($s_{2,15}$)	-0.416	0.195	ln(f1992)	-1.204	0.148	ln(R1973)	8.684	0.158	ln(R2008)	9.400	0.141	ln(σ3)	-1.361	0.176
ln($s_{2,16}$)	-0.333	0.211	ln(f1993)	-1.266	0.153	ln(R1974)	8.459	0.153	ln(R2009)	9.229	0.149	ln(σ4)	-0.900	0.284
ln($s_{2,17}$)	-0.204	0.228	ln(f1994)	-2.187	0.161	ln(R1975)	8.414	0.154	ln(R2010)	8.638	0.162	ln(σ5)	-1.576	0.175
ln($s_{2,18}$)	-0.173	0.271	ln(f1995)	-1.360	0.149	ln(R1976)	8.509	0.154	ln(R2011)	8.928	0.170	ln(σ6)	-1.264	0.181
ln($s_{2,19}$)	-0.572	0.337	ln(f1996)	-0.843	0.135	ln(R1977)	8.753	0.154	ln(R2012)	8.694	0.190	ln(σ7)	-1.446	0.188
ln($s_{2,20}$)	-0.373	0.425	ln(f1997)	-0.646	0.126	ln(R1978)	9.023	0.155	ln(R2013)	9.420	0.202	ln(σ8)	-0.525	0.227
ln(f_{1963})	-3.916	0.241	ln(f1998)	-0.196	0.111	ln(R1979)	9.284	0.155	ln(R2014)	9.099	0.243	ln(σ9)	-1.492	0.260
ln(f_{1964})	-3.063	0.210	ln(f1999)	-0.828	0.140	ln(R1980)	9.512	0.152	ln(R2015)	9.639	0.282	ln(σ10)	-1.587	0.179
ln(f_{1965})	-2.410	0.198	ln(f2000)	-0.854	0.134	ln(R1981)	9.354	0.150	ln(R2016)	9.141	0.415	ln(σa)	-0.601	0.043
ln(f_{1966})	-1.918	0.189	ln(f2001)	-1.126	0.148	ln(R1982)	9.140	0.147	ln(N1963,3)	7.911	0.166	ln(α)	-1.879	0.483
ln(f_{1967})	-2.068	0.184	ln(f2002)	-1.280	0.168	ln(R1983)	9.117	0.142	ln(N1963,4)	7.380	0.167	ln(β)	2.223	1.332
ln(f_{1968})	-1.560	0.183	ln(f2003)	-1.456	0.172	ln(R1984)	9.119	0.139	ln(N1963,5)	7.265	0.173			
ln(f_{1969})	-1.762	0.176	ln(f2004)	-1.736	0.175	ln(R1985)	9.218	0.137	ln(N1963,6)	6.968	0.183			
ln(f_{1970})	-1.692	0.177	ln(f2005)	-1.664	0.161	ln(R1986)	9.259	0.133	ln(N1963,7)	6.545	0.196			
ln(f_{1971})	-1.654	0.171	ln(f2006)	-1.522	0.154	ln(R1987)	9.362	0.130	ln(N1963,8)	6.054	0.211			

The logistic selectivity-at-age relationship of the TINRO trawl catch rate at age indicates that pollock is not fully recruited to the survey, at least over ages 2–20 (Figure 25). On the other hand, the catchability of the TINRO trawl TSB index is assumed to be one; this is suggestive of an issue with the assumed catchabilities of the TINRO trawl survey indices in the Synthesis model. This was an issue discussed during the Russian peer-review process and will be further explored in future assessments (PCA 2018).

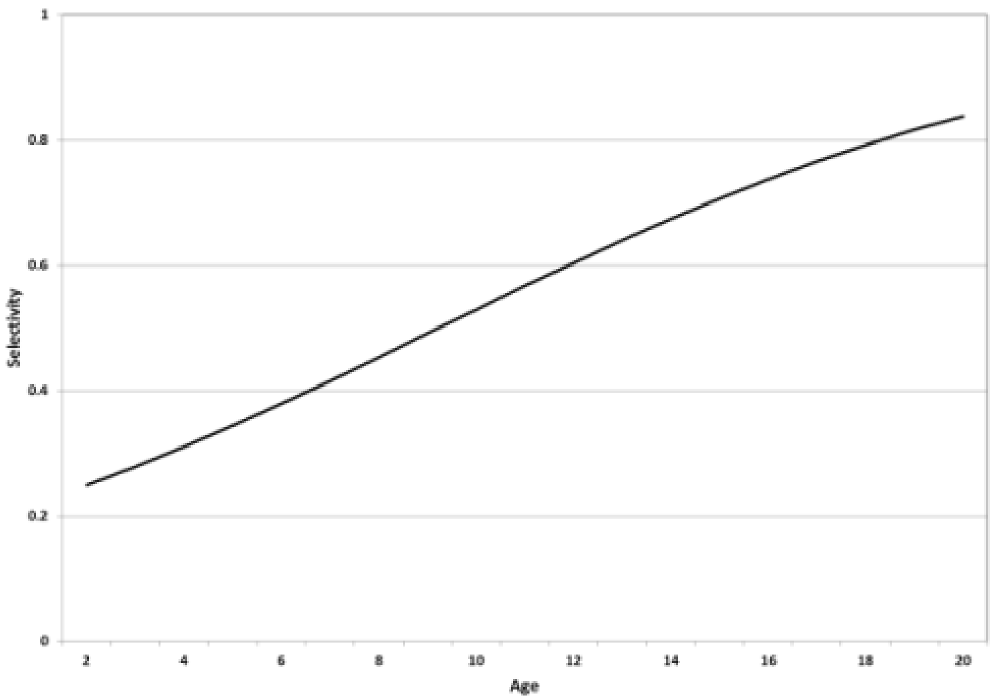


Figure 25. Logistic selectivity at age of the TINRO trawl catch rate at age index (I11).

Varkentin and Ilyin (2017) provide the residual plots for catch at age (Figure 26). There is some positive and negative patterning in the residuals, but overall, the model fit to the data, particularly the most abundant age groups, is good.

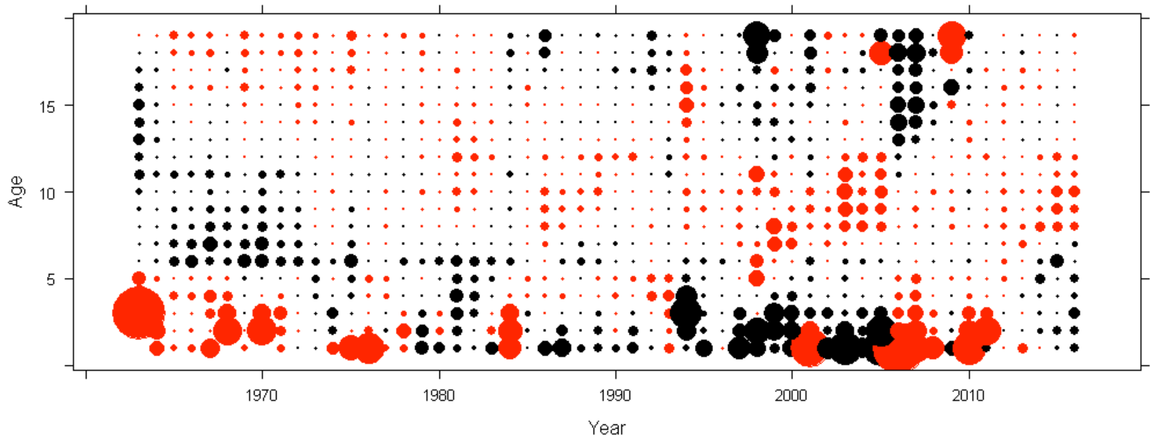


Figure 26. Residuals (ln observed – ln predicted) of catch at age from the SOO pollock assessment; black, positive; red, negative; after Varkentin and Ilyin (2017).

Overall, the fits of the model to the survey indices are good (all fits in Varkentin and Ilyin 2017), a conclusion also reached by Sharov (2016). This implies that the assumption of q = 1 is generally supported except in the case of the TINRO trawl SSB, where the model underestimates stock biomass (Figure 27). This is consistent with the observation on the selectivity at age of the TINRO trawl survey made above and which is being considered in future assessments.

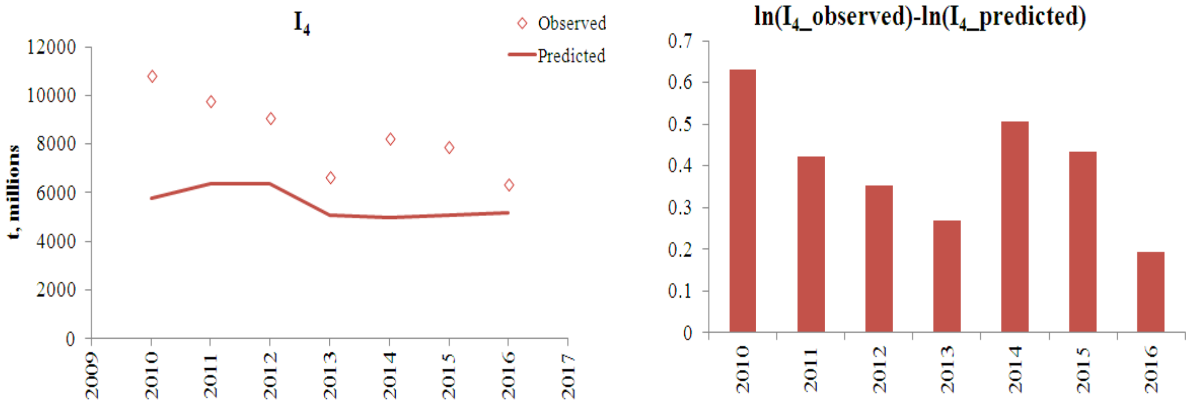


Figure 27. Residuals (ln observed – ln predicted) of the TINRO trawl SSB index from the SOO pollock assessment; after Varkentin and Ilyin (2017).

Finally, the fits to the commercial trawl catch rate indices were good, with no evident trends in the resuiduals (fits in Varkentin and Ilyin 2017). Overall, therefore, although there were issues in some of the fits (i.e. that relating to the TINRO trawl), they were not considered sufficient by the Russian peer-review process to invalidate the model as the basis for TAC advice.

Varkentin and Ilyin (2017) provide retrospective analyses of SSB, F and age 2 recruitment based on the most recent model. Although there was a small pattern in fishing mortality prior to 2013, since then, assessments of the stock indicators have been very consistent (
Figure 28).

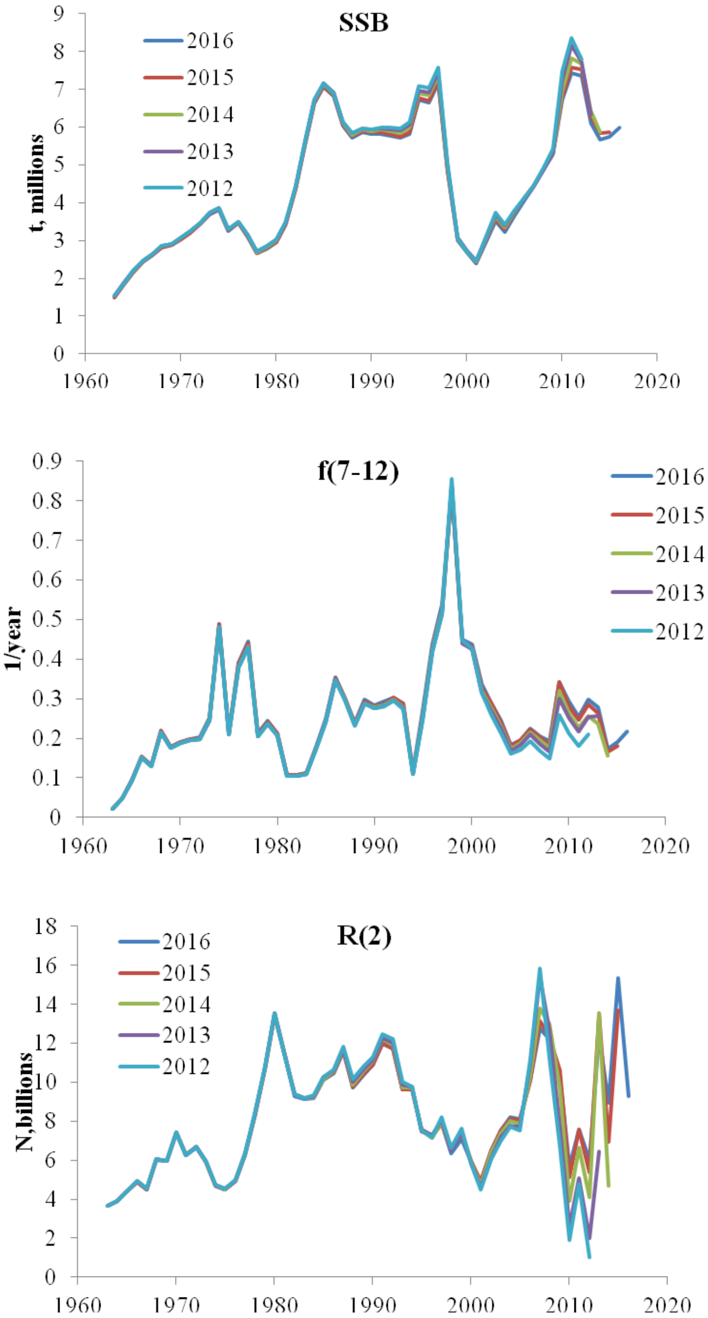


Figure 28. Retrospective analyses of SSB, F and age 2 recruitment in the SOO pollock assessment; after Varkentin and Ilyin (2017).

Another form of retrospective analysis is to compare the assessed biomass with that forecast two years ahead during the TAC advisory process. Varkentin and Ilyin (2017) reported that when terminal year estimates of SSB of the assessment in year t (e.g. 2017) are compared with the forecast in year t made two years earlier by the assessment in year t–2 (e.g. 2015), the assessed SSB estimate in year t, which included the additional model tuning information and changes, was higher than the forecast SSB estimate (
Figure 29). Varkentin and Ilyin (2017) consider that this indicates that forecasts on which TACs are based have been conservative.

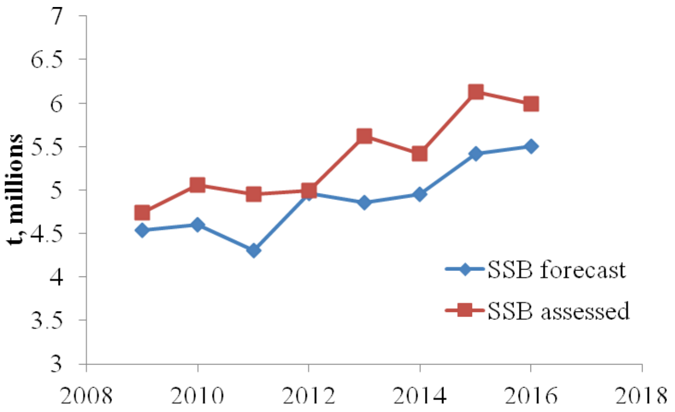


Figure 29. Current spawning stock data vs. forecast SSB for the same year; after Varkentin and Ilyin (2017).

Estimation of the uncertainty in historical estimates of stock and fishery dynamics has not changed since the evaluation of Intertek (2013) and, as noted above, involves non-parametric bootstrap sampling of the residuals associated with the catch at age and stock abundance indices (e.g. CPUE and survey indices), adding these to the model-predicted data and re-running the assessment with the 'new' input datasets. This process is conducted multiple times, allowing characterization of the uncertainty in the stock indicators (see Figure 5 and Figure 6 above for the uncertainty in historical SSB and F). Sharov (2016) reviewed the 2015 stock assessment model (Varkentin and Ilyin 2015), the same model used during the years 2009–2014 (see Peer Review section below) and noted that this characterization of uncertainty is one of the most frequent standard approaches used by stock assessment scientists although it should be interpreted as providing an approximation to the uncertainty associated with each output. Not all combinations of inputs are equally likely because biological parameters might be correlated and all runs are given equal weight while some might provide better fits to the data than others. Notwithstanding this fact, Sharov considered that the assessment does characterize the major sources of uncertainty, such as the uncertainty caused by measurement errors in input data, uncertainty in the model approximation of population dynamics, and uncertainty in the natural variability of the northern Sea of Okhotsk ecosystem.

Sharov (2016) therefore concluded that the assessment model used for the UoC fishery is satisfactory by current international best standards and appropriately takes the major uncertainties into consideration, such as that caused by measurement errors in input data as well as in model approximation of population dynamics and in the natural variability of the northern Sea of Okhotsk ecosystem. The methods used for uncertainty characterization were deemed similar to those used by stock assessment teams throughout the world. On that basis, the assessment team closed Condition 3 (on assessment uncertainty) during its third surveillance audit. Sharov (2016), however, made eight recommendations to improve the assessment model. The full response to these recommendations is provided in Appendix 1 of Varkentin and Ilyin (2017). In summary, Sharov recommended that the TINRO trawl survey index be disaggregated by age, a modification that was introduced in the most recent assessment. Sensitivity analyses of a number of stock dynamic processes were also recommended, and Varkentin and Ilyin (2017) respond that such an investigation, at least in respect of instantaneous rates of natural mortality and the shape of the selectivity curve, is planned for the next assessment (that for 2019). Sharov (2016) further recommended that the HCR be enhanced to include the estimation of $Pr(SSB<B_{MSY})$. The latter is now addressed through the 10-year projections associated with the HCR. Sharov also recommended that uncertainty in the SSB and F reference points be estimated, a task which will be undertaken in the next review of reference points. Two of the other recommendations (data weighting in the objective function and separate estimation of trawl and Danish fleet selectivity at age) were either not considered feasible at this time or had already been undertaken. The last two recommendations relate to the assessment software and are for future

consideration. Overall, therefore, it is considered that KamchatNIRO, the organisation responsible for the stock assessment modelling underpinning management of the pollock fishery, has considered and responded appropriately and fully to the recommendations of Sharov (2016).

Two alternative models have been explored since the evaluation made by Intertek (2013). Ilyin *et al*. (2016) describe a state-space model that uses the same suite of input data and stock dynamics assumptions as Varkentin and Ilyin (2017), but it includes process as well as observation error. Overall, the model indicates good agreement of stock and fishery indicators with the 2017 stock assessment model since the mid-1980s, but greater biomass prior to then. There is more certainty in stock dynamics since 1998 when a number of survey indices entered the model. Although the Ilyin *et al*. (2016) model has yet to be considered by the Russian peer-review process (PCA 2018), it is considered to have significant potential for future stock assessments of SOO pollock. Scientists from VNIRO also presented a TISVPA model (Vasilyev 2005) of the stock to a session of the Pollock Council in 2016. It was recommended that the model be fitted to the same simulated dataset as that used to test the current Synthesis model (see below), but this has yet to be undertaken. During the site visit, it was indicated that the Synthesis model will be used for the foreseeable future.

➢ *Stock assessment peer review*

The annual Russian scientific peer-review process starts with the preparation of the assessments by each institute (TINRO, KamchatNIRO, MagadanNIRO and SakhNIRO). The draft assessments are then reviewed at an annual meeting (early December at TINRO) of the Far Eastern Pollock Council. The Pollock Council (there are similar councils in place for crabs, flatfish, herring and salmon) is the first level in the TAC development and peer review/approval system. The Far Eastern Pollock Council was established in 1996 and all Far Eastern fishery research institutes are represented. Its members (currently 15) are the lead experts from each of the Far Eastern research institutes. The Council was set up to coordinate and provide recommendations on pollock stock assessment and management, and associated research in the Far Eastern basin. During its December meetings, the Pollock Council discusses the draft assessments and TAC advice for two years ahead. The data and analyses are discussed and a consensus on the TAC forecasts developed. Prior to the end of the following January, the draft assessments and projections are presented to the Scientific Council of each fishery research institute whose specialists participated in development of the forecast (in respect of northern Sea of Okhotsk pollock, the Councils of KamchatNIRO, TINRO and MagadanNIRO). If approved, the assessment and advice are provided to VNIRO, the all-Russian (central) research institute. Over a one-month period, experts examine the assessments and projected TACs, making recommendations to be incorporated into the assessments and TAC advice. In early March, an enlarged session of VNIRO's Scientific Council is held to discuss all TAC assessments. Following this, the resultant TACs are discussed both at a meeting of the Fishery Industry Council under the auspices of the Federal Fishery Agency and during public hearings one month later, which consider testimony from scientific and management agencies, fishing companies, individuals, NGOs and the media. Then, in late summer, as part of the independent Environmental Expert Review, non-FFA contracted scientists, academics and nature conservation organizations with ecological expertise review the TACs and assessments under the auspices of the Ministry of Natural Resources, which is independent of the FFA. TACs cannot be raised over the objections of these external experts. After that, the Federal Fishery Agency issues a Directive on TAC approval for the coming year. Throughout, it is the responsibility of the regional institute to agree to and approve any recommended changes. The overall process is complete by about the December after the assessment year and before the projected TAC year.

In addition to the annual assessment and TAC review process, an Inter-Institutional Working Group (IWG) has been established under the auspices of VNIRO with experts from the scientific organizations under the Federal Fishery Agency. The IWG's mandate is to test and verify the methods and models used in stock assessment and TAC development. IWG meetings are held on an annual basis. Information on the IWG seminars held during 2014–2016 (participants, agenda, final recommendations and resolutions) is available on the VNIRO website (in Russian: http://vniro.ru/ru/industry-seminar). In September 2015, the IWG reviewed and approved a preliminary list of recommended methods and models for stock assessment and TAC calculation for all aquatic living resources in Russia including TISVPA (VNIRO), Combi 0.3 (VNIRO), Synthesis (KamchatNIRO) as well as ASPIC from the NOAA Fisheries Toolbox, Version 3.1 software application package (USA). In October 2016, the IWG undertook an evaluation of the Synthesis model, during which simulated input datasets were assessed. The model was successful in reconstructing the simulated stock history (Varkentin and Ilyin 2017, PCA 2018). General information on the activities of the IWG is available on the VNIRO website (in Russian: http://vniro.ru/ru/interinstitutional-working-group).

Finally, as reported above, an independent review (Sharov 2016) of the 2015 Sea of Okhotsk stock assessment was commissioned by the PCA in response to the MSC assessment of Intertek (2013). The goals of the review were to

- evaluate the efficiency of the current harvesting strategy for Sea of Okhotsk pollock;
- evaluate the consistency in uncertainty consideration in stock assessment modelling and TAC forecasting for pollock in the northern Sea of Okhotsk;
- evaluate the consistency in the methods used for uncertainty consideration in stock assessment and TAC forecasting of pollock in the northern Sea of Okhotsk.

Although not considered the main thrust of his review, Sharov (2016) did include some recommendations for possible model modification or supplementation to improve *inter alia* the handling of model uncertainty. The findings and recommendations of that review are reported above.

3.6 Principle Two: Ecosystem Background

3.6.1 General Ecosystem Characteristics

The Sea of Okhotsk is a unique semi-closed ecosystem with a total area of 1.53 million km^2 that has been classified as one of the world's 62 Large Marine Ecosystems (LMEs). It is classified as "sub-polar", is subject seasonally to ice coverage, and is relatively shallow with an average depth of 891 m and a reported maximum depth of 3916 m. It is surprisingly productive and, based on the TACs for all its harvestable stocks, was estimated to be worth US$23.5 × 10^9 in 2014 with a total estimated value of ecosystem services per unit area delivering as much as US$294.4 × 10^9 annually. Any consideration of the SOO ecosystem in terms of its abundant commercial (exploited) species (i.e. mainly pollock) has therefore to recognise the semi-closed nature of the Sea and the complexity of the whole ecosystem including the other commercial species exploited and the relationships between the various stocks and the main components of the ecosystem (habitat, physical, chemical and biological oceanography, trophic structure).

The bathymetry of the SOO also plays an important role in the distribution of the fisheries, with the most productive areas in the shallower parts of the northern part and along the eastern side (the latter also referred to as West Kamchatka (Figure 30).

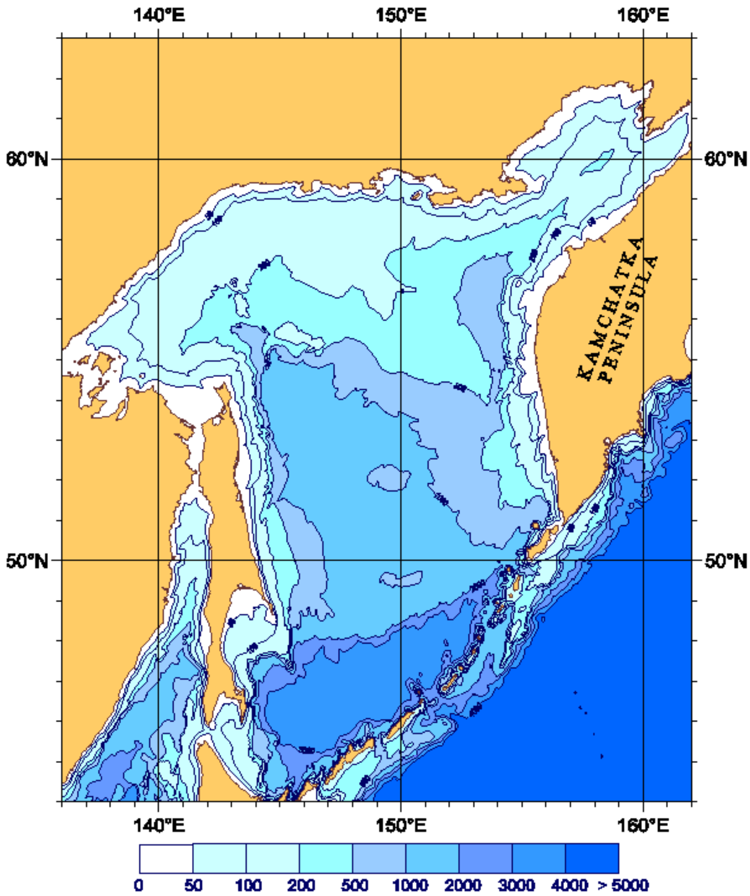


Figure 30. Bathymetry of the Sea of Okhotsk showing the deep central and Kuril basins and the productive shallower northern and eastern areas.

The central and southern part of the SOO (adjacent to the Kuril Islands) is deep, so it is the shallower areas of the Sea that are of most interest ecologically and in which the main part of the pollock fishery is prosecuted. The Kuril Straits allow for seasonal exchange of water from the Pacific Ocean, and large-scale circulation in the Sea of Okhotsk is cyclonic, with northward flow in the northeastern part, the West Kamchatka Current, and southward flow in the west, the East Sakhalin Current (Favorite *et al*. 1976).

In winter, the surface of the Sea of Okhotsk is covered entirely by ice. In spring, ice-melt combined with river run-off causes a shallow pycnocline (Sorokin and Sorokin 1999). The extent of the ice cover changes year on year and it influences not only the operations of the fishery but also the stock assessments that underpin management (Figure 31).

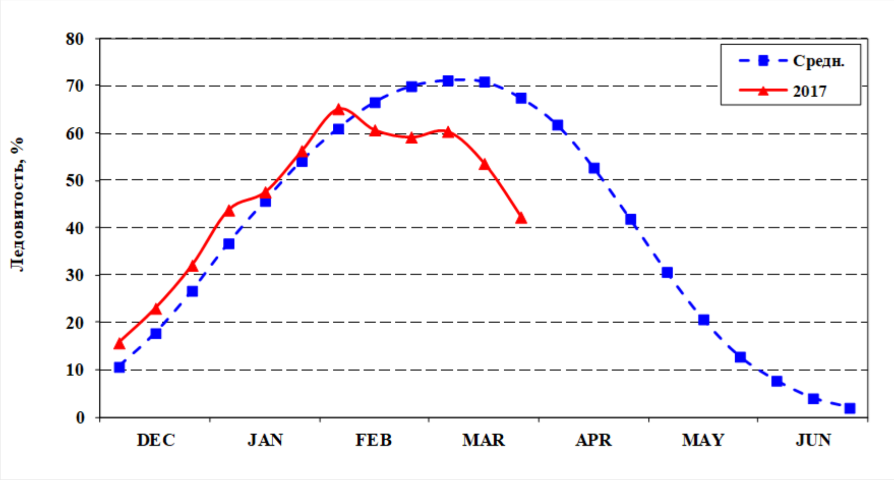


Figure 31. Seasonal distribution of ice cover relative to 2017 levels (up to April), as reported by Varkentin and Ilyin (2017).

Sea surface temperature (SST) also varies interannually (Varkentin and Ilyin 2017) – see Figure 32. Comprehensive ecosystem research is carried out in the whole of the SOO by various Russian research institutes, but focus is on the areas where the main fisheries are located, for example on the shelf west of the Kamchatka Peninsula and in the north.

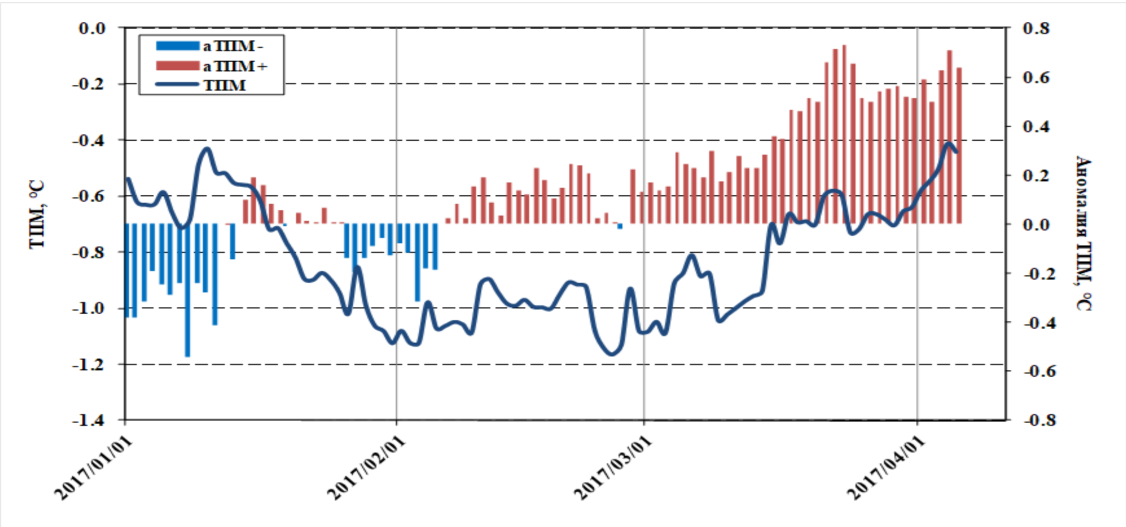


Figure 32. Temporal variation in sea surface temperature (SST) and its anomaly (aSST) in the northeastern part of the Sea of Okhotsk during the period January to early April 2017 (after Varkentin and Ilyin (2017).

The dominance of pollock in the Sea of Okhotsk ecosystem is significant in the context of this assessment. As pollock are essentially midwater species, the catching gear is designed and deployed to fish above the sea floor. For this reason, catches of non-target species need to be minimised. The gear would, however, be expected to impact other pelagic species such as herring.

3.6.2 Information available for Principle 2 evaluation

The ecosystem evaluation of the Sea of Okhotsk reported by Intertek (2013) showed that the general ecosystem characteristics are well understood (see Chernyavsky *et al*. 1981, Markina and Chernyavsky 1984, Kuznetsov *et al*. 1993, Iljinskiy and Gorbatenko 1994, Arzhanova and Zubarevich 1997, Dulepova 2002, Ishmukova 2004, Chuchukalo 2006, Dulepova and Merzlyakov 2007, Okunishi *et al*. 2007, Radchenko 2007, Labay and Kochnev 2008, Radchenko *et al*. 2010). Here, however, focus is on more recent work and particularly on the documentation used during surveillance audits carried out since first certification to close specific conditions set then.

PCA and TINRO have reported in detail at each surveillance audit on monitoring of the pollock fishery undertaken in the SOO. In the final (4th) surveillance report for the fishery (Acoura 2017), monitoring and related activities are listed, and they are reproduced here in Table 8 (PCA 2017d).

Table 8. Summary of pollock midwater trawl fishery monitoring undertaken in the 2016 and 2017 fishing seasons. Note: after PCA (2017d), reference to "stations"refers to the number of trawl locations at which observations were made.

Key indicators of observer and monitoring activities conducted in 2016–2017

	2016	2017	2017/2016
Number of observed hauls	769	1004	+27%
Weight measurements of pollock, individuals	67985	143906	+211%
Biological analysis of pollock, individual	2214	9122	+412%
Stations for observation of seabird and marine mammal	425	1440	+339%
Fishery coverage by fishing operations	4.2%	5.6%	+33%
Number of observers	13	18	+38.5%
Fishery coverage by vessels	7.6%	10%	+31.6%
Spatial and temporal scope of monitoring activities	70%	81%	+16%
Fishery coverage by catch volume	n/a	90%	-

Monitoring effort is directed systematically at midwater trawl operations in season A, when the bulk of the TAC is taken. Observer deployments are undertaken collaboratively between the various research organisations, primarily and overseen by TINRO.

As stated elsewhere in this report but repeated here for continuity of discussion, Smirnov *et al*. (2014) reported on the number of scientific observers active in the fishery up to 2014, analysing statistically the number required to obtain adequate independent coverage. They also updated their analysis annually and up to 2017 (Smirnov *et al*. 2017) – see Table 6 in Section 3.5 and Table 16 in Section 3.7.3. As many as 22 observers were deployed annually up to 2017 (note that 23 operated in 2018; see above) achieving a scientific coverage of up to 5.6% of fishing operations (this value excludes the mandatory Coastguard inspections). What is critical in this consideration from an MSC assessment perspective is that the fishery for pollock targets spawning aggregations and has minimal bycatch, i.e. the fishery is relatively "clean". The observer strategy for the fishery, so thoroughly quantified by Smirnov *et al.* (2014) in terms of necessary biological and directed sampling levels of the catch, identified the requirements for statistically robust sampling levels. Key sampling requirements include:

- sampling the target catch (pollock) for size distribution and biological parameters;
- sampling the bycatch, both retained and discarded;
- dedicated recording on specific trips but also since first certification routinely for ETP and other species on commercial operations by both fishing skippers and observers;
- changes to catch logs to incorporate observations on ETP species.

As also emphasized elsewhere in this report, the analysis of Smirnov *et al*. (2014) shows that operationally, because the pollock fleet works in groups of vessels targeting the same aggregations, the observer sampling levels achieved are both appropriate and adequate. Figure 33 shows the pattern of dedicated observer deployment to the midwater trawl fleet during season A of 2017, with observers moving systematically with the fleet as it effectively followed the movement of pollock aggregations north and into the different subzones of the SOO. Critically, however, and an issue addressed by the management of the fishery, is that the allocation of TAC between subzones is not fixed – the allocations for each subzone only approximate the historical catch levels in each zone (see Section 3.5 above for a comprehensive discussion of this issue). Fleet dynamics, seasonal ice cover and fish aggregating behaviour largely dictate the dynamics of the trawl operations (of all sizes of vessel operating, including UoC and non-UoC fleets, the latter including the Danish seine fleet operating on the shelf off the Kamchatka Peninsula). All vessels operating in the Sea are subject to independent scientific observation in terms of the sampling requirements bulleted above.

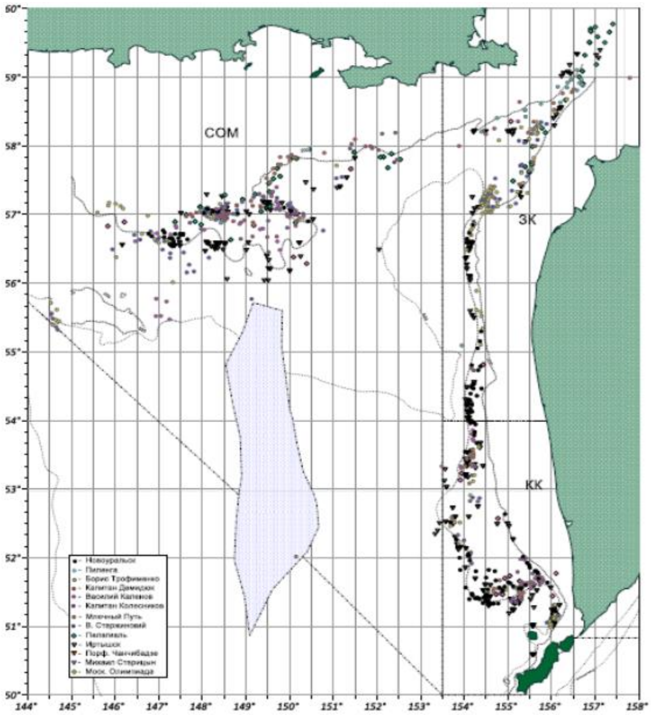


Figure 33. Example of the distribution of pollock-directed midwater trawls processed by observers deployed in the SOO between January and April 2017 (season A).

Typically, scientific observers operating in the Sea of Okhotsk work on board fishing vessels for an entire fishing season, covering season A (January–April) in the Kamchatka-Kuril (61.05.4), Western Kamchatka (61.05.2) and northern Sea of Okhotsk (61.05.1) subzones. The timing of observer deployments follows strictly the *Fishing Rules* (as amended up to 2017; Ministry of Agriculture 2017), with season A opening in January and lasting through to no later than 10 April, but dependent on catch and ice cover. Subzone coverage by observers has been reported at each surveillance audit, and Table 9 lists the deployments and summarized coverage for the 2017 season. (Overall annual observer coverage of the fishery since 2007 is listed in Table 6 in Section 3.5 above.)

As an example of the observation database available for the pollock fishery, including information collected other than just length, there is a long historical time-series of sampling by subzone available (see Table 7 in Section 3.5.4).

Comprehensive and detailed observer reports are prepared by each observer after each trip (in Russian, but translations of sample documents are readily made available). All Russian observers are well trained by the respective research institutes – unlike in many other observer programmes, the observers are mostly qualified researchers and students in the early parts of their careers. Sampling is therefore deemed to be of a very high quality.

Table 9. Scientific observer sampling in the SOO pollock fishery between 1 January and 9 April 2017 (after Smirnov *et al*. 2017).

Area	Surveyed water depths	Number of registered hauls	Object of study	Weight measurement, individuals	Biological analysis, individuals
North Sea of Okhotsk subzone (6105.1)	140-560	355	Pollock Others	70426 19995	2512 1034
West Kamchatka subzone (6105.2)	120-560	316 (4 Danish seine)	Pollock Others	40866 12604	1156 681
Kamchatka-Kuril subzone (6105.4)	155-760	331 (16 Danish seine)	Pollock Others	66599 2342	2066 198
TOTAL (including 20 Danish seine operations):		(1002)	Pollock Others	177891 34941	5734 1913

In addition to observer coverage, fleet operations are comprehensively overseen and monitored for compliance by FSB Coastguard inspectors (see Section 3.7 below). All at-sea transshipments are monitored by inspectors who move from vessel to vessel among the aggregated fleets (both mother vessels and “catchers”). Succinctly, Coastguard inspectors primarily monitor and sample for target catch, gear, discarding, proportions of juveniles, administrative compliance, etc, although increasingly report also on other elements of the harvesting, such as bycatch.

In summary, the data availability used for P2 evaluation takes into consideration “the impact of the fishery on all components in P2 including both unobserved and observed fishing mortality”, meeting the general requirements for P2.

3.6.3 Retained Species (bycatch)

Information on retained species is based mainly on Federal Security Service (FSB) Coastguard reports and daily catch logs completed by the vessel captain. The latter data are currently transmitted electronically to the Centre for Fisheries Monitoring and Communications (CFMC) daily by each vessel, where they are entered into a national database (as stated later in Section 3.7, a new electronic logbook system is currently under trial and scheduled for imminent implementation). Vessels are required by law to accept Coastguard inspectors on board, and all transshipments of pollock are inspected. Vessels can be inspected at any time, but is always done upon entering and departing fishing grounds and in ports. Based on the information provided during the surveillance visits to the FSB and FFA offices in Vladivostok and Petropavlovsk-Kamchatsky, the percentage of catcher/catcher-processor hauls inspected by the FSB system is comprehensive and provides little scope for misreporting. Transgressions in reporting, particularly relating to juvenile pollock catch and the application of the move-on rule (see Ministry of Agriculture 2017 for all the *Fishing Rules*), is rare (as discussed elsewhere in this report). The cross-referencing system between data systems and inspections suggests that there is little scope for misreporting of retained catches.

The FSB Coastguard conducts at-sea inspections including of all transshipments at sea, reviews documentation, checks VMS devices and gear, and inspects fish cargoes. A Fishery Monitoring System (FMS) has been implemented that integrates the available information at a centralized collection, storage and processing unit, and these electronic data are maintained on a Fishery Register to which the main management agencies have access (i.e. FFA, FSB and Customs). Overall, monitoring of the pollock fishery is tightly controlled, generating confidence in the catch estimates.

Separation of retained species from target catch relies on two sources of information – the actual landings reported for the fishery, and independent research and or observer reports. The dominance of pollock in the SOO fish community was already evident in the 1980s (Shuntov *et al*. 1993). For example, Radchenko *et al*. (2010) reported on the relative decadal proportions of the main fish species in the Sea. That analysis provides a historical perspective of the relative proportions that might be expected of pollock and other species in the Sea of Okhotsk. Radchenko *et al.* (2010) demonstrated that there had been changes in the proportions of the main fish groups in the SOO over time, but also stressed the dominance of pollock in the broader SOO ecosystem (
Figure 34). In the 1980s, total fish biomass in the Sea was likely >55 million tonnes, broadly separated between midwater (pollock) approximated at 15.6 million tonnes, demersal (groundfish) at 5.7 million tonnes, and other epipelagic fish at 2–3 million tonnes (
Figure 34). Also, up to the early 1990s, about a million tonnes of Pacific sardine were estimated to migrate annually into the SOO for summer feeding. Further, as shown in Figure 34, the relative proportion of pollock increased in the periods 1991–1995 and 1996–2005 from 57.5% to 80.2% while that of herring decreased in the same periods from 20.5% to 12.3%. Other gadoid fish (Pacific cod and saffron cod) also had a large biomass in the demersal fish community on the shelf. Among groundfish, grenadiers dominated, with a biomass of some 2 million tonnes, and small flatfish combined a total of 0.94 million tonnes. Pacific cod biomass reached highs of 660 000 t, saffron cod 200 000 t, Greenland turbot 570 000 t, eelpouts 430 000 t, skates 370 000 t, and the balance 570 000 t.

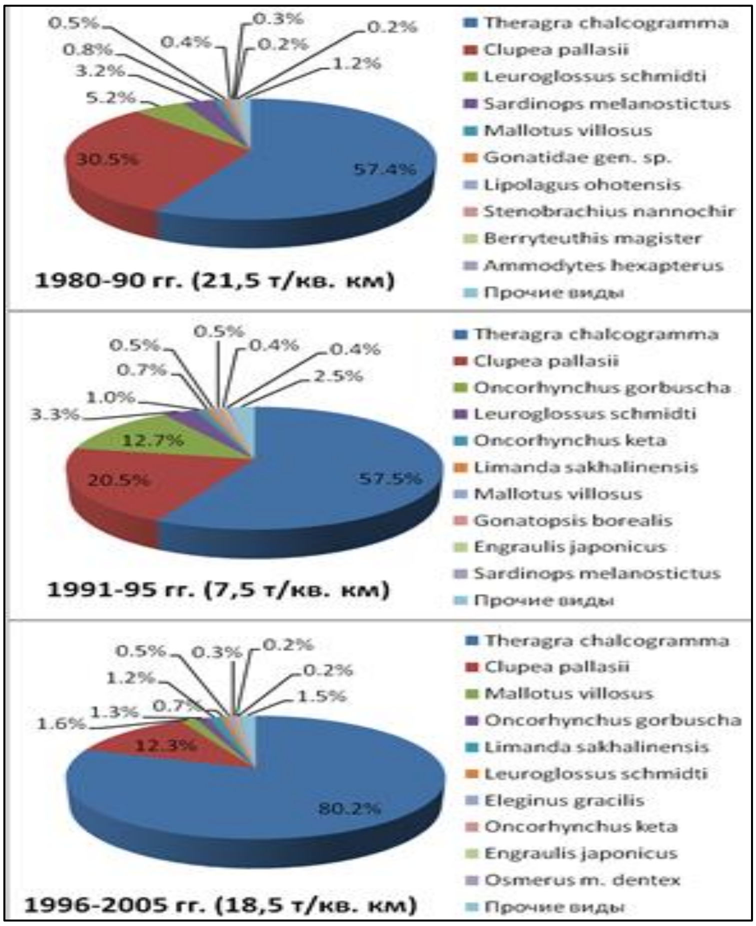


Figure 34. Quantitative composition of the epipelagic fish community in the Sea of Okhotsk in the 1980s, early 1990s and from 1996 to 2005 – after Radchenko *et al.* (2010).

The MSC requires retained species and bycatch to be separated in any analysis (under v.1.3 of the standard). The basis on which retained species, bycatch and ETP species are scored for the UoC SOO pollock fishery relies on both qualitative and quantitative information made readily available to the assessment team. Considerably more data on the non-target elements of the catch in the pollock-directed midwater trawl fishery are available than at the time of the first certification (as reported in Intertek 2013). The reasons for this are numerous, but suffice it to say that certification has created a heightened awareness of the non-target elements of the fishery, including all bycatch. Researchers at the various Russian research organisations as well as the FFA and FSB monitoring agencies systematically produced comprehensive "monitoring" reports at each surveillance audit (see Acoura 2015, 2016, 2017, for example). The sources of information used included:

- reported landings and species breakdowns (essentially the recorded retained species by the SOO pollock fleet) – these are quantitative data from 100% coverage of the fleet and have a high level of confidence based on the rigorous monitoring strategy demonstrated to the assessment team, i.e. 100% monitoring of transshipments and port landings, daily reporting of catches, cross-referencing with logbooks and DVRs submitted by the fishing fleet;
- observer data, since first certification significantly improved qualitatively and quantitatively, with a high level of quality assurance through the well-established and managed observer programme, good spatial and temporal coverage, as well as detailed modelling providing greater confidence in the robustness of the sampling design;
- qualitative data presented by TINRO and KamchatNiro scientists supported by quantitative information from observers and monitoring agencies – knowledge of the gear deployed by the fishery along with the history of research and experience of scientific staff shows that the fishery remains "clean" and that landings and observer samples are fully representative of the overall fishery.

This assessment of both retained species and bycatch is also guided by para 7.2.2 of FAM v. 2.1. In particular for P2 retained species, bycatch and ETP species, the following paragraph has relevance to this assessment:

"*Both SG60 and SG80 use the qualifier main retained species. 'Main' in this context is intended to allow consideration of the weight, value or vulnerability of species caught. For instance, a species that comprises less than 5% of the total catch by weight may normally be considered to be a minor species, i.e., not main', in the catch, unless it is of high value to the fisher or of particular vulnerability, or if the total catch of the fishery is large, in which case even 5% may be a considerable catch. On the other hand a species that normally comprises 20% or more of the total catch by weight would almost always be considered a main' retained species. Assessment Teams shall use their expert judgement to determine and justify in writing which species are considered main' and which are not*".

The Russian system of classifying commercial species applies to both Total Allowable Catch (TAC) and Possible Yield (or "catch", PY or PC). Permits are issued for species allocated as either TAC or PC as listed later in this report, in Table 12. These are the species for which permits are issued and are "potential" retained species. Discarded species (shown as N/C or non-commercial in
Table **13** later) are any other species not permitted to be landed. By way of an example, the retained catches in each subzone of actual retained catches for 2016 and 2017 are listed in

Table 10. The information listed is the TAC for each species, the total catch of that species (in all fisheries) and the proportion of that species caught in pollock-directed fisheries. The aggregate for the two years has been used to approximate the proportion of each species taken by the pollock-directed fisheries, i.e. their retained catches. The team notes that these proportions are similar to those reported in the initial MSC assessment (Intertek 2013), i.e. that there has been little or no change. Further, the total catch estimates for TAC and PY species as approximated by the observer sampling is shown in Table 12 (NB: 2017 data are used for the most recent monitoring reports for ease of presentation. Similar data were presented for 2016 and earlier reports, as well as in the original certification report, again with no noticeable differences in species proportions).

Table 10. Retained (landed) species in SOO subzones for the pollock fishery for 2016 and 2017, in tonnes. The allowable catch for these species in all fisheries and the proportions landed by the pollock fisheries is also shown.

	2016			2017			Aggregate 2016/17			
	TAC (t)	Catch all Fisheries	Pollock Reported Catch	TAC (t)	Catch all Fisheries	Pollock Reported Catch	TAC (t)	Catch all Fisheries	Pollock Reported Catch	Pollock Trawl Mean catch proportion %
Northern SOO : Sub-Zone 5.1										
Herring Clupea pallasii	266000	238845	11262	275000	214240	14398	270500	226543	12830	**4,74**
Cod G. macrocephalus	1517	287	0,483	1865	456	0,8	1691	372	0,6415	**0,04**
Greenland Halibat R. hippoglossoides	6900	5978	0,208	6900	5054	1	6900	5516	0,604	**0,01**
Pacific halibut H. stenolepis	54	4,8	0	54	0,5	0	54	3	0	**0,00**
Soles (all)	1977	2611	0,041	1977	2341	7	1977	2476	3,5205	**0,18**
Sculpins	53	59	0,008	53	39	1,4	53	49	0,704	**1,33**
Skates	2660	2487	4,5	1995	1646	2,5	2327,5	2067	3,5	**0,15**
Kamchat Kuril : Sub-Zone 5.4										
Herring Clupea pallasii	0	0	0,07	0	0,8	0,3	0	0	0,185	**0,00**
Cod G. macrocephalus	16400	10708	11	16400	11604	20	16400	11156	15,5	**0,09**
Greenland Halibat R. hippoglossoides	2270	1511	27	3100	1770	10	2685	1641	18,5	**0,69**
Pacific halibut H. stenolepis	173	160	0,237	209	200	0,6	191	180	0,4185	**0,22**
Soles (all)	29200	19572	65	27200	17580	27	28200	18576	46	**0,16**
Sculpins	5300	3280	81	7500	5004	8	6400	4142	44,5	**0,70**
Skates	1300	577	1,2	1300	769	1	1300	673	1,1	**0,08**
West Kamchatka : Sub-Zone 5.2										
Herring Clupea pallasii	68000	49753	77	88000	79140	2395	78000	64447	1236	**1,58**
Cod G. macrocephalus	9300	4058	3,9	7000	2982	8	8150	3520	5,95	**0,07**
Greenland Halibat R. hippoglossoides	3860	2890	2,7	2860	1432	1,2	3360	2161	1,95	**0,06**
Pacific halibut H. stenolepis	211	184	0,1	204	149	0,2	207,5	167	0,15	**0,07**
Soles (all)	21400	19077	2,8	20800	17285	5,6	21100	18181	4,2	**0,02**
Sculpins	2000	907	0,3	3000	3531	14	2500	2219	7,15	**0,29**
Skates	700	548	0,3	700	319	0	700	434	0,15	**0,02**
All Sea of Okhotsk (5.1, 5.2 & 5.4)										
Herring Clupea pallasii	334000	288598	11339,07	363000	293380,8	16793,3	348500	290989	14066,185	**4,04**
Cod G. macrocephalus	27217	15053	15,383	25265	15042	28,8	26241	15048	22,0915	**0,08**
Greenland Halibat R. hippoglossoides	13030	10379	29,908	12860	8256	12,2	12945	9318	21,054	**0,16**
Pacific halibut H. stenolepis	438	348,8	0,337	467	349,5	0,8	452,5	349	0,5685	**0,13**
Soles (all)	52577	41260	67,841	49977	37206	39,6	51277	39233	53,7205	**0,10**
Sculpins	7353	4246	81,308	10553	8574	23,4	8953	6410	52,354	**0,58**
Skates	4660	3612	6	3995	2734	3,5	4327,5	3173	4,75	**0,11**

There are established measures that support a strategy for mitigation of bycatch that are incorporated into the *Fishing Rules* (Ministry of Agriculture 2017). These include *inter alia*:

- if an incidental bycatch by a pollock-fishing vessel is large, the vessel is permitted to transfer/allocate the catch to an alternate rights-holder with allocation for that species;
- if bycatch is in excess of the TAC or PC, the management authority can enforce time–area closures to mitigate further excess bycatch;
- if bycatch exceeds 2% of the pollock catch in any one haul, the excess catch must be returned to the sea and a move-on rule applied such that the vessel has to relocate at least 5 miles from the area in which that bycatch was taken;
- multiple species quotas – vessels can have permits for species other than the target species, eliminating the need to apply mitigation as long as the allocation to the vessel for the PY species is not exceeded, i.e this is a precautionary catch limit;
- closed seasons applied to fishing outside of the periods 1 January to 31 March (Kamchatka–Kuril and West Kamchatka) and 1 January to 9 April (northern SOO).

- pollock-directed effort is mainly midwater trawling with nets of a minimum of 100 mm mesh, and no bottom trawling is allowed (the smaller Danish seine sector is the other pollock fishery in the SOO, but it is not part of the UoC);
- spatial management – there is a full or partial ban in some fishing zones, with trawling not permitted <30 miles offshore and 5–12 miles from islands;
- daily vessel records (DVRs) – vessel captains must keep records of bycatch and submit the records daily.

For the purposes of this certification assessment, although it is acknowledged that bycatch proportions in the midwater pollock-directed fishery are extremely low (<1% for all species reported except herring and sculpins specifically in subzone 5.1), it was noted that some of the other important commercial species are reported and discussed in the annual monitoring reports. Midwater trawls, because of their “off-the-bottom” operational design, rarely catch species living on or near the bottom. These species would include flatfish such as flounders, Greenland halibut and skates, as well as gadoids such as cod (of which there are various species). Squid are taken in midwater trawls, however. Salmon could also be a species of concern if taken as bycatch, but official records and observations at sea show that salmon species are taken in the West Bering Sea only and that they are rare in the SOO. Small proportions of some of these species are nevertheless listed in

Table 10 (retained) or also recorded in the samples taken by observers (see Table 12 below).

Based on both the retained species list (

Table 10 above) and the observer samples (Table 12 and
Table **13** below) as well as the lists of species presented in the successive surveillance audits (those underpinning the reports of Acoura 2015, 2016, 2017), it is clear that the only bycatch species of any significance that is retained is Pacific herring. Catches of herring nevertheless are still below the 5% threshold for definition as “Main”. They are made in pollock trawls only incidentally in subzones 5.2 and 5.4 and it is only in the northern SOO (5.1) that notable herring catches are made in pollock trawls. Herring catches are permitted by pollock midwater trawlers and the vessels are allocated permits to accommodate them. The herring fishery (with herring often categorised elsewhere as a lower trophic level species, LTL) is an important one and is entirely separate from the fishery for pollock shown in

Table 10. According to data provide by TINRO, herring bycatch in the midwater trawl pollock fishery in the northern SOO subzone was estimated at 14 400 t in 2017. All companies harvesting pollock have quotas and permits to retain herring, and such catches may be retained as long as the catch taken does not exceed 2% (as per the *Fishing Rules*; Ministry of Agriculture 2017).

Although catches of herring are less than the 5% threshold, the species is here considered to be a “main” species because of its economic importance and likely LTL status. Smirnov *et al*. (2016) note that herring belong to “two populations” (North Sea of Okhotsk and Gizhiga–Kamchatka [so-called Gizhidinsk herring]) so explaining the species’ “large percentage in the nekton of the northern part of the SOO”. The spatial distribution of herring catches in pollock trawls is illustrated in Figure 35 for fishing season A of 2017 (after Smirnov *et al*. 2017) and the historical TACs for the fishery up to 2016 in Table 11 (as well as the catches in

Table 10). In terms of reference points for herring management, these are shown in Figure 36. Succinctly, although northern SOO herring biomass dropped to B_{LIM} in the mid-1970s, since then it has fluctuated within the target range and has remained well above B_{LIM}, particularly in recent years.

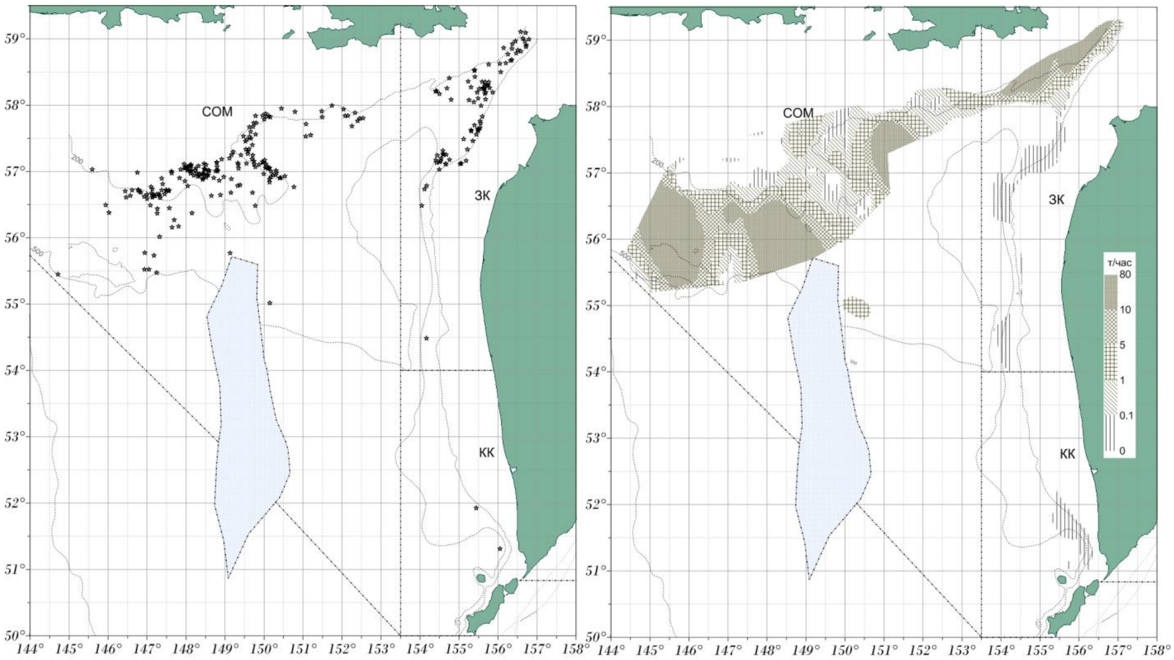


Figure 35. Herring spatial distribution and catches (per 1 hour of trawling) in the pollock fishery in Season "A" of 2017 (after Smirnov *et al*. 2017).

Table 11. Breakdown of allowable catches, 2001–2016, for Pacific herring in the SOO (after Smirnov *et al*. 2016).

Table 5.1.1

Okhotsk herring catch and TAC in 2001-2015 and recommended catch breakdown in 2016

Year	Catch, thsd tons				TAC, thsd tons	% of TAC use
	wintering and pre-spawning	spawning	feeding	total		
2001	49.7	19.3	120.7	189.7	238.0	79.7
2002	9.6	28.4	138.0	176.0	200.0	88.0
2003	41.5	22.5	88.2	152.2	163.0	93.4
2004	73.8	30.0	51.6	155.4	178.0	87.3
2005	99.2	18.2	71.6	189.0	189.0	100.0
2006	100.2	25.2	76.6	202.0	202.0	100.0
2007	66.3	15.2	82.5	164.0	164.0	100.0
2008	52.5	11.2	89.4	153.1	176.5	86.7
2009	46.9	9.0	123.5	179.4	211.0	85.0
2010	20.4	14.1	166.8	201.3	250.0	80.5
2011	127.8	12.1	137.7	277.6	285.0	97.4
2012	81.2	12.2	144.4	237.8	252.0	94.4
2013	95.9	6.0	135.5	237.4	258.0	92.0
2014	54.6	14.8	156.7	226.1	275.0	82.2
2015	73.2	11.5	159.2	243.9	270.0	90.3
2016	*65.0**	*25.0**	*176.0**	-	266.0	-
M***	66.2	16.6	116.2	199.0	220.8	90.5

Note:* - recommended catch breakdown in 2016;

** - mean for 2001-2015

A detailed account of the history and management measures for the herring fishery is provided in Smirnov *et al*. (2016, pp. 85–97) along with details of the stock assessments undertaken that incorporate herring bycatch in pollock-directed trawls (but see also Panfilov *et al*. 2017). The measures outlined include biological reference points, age structure, cohort analysis and spatial surveys to determine biomass, as well as closure of the fishery for certain periods to protect spawning and recruitment. According to TINRO data, herring bycatch in the midwater trawl pollock fishery in the northern SOO subzone is estimated to have been ~14 400 t in 2017. For the other herring stock (Gizhidinsk) in the West Kamchatka subzone (61.05.2), a TAC of 50 000 t was set in 2017, and TINRO estimate that the bycatch of herring in that subzone by the pollock fishery was 2400 t. It is concluded, therefore, that the catch of herring taken by the pollock fishery is both managed effectively and within biological limits.

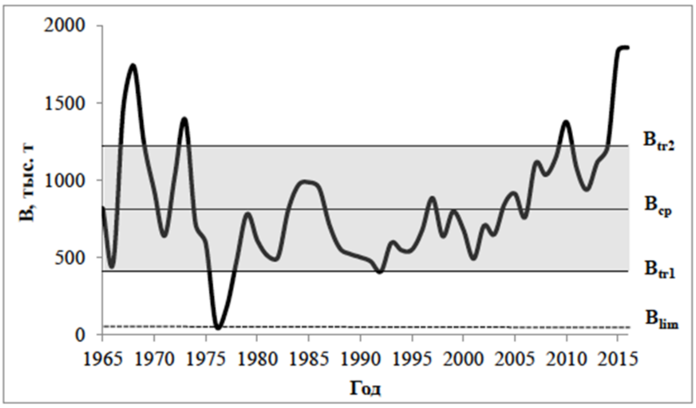


Figure 36. Status of herring in the northern SOO. The graphic (in Russian) reveals that the spawner biomass trend since the mid 1970s has been well above B_{LIM} and since the early 1990s also above the target reference points B_{TR1} and B_{TR1} (shaded area, with B_{CP} being the mean).

In terms of the bycatch of other retained species, or important other commercial species, Smirnov *et al*. (2016, 2017) provide an overview covering the key species (see also Table 12 for a full list of these species extracted from the monitoring reports). It includes the distribution of other bycatch species in the pollock fishery in season A of 2017 (by way of an example only). The species covered include Greenland halibut, flounder, lumpsucker, flathead sole, Kommander squid and cod, all of which are very minor bycatches in the pollock fishery, with insignificant volumes. In summary, all the information provided demonstrates that the proportions of retained bycatch in pollock trawls is consistent with that reported in the first assessment (Intertek 2013) and that there has been no noticeable change in retained species proportions in the intervening five years. The proportion of retained species in the pollock fishery when compared between declared catches and observer estimates indicates that, with the exception of Pacific herring, all retained catch is <2% of the directed (pollock) catch.

3.6.4 Bycatch Species (Discard)

Species other than retained catch (TAC and PY species, as listed in Table 12) form part of the detailed observer reports provided to the team. Bycatch species other than those of commercial interest are summarised in
Table **13**. These data represent the same dataset provided in Smirnov *et al.* (2017) separated between subzones. There are in all 91 minor species listed, of which the largest number is in the northern SOO (74). Of these, two species of lumpfish (*Eumicrotremus soldatovi* and *Aptocyclus ventricosus*) are caught the most frequently (but are not assessed under the IUCN). The armhook squid (*Berryteuthis magister)* is the third most frequently caught species in samples (IUCN classifies it as being of least concern) and the snailfish (*Careproctus rastrinus*) the fourth most frequent (again, it is not IUCN assessed) The species listed in

Table **13** are also similar to those listed by Smirnov *et al*. (2016) and comparable with the species proportions recorded in Intertek (2013). Collectively, the proportions of discard species (all minor) are very small or negligible (Table 12 and
Table **13**), and their near-negligible proportions recorded in pollock midwater trawls demonstrates that at such catch levels there would almost certainly be no serious or irreversible harm to them and that any biologically based limits set for them would not be likely to be exceeded.

Table 12. Observer samples providing a breakdown of retained species (TAC) and Possible Yield (PY) species and other discard species taken in the northern SOO between 1 January and 9 April 2017.

					All Areas	Catch Proportion (%) by Fishing Zone			
Species	**Fishery permit type**	**Frequency of occurrence (%)**	**Sample size (t)**	**Estimated catch Raised from observer percentage**	**Proportion (%) of catch (2017)**	**West Kamchatka (5.2)**	**Kamchat–Kuril (5.4)**	**Northern SOO (5.1)**	**MSC defined**
Gadus chalcogrammus (pollock)	TAC	99.87	12 660	276 400.00	98.217	98.830	99.950	95.870	Target
Clupea pallasii (herring)	TAC	39.40	285	5597.89	1.748	1.138	0.000	4.107	Main Ret.
Reinhardtius hippoglossoides (Greenland halibut)	TAC	17.00	0.147	4.08	0.001	0.001	0.004	0.000	Minor Ret.
Hippoglossoides robustus (halibut)	TAC	15.57	0.326	9.16	0.003	0.000	0.008	0.001	Minor Ret.
Gadus macrocephalus (cod)	TAC	13.03	0.393	9.76	0.004	0.004	0.007	0.000	Minor Ret.
Limanda aspera (sole)	TAC	7.60	0.154	2.67	0.001	0.002	0.000	0.000	Minor Ret.
Limanda sakhalinensis (sole)	TAC	3.60	0.028	0.57	0.000	0.000	0.000	0.000	Minor Ret.
Sebastes glaucus (rockfish)	TAC	3.40	0.017	0.32	0.000	0.000	0.000	0.000	Minor Ret.
Hippoglossus stenolepis (halibut)	TAC	1.70	0.016	0.41	0.000	0.000	0.000	0.000	Minor Ret.
Eleginus gracilis (Wachna cod)	TAC	1.65	0.005	0.11	0.000	0.000	0.000	0.000	Minor Ret.
Platichthys stellatus (flounder)	TAC	1.65	0.012	0.21	0.000	0.000	0.000	0.000	Minor Ret.

Species	Fishery permit type	Frequency of occurrence (%)	Sample size (t)	Estimated catch Raised from observer percentage	All Areas	Catch Proportion (%) by Fishing Zone			MSC defined
					Proportion (%) of catch (2017)	West Kamchatka (5.2)	Kamchat–Kuril (5.4)	Northern SOO (5.1)	
Glyptocephalus stelleri (flounder)	TAC	1.15	0.006	0.12	0.000	0.000	0.000	0.000	Minor Ret.
Lepidopsetta polyxistra (rock sole)	TAC	1.00	0.080	2.49	0.001	0.000	0.002	0.000	Minor Ret.
Pandalus borealis (Northern shrimp)	TAC	0.90	0.004	0.07	0.000	0.000	0.000	0.000	Minor Ret.
Oncorhynchus tschawytscha (Chinook salmon)	TAC	0.50	0.002	0.05	0.000	0.000	0.000	0.000	Minor Ret.
Pleuronectes quadrituberculatus (plaice)	TAC	0.50	0.001	0.01	0.000	0.000	0.000	0.000	Minor Ret.
*Oncorhynchus keta (*chum salmon*)*	TAC	0.45	0.003	0.07	0.000	0.000	0.000	0.000	Minor Ret.
Non-TAC species but with permit to catch (not retained)									
Hemilepidotus gilberti	PY	4.65	0.291	5.03	0.002	0.004	0.000	0.000	Minor
Bathyraja parmifera	PY	2.80	0.061	1.29	0.000	0.000	0.000	0.001	Minor
Lycodes soldatovi	PY	2.45	0.007	0.20	0.000	0.000	0.000	0.000	Minor
Myoxocephalus polyacanthocephalus	PY	2.27	0.025	0.62	0.000	0.000	0.000	0.000	Minor
Careproctus furcellus	PY	2.25	0.095	1.71	0.001	0.001	0.000	0.000	Minor
Gymnacanthus detrisus	PY	1.93	0.028	0.84	0.000	0.000	0.001	0.000	Minor
Myoxocephalus sp.	PY	1.80	0.010	0.17	0.000	0.000	0.000	0.000	Minor

Species	Fishery permit type	Frequency of occurrence (%)	Sample size (t)	Estimated catch Raised from observer percentage	All Areas	Catch Proportion (%) by Fishing Zone			MSC defined
					Proportion (%) of catch (2017)	West Kamchatka (5.2)	Kamchat–Kuril (5.4)	Northern SOO (5.1)	
Myoxocephalus stelleri	PY	1.60	0.007	0.22	0.000	0.000	0.000	0.000	Minor
Crystallichthys mirabilis	PY	1.20	0.016	0.27	0.000	0.000	0.000	0.000	Minor
Bathyraja aleutica	PY	1.10	0.010	0.33	0.000	0.000	0.000	0.000	Minor
Lycodes pectoralis	PY	1.10	0.005	0.15	0.000	0.000	0.000	0.000	Minor
Hemilepidotus jordani	PY	0.83	0.013	0.33	0.000	0.000	0.000	0.000	Minor
Bathyraja maculata	PY	0.65	0.012	0.28	0.000	0.000	0.000	0.000	Minor
Mallotus villosus	PY	0.60	0.002	0.04	0.000	0.000	0.000	0.000	Minor
Coryphaenoides longifilis	PY	0.50	0.002	0.07	0.000	0.000	0.000	0.000	Minor
Myoxocephalus jaok	PY	0.50	0.097	3.04	0.001	0.000	0.001	0.000	Minor
Lycodes palearis	PY	0.45	0.001	0.02	0.000	0.000	0.000	0.000	Minor
Lycodes brunneofasciatus	PY	0.40	0.002	0.04	0.000	0.000	0.000	0.000	Minor
Lycodes tanakai	PY	0.40	0.002	0.03	0.000	0.000	0.000	0.000	Minor

Table 13. Observer samples providing a breakdown of retained species (TAC) and Possible Yield (PY) species and other discard species taken in the northern SOO between 1 January and 9 April 2017.

Species	Permit	% occurrence in samples	Sample size (t)	Estimated catch raised from observer %	All Areas: Proportion of catch (2017)	Catch Proportion (%) by Fishing Zone: West Kamchatka (5.2)	Kamchat–Kuril (5.4)	Northern SOO (5.1)	MSC Cat.
Bycatch species discarded									
Eumicrotremus soldatovi	N/C	31.15	1.656	34.63	0.007	0.001	0.000	0.013	Minor
Aptocyclus ventricosus	N/C	27.67	0.693	15.91	0.006	0.005	0.008	0.004	Minor
Berryteuthis magister	N/C	15.33	0.285	8.00	0.003	0.001	0.007	0.000	Minor
Careproctus rastrinus	N/C	9.03	0.314	6.15	0.002	0.004	0.000	0.001	Minor
Bothrocarichthys microcephalus	N/C	8.63	0.046	1.14	0.000	0.000	0.001	0.000	Minor
Boreoteuthis borealis	N/C	6.50	0.050	1.19	0.000	0.000	0.000	0.000	Minor
Coryphaenoides cinereus	N/C	5.55	0.055	1.47	0.000	0.000	0.001	0.000	Minor
Cyanea capillata	N/C	5.10	0.060	1.19	0.000	0.000	0.000	0.000	Minor
Chrysaora melonaster	N/C	5.07	0.101	2.06	0.000	0.000	0.000	0.001	Minor
Hemilepidotus papilio	N/C	5.05	0.178	3.48	0.001	0.001	0.000	0.001	Minor
Lycogrammoides schmidti	N/C	4.35	0.016	0.41	0.000	0.000	0.000	0.000	Minor
Lycogrammoides nigrocaudatus	N/C	4.10	0.193	3.79	0.001	0.002	0.000	0.001	Minor
Albatrosia pectoralis	N/C	3.70	0.045	1.41	0.000	0.000	0.000	0.000	Minor
Alepisaurus ferox	N/C	3.70	0.043	1.34	0.000	0.000	0.000	0.000	Minor
Careproctus rosseofuscus	N/C	3.65	0.060	1.16	0.000	0.000	0.000	0.000	Minor
Bothrocara brunneus	N/C	3.40	0.068	1.69	0.000	0.000	0.001	0.000	Minor
Malacocottus zonurus	N/C	3.23	0.008	0.20	0.000	0.000	0.000	0.000	Minor

Species	Permit	% occurrence in samples	Sample size (t)	Estimated catch raised from observer %	All Areas	Catch Proportion (%) by Fishing Zone			MSC Cat.
					Proportion of catch (2017)	West Kamchatka (5.2)	Kamchat–Kuril (5.4)	Northern SOO (5.1)	
Bycatch species discarded									
Liparis ochotensis	N/C	2.97	0.043	0.85	0.000	0.000	0.000	0.000	Minor
Bothrocara zestum	N/C	2.33	0.070	1.69	0.000	0.000	0.001	0.001	Minor
Opisthoteuthis californiana	N/C	2.33	0.023	0.60	0.000	0.000	0.000	0.000	Minor
Hemitripterus villosus	N/C	2.20	0.033	0.66	0.000	0.000	0.000	0.000	Minor
Bothrocarina sp.	N/C	2.13	0.005	0.12	0.000	0.000	0.000	0.000	Minor
Lumpenella longirostris	N/C	2.07	0.002	0.04	0.000	0.000	0.000	0.000	Minor
Gonatus kamtschaticus	N/C	1.90	0.008	0.21	0.000	0.000	0.000	0.000	Minor
Lycodes concolor	N/C	1.90	0.010	0.25	0.000	0.000	0.000	0.000	Minor
Bothrocarichthys nigrocaudata	N/C	1.47	0.005	0.10	0.000	0.000	0.000	0.000	Minor
Careproctus colletti	N/C	1.37	0.022	0.46	0.000	0.000	0.000	0.000	Minor
Moroteuthis robusta	N/C	1.35	0.006	0.16	0.000	0.000	0.000	0.000	Minor
Aurelia aurita	N/C	1.20	0.003	0.05	0.000	0.000	0.000	0.000	Minor
Mallotus villosus	N/C	1.20	0.001	0.01	0.000	0.000	0.000	0.000	Minor
Phacellophora camtshchatica	N/C	1.20	0.007	0.15	0.000	0.000	0.000	0.000	Minor
Careproctus cypselurus	N/C	1.05	0.010	0.20	0.000	0.000	0.000	0.000	Minor
Careproctus sp.	N/C	0.75	0.003	0.07	0.000	0.000	0.000	0.000	Minor
Liparis sp.	N/C	0.75	0.003	0.07	0.000	0.000	0.000	0.000	Minor

					All Areas	Catch Proportion (%) by Fishing Zone			
Species	**Permit**	**% occurrence in samples**	**Sample size (t)**	**Estimated catch raised from observer %**	**Proportion of catch (2017)**	**West Kamchatka (5.2)**	**Kamchat–Kuril (5.4)**	**Northern SOO (5.1)**	**MSC Cat.**
Bycatch species discarded									
Grimpoteuthis albatrossi	N/C	0.73	0.004	0.09	0.000	0.000	0.000	0.000	Minor
Galiteuthis phyllura	N/C	0.70	0.042	1.11	0.000	0.000	0.000	0.000	Minor
Gonatopsis japonicus	N/C	0.70	0.002	0.04	0.000	0.000	0.000	0.000	Minor
Aurelia limbata	N/C	0.70	0.001	0.02	0.000	0.000	0.000	0.000	Minor
Percis japonicus	N/C	0.65	0.000	0.01	0.000	0.000	0.000	0.000	Minor
Lepidopsetta bilineata (juv.)	N/C	0.65	0.001	0.02	0.000	0.000	0.000	0.000	Minor
Careproctus macrodiscus	N/C	0.60	0.001	0.02	0.000	0.000	0.000	0.000	Minor
Myoxocephalus ochotensis	N/C	0.60	0.001	0.02	0.000	0.000	0.000	0.000	Minor
Sebastes borealis	N/C	0.60	0.002	0.04	0.000	0.000	0.000	0.000	Minor
Alepisauridae	N/C	0.50	0.007	0.23	0.000	0.000	0.000	0.000	Minor
Antimora microlepis	N/C	0.50	0.001	0.04	0.000	0.000	0.000	0.000	Minor
Bothrocara sp.	N/C	0.40	0.000	0.01	0.000	0.000	0.000	0.000	Minor
Lycogramma soldatovi	N/C	0.40	0.013	0.26	0.000	0.000	0.000	0.000	Minor
Lycogrammoides microcephalus	N/C	0.40	0.005	0.09	0.000	0.000	0.000	0.000	Minor
Scopelosaurus harryi	N/C	0.40	0.000	0.00	0.000	0.000	0.000	0.000	Minor
Careproctus cyclocephalus	N/C	0.35	0.000	0.00	0.000	0.000	0.000	0.000	Minor
Dasycottus setiger	N/C	0.35	0.000	0.01	0.000	0.000	0.000	0.000	Minor
Gonatus onyx	N/C	0.35	0.007	0.19	0.000	0.000	0.000	0.000	Minor

					All Areas	Catch Proportion (%) by Fishing Zone			
Species	**Permit**	**% occurrence in samples**	**Sample size (t)**	**Estimated catch raised from observer %**	**Proportion of catch (2017)**	**West Kamchatka (5.2)**	**Kamchat–Kuril (5.4)**	**Northern SOO (5.1)**	**MSC Cat.**
Bycatch species discarded									
Lycodes sp.	N/C	0.35	0.001	0.04	0.000	0.000	0.000	0.000	Minor
Sebastes alutus	N/C	0.35	0.001	0.02	0.000	0.000	0.000	0.000	Minor
Sebastolobus alascanus	N/C	0.35	0.000	0.01	0.000	0.000	0.000	0.000	Minor
			Species count :		**91**	**58**	**62**	**74**	

3.6.5 Endangered, Threatened and Protected Species

Intertek (2013) listed all the potential ETP species that might be impacted by the fishery at the time of the first certification. Considerable effort was then made post-certification to identify and assess the impacts of the fishery on ETP species. Defining ETP species under MSC (v. 1.3) documentation needs consideration of both national and international requirements, in particular Appendix 1 of the Convention on International Trade in Endangered Species (CITES). Russia is also an active member of the International Union for the Conservation of Nature and Natural Resources (IUCN), which also designates a Red List of Threatened Species (see http://www.iucnredlist.org/about/overview). Further, the Federation is a member of the International Whaling Commission (IWC), for which the key goal is the conservation of whale populations.

The main national (Russian) legislation is the Red Data Book of the Russian Federation (http://redbookrf.ru/) and the regional Red Books, e.g. for Kamchatsky (http://www.kamchatsky-krai.ru/geography/red-book-1/) and Primorsky. After first certification of the fishery, the PCA commissioned significant amounts of work to support meeting the certification conditions associated with two species in the SOO considered to be possibly of concern, viz. Steller sea lion (*Eumetopias jubatus*) and short-tailed albatross (*Phoebastria albatrus)*. The conditions associated with both these species were deemed satisfactorily closed during the surveillance audits (https://fisheries.msc.org/en/fisheries/russia-sea-of-okhotsk-pollock/@@assessments). However, the team notes that some (stakeholder) organisations remain concerned especially concerning the general conservation status of the Steller sea lion (e.g. see https://www.seafoodwatch.org/seafood-recommendation/).

Altogether there are some 19 sea mammals and 22 seabirds protected by international and Russian federal environmental laws – these have been succinctly described under work contracted by the PCA as part of their action plan, and the publications can be referenced at http://www.russianpollock.com/information/publications/ and http://www.russianpollock.com/ecosystem/protected-species.

In terms of the fishery under assessment and its impact on ETP species, it is important to separate pollock-directed gear types when assessing ETP species, in particular in this case the Danish seine (non-MSC) and midwater trawl (MSC-certified) gears. A further consideration is the area in which ETP species may be found: both the Western Bering Sea and Navarinsky areas (western Pacific) have pollock-directed fisheries, but the distribution of many of the ETP species found there do not generally overlap with that of the same species in the SOO. The Kuril Islands (east, on the Pacific side and west towards Sakhalin Island) are also expected to yield a greater incidence of ETP species, in particular marine mammals and seabirds, owing to their proximity to rookeries and nesting locations.

The midwater trawl fishery is prosecuted offshore of the Kamchatka Peninsula (noting that the Sakhalin subzone does not form part of the UoC). Further mitigation to reduce impacts of the fishery on ETP species is to some degree supported through closed seasons applied to fishing outside of the periods 1 January to 31 March (Kamchatka–Kuril and West Kamchatka) and 1 January to 9 April in the northern Sea of Okhotsk. Pollock-directed effort is also in midwater with nets of 100 mm mesh, and no bottom trawling is permitted. Additionally, spatial management measures include fishing zones that permit no trawling <30 nautical miles offshore and 5–12 miles from islands. The ice coverage that closes the fishery for large parts of the year also lessens the likelihood of there being interactions between ETP species and the midwater trawl fishery.

Several projects were specified by the client action plan of 2013 and undertaken to try and identify the fishery-specific impacts on ETP species, because this was an area identified as needing more information. In that regard, observers were rigorously trained to identify and record seabird and marine mammal interactions. The training was undertaken by professional Russian scientists in their particular fields of expertise, specifically by Yu. B. Artyukhin, Ornithology Laboratory Manager, Kamchatka Branch of the Pacific Institute of Geography, and V. N. Burkanov, Head of Research Group in the Laboratory of Higher Vertebrate Animal Ecology, Kamchatka Branch of the Pacific Institute of Geography. Reference works of relevance are those of Artyukhin (2015) for seabirds, and Kuzin (2016) and Burkanov *et al*. (2015) for marine mammals. Observer deployments on ETP species over the past three years are listed in Table 14.

Table 14. Observer coverage of seabirds and marine mammal bycatch and interaction in the SOO midwater trawl fishery for pollock (consolidated observer deployment data provided by PCA).

Year	Number of observers performing targeted seabird and marine mammal bycatch monitoring	Total number of fleet hauls	Number of hauls observed	Coverage (%)
2015	3	14 225	513	3.6
2016	8	18 841	425	2.3
2017	13	18 051	1 440	8.0

➢ *Marine Mammals*

Marine mammal species listed in Russian and international red data books are protected under the *Fishing Rules* Order 385 of 21 October 2013 as amended (Ministry of Agriculture 2017). It is also prohibited to capture or hunt the pelagic species of marine mammal listed in red data books. A complete list of potential ETP mammal species is shown in Table 15. Of the species listed, however, only Steller sea lion and Kuril habour seal *Phoca vitulina stejnegeriare* are listed as red data species (IUCN and Russian red data books). For Steller sea lion specifically, see also http://www.kamchatsky-krai.ru/geography/red-book-1/sivuch.htm.

Table 15. Marine mammals found in the Sea of Okhotsk that are listed in the IUCN and Russian red data books; after Kuzin (2016).

Species	Conservation status
Gray whale (Eschrichtius robustus)-Okhotsk-Korean population	Red Book of Russia – category 1, IUCN - CR
Bowhead whale (Balaena mysticetus)	Red Book of Russia - category 1, IUCN - EN
North Pacific right whale (Eubalena jap.)	Red Book of Russia - category 1, IUCN - EN
Fin whale (Balaenoptera physalus)	Red Book of Russia - category 2, IUCN - CN
Humpback whale (Megaptera novaeangliae)	Red Book of Russia - category 1, IUCN - LC
Blue whale (Balaenoptera musculus)	Red Book of Russia - category 1, IUCN - EN
Sperm whale (Physeter catodon)	Not listed on Red Book of Russia, IUCN - CR
Beluga (Delphinapterus leucas)	Not listed on Red Book of Russia, IUCN - VU
Killer whale (Orcinus orca)	Not listed on Red Book of Russia, IUCN – DD
Harbor porpoise (Phocoena phocoena)	Not listed on Red Book of Russia, IUCN - VU
Dall's porpoise (Phocoenoides dalli)	Not listed on Red Book of Russia, IUCN - CR
Risso's dolphin (Grampus griseus)	Red Book of Russia – category 4, IUCN - EN
Kuril harbor seal (Phoca vitulina stejnegeri)	Red Book of Russia (1996) – category – 3, IUCN - LC
Steller sea lion (Eumetopias jubatus)	Red Book of Russia – category 2, IUCN - EN

*Note. Six categories characterizing rarity of species are adopted in the Red Book of Russia: 0 – probably extinct; 1 – endangered; 2 – decreasing their abundance; 3 – rare; 4 – status not determined, 5 – being recovered and recovering.
The International Union for Conservation of Nature specifies 9 categories characterizing rarity of species: EX – extinct; EW – extinct in the wild; CR – critically endangered; EN – endangered; VU – vulnerable; NT – near threatened; LC – least concern; DD – data deficient; NE – not evaluated.

Commentary on potential and observed interactions between Steller sea lions and the pollock midwater trawl fishery in the SOO is given in Burkanov *et al*. (2015). Interactions are rare, probably because pollock midwater trawl gear is typically deployed far from rookeries and haulouts (

Figure 37). On three separate observer trips, though, Steller sea lions were commonly encountered (a count of 564). However, in terms of the species' interaction with fishing vessels during these trips, Burkanov *et al*. (2015) state that:

"The vast majority of MM species met in the pollock trawl fishery in the Sea of Okhotsk did not show any reaction to or noticeable interest in operating fishing vessels neither during fish catching nor fish processing. MM can be brought into two groups in terms of interaction with vessels engaged in pollock trawl fishing – species which are neutral or indifferent to pollock fishing and species which are dependent on it or somehow interacting with it ".

Steller sea lions (*Eumetopias jubatus*) were the most commonly encountered species of marine mammal during Burkanov's survey. The analysis of the results was largely inconclusive, however, confirming through both direct observation and skipper interviews that interactions with Steller sea lions were with animals attracted to fishing operations and feeding freely on waste. Mortality of sea lions did take place (four animals were captured in nets and released alive while one died), but it was not fully quantified or deemed significant enough to impact overall populations of the species. Further, Kuzin (2016) concluded that trophic effects on marine mammals (such as Steller sea lions), including changes in population structure, cannot be explained by the introduction of the pollock fishery as the main changes to the population took place prior to the fishery starting. He writes:

"*In general, abundance depressions observed in 1960s – 1970s among some pinniped species living in the Sea of Okhotsk cannot be explained by dependence on availability of food resources (Kuzin 2014), the more so by dependence on pollock stock status because commercial fishing for pollock in the Sea of Okhotsk was launched in 1963 and off East Sakhalin it was started in 1975 (Shuntov 1986).*"

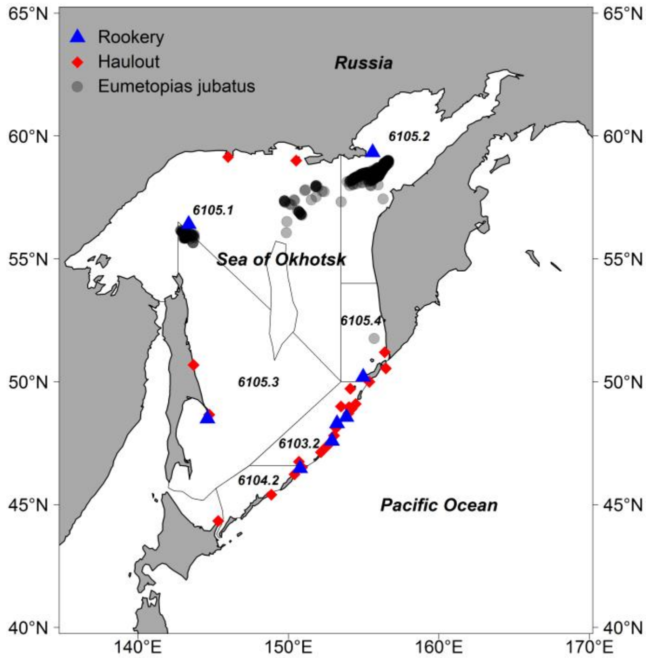


Figure 37. Locations where Steller sea lions were observed in the Sea of Okhotsk between January and April 2015 (season A of that fishing season). The intensity of the colour of the dots indicates

the frequency of encounters, so animals were observed more often at darker-coloured sites (after Burkanov *et al*. (2015).

In terms of the other red data ETP pinniped, the Kuril harbour seal, it can be stated with a high level of confidence that the fishery does not directly overlap with its distribution. For the other species of marine mammal occurring in the SOO, no mortalities were reported and indeed many of them were observed to take no interest in the fishing vessels or their activities. It is therefore assumed with a high level of confidence that the fishery does not significantly impact them.

➢ *Seabirds*

As with marine mammals, the PCA commissioned work to improve understanding of bird interactions with the fishery (Artyukhin 2015). Although all seabirds were assessed during the at-sea investigations, the primary species of focus was the short-tailed albatross, which is listed as endangered under both the Russian red data book and CITES Appendix I.

The work undertaken by Artyukhin (2015) represents a significant new study on the distribution of birds in the SOO, in particular relating to the pollock fishery. Whereas at the time of first certification, the observer reporting protocol did not allow for listing bird mortality or observations on seabirds and other species such as seals, the work undertaken to meet the conditions set on the fishery's certification has raised the awareness of bird–fishery interactions and stimulated the introduction of fresh observer sampling protocols for birds as well as the reporting in skipper logs, which was there at first certification but not always complied with in full. In the recent study (see http://www.russianpollock.com/information/publications/ for the paper in English), Artyukhin (2015) summarised:

"*According to shipboard counting data, average distribution density of all birds is 10.0 individuals/km^2. Auks (48%), procellariids (33%) and larids (19%) dominate in quantitative terms, while albatrosses and storm petrels account for less than one-tenth per cent of the winter population abundance".*

Compared with earlier observations made by Shuntov (1972, 1998a, 1998b), the total density of the avian population was at a similar level, i.e. no change, with some 10 individuals per km^2 on the shelf and continental slope waters being observed in the early 1960s. Changes have, however, occurred in the quantitative proportion of the main taxonomic groups: whereas auks (murres and auklets) dominated throughout the SOO in the past, they now generally maintain quantitative dominance but are "*inferior to procellariids (fulmar) and larids (mostly Larus genus) in fishing fleet concentration areas*".

Of the 1140 bird observations made in 2015, six dead fulmars were recorded. Artyukhin (2015) concludes that the most likely reason for the changes seen in avian abundance and distribution would be the steady decline in total and seasonal ice coverage of the Sea of Okhotsk over time. Also the use of vessels engaged in the pollock fishery provided an effective platform from which to study the effects of the fishery on seabirds as well as for the "*collection of baseline information about bird populations in fishing areas*". In other words, the results from the earlier studies had not benefitted from the availability of fishing vessels as platforms from which to make the observations underlying the analyses.

As in the previous certification report (Intertek 2013), no conclusions based on observer data can be drawn on either the distribution or the abundance of seabirds relative to fishing operations or on specifics related to short-tailed albatross, the focus species. A review undertaken at the time of first certification indicated that no mortality was likely (associated with the fishery), but that seabirds do concentrate in hotspots (e.g. at least 200 albatrosses or about 10% of the total population were observed within sight of a single fishing vessel) and therefore may be vulnerable to perturbations in those locations (Piatt *et al*. 2006). The Artyukhin (2015) study on vessels of the PCA sighted the short-tailed albatross only once (see Figure 38).

Summarising, Artyukhin (2015) concluded that only one of three northern Pacific albatross species was sighted during their dedicated study between January and April 2015, a Laysan albatross, a species known to aggregate regularly around fishing vessels in the southern part of the Kamchatka–Kuril subzone. Just one short-tailed albatross was sighted during the study, at the southern border of the Russian EEZ (Figure 38). As the species is obviously extremely rare and little is known about it, Artyukhin (2015) did go so far as to recommend that a broader spatial and temporal study of the species be undertaken in future, but such a recommendation is beyond the mandate of MSC to suggest.

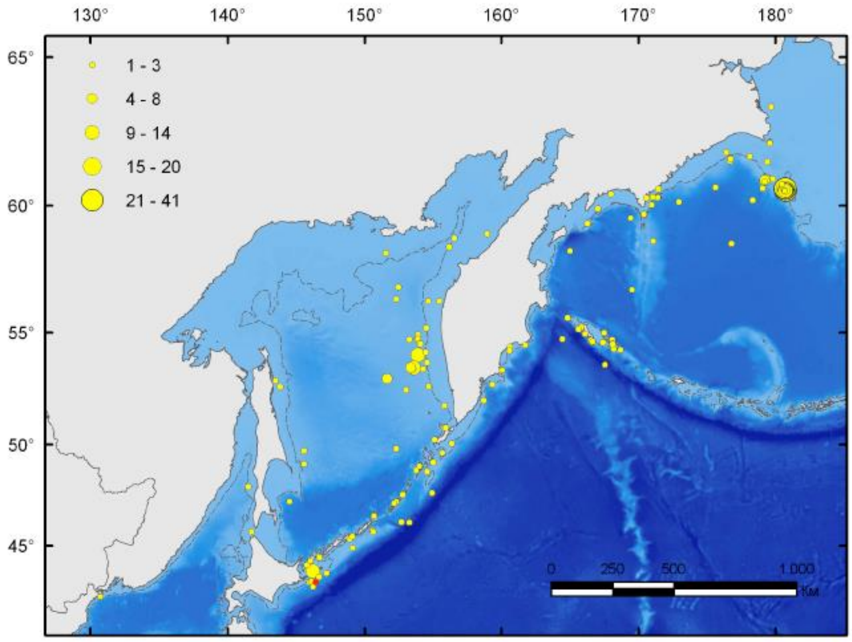


Figure 38. Distribution of short-tailed albatross (individuals) in Russian Far East seas, 1950–2014; the single red dot in the south Kuril Island area is the only sighting of the species and was made in April 2015; after Artyukhin (2015).

➢ *Other ETP species*

No other ETP species concerns were raised when conducting the assessment. Rare species such as sleeper sharks were not recorded (only one was noted in the previous certification report; Intertek 2013). Sea-otter distribution is localised and no impact is likely because of the offshore nature of the pollock fishery. The take of salmon in pollock midwater trawls is minimal and only a few specimens of chum and Chinook salmon have been reported in observer samples (see Table 17). Salmon catches would be more likely on the Bering Sea side of the Kamchatka Peninsula than in the SOO, where ice cover largely prevents the fishery from operating at times when greatest availability of salmon might be expected.

3.6.6 Habitat

As midwater gear does not make contact with the seabed, there is expected to be near-zero impact on bottom habitat. The fishery operates beyond 30 miles offshore and generally deeper than 200 m water depth. Although midwater trawl gear can theoretically fish very close to the seabed, the likelihood of contact is very low. Midwater gear is very expensive and no skipper would deliberately fish it on or very near the seabed, either to target alternative (bottom) species or the pollock that might be living on or very near the sea floor (Valdemarsen *et al*. 2007). The Danish seine fishery operates shallower than the midwater trawl and deploys a totally different gear, so is not relevant to this assessment. Valdemarsen *et al*. (2007), in their overview of trawling gear, report that whereas prior to 1990, (Alaskan) pollock was captured only with bottom trawling gear, concerns about the impacts on bycatch species resulted in a switch to “pelagic trawling”, which very soon proved to be as efficient as bottom trawling at catching the species. Therefore, the industry quickly adopted the fresh trawling technique, resulting soon in a bottom-trawl ban for North Pacific fisheries (a ban adopted also by Russian fleets).

Although the impacts of midwater trawl gear on benthic habitat are expected to be minimal, Russian research institutes do undertake both bottom and midwater trawl research surveys (
Figure 39). The bottom trawl surveys target bottom species such as cod, flounder and halibut in similar areas as the pollock fisheries. These other fisheries might suggest that cumulative impacts on bottom habitat might occur (with overlapping fisheries), although it is highly unlikely that the midwater gear contributes in any significant way to any impact.

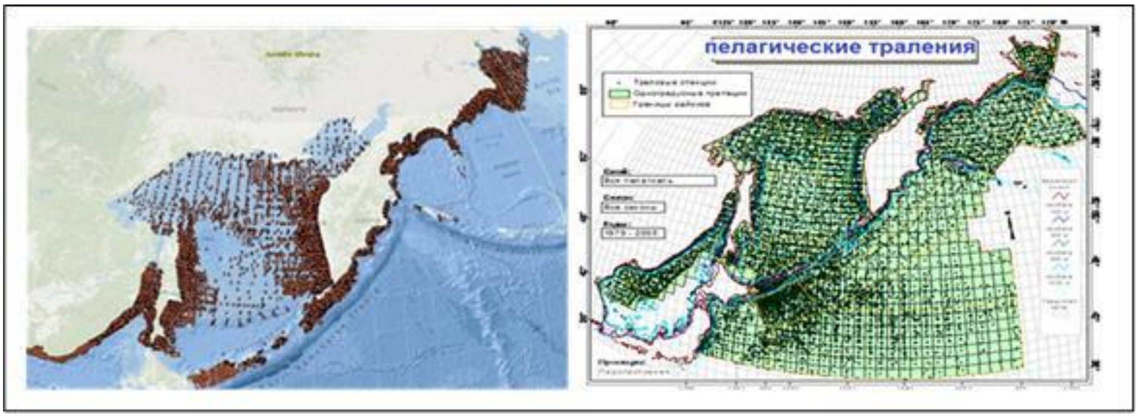


Figure 39. Comparative maps of cumulative bottom and midwater trawl surveys undertaken in the SOO; after Dulepova (2017).

Although the description of substratum type in the Sea of Okhotsk is somewhat dated (see
Figure 40), there are ongoing studies on benthic habitat aimed at understanding the ecology and monitoring any changes that may be occurring in the epifauna.

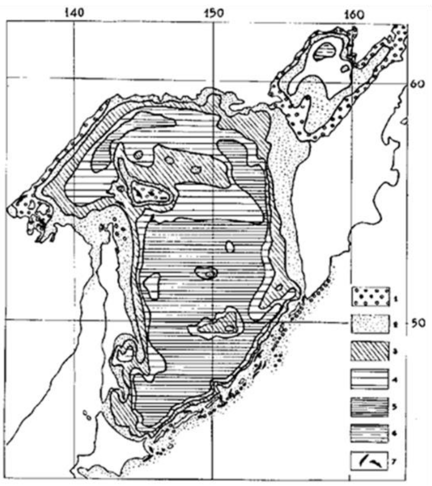


Figure 40. Bottom sediments of the SOO: 1, boulder-gravel-pebble; 2, sand; 3, silt; 4, silty-clayey diatom muds; 5, clayey diatom muds; 6, silty-clayey muds without silica; 7, rock outcrops; after Bezrukov (1960).

TINRO and other regional research institutes do undertake benthos-related research in specific areas, notably over the East Kamchtaka shelf. Much of the benthos-related research output relates to work undertaken in the mid-2000s, such as that reported by Dulepova (2017, based on the studies of Nadtochiy *et al*. 2007) during the fourth surveillance audit of the certified fishery (Figure 41).

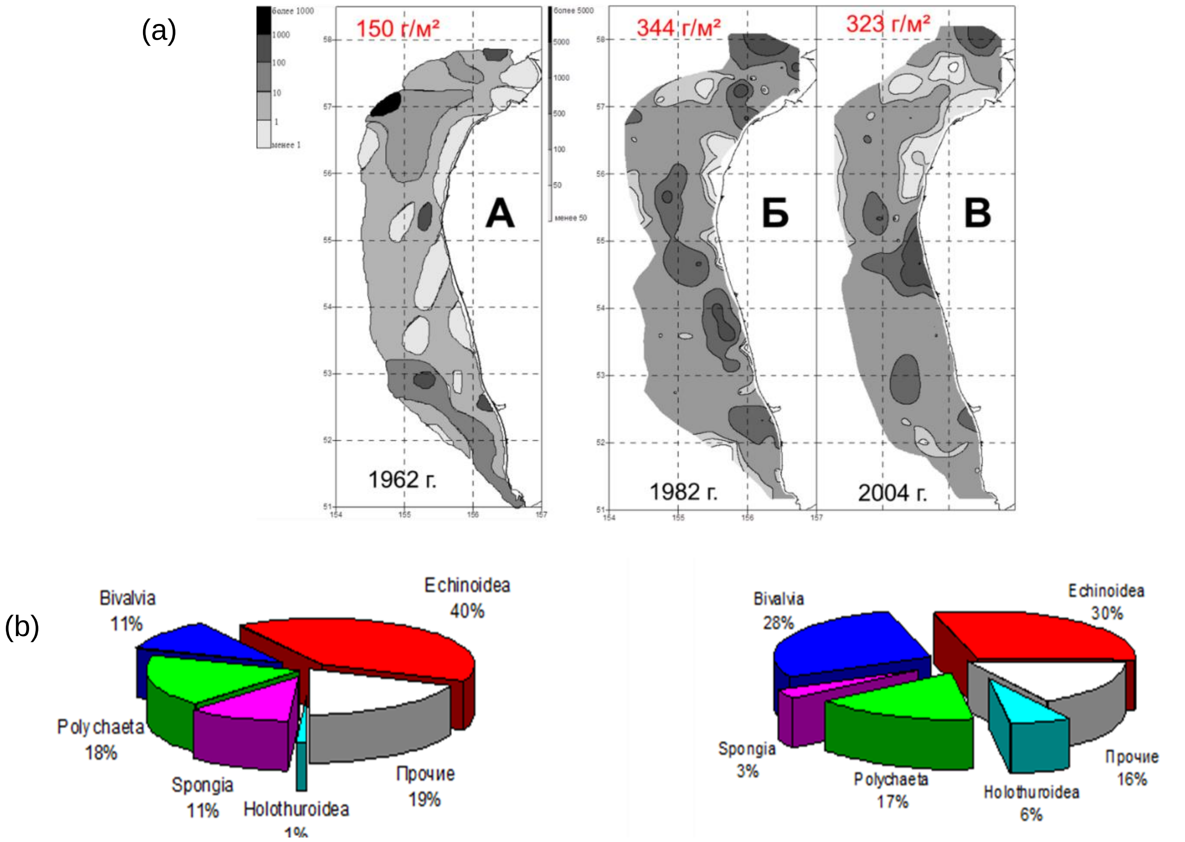


Figure 41. (a) Distribution of total biomass of benthos (g m^{-2}) on the shelf off Western Kamchatka in approximately 20-year cycles; after Dulepova (2017). (b) Ratio of the basic taxonomic groups of macrozoobenthos on the shelf off Western Kamchatka in different years (left, 1982; right, 2004 right); after Nadtochiy *et al*. (2007) and Dulepova (2017).

Over a period of about 20 years, there were reported to be no significant changes in bottom fauna (Shuntov 2001, Dulepova 2002). Those authors also reported that the benthic fauna was dominated by predatory polychaetes (30%). The results of that research are largely inconclusive, or at least suggest that no major habitat changes are taking place (see also the Sea of Okhotsk LME review conducted by Heileman and Belkin 2009). Russian researchers are also investigating the distribution of rare species used as indicators of vulnerable marine ecosystems (VMEs). This work includes gorgonarians (*Gersemia rubiformis*) and representative species of the family Alcyonacea (
Figure 42).

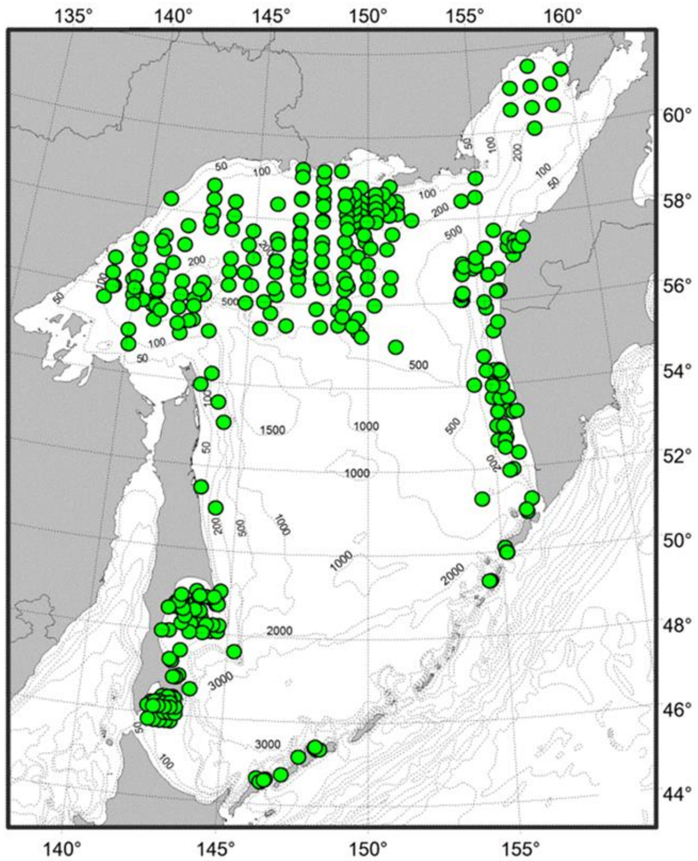


Figure 42. Distribution of VME indicator species in the Sea of Okhotsk according to trawl surveys (1963–2013): representatives of the Alcyonacea; after Dulepova (2017).

3.6.7 Ecosystem

Ecosystem research in the Sea of Okhotsk is undertaken mainly by TINRO, and to a lesser extent by KamchatNiro and MagadanNIRO. Much of the research on the SOO (and in Russian Far East waters) has been undertaken by Nadtochiy and Dulepova and their colleagues at TINRO in Vladivostok. Dulepova (2017a, 2017b) reports that historical ecosystem-based research includes some 500 research cruises, 22 000 plankton stations, 30 000 midwater tows, 35 000 bottom tows, plus stomach content analysis of some 700 000 fish. The research is typically undertaken on directed biomass and other surveys covering most of the Sea of Okhotsk (Figure 43). The seasonal ice coverage of the Sea dictates not only the nature and frequency of research undertaken, but also the opening and closing of the fishery and the distribution of many species in the system.

Comparatively, the surveys have shown for example that the number of fish species found in the Sea of Okhotsk (435) is greater than the number reported for the northwestern Bering Sea (318), but lower than the number found off the Kuril Island chain in the southwestern Bering Sea (493; Figure 43). Dulepova (2017b) also reports that the main commercial stocks (pollock, herring, capelin and salmon) are the species that dominate the biocoenosis in the SOO, emphasizing the trophic importance of, for example, the pollock fishery and the relatively limited contributions to energy flow there of other minor species.

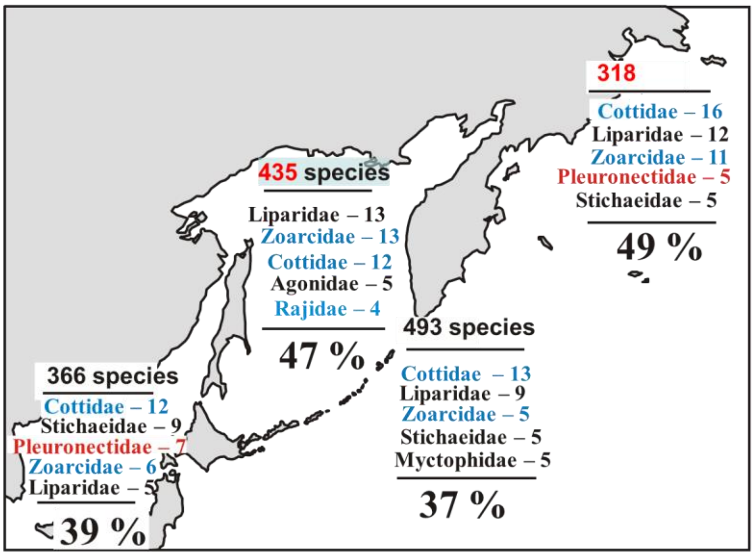


Figure 43. Comparative number of fish species found between main ocean areas adjacent to the SOO; after Dulepova (2017b).

According to Melnik *et al.* (undated), research has demonstrated that most observed changes in pelagic communities of large ecosystems are the results of natural climatic (and other) perturbations. In particular, in the SOO, the three main "strategic" species are pollock, Pacific herring and sardine (Shuntov *et al*. 1993). Climate is considered the primary force driving the SOO ecosystem, with intensive fishing as a secondary driving force (Heileman and Belkin 2010). The Sea of Okhotsk is nevertheless considered to be a highly productive system and the most productive area in the northwestern Pacific (450 gC m^{-2}; Shuntov and Dulepova 1996). Heileman and Belkin (2010) are of the view that the SOO is a "moderately productive" ecosystem, producing 150–300 gC m^{-2} $year^{-1}$. Areas of greatest primary productivity are in the northern and eastern parts of the SOO (adjacent to the Kamchatka Peninsula). The high level of biological productivity in the Sea of Okhotsk is fuelled by nutrients that enrich the surface layer during the period of intensive vertical mixing in autumn and winter; those nutrients are almost completely used up by phytoplankton during the spring bloom. Production continues through the summer through nutrient recycling and upwelling.

Within epipelagic fish communities, pollock plays a central ecological role in the Sea of Okhotsk (Shuntov *et al.* 1993). One manifestation of this is the apparent inverse relationship between the abundance of pollock and herring, suggesting competition for plankton (Shuntov *et al*. 1993). The impact of the removal of pollock from the SOO system is, however, still poorly understood, although trophic modelling has been attempted (Lapko and Radchenko 2000, Aydin *et al.* 2002), recently by Kulik (2017). The exploratory trophic modelling currently in process (Kulik 2017) is providing a way forward to improving overall understanding of the SOO ecosystem and the role played by the dominant species (pollock and herring). Earlier studies reported at first certification of the fishery (Intertek 2013) included estimation of the size and composition of the food consumption by the pollock stock (Shuntov *et al*. 1993, Chuchukalo 2006). The results of those studies underscore the dominant role played by pollock in the ecosystems in which they are found. Although pollock are major consumers, they are also food for a number of predators in the Sea of Okhotsk, including other pollock (cannibalism), other fish and marine mammals (mainly Steller sea lions and northern fur seals). During the 1980s, predators accounted for an estimated 58–78% of the annual take of pollock from the Sea, whereas the fishery accounted for some 22–42% (Shuntov *et al*. 1993).

Estimating the cumulative impacts of multiple fisheries in the Sea of Okhotsk is also an ongoing exercise, most notably by Nadtochiy *et al.* (2007) and currently by Kulik (2017). It is evident that measures have been implemented to protect sensitive parts of the SOO ecosystem. This has been accomplished primarily through implementation of fishing regulations restricting pollock and other fisheries in specific ways. For the Russian Far East Basin, Jamieson *et al*. (2010) reported:

"*The Fishery Rules have established 54 permanent and three seasonal area closures for commercial fisheries for all species: three closures are for trawls, one is for bottom gillnets, and others are for all gears for vessels whose total length is greater than 24 m. There are exceptions for shorter fishery vessels conducting coastal fisheries, and four which exempt Pacific salmon and kelp harvesting. There are additional area closures for some species: e.g., nine for walleye pollock, two for holothurians, and one or two for each of the eight crab species. Many of these limitations protect marine mammals' rockeries and the forage grounds around them, as well as some valuable bottom biotopes which are protected from the negative influence of the bottom trawl fishery*.

As reported at first certification (Intertek 2013), the *Fishing Rules* have established 44 seasonal fishery closures that deal with 20 species and groups of fishery targets. Most of the closed areas protect spawning and early development of commercial species. Other closures are efforts to restrict large-scale fisheries to the most profitable period (the times with the greatest rates of catch per unit effort) to reduce the total effect of a fleet presence on ecosystems. When a fishery quota is realized in the shortest time-period, the fleet's environmental impact, attributable to its discarding, noise and waste, on the marine ecosystem also manifests itself over a shorter time. This aspect would also include other potential unintended impacts related to fishery operations, such as loss of fishing gear, as well as pollution from discharges of oil and other waste products from the vessels. The larger pollock vessels carry reduction facilities for processing of waste (into fishmeal), thereby reducing the discharge of processed fish waste. Russia is a full member of MARPOL and skippers and vessel operators are obliged to minimise oil spills and to follow all waste discharge mitigation requirements set by MARPOL, including discharge of both organic and inorganic wastes in prescribed areas and at specified distances from the coast. Loss of midwater trawl gear is rare because the gear is fished off the seabed, so fouling of the net is very unlikely to happen.

3.7 Principle Three: Management System Background

3.7.1 General Overview

Within the management framework for Russian fisheries, the organizational structure has well-defined roles and responsibilities, and it is under this system that the Russian pollock fisheries in both the Sea of Okhotsk (SOO) and the Western Bering Sea (WBS) are managed. However, only the SOO fishery is the subject of this certification.

The fishery in the SOO is not classified as part of a straddling or a shared stock, and there is little evidence, genetic or otherwise, of any interaction/inter-migration with the small stocks of pollock adjacent to but outside the SOO. Also, although some 20% of the TAC of the stock is taken annually by non-UoC fishers, much of it using the same midwater trawl gear and some alongside the fleet seeking recertification, a small part is caught generally inshore by other fishers, some of which use a different gear, e.g. Danish seine. All such harvests from the stock are monitored, recorded and fully accounted for in the catch record, however, so management of the SOO stock referred to later is for the entire area of the partially enclosed Sea and its annual catches of pollock.

Succinctly, management of pollock fisheries in Russia is according to a clearly articulated long-term plan for the resource overseen by a single coordinating agency, the Federal Fisheries Agency (FFA), which operates with executive power under the Ministry of Agriculture and manages five regional offices in the Russian Far East. The Centre for Fisheries Monitoring and Communications (CFMC) falls under the auspices of the FFA, and for pollock (in the SOO and elsewhere), its regional operational office is in Petropavlovsk-Kamchatsky (P-K). The CFMC integrates all fishery information in a modern and transparent system, allowing for centralized collection, storage and processing of data on the quanta of aquatic biological resources (ABRs) harvested, processed, transshipped, transported and landed by individual fishing vessels. Reporting of data and information to the Centre is at least daily, but at the time of the site visit, Russian authorities were actively phasing out the Argos Vessel Monitoring System (VMS) underpinning the tracking and reporting system in favour of the internationally accepted alternative Inmarsat system. Simultaneously, Russia is developing its own comprehensive "Gonets" satellite tracking system, which they expect in time to replace the other systems on all Russian vessels, to be able also to interface too with an electronic logbook system that is in advanced form of development.

There is also a network of fishery institutes in Russia that conduct scientific surveys and carry out appropriate research and monitoring to underpin the basic advice for management. The scientific function is coordinated by VNIRO (the All-Russian Institute for Fishery and Oceanography, Moscow) and the FFA, but surveys and research on the pollock fisheries are carried out on an autonomous, scientific and objective basis through the regional expert centres (primarily TINRO, Vladivostok, and KamchatNIRO, P-K, for the SOO, plus to a lesser extent SakhNIRO and MagadanNIRO). These centres coordinate their activities between themselves, and VNIRO oversees the process federally.

Enforcement of fishery laws and regulations is the responsibility of the Federal Security Service (FSB), whose Coastguard conducts inspections and issues violation notices in the case of non-compliance. At sea, the Coastguard inspects all transshipments, checks documentation and VMS devices, inspects fish cargoes and generally observes fishery operations. The service also conducts port control inspections, tracks vessel locations and fishing effort and provides up-to-date fishery operational information to the other management agencies.

More detail about these agencies and centres is provided in the following sections, but overall, it is worth noting that there are many opportunities for expert or interested public participation in aspects of fishery management. Indeed, the Federal Law "On fisheries…" dictates that all citizens, public organizations and associations have a right to participate in the decision-making process. For that participation to be realised, there is a multi-level system of public (community) and regional scientific fishery councils that provides opportunities for those wishing to do so to participate in and influence decision-making as well as the regulations governing the fishery. The four levels are Regulatory (public chamber and Regulatory Impact Assessment), Federal (the FFA Public Council), Fishery (Far Eastern Scientific and Technical Council, DVNPS) and Regional (e.g. Kamchatka and Primorsky entities of the Russian Federation). There are also several fisher associations and unions regionally, and for Sea of Okhotsk (and Western Bering Sea) pollock, the Pollock Catchers Association (PCA), the client for the UoC fishery, was established in 2006 to provide private industry leadership and advocacy for responsible self-governance and compliance with fishery regulations on behalf of the pollock fishery. Through a process of rationalisation, PCA membership has shrunk from 45 fishing companies at first certification in 2013 to 31 companies in 2017 that together held some 70% of the total pollock catch allocation in Russia, and as stated above, >80% of the SOO pollock TAC.

There are no subsidies available to the Russian pollock fishery. The fishery is therefore based on maintaining a commercially viable industry, managed through licenses to fish on quota granted for the long term, and with punitive sanctions (including exclusion from the fishery, with active quotas and licenses then being offered publicly to others) being applied to those who breach fishing rules or persistently offend on any aspect of fishery management.

3.7.2 The Legislative Framework

Russia's overall legal and policy framework supports the development of sustainable fisheries. State policy is implemented by means of statutory and regulatory support to the fishing industry, which is given nationwide and takes into account international law in the sphere of fisheries and resource conservation. Hisorically, however, the international law link was not so obvious. Hønneland (2004) noted that the Russian Parliament worked on the Fisheries Act during the post-Soviet period 1992–2004, corroborating and rejecting a number of propositions until approval, and although domestic concerns were considered, international obligations were not an obvious consideration. Notwithstanding, the current governance structure is now based on a series of inter-linked laws, decrees, orders and rules consistent with local, national and international mandates, empowering national and regional bodies to propose, implement and enforce the laws and rules related to (international-law-based) fishery management.

The fundamental statutory act determining the basics of fisheries management, including pollock fisheries, is the revised Federal law "*On fisheries and aquatic biological resources conservation*" (No. 166-FZ dated 20 December 2014), which sets out the fundamental principles of fisheries statutory regulation. Resource conservation and sustainable use are therefore prioritized legislatively in terms of fisheries and their management. More than 30 legal acts of the Government of the Russian Federation regulate fishing industry operations, and notably they include:

No. 52-FZ "*On Fauna*" dated 24 April 1995 (general considerations on fauna);
No. 191-FZ "*On the Exclusive Economic Zone of the Russian Federation*" dated 17 December 1998, covering the principles of sustainable use and conservation of shared resources and straddling fish species, including anadromous, catadromous, wide-ranging fish species and marine mammals;
No. 155-FZ **"***On the Internal Sea Waters, Territorial Sea and Contiguous Zone of the Russian Federation*" dated 31 July 1998, Chapter 5 of which is devoted to protection and conservation of the marine environment and natural resources of internal seawaters and the territorial sea;
No. 187-FZ "*On the Continental Shelf of the Russian Federation*" dated 30 November 1995, Chapter 3 of which addresses the study and utilisation of marine living resources;
No. 174-FZ "*On Ecological Expertise*" dated 23 November 1995, which regulates the procedure for State-ensured ecological appraisal of all activities that can affect the status of the marine environment and the natural resources of the sea and internal waters, including the collection of information to support determination of allowable catches of ABRs (aquatic biological resources).

Legislation on ABRs also covers regional regulation adopted at the level of Russia's territorial entities, but the overarching legislation is the federal legal acts, including those addressing coastal fisheries, the allocation of fishing grounds, and quotas to catch resources by indigenous minorities. The practices, rules and procedures of implementation of provisions established by federal laws on fisheries management and ABR conservation are determined through bye-laws, among which are Government regulations and executive orders and departmental regulatory acts covering fishery control agencies (such as the Ministry of Agriculture, the Federal Fisheries Agency and the Border Directorate of the Federal Security Service). Specifically, the Ministry of Agriculture approves the fundamental document "*Fishery Regulations for the Far Eastern fishery basin*" (or "*Fishing Rules*", Ministry of Agriculture 2017), which establishes the basis used internationally for fisheries control (fishing gear, harvesting seasons, size structure of the catches, bycatch, prohibited areas). Fishing regulations are continuously being updated and improved, after allowing for public consultation, to ensure that they meet best international standards. The FFA (or *Rosrybolovstvo*) issues orders aimed at fisheries operational control, and the Border Directorate of the FSB issues regulatory documents concerning functions of state control and of resource protection.

For **long-term management and development of the fishing industry**, a broadly discussed and rigorously formulated programme entitled "*Development of the Fishing Industry for the period 2013–2020*" is being implemented. The measures contained in that programme aim to achieve the established long-term development goals of the fishing industry through innovative development set against the background of resource conservation and sustainable use. The document represents the management plan for the fishery. A second document covering long-term fisheries development goals is entitled "*Marine Policy of the Russian Federation up to 2020*", which when implemented even before first certification in 2013 defined the general goals through which the fishing industry needed to develop over the 10 years up to 2020 and provided a policy framework to achieve the goals in an integrated manner. The mandates in both those documents link national food security to the fishing industry and recognize the legal rights of fishers, indigenous communities and other stakeholders in the fisheries.

As stated in section 3.7.1 above, the public's right to participate in fisheries management is enshrined in the Federal Law "*On Fisheries …*". Transparency in management is paramount, so citizens, public associations and associations of legal entities (associations and unions) are guaranteed access to decision-making at a legislative level, notably where it relates to the drafting of resolutions that may influence the state of aquatic biological resources. For the purpose, a layered scheme of public participation of fishery entities has been established and is overseen by the FFA.

The **rights of indigenous peoples** (who live in the north of Russia, in Siberia and some in the Russian Far East, hereafter referred to as KMNS) are enshrined in the federal law "*On Fisheries* …"and also in Federal Laws No. 82-FZ "*On Guarantees of the Rights of Small Indigenous Peoples of the Russian Federation*" dated 30 April 1999, and No. 104-FZ "*The Communities of Small Indigenous Peoples of the North, Siberia and the Russian Far East*" dated 20 July 2000; Decrees No. 255 "*On Consolidated List of Small Indigenous Peoples of the Russian Federation*" dated 24 March 2000, and No. 765 "*On Procedure for Preparation and Decision-Making Concerning Granting for Use of Aquatic Biological Resources Classified as Objects of Fishery*" dated 15 October 2008; Orders No. 631-r "*On Approval of the List of the Traditional Indigenous Habitats and Traditional Indigenous Activity in the Russian Federation and the List of Traditional Indigenous Types of Activity in the Russian Federation*" dated 8 May 2009, and No. 536-r "*On Approval of the List of Small Indigenous Peoples of the North, Siberia and the Russian Far East*" dated 8 May 2009.

The detailed procedure for implementing KMNS fishing rights and their access to aquatic resources is regulated by regulatory acts of the Ministry of Agriculture and the FFA. Fishing methods, applications to fish and the receipt of quotas (catch limits) to harvest bioresources aimed at maintaining their traditional ways of life are regulated through regulatory acts of the Ministry of Agriculture (Order No. 659 dated 24 December 2015) and the FFA (Order No. 315 dated 11 April 2008). KMNS mainly engage in coastal fisheries and to catch anadromous species, but some quotas for pollock in coastal waters adjacent to Kamchatka and in the Chukotka Autonomous Region are allocated to them (currently 119 t in the SOO).

In terms of formal **International Cooperation**, the Russian Federation actively collaborates with other countries in the sphere of fisheries, the study of ABRs and in combating IUU fishing. Cooperation in fisheries takes the form *inter alia* of international treaties, mainly within the framework of the UN, aimed at utilization of the principles of sustainable management of ABRs and their stocks. The requirements of international treaties are integrated into national fishery legislation. Russia has signed up to many international conventions and treaties: *United Nations Convention on the Law of the Sea* (UNCLOS 1982, establishing the concept of MSY as the basis for fisheries management); *Code of Conduct for Responsible Fisheries of the FAO* (FAO 1995, recommending a precautionary approach to the management of ABR stocks); *UN Convention on Biological Diversity* (UNCBD 1992, covering the maintenance of biological diversity on the basis of an ecosystem approach); *United Nations Fish Stocks Agreement* (UNFSA 1995, applying a precautionary management approach to straddling and wide-ranging ABRs); *Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing* (FAO 2010).

Another form of international cooperation is participation in bilateral intergovernmental agreements on fisheries and the fishing industry, which Russia currently has with 21 countries, including in the North Pacific, the USA, Canada, Japan, the Republic of Korea, the Democratic People's Republic of Korea, and China. Further, some intergovernmental agreements are specifically aimed at combating and countering IUU fishing, and Russia itself has a comprehensive national plan to combat all IUU fishing (Order No. 2534-r of 25 December 2013), with specific actions to be taken throughout its waters. Russia has concluded agreements on IUU fishing with the Republic of Korea (December 2009), the Democratic People's Republic of Korea (January 2012), Japan (September 2012), China (December 2012) and the USA (2015), and has product and catch verification schemes in place with the EU (January 2010) and China (January 2014). Further, a Memorandum of Understanding on fisheries cooperation between the Government of Canada and the Government of the Russian Federation was signed in July 2012; one of the key objectives of that memorandum is to enhance mutual actions aimed at preventing and eliminating IUU fishing.

Finally, Russia participates actively in 12 international organizations involved in the study of ABRs and their ecosystems, e.g. ICES (for the North Atlantic and adjacent water bodies), PICES, NPFC and NPAFC (all covering the Pacific Ocean or parts of it).

A **dispute settlement** procedure for Russian fisheries and aquatic bioresources conservation is established in law, with a formal means of settlement of any disputes through the court. Agencies with appropriate authority to protect and control ABRs can institute administrative proceedings against violators, notably to impose fines, seize illegal catch and confiscate fishing gears or even vessels.

In 2008, the State approved a new principle for **quota allocation** of ABR catches. Under that arrangement, rights to catch are allocated to a company for 10 years, with a company's share of a quota (percentage of volume by type of fishery) being calculated on the basis of historical catch/performance. Hence, a company's share of a quota is fixed, although its quantum varies according to the TAC established annually. In 2016 the Federal Law "*On Fisheries …*" was amended (Order No. 349-FZ dated 3 July 2016) to introduce a new type of quota – a production (catch) quota of aquatic bioresources for investment purposes. The volume of such quota is allowed to be up to 20% of the approved TAC for the year in question. Such a form of quota was introduced to encourage fishing fleet renewal (see Stupachenko 2018, who writes about plans for "supertrawlers" to operate in the fishery), development of onboard and coastal ABR processing, and to increase the effectiveness of utilization of the raw material. Starting in 2018, therefore, quotas can be issued to companies for periods of 15 years as industrial, coastal or scientific (for research and monitoring) quotas, quotas for educational and culturally educational purposes, for aquaculture, for amateur and sport recreational purposes, KMNS quota, quotas to support international treaties, foreign quotas in the Russian EEZ, industrial quotas in freshwater reservoirs, and quotas to meet investment objectives.

For each fishery, the total volume of the allocated quotas must not exceed the TAC, and the FFA distributes and manages the quotas. For pollock, the FFA follows the recommendations on quota made by the DVNPS, the Far Eastern Scientific and Technical Council, but only a few of the types of quota listed above for the whole of Russia applied in 2017. The SOO pollock TAC for 2017 was 966 700 t (slightly less, mainly for marketing reasons, than the 1084 t calculated from the assessment model) and for 2018 the same value (again less than the 1078 t calculated by the assessment model), and of the 2017 value, the industrial quota in the EEZ was 897 301 t, the coastal fishery (including by Danish seine) 68 650 t, the scientific quota 624 t, KMNS quota 119 t, and the recreational quota 6 t.

Each year, after approval of the TAC and its distribution by fishery type (i.e. quota type), the FFA determines the share of the quota for each company by every ABR type for each area, and the company has to apply to the FFA regional office for its fishing permit(s). For example, for the 2017 fishing season for pollock in the Far Eastern Basin, the FFA issued instructions under Orders No. 799 of 9 December 2016 and No. 801 of 9 December 2016 for industrial and coastal quotas, respectively.

Quota forfeiture without a violation of rules can only take place if ABRs are needed by the State, if <50% of a company's allocation was taken in two successive years (a proportion scheduled to rise to <70% in 2019), if fishing regulations are seriously violated twice or more in a fishing season, if catches are not delivered to a Russian port for validation, if technical controls (e.g. VMS – note that in Russia, all vessels with an engine power >55 kW and >80 t engaged in fishing operations have to be equipped with a functioning VMS) are inoperative without adequate explanation for 48 h while a vessel is fishing, if a company is controlled by a foreign investor, breaching national legislation, if catches harvested by coastal fishing or their product are not offloaded in the port of compulsory offloading, or for failure to comply with the terms (obligations) in the case of investment quotas.

3.7.3 Agencies and Mandates

The Russian ***Ministry of Agriculture*** (MA) oversees the development and implementation of State policy and the statutory regulation of Russian fisheries, ABR conservation, production, processing and sales of product, production activities at sea and on land, sustainable use, research into the biology, including spawning, of ABRs and their habitats (except for ABRs and/or areas registered federally as requiring special protection and entered in the Russian Federation Red Book) and control and supervision of ABRs and their habitats in internal waters.

Charts of the Fishery Management System in place showing the relative positions of all the contributing agencies is given in Figure 44 and the inter-organisational relationship in Figure 45.

The **Federal Fishing Agency**, the FFA (or *Rosrybolovstvo*), plays the central role in managing Russian fisheries, including pollock fisheries in the Russian Far East (SOO and WBS). Established by Presidential Decree No. 724 of 12 May 2008, the FFA replaced the previous State Committee for Fisheries under the Ministry of Agriculture, although as a consequence of Russian Government restructuring in 2012 (Presidential Decree No. 636 of 21 May 2012), the FFA once again operates as part of that Ministry.

By decrees and subsequent amendments, the FFA *inter alia*:

- develops laws, orders and rules related to fisheries management, and provides them for MoA approval;
- manages the protection, rational use and research into the biology (including spawning) of ABRs and their habitats;
- delivers public services in the area of fisheries, conservation, sustainable use, conservation and biology of ABRs and their habitat;
- provides safety and rescue operations in fishing areas;
- coordinates scientific research and surveying of fish stocks and their habitats;
- coordinates production activities related to ports and vessel maintenance;
- coordinates monitoring of stocks, specifically including their distribution, abundance and biology;
- manages the Fishery Monitoring System;
- distributes the TAC and quotas among fishing companies and other users;
- approves the allocation of fishery areas;
- issues and manages fishing permits;
- performs federal state control in fisheries and fish stock protection;
- enforces regulations on fisheries and stocks in inland waters;
- allocates quotas and catch limits for KMNS (the defined indigenous peoples).

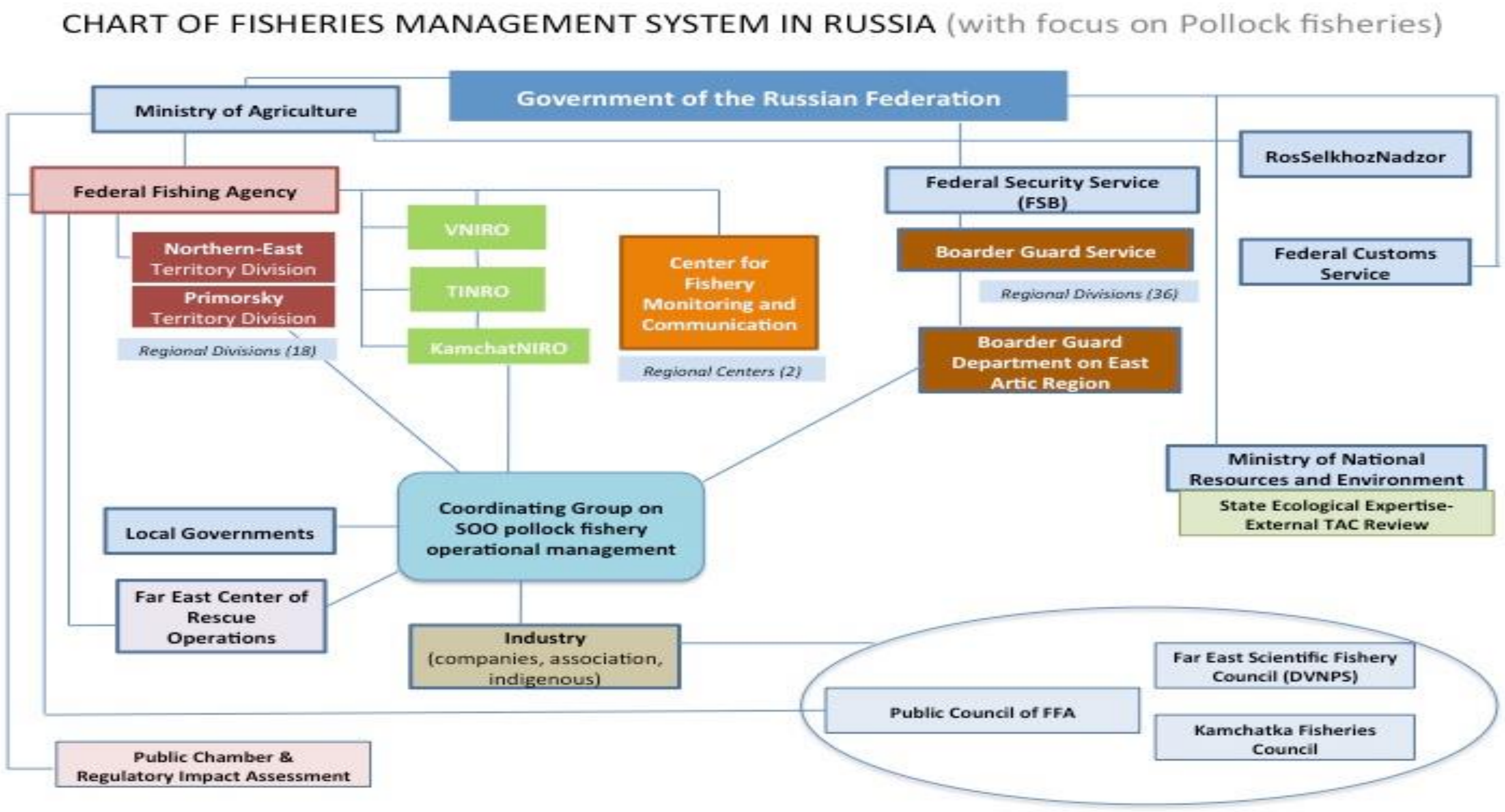


Figure 44. The Russian Fisheries Management system.

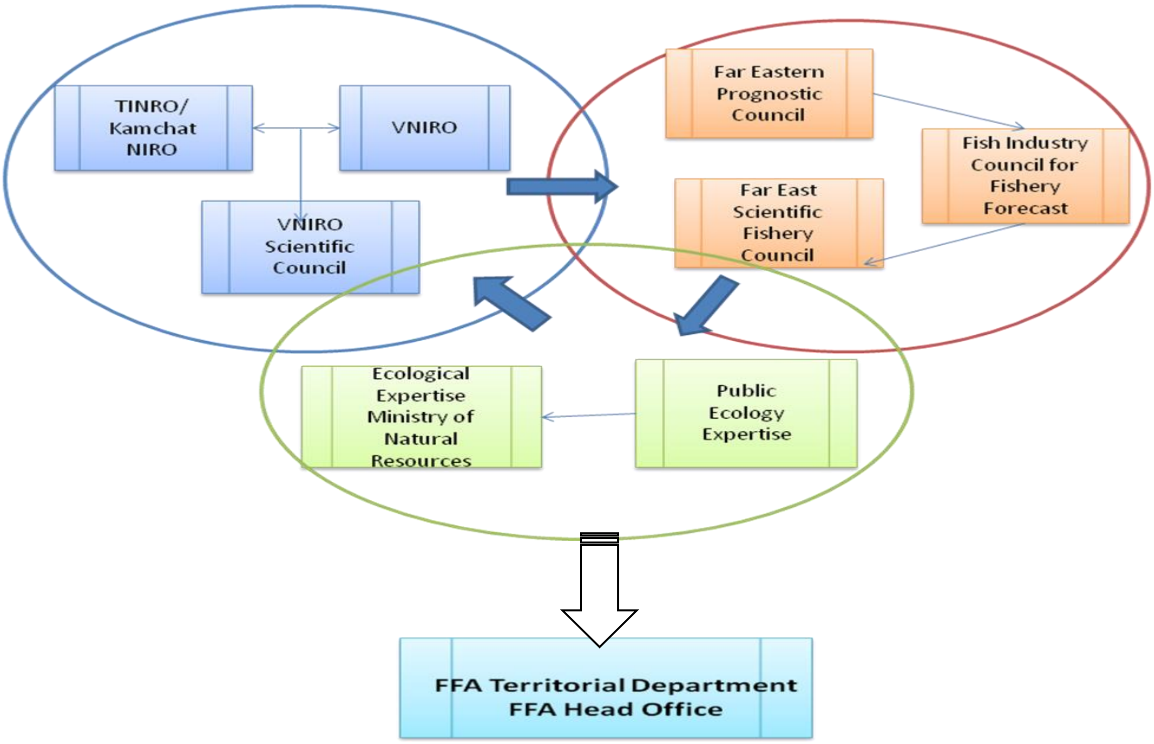


Figure 45. Inter-organizational relationship within the Russian TAC-setting process.

The FFA is responsible for the operational management (fisheries management and control) of all Russian fisheries, which it delivers through 18 territorial departments around the country; five of these are in the Far East Basin. Territorial FFA departments are responsible for issuing fishing permits, monitoring fish catches, performing control and enforcement functions, and collecting and processing operational and catch reports. Besides the operational management and control of fisheries, FFA territorial departments issue catch certificates that prove the legality of fishery products in accord with EU Council Regulation (EC) No. 1005/2008, establishing a community system to prevent, deter and eliminate IUU fishing, and intergovernmental agreements for fishery products exported to China and Japan.

The FFA also collaborates with the Federal Security Service (FSB, see below) in meeting monitoring, control and surveillance (MCS) responsibilities. Within this role, the FFA issues fish permits, collects and processes daily vessel catch reports, monitors VMS data, and manages the Centre for Fisheries Monitoring and Communications (CFMC). The FFA maintains a functioning Fishery Monitoring System (FMS) and supports the CFMC in collecting, storing, processing and distributing all fishery data. That responsibility includes issuing daily statistics on the volumes of biological resources harvested, processed, transshipped, and transported by individual vessels, and providing real-time vessel position information to allow the authorities to identify possible cases of non-compliance or anomaly. The FFA and FSB share data through the CFMC. The FFA manages the fisheries through a process of coordinating its activities with those of scientific institutes, subordinate institutions and government agencies responsible for oversight functions. A key instrument of operational management in terms of pollock fishing in the SOO is the Coordinating Group for operational pollock fishing (catch) regulation in the Sea of Okhotsk (Order No. 1112 dated 30 December 2010). That Group coordinates pollock fishing vessel activity in the SOO, oversees data collection for the fishery (e.g. catches and catch rates), controls pollock allocations, ensures data acquisition in terms of fish size and age composition, roe yield, bycatch of juveniles and other species, sex and maturity ratio and material from which fish age can be determined, proposes restrictions on fishing (e.g. closing areas where juvenile catch percentage is deemed to be too high) and suggests changes to regulations. Swift decision-making is assured through the facilitating of regular (in most cases at least weekly) discussions with all appropriate parties. As an example, during the main fishing season for pollock (season A) in 2017, 13 coordinating meetings were held and their contents documented on the FFA website in the the three months between mid-January and mid-April.

Operationally, the FFA adopts the *Fishing Rules* on catch limits, seasons, gear specification, fishing areas and the procedures for fishing plot (parcel) allocation, catch recording and reporting. Those *Fishing Rules*, for which the most recent version for the Far East Fishery Basin was approved by Ministry of Agriculture decree on 20 April 2017, set out general management measures for the pollock fisheries and can only be modified through a process of review by the Far Eastern Scientific and Technical Council (DVNPS).

The FFA also provides the legal and administrative mandate for scientific surveying, research and monitoring conducted in Russia by the research institutes VNIRO, TINRO, KamchatNIRO, MagadanNIRO and SakhNIRO, with the last four responsible for operational research activities and VNIRO providing federal oversight and advice. VNIRO, TINRO and KamchatNIRO scientists and advisors publish their findings internally, on their websites and also in terms of their science externally in the peer-reviewed literature. Great effort has also been made over the past decade to ensure that reports, literature and findings, or at least succinct summaries of them, are available in English as well as in the Russian language. Official and formal, some newly created, websites facilitate this activity.

It is worth noting here too that the Russian Government has initiated a complex programme to improve the transparency of federal agencies and governance entitled “Open Government”. The concept, which was initiated by formal decree in January 2014¸ aims to increase the transparency and public integrity of the State’s management system along with enhancing public knowledge of and hopefully satisfaction with the quality of management, expand the opportunities for direct public participation in all decision-making, improve the qualitative level of information transparency of federal authorities, and develop public control mechanisms within formal decision-making. To implement the Open Government concept, the FFA established a working group headed by its deputy minister, and its plan of implementation has been named “Open Agency” (for the 2016 plan, see http://fish.gov.ru/files/documents/otkrytoe_agentsvto/plan-otchet/plan-real-otkr-2016.pdf). *Inter alia*, the FFA Public Council within its Open Agency initiative ensures full industry and public participation in fishery management.

For TAC and Possible Catch (PC) setting, there are established formal decision-making processes (see Figure 45 above). The FFA documents the annual allocations of TACs and PCs for all fish species in the Russian Far East Basin to the MoA for official approval (the list of species managed through TAC and PC is established through Ministry of Agriculture decrees). To do this, the FFA collaborates with the established scientific institutes dealing with the fisheries who provide the robustly determined draft advice based on internationally acceptable stock assessment modelling methodology (i.e. VNIRO, TINRO, KamchatNIRO, etc.). TAC species (generally species of high commercial value such as pollock) can be harvested only by registered fishing companies that have long-term fixed quotas for a specific TAC species in a fishing zone, but for PC species, fishing companies do not have to have a long-term quota but can apply for an allocation annually. For TAC-setting, the formal process is collaborative and national, starting at the scientific institute level (for pollock, mainly TINRO and KamchatNIRO), through intra-regional public dialogue, review by VNIRO, consideration by the Fishing Industry Council for Fishery Forecasts, and finally along with external independent consideration at the Ministry of Natural Resources.

An important element of TAC determination and advice is the public hearings held separately in every region. For example, several public hearings on the proposed TAC(s) for 2018 were held in Kamchatka in April 2017, and a total of 52 people attended, representing fishing companies and associations, the media and public organizations such as local representatives of the WWF. All inputs were documented formally and uploaded to the KamchatNIRO website. At the next stage, there is obligatory external review of the proposed TAC. The FFA submits the proposed TAC for consideration by the Ministry of Natural Resources' State Ecological Expertise, an expert scientific panel consisting of scientists mainly independent of the FFA system (generally from the Russian Academy of Science). When the results of this external review are complete, the Ministry of Agriculture formally approves the TAC and mandates the FFA to distribute quotas among fishing companies. The overall decision-making procedure is described in Figure 46.

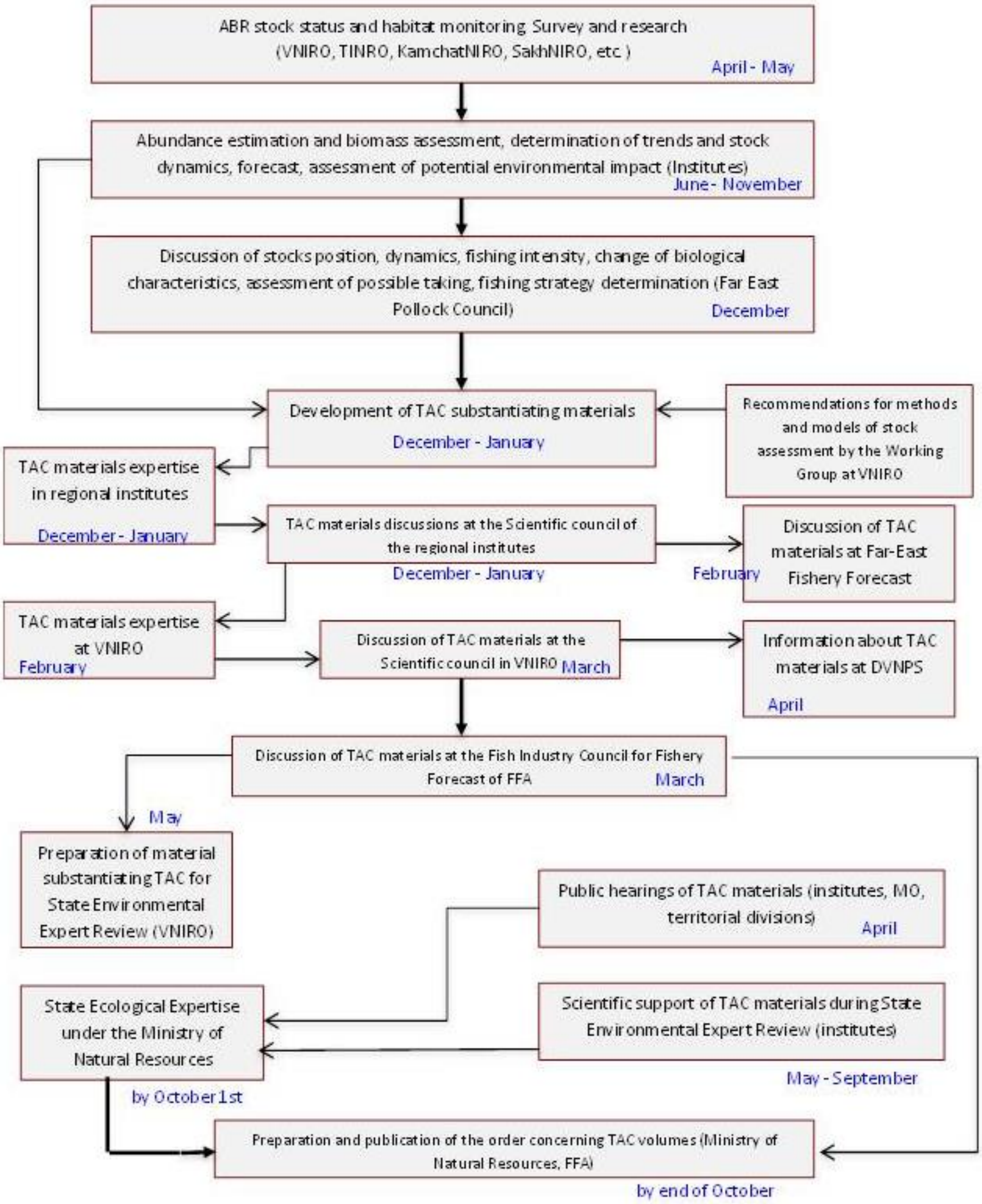


Figure 46. The SOO pollock TAC decision-making process flow chart.

Falling under the auspices of the ***Centre for Fisheries Monitoring and Communications*** (CFMC), which was founded as long ago as 1993, the Fishery Monitoring System (FMS) for aquatic biological resources

(ABRs) monitors and controls the activities of fishing and support vessels, including catching, receiving, processing, transhipping, transporting, storage and offloading, and the production of fish and other products derived from ABRs. The CFMC also makes available relevant activity information to the Federal Security Service (FSB) so that that agency can exercise appropriate controls and inspections to ensure full compliance with the *Fishing Rules* and regulations (see below and Ministry of Agriculture 2017).

The main regional centres of Russia's CFMC are located in Murmansk and Petropavlovsk-Kamchatsky (P-K), the latter responsible for the pollock fishery, and seven regional information centres collect and process information on catch and production activity received from the vessels in the form of daily vessel reports. The CFMC also exercises technical control over the transfer of information from the VMS on the vessel, either through the land-based station (for Inmarsat currently) or through the Russian Gonets communication complex, which is currently being trialled. Inmarsat provides positional fixes per vessel once every 2 h, and Gonets a positional fix once every 10 minutes. Vessel reports on activity and production are received daily either directly or through the satellite system, and the information so received (vessel location and position accuracy, activity, catch, production and form, stock already in the hold) is processed, stored and shared as required with other agencies, namely the FFA and its territorial divisions (in the case of pollock, the one in P-K for the Far East Basin), the Border Directorate of the FSB (the Coastguard), State port control, fishing companies and representative organisations, and scientific institutes and centres. For the purpose of sharing information, a robust software application (Analytics) and a cartographic interface module (Globus) is provided. The electronic logbook system wherein all data are submitted automatically (rather than manually) is scheduled for full implementation in 2018, and at the time of the site visit, 140 pollock fishing vessels (not just those operating in the UoC fishery in the SOO) were trialling it.

The Fishery Monitoring System operated by the Kamchatka branch of the CFMC, the one that covers the UoC fishery for pollock in the SOO, is shown in Figure 47.

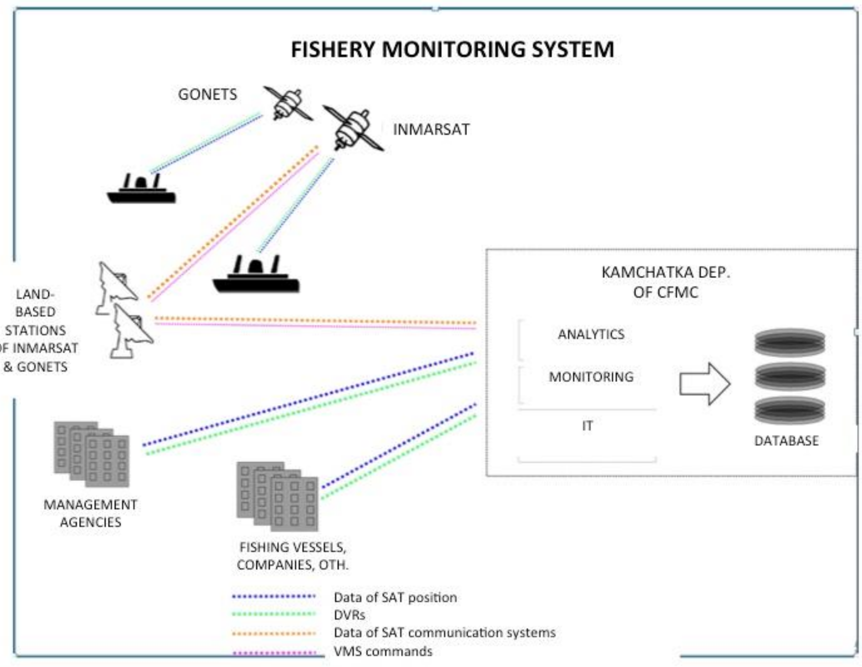


Figure 47. General chart of the Fishery Monitoring System operated by the Kamchatka CFMC.

Apart from the daily information it collates, the CFMC also provides operational reports (half monthly) by vessel and company from the start of each season and quarterly statistical reports by company.

In the rare cases of VMS non-compliance (where VMS fixes are not being streamed regularly), the vessel is immediately requested automatically to rectify the problem while providing regular positional fixes by telephone or fax, but if it cannot bring the system back into operation within 48 h, the vessel has to return to port. Similarly, an out-of-order VMS can be countenanced once during a fishing trip, but if it fails a second time the vessel has to return to port for it to be repaired or replaced before continuing its voyage. Foreign vessels in Russian waters are also tracked.

All marine scientific research in Russia is conducted under the FFA's Department of Science and Education. Of the 14 ***Fishery Research Institutes*** in the country, VNIRO, TINRO and KamchatNIRO are heavily involved in work relating to the SOO pollock fishery, and SakhNIRO and MagadanNIro also contribute, but all of these institutes cover other fisheries too, for pollock and other species. **VNIRO** (the All-Russian Research Institute of Fisheries and Oceanography) is the lead institute and coordinates the work and output of regional institutes such as TINRO and KamchatNIRO in the Russian Far East. VNIRO's key functions in fisheries management are to coordinate fisheries research and development countrywide, to oversee Russian involvement in international fisheries organizations, to facilitate and be responsible for the outputs of appropriate monitoring, to provide an oversight and advice on TAC determination and advice, including bringing (independent) ecological and ecosystem input to bear, and to develop long-term plans and programmes associated with a fishery and its controls.

TINRO coordinates fisheries science in the Russian Far East, develops and implements a comprehensive strategy for fishery-related work in the Pacific, oversees and coordinates the country's Pacific research programmes, and directly carries out fish biomass and distribution and ecological surveys, notably in the Sea of Okhotsk and the Western Bering Sea. It maintains long time-series (in some cases, 30 years and more) of fisheries and ecosystem information and operates under 5-year research plans, the last of which ended in 2017 (it had been extended for an extra year). At the time of the site visit in October 2017, the next five-year programme (to 2022) was being developed, and as before, it will be a broadly discussed and integrated programme covering the research activities of all RFE research agencies of the FFA, with input too from experts at the Russian Academy of Science and the support of fishing organisations and processors. The integrated five-year research and monitoring programme is authorised by the FFA, and annual effort within the various subprogrammes is approved by that organisation and supervised, as appropriate, by VNIRO. TINRO's surveys of (pollock and other species) stock abundance are carried out during the spawning season of the species and are based on ichthyoplankton sampling, trawling and acoustic methodology, concomitantly collecting information on ecosystem structure and function. For pollock, size and age structure studies, distribution, bycatch (juvenile and other species) and commercial fleet operation/distribution are the main requirements of the research surveys.

To meet its aim of coordination, TINRO established several Councils (the Pollock Council was set up in 1996, but there are also Councils for crab, flatfish, herring and salmon) as a means of ensuring all-institute decisions on research, stock assessment and effective, sustainable exploitation in Russia's Far Eastern Basin. They are recommendation bodies only and include members (experts) from all the Far Eastern research institutes, but in the case of pollock, meets annually usually in December to review the past season and to plan ahead. Prior to the site visit, the previous meeting of the Pollock Council in December 2016 focused on assessment methods, harvest control rules and biological reference points for the different pollock stocks, not just that in the SOO.

In terms of the pollock fishery in the SOO and the WBS, **KamchatNIRO** is the scientific institute currently responsible for the numerical stock assessment and forecasting (for the SOO, see Varkentin and Ilyin 2017), but its staff are also involved in collecting some of the underlying monitoring data (see

Figure 46). It is similarly involved in the assessment (modelling) and advisory processes for other fisheries and stocks harvested by the Russian fleet in its Far East.

The same three scientific institutes plus to a lesser extent SakhNIRO and MagadanNIRO are responsible for scientific observer deployment in the pollock fishery (see also Section 3.5.4). Such effort is crucial not only in obtaining information on pollock (size/age composition, sex ratio, maturity cycles and timing), but also in terms of bycatch (of juvenile pollock and other species), ice coverage, supplementary oceanographic data (to add to the scientific survey data also collected) and recently also marine mammal and seabird observations (including ETP species). To ensure robust and targeted observer deployment in the UoC fishery, TINRO, which formally trains and runs the observer corps, has established an Observer Working Group including scientists, the fishing industry, sometimes higher education representatives, and NGOs such as the WWF, and it meets several times annually. Initial calculations of statistically representative observer coverage in the SOO pollock fishery are documented in Smirnov *et al*. (2014), and Smirnov *et al.* (2017) showed that the level of coverage of fleet activity by trained observers in the 2017 season was virtually optimal (definitely optimal for stock assessment purposes), statistically at least. A slight expansion of the trained observer corps to some 22 persons was predicted for 2018 (in fact, 23 operated in 2018; see above), mainly to cover more adequately ecosystem components such as seabirds and marine mammals; the recent record of annual scientific observations is listed in Table 16 below.

Table 16. Distribution of scientific observer sampling coverage by vessel size, 2006–2017 (Season A only for 2017); data from PCA and TINRO.

Year	Large and average size midwater trawlers (UoC fishery)				Medium-sized Danish seiners (non-UoC fishery)			
	No. of scientific observers	No. of hauls	No. of hauls observed	% of hauls observed	No. of scientific observers	No. of hauls	No. of hauls observed	% of hauls observed
2006	13	16035	570	3.6	2	6907	129	1.9
2007	11	12246	595	4.9	1	5235	57	1.1
2008	11	13568	440	3.2	1	7058	73	1.0
2009	12	15607	349	2.2	2	6187	47	0.8
2010	12	15171	929	6.1	2	8581	35	0.4
2011	14	15515	622	4.0	1	5175	95	1.8
2012	11	15016	462	3.1	1	5740	55	1.0
2013	12	13483	521	3.9	1	3573	62	1.7
2014	13	13879	642	4.6	1	2948	111	3.7
2015	10	14225	659	4.6	2	4512	38	0.8
2016	12	18841	789	4.2	2	2367	66	3.2
2017	16	18051	1004	5.6	2	2312	47	2.0

Formal compliance monitoring, as opposed to fisheries-independent scientific observation, which is delivered by the FSB, is addressed beneath.

According to a 1997 Presidential decree and subsequently several other decrees and Orders, the ***Federal Security Service*** (FSB) enforces marine fishery laws and rules to protect species and their habitats. Its Border Guard Service supports the Coastguard in enforcing laws in territorial waters, the EEZ and the continental shelf and also internal waters in terms of salmon. Coastguard inspectors use aircraft, patrol vessels (there are currently six of them country-wide, plus a fleet of speedboats) and radar surveillance, and make use of the Fisheries Monitoring System run by the CFMC and the fishing permit database maintained by the FFA.

It operates through five methods of control:

- analytical monitoring of the fishery (catch rates per vessel per day, juvenile pollock bycatch relative to fleet trends, production statistics);
- visual monitoring on the basis of VMS data (using its aircraft);
- transshipment control as fishing vessels transfer their catches at sea to reefers or motherships (legality, origin and relevant documentation), and onboard checking of fishing gear;
- offshore inspection of fishing vessels, without prior notification (compliance with regulations, catches and quotas, juvenile pollock and other species bycatches, VMS checks, hold and cargo inspection, gear verification, logbooks and other relevant documentation kept on board);
- port control (starting in 2009, all fish caught in the Russian EEZ has to be delivered into a Russian port for clearance; Federal Law No. 333-FZ of 6 December 2007).

The Coastguard is responsible for bringing offenders to prosecution and keeping an up-to-date record of fishing company and vessel compliance and where relevant the sanctions applied for the information of other State authorities (see Table 17).

Table 17. At-sea inspection activities by the Coastguard since 2008; data from FSB East Arctic Coastguard Department.

Parameter / year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*
Number of vessels boarded/inspections	1088	1334	1406	1629	1578	1630	1452	1666	1833	2133
Number of violations	37	33	24	10	23	13	28	34	25	46
Annual level of non-compliance (violations/inspections)	3.4%	2.5%	1.7%	0.6%	1.5%	0.8%	1.9%	2.0%	2.1%	2.2%

* Season A only, at the time of the site visit. Also, 15 of the 46 transgressions for that year related to new rules for VMS equipment (i.e. the securing of units to control potential interference in signal transmissions) that entered into force on 1 January 2017, when many vessels were already at sea

The Coastguard also ensures compliance with international fishery agreements and regulations, where applicable. Immediate sanctions such as suspending fishing or ordering a vessel to return to port can be applied, and the present court penalties for illegal catching can include vessel and/or gear confiscation, fines of up to one million rubles, and prohibition from fishing activities for up to two years. Finally, the Coastguard (together with the Federal Customs Service and the Veterinary Control Service, or RosSelkhozNadzor) inspects and verifies fish products (for export and the domestic market) and all vessels (transport and fishing) as a form of port, state, customs, quarantine and veterinary control.

3.7.4 The Precautionary Nature of SOO Fisheries Management

The federal law "On fisheries …" stresses that priority in fishery management has to be given to preservation and the rational use of aquatic biological resources. Therefore, although the precautionary approach as such is not formally incorporated into Russian fisheries legislation, the principle of precautionary fishery management is enshrined in the FAO's Code of Conduct for Responsible Fisheries (FAO 1995), to which Russia is a signatory, and practical harvest control rules used in the pollock fishery do incorporate a clear precautionary element. Several "tools" have been suggested by those who helped develop that code to assist managers and decision-makers in applying the precautionary principle to the management of national and international fisheries. Those tools were outlined by Garcia (1994), and it is illustrative here to list them as a means of briefly evaluating whether, in the opinion of this certification team, the UoC pollock fishery is following the precautionary approach by utilizing those tools. The full list of tools is:

- adopt the sustainable development principle;
- adopt the principle of precautionary management;
- use the best scientific evidence available;
- adopt a broad range of management benchmarks and reference points;
- develop criteria for use when assessing the impacts of development;
- take a risk-averse stand;
- agree acceptable levels of impacts and risk;
- take a holistic view of resources within their environment;
- speed up management response time;
- allow for greater participation by non-fishery users in management bodies;
- improve decision-making procedures;
- introduce prior consulting procedures; and
- strengthen monitoring, control and surveillance.

Noteworthy in the above list are the use of the terms “sustainability”, “best scientific evidence”, “risk-aversion”, “holistic view” (= an ecosystem approach to management), and “reference points”, key terms used nowadays to underpin best practice fishery management worldwide. Some of these tools are clearly taken up robustly in stated Russian national fisheries policy, some obviously in the harvest control rules applied. However, while acknowledging that future environmental (or climate change) impacts are largely unpredictable, it is the team’s view that the fishery here seeking certification is well covered by most of the tools, so that it does adhere closely to the principle of precautionary management. Overall, therefore, the precautionary approach to management of Russian pollock fisheries appears to be applied implicitly within long-term objectives, to guide decision-making. General evidence includes: the strong legal basis through robust policies enshrined in law; a TAC process that is adaptable to changing, long-term-monitored environmental conditions; some protected areas around the Kommander Islands; a moratorium on fishing in key grounds in international waters and temporary closures of areas where the juvenile pollock catch is relatively high; Russia’s ratification of and adherence to important international conventions; long-term forecasting of the ecosystem conditions needed to generate (high) productivity of resources; management advice being provided according to stock assessments carried out under the precautionary management recommendations of Babayan (2000); harvest control rules incorporating clear precautionary elements; strong monitoring, control and surveillance (MCS) processes.

3.7.5 Summary Overview of Fisheries Management

Russia and the FMS currently operative is committed strongly to protecting and wisely utilizing its pollock fishery in the Sea of Okhotsk. The administrative system is sound and comprehensive, the formal compliance inspections continue to increase in number annually while the number of violations remains small and are generally of a minor nature, the stock assessment methodology is regularly reviewed and deemed to be to internationally acceptable levels of excellence, fisheries-independent scientific observation capacity and output are increasing annually, and monitoring and surveying is maintained through consistent survey platforms and gears, resulting in long and valid time-series (fisheries and oceanography). There are other incentives to sustainability in place too. For instance, there is an incentive supplied by the opportunity to participate in a long-term (by international standards) and hence fairly stable fishery for up to 10 years, and a fleet-modernization incentive provided earlier by the State through partial compensation of bank interest on loans supporting new vessel construction and the recently implemented ability to divert part of the TAC to supporting such commitment to renew the fleet (and note the plans documented by Stupachenko 2018). By these incentives alone and others made known to the team during the site visit, it is obvious that the Russian authorities are bent on better balancing fleet capacity against resource availability.

The whole fisheries management system within Russia (not just the UoC fishery) has been subject to internal review and adjustment over the past two decades and is widely regarded internationally as good; indeed Melnychuk *et al*. (2016) ranked the Russian system in fourth place of those they were able to rank, after those of the USA, Iceland and Norway, but just above the generally lauded systems of New Zealand and South Africa. Also available is an independently commissioned and delivered comprehensive review of management of the SOO UoC pollock fishery carried out by Radchenko (2017, available in English at www.russianpollock.com), which comes to similar conclusions on the quality, credibility, reliability and international standards of the fishery management system as that published by Melnychuk and his co-workers. In the team's opinion, therefore, fishery management structures and rigour are good, and there is also an ethos within both state structures and the fishing industry of support for the principle of sustainable fishing practice in the Sea of Okhotsk pollock fishery.

4 Evaluation Procedure

4.1 Harmonised Fishery Assessment

There is no other certified fishery for pollock or any other species in the Sea of Okhotsk and, although there is another certified pollock fishery (off the northwestern US in the Eastern Bering Sea), the stocks are deemed to be totally separate; hence, the the scope of the fishery contains a fishery that overlaps with another certified or applicant fishery, Annex PB shall be applied.

4.2 Previous assessments

The first MSC evaluation of the Russian Sea of Okhotsk midwater trawl pollock fishery started more than ten years ago. Full assessment was initiated in 2008 after a pre-assessment, submissions were published in September 2010, the first site visit of two weeks to Vladivostok took place after multiple personnel changes in June/July 2011 and some stakeholder meetings were held in Seattle on 11 July 2011. Ultimately, certification was achieved on 24 September 2013 after the standard client review, expert peer reviews, public consultation and stakeholder review and, in that case, several objections that were ultimately overturned by an MSC-appointed independent adjudicator (IA, see below).

It was clear from the start that the Russian (and previous Soviet) tradition of collecting long and generally consistent time-series of fisheries and ecosystem-associated data (species, habitats, environment) had continued despite the massive changes, including in management systems, following the Soviet-era/Russian Federation political and administrative transformation in the early 1990s. However, historical approaches to fishery monitoring and the collection of biological data in Russia depended less on direct fishery sampling and more on scientific research conducted independently of or in tandem with a fishery. Therefore, the quantum of direct, fully independent observations of potential fishery impacts across much of the fishery was initially limited, leaving the candidate fishery disadvantaged in responding to a number of performance indicators within the first certification assessment. That, plus the perception that much of the whole process (monitoring, science, assessment, advice, decision-making and control) was more opaque to those outside Russia than it should be by MSC standards, with language and hence understanding complicating factors, was clearly going to provide some of the sticking points holding back certification to MSC standards. The widely perceived lack of transparency and apparently also of external or independent review of several aspects of the management and even the expert numerical assessment was of course underpinned by the fact that much of the required documentation was in Russian. Much effort therefore went into ensuring expert, totally independent translation and interpretation of material into English, and the client developed that initiative further throughout the four surveillance years, supplemented by the State's own "Open Government" and "Open Agency" initiatives.

After scoring the fishery against MSC default performance indicators, subsequent client review and clarifications, peer review and stakeholder comment in 2011/12, the assessment team recommended certification of the fishery because they felt that the basic requirements for certification had been met. MSC certification requires that each of the three MSC Principles had aggregated scores of 80 or higher, that no individual PI scored less than 60, and that the client provided an acceptable action plan to improve the performance of those indicators with scores less than 80 and for which conditions were being prescribed. The fishery met those three requirements. The final MSC Principle scores were calculated based on the MSC scoring methodology defined in MSC FAM v2.1 and were P1 (Target Species) 80.0, P2 (Ecosystem Components) 80.3, and P3 (Management System) 85.1.

The Final Report and Determination was published on the MSC website for a final public consultation period of 15 working days, during which period two objections against the decision to certify the fishery with eight conditions were received, one each from the World Wildlife Fund (WWF) and the At-Sea Processors Association (APA), representing the MSC-certified Alaska pollock fishery. Each party submitted a Notice of Objection that was subsequently accepted as valid by the IA in keeping with MSC Certification Requirements (CR) v1.3 as defined in Annex CD Objections Procedure. During the Objection Procedure process, the objection submitted by WWF was formally withdrawn after WWF and the client (PCA) were able to reach agreement on revisions to the condition milestones in relation to Conditions 2, 4 and 5. As directed in the IA's communication dated 22 April 2013, the accepted changes were final and binding, thus concluding the WWF objection. A revised version of the Final Certification Report was published on the MSC website on 30 April 2013. That report presented the revisions proposed by the client, accepted by WWF and approved by the IA. The objection process for the APA objection continued through to adjudication, with a hearing conducted on 31 May 2013, an initial remand decision issued by the IA on 19 June 2013, a CAB response issued on 18 July 2013 and APA comments on that response issued on 31 July 2013. The IA published a preliminary decision on 14 August 2013 and the CAB and APA provided responses, as per IA directions, over the following weeks. The IA issued a final decision to the APA objection on 16 September 2013, with the IA upholding the decision to certify the Russian pollock SOO midwater trawl fishery with conditions, pursuant to final approval of the Public Certification Report. The IA objection remand, preliminary and final decisions along with the various responses to those directives and weblinks to key documents published during the objection process can be seen in Appendix F of the first certification report.

Subsequently, three annual (autumn/fall) surveillances of the fishery were conducted by a team consisting of two members of the original expert certification team for the fishery on-site and one qualified P3-specific expert off-site. The 4th annual surveillance during which the final four Conditions were deemed to have been met was held in Vladivostok and Petropavlovsk-Kamchatsky with the original three members of the expert team present, and it piggy-backed with consultations regarding potential re-certification, the subject of the current report. During the four years of annual surveillance, all eight Conditions were closed, although three of the eight were delayed past their anticipated closure by one year each (decisions endorsed by the Client) to ensure total compliance with the perceived as well as the stated aims of the original Condition (see Table 18 below).

Table 18. Summary of previous Assessment Conditions.

Condition number	PI	Year closed	Justification
1. Harvest strategy	1.2.1	Year 4, 2017	With the additional years of SOO pollock stock status information and modelling since the original certification, ongoing testing undertaken through short- and long-term harvest projections under assessed stock status and uncertainties, and evidence of sound institutional response to the need to modify an HCR when required, it was concluded that, although the harvest strategy may not have been fully tested, evidence exists that it is achieving its objectives. Succinctly, the risks of adverse consequences to the stock arising from the implementation of the current HCR are minimal. With all SIs met at SG80 and the first and third SIs of SG100 also met, the PI was rescored at 95.
2. Information/ monitoring of harvest strategy	1.2.3	Year 4, 2017	With additional work on fishery and survey monitoring since certification in 2013, it was concluded that stock abundance and fishery removals are regularly monitored at a level of accuracy consistent with the HCR. Moreover, the current level of observer coverage of the fishery, including the number of hauls they processed, delivers sufficient scientific information to be able to evaluate the overall dynamics of the pollock fishery, its biological characteristics and the quantitative and qualitative composition of bycatch, and to monitor fishery effects on key components of the ecosystem with sufficient frequency to support the HCR. The coverage is

			also of high quality in terms of fishery removals over and above the information gathered on target (pollock) catch. With the two SIs at SG60 still met and all three SIs of SG80 met, the PI was rescored at 80.
3. Assessment of stock status	1.2.4	Year 3, 2016	By Year 3, the requirement was to provide a report that detailed how the assessment appropriately evaluated the major sources of uncertainty and took them into account. That external independent review was commissioned and provided, and it showed that the assessment model used for the UoC fishery was fully satisfactory by current best international standards and appropriately took the major uncertainties into consideration. Some suggestions on possible improvement of the model were provided for consideration in future rounds of assessment of the stock, and some had been taken up already by Year 4. The scientific integrity of the review was deemed proven and the PI was therefore rescored at 90.
4. Information/ monitoring of bycatch	2.2.3	Year 3, 2016	Two scoring issues were seemingly problematic at certification, the adequacy of information to estimate outcome status with respect to biologically based limits for main bycatch species and the sufficiency of the data being collected to detect any increase in the risk to main bycatch species. Detailed reports were provided at Years 2 and 3 showing that bycatch data of a high quality were being collected, including at Year 3 of a full breakdown of catches into main and minor components. The results were consistent with what was learned at certification, suggestive of no material change having taken place since then. Bycatch species proportions were similar to what they were at certification, and the main species noted then, i.e. herring, cod and Greenland halibut, were under full assessment and their biological limits and stock dynamics documented and well understood. This PI was therefore rescored at 80.
5. Information/ monitoring ETP species	2.3.3	Year 4, 2017	The evaluation team was satisfied that all SG80 SIs were met in full. However, as the management measures had only being implemented since first certification and the data series was still short, it could not be affirmed that the information was sufficiently quantitative for robust analysis or adequate to support a comprehensive strategy to manage the impacts of the fishery on ETP species, or that it was accurate and verifiable, i.e. SG100 was not met. The PI was rescored at 80.
6. Information/ monitoring of ecosystem	2.5.3	Year 2, 2015	The aim of this condition was to demonstrate that sufficient information was available and being collected on the impacts of the fishery on ecosystem components (i.e. target, bycatch, retained and ETP species, and habitats) and key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity) to be able to detect any increase in risk level. A report needed to be provided that detailed an analysis of the data in order to demonstrate that the level of monitoring was adequate to evaluate the impact of the fishery on the whole ecosystem. Apart from a long time-series of historical data, appropriate new data were collected and made available for a rigorous analysis (Kulik 2015) that showed that at the current level of fishing, no negative affect on

			ecosystem components was identifiable. The PI was rescored at 80.
7. Decision-making processes	3.2.2	Year 3, 2016	This condition was related to the transparency of information and proof of the responsiveness of the management system to issues identified by taking account of the broader implications of decisions made. There is now a much-improved, relevant and comprehensive pollock website (much in the English language), other agencies and Ministries are implementing other schemes of better transparency (e.g. Open Agency), and there is public, sometimes fully independent, participation in state governance and decision-making. International models are being used to demonstrate the importance of biological and ecological input through public hearings, public councils, relevant research, monitoring, evaluation and consultation in a transparent, timely and adaptive manner to reach decisions and to take account of the wider implications of those decisions. Compliance rates in the fishery remain high and stable, so with the demonstrated and documented vastly improved transparency associated with the research underpinning the advice and in management and its decision-making, the PI was rescored at 80, one year later than predicted.
8. Monitoring and management performance evaluation	3.2.5	Year 4, 2017	The fishery was deemed to have in place mechanisms to evaluate key parts of the management system and to be subject to regular internal (shown over the years since certification) and occasional (independent) external review, one year later than originally predicted. The PI was rescored at 80.

4.3 Assessment Methodologies

The Russian Sea of Okhotsk Midwater Trawl Walleye pollock fishery has been reassessed against the MSC Certification Requirements version 1.3 and using version 2.0 process and report template.

The default assessment tree was used.

4.4 Evaluation Processes and Techniques

4.4.1 Site Visits

The site visit for the Unit of Certification Russian Sea of Okhotsk midwater trawl walleye pollock fishery was conducted in Vladivostok and Petropavlovsk-Kamchatsky from 2 to 9 October 2017. The itinerary for the site visit and those in attendance are set out below. In all, nine stakeholder organizations and individuals representing them having relevant interest in the assessment were consulted during this surveillance audit. On all occasions, those being interviewed were asked up front whether they had any issue with having either the client or an interpreter present (on many occasions both). All replied in the negative.

2 October 2017, 09:30 local time. Meeting at the Client's office in Vladivostok, the Client represented by Executive Director Alexey Buglak, with Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle, plus interpreter Darya Pershina.

2 October 2017, 11:00 local time. Meeting at TINRO Centre, Vladivostok, with TINRO Centre scientists and advisors and the Client. Igor Melnikov (Deputy Director TINRO), Vladimir Leonov, Evgeny Ovsyannikov, Alexander Zolotov and Anatoly Smirnov (all Scientists, TINRO, some specifically

associated with the scientific observer team), PCA Executive Director Alexey Buglak (representing the Client), Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle, and interpreter Dariya Pershina.

2 October 2017, 17:00 local time. Meeting at Hyundai Hotel, Vladivostok, between Konstantin Zgurovsky (Senior advisor on the Sustainable Fishery Programme to WWF Russia) and Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle.

3 October 2017, 15:00 local time. Meeting at the Kamchatka office of the Fishery Monitoring System (CFMC) with their representatives and the Client. Dmitry Nedobozhkin and Vitaly Pomazkin (Deputy Directors), Oksana Guseva and Anton Rostlyi (technical leads for monitoring the Russian pollock fishery and for the implementation of the electronic logbook system, respectively), PCA Executive Director Alexey Buglak (representing the Client), Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle, plus interpreter Nataliya Karaziya.

3 October 2017. 17:30 local time. Skype meeting conducted from the Avacha Hotel, P-K, with representatives of At-sea Processors Association (APA, US). T. Kevin Stokes (consultant) in New Zealand, Austin Estabrooks (APA) and Ruth Christiansen (United Catcher Boats, Alaska), both in Alaska, Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle.

4 October 2017, 09:30 local time. Meeting at KamchatNiro Office with KamchatNIRO scientists and advisors and the Client. Oleg Ilyin (Head of Stock Assessment Laboratory, KamchatNIRO), Alexander Varkentin (Head of Marine Resources Group, KamchatNIRO), Nina Shpigalskaya (Director, KamchatNIRO) and Arina Shurygina (KamchatNiro translator), PCA Executive Director Alexey Buglak (representing the Client), Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle, and interpreter Nataliya Karaziya.

4 October 2017, 15:30 local time. Meeting at the Avacha Hotel with local P-K representatives of the FSB (Coastguard) and the Client. Yuriy Tumanov, Igor Kiselev and Stanislav Dashevskiy (FSB Kamchatka), PCA Executive Director Alexey Buglak (representing the Client), Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle, and interpreter Nataliya Karaziya.

5 October 2017, 10:00 local time. Meeting on board pollock trawler BMRT "Seroglazka" with officers and company (Kolkhoz im. Lenina) representatives and the Client. Evgeniy Sadovnikov (captain), Elena Kolch (Company technologist-engineer) Boris Vyalykh (Company Commercial Fishing Service Head) and Ivan Kuzmin (Vessel Factory Manager), PCA Executive Director Alexey Buglak (representing the Client), Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle, and interpreter Nataliya Karaziya.

6 October 2017, 10:00 local time. Meeting at TINRO Centre, Vladivostok, with TINRO Centre scientists and advisors. Igor Melnikov (Deputy Director TINRO), Evgeniy Ovsyannikov, Vladimir Kulik, Victor Nadtochy, Elena Dulepova and Anatoly Smirnov (all Scientists, TINRO), Oleg Katyugin (Department of International Cooperation, TINRO), Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle, and interpreter Dariya Pershina.

6 October 2017, 18:30 local time, Meeting at the office of the Client, PCA. German Zverev (Chairman, PCA), Alexey Buglak (Vice-Chairman and Executive Director, PCA), Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle.

9 October 2017, 10:00 local time. Meeting at Hyundai Hotel, Vladivostok, with Vladimir I. Radchenko of the North Pacific Anadromous Fish Commission (NPAFC), Vancouver, Canada, the contracted independent expert who provided an independent expert overview of the performance of the Russian

Fishery Management System, particularly referring to Russian pollock. Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle.

9 October 2017, 13:30 local time. Meeting at his office with the Client, represented by Executive Director Alexey Buglak, Acoura surveillance team members Andrew I. L. Payne, David W. Japp and Robert O'Boyle.

The team also noted (and reviewed) the mainly English language website developed and kept live by the PCA: www.russianpollock.com. Pertinent archive and new material was uploaded to the site before, during and just after the site visit.

4.4.2 Consultations

Assessment team members met with and/or spoke to a number of stakeholders representing different groups throughout the course of the site visit. The names of individuals and affiliated organizations are listed above.

Two groups of stakeholders provided input during the consultation process. The first group included those who were specifically invited by the assessment team to provide information about the fishery and its management. This group included the clients, industry representatives, TINRO, KamchatNIRO, CFMC personnel, FSB personnel and members of other management agencies. The second group included those parties whose information was not specifically requested by the assessment team but who chose to present information about the fishery, the stock's health, fishery impacts and the fishery management system, plus Vladimir I. Radchenko of the North Pacific Anadromous Fish Commission (NPAFC), Vancouver, Canada, the contracted independent expert who provided a written independent expert overview of the performance of the Russian Fishery Management System, particularly referring to Russian pollock, and who happened to be in Vladivostok at the same time as the expert team. The rest of that group included all other parties who had a concern about some aspect of the fishery and its management. One of the consultations (with the APA) was by Skype, but with advance written information available (see Appendix 3). The main topics discussed were the stock assessment process, the level of fisheries-independent scientific observer coverage and lack of transparency and availability of information regarding the fishery and stocks. All issues and concerns raised by stakeholders were considered in the scoring of the appropriate Performance Indicators (PIs).

4.4.3 Evaluation Techniques

The full recertification assessment of the Russian Sea of Okhotsk Midwater Trawl Walleye Pollock Fishery commenced 31st August 2017. All aspects of the assessment process were carried out under the management of Acoura Marine, Edinburgh, UK, an accredited MSC conformity assessment body (CAB) in accordance with MSC requirements v1.3.

The fishery announced MSC full reassessment on 31 August 2017. The fishery assessment was announced via email to all registered stakeholders.

The fishery client provided information for the re-certification assessment, as done for the initial certification and intervening surveillance audits, with significant help from the scientific authorities for the fishery, TINRO and KamchatNIRO, in order to respond to Fisheries Assessment Methodology default indicators. The default assessment tree was used without adjustment. The various client submissions prepared for the full assessment were published on the MSC website: https://fisheries.msc.org/en/fisheries/russia-sea-of-okhotsk-pollock/@@assessments

Apart from the extensive and comprehensive background information provided by the client, as above, the team was also in possession of copious documentation provided for all four of the surveillance audits mainly, but not only, to meet the requirements of the original eight Conditions set to the first certification. All three principles were covered comprehensively in the various documents. Much of this material was also available before the site visit or soon thereafter, either in English or in Russian with an extensive English summary, on the English language website set up by the client. Other material was perused on the various websites hosted by the contributing agencies and institutions, some using Google Translate and, in several instances, after a translated version had been requested and willingly provided.

Overall, an excellent working knowledge of the management operation, administrative and commercial, was attained, although by necessity the actual interviews conducted were just a large sample of what was theoretically available. It was noticeable too that personnel associated with the fishery, with the science and advice, and with the legislative organisations made great effort to make themselves available for the meetings with the assessment team; this statement applies to senior personnel as well as those actively monitoring the various aspects of the fishery and its control.

For scoring, individual team members considered all aspects based on what had been provided to them in writing and verbally and had drafted in the background sections, and interacted with each other electronically throughout the process. Ultimate scoring decisions were based, however, on final group consensus following a Skype meeting on 26 March 2018. The final recommendation was based on the decision rule that the aggregate of all category-level scores had to exceed 80 and no individual PI scored less then 60.

5 Traceability

5.1 Eligibility Date

The eligibility date for the fishery to become recertified is scheduled for 24 September 2018, when the current certificate expires.

5.2 Traceability within the Fishery

In terms of the **legality of catches and vessel monitoring**, the fishery for Russian pollock is prosecuted using large and medium-sized vessels that catch and process pollock and other retained species at sea. Most of the product is produced in headed and gutted form after roe has been stripped from it, and it is block-frozen. Some product is frozen whole round for processing at plants ashore, not necessarily in Russia, and there is a gradually increasing quantum of fillet produced for the domestic market (currently, some 60% of the fillet production enters the domestic market). The vessels stay at sea for long periods and may transfer product to reefers or motherships, but only under the rigorous control (and watchful eye) of FSB Coastguard oficials.

All vessels operating in the fishery have to be equipped with an Inmarsat (previously Argos) Vessel Monitoring System (VMS), and efforts are underway to replace that system during 2018 with a Russian version known as Gonets, which sends data more frequently that Inmarsat, every 10 minutes. Depending on fishing area, the vessels are tracked by equipment in the CFMC offices, which fall under the overall control of the FFA but share their data with the compliance-ensuring organisation, the Federal Security Service (FSB). All companies are issued annual quota, dependent upon company share. Each vessel has to have a catch permit on board that tells masters how much product they are allowed to catch and in which fishing zones that catch is to be taken. While at sea, vessels report at least daily on catches and production volumes. If vessels do not report at the end of each day, the monitoring centres contact them to identify the reason for lack of communication. The current system of manual daily catch reporting is due to be replaced in 2018 by a currently-under-test electronic logbook system, also operated through the CFMC.

Coastguard inspectors can board vessels whenever they wish during a fishing season, and are generally unannounced. They review fishing and production logs, daily communications, gear utilization (for pollock, only permitted midwater trawl gear is allowed to be in an operative state and all other gear, if any, on board has to be sealed and unused) and verify hold contents.

It is concluded that there is an extremely low risk of Russian vessels **fishing (unobserved) outside the UoC in Russia's EEZ**, with the commercially viable pollock concentrations concentrated in the northern and eastern part of the Sea of Okhotsk, in Zones 5.1, 5.2 and 5.4. Russian vessels do not fish in the "Peanut Hole" area in the middle of the SOO (see Figure 1). It is possible that vessels fishing in the SOO may deploy to the Russian EEZ fishing zone to the west (i.e. Zone 5.3, East Sakahlin), which is not part of the Unit of Certification. However, such catch would be traceable through the fishing logs and transshipment records and vessel activity in 5.3 would anyway be logged immediately through its VMS record. The same would apply to any vessel activity on pollock or other stocks in the Western Bering Sea (WBS), which fishery is not certified. Note too that, apart from VMS records, all movements to and from fishing grounds in the SOO (e.g. to and from port) or to other areas such as the WBS have to be notified in advance to the Coastguard.

In terms of **onboard processing and labelling**, members of the assessment team met with the Captain, Production Manager and other operations (at sea) and management (on shore) staff of the BMRT "Seroglazka" during the site visit to Petropavlovsk-Kamchatsky. The seagoing crew explained how product is typically processed aboard Russian pollock fishing vessels. The team's understanding is that although this procedure may vary slightly depending upon fishing company and individual customer requirements, the procedure is basically the same for most at-sea processors. Production from each day is processed and frozen on a continual basis. Production plants use a system of marking the external packaging for pollock blocks, usually food grade paper. Blocks are put into paper sacks, and are either sewn shut with a different colour thread (one colour for each day) or bags are labelled with different colour labels to indicate the day of production. Each bag is generally marked with a production code to indicate the day of production. Once frozen product is bagged, it is stored in the holds, with one of the senior seagoing staff responsible for supervising all storage of product. Product is stowed sequentially in holds and batches are typically evident based on the label or threads used to differentiate between them.

As far as **transshipment and first point of landing** is concerned, product is transshipped to transport reefer vessels or motherships to allow the fishing vessels to continue to fish when their storage hold is nearing fullness or product is required to meet market demand. All transshipments are always conducted under the supervision of FSB Coastguard personnel, who operate off all transport vessels at all times. Product is transferred and a tally kept by both vessels. Once transshipped, all processed or raw product caught by Russian vessels within the Russian EEZ has to be taken to a designated Russian port for Customs inspection prior to shore-based onward production or export to another location. Much of the pollock raw material caught in Russian waters is taken to China, where it is either forward-shipped to customers or subjected to further processing.

There is a very **low risk of substitution of certified fish prior to and at the point of landing**. All transshipments are made under compliance inspector (i.e. FSB Coastguard) supervision to the point of landing at a Russian port where they are Customs- and veterinary-inspected. They may then be shipped back out to the Russian EEZ or elsewhere, depending on target market. If a transport vessel has no more available cargo space and is en route to another country, the risk that the fishing vessel will attempt to take more product on board is considered low, so the vessel may leave unsupervised.

A summary of the Traceability factors within this fishery is provided in Table 19.

Table 19. 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	Low risk. Other gear is generally not carried aboard, but if it is, it has to be sealed and unused. Inspection of gears is regular, unannounced and rigorous.
Potential for vessels from the UoC to fish outside the UoC or in different geographic areas (on the same trips or different trips)	Medium to low risk during the pollock fishing season in the SOO, which is lucrative but limited by sea-ice cover to certain periods of the year. Fishing during transit through Zone 5.3, which is not part of the UoC, could take place, but VMS records clearly display steaming and fishing activities. Likewise, a vessel wishing to fish in the WBS has to pre-notify plans to the Coastguard and be inspected before proceeding.
Potential for vessels outside of the UoC or client group fishing the same stock	High risk. A notable proportion of the SOO pollock TAC is held by companies not part of the UoC fishery. All companies are, however, subject to the same stringent and strict controls on catches as the UoC fishery, and their data taken up in thr formal catch record and stock assessment. The risk of mixing of product is well mitigated.
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)	Medium risk. Coastguard controls of stored product and during transshipment and transport, and on ultimate landing, are extremely rigorous, however. Source information is therefore very accurate and the risk well mitigated.
Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)	Low risk of the UoC fishery taking or processing any non-certified catch during at-sea operations.
Risks of mixing between certified and non-certified catch during transshipment	Low risk. Careful colour coding and separation of different source material in reefers' holds mitigates this risk entirely, and reefers are carefully checked when they come into a pre-designated Russian port, which they have to do by law.
Any other risks of substitution between fish from the UoC (certified catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required	Extremely low risk.

5.3 Eligibility to Enter Further Chains of Custody

Subject to final confirmation following peer and stakeholder review, this product will be eligible to enter further certified chains of custody and if it is eligible to be sold as MSC certified. The scope of this certification ends at the first point of landing in Russian territory after completion of Customs inspection. Change of ownership also occurs at this point. Downstream certification of the product would require appropriate certification of storage and handling facilities at those locations.

Only pollock caught by PCA members, as listed in Table 2 early in this report, is eligible to enter Chains of Custody. At the time of writing in late 2017 and early 2018, all 31 PCA member companies had been assessed towards the MSC Chain of Custody Standard. The audits were conducted by Acoura Marine itself, an MSC-accredited CAB. All applicants had passed assessment and obtained MSC Chain of Custody certificates. More comprehensive information about certified PCA suppliers is available at the MSC website at:
http://cert.msc.org/supplierdirectory/VController.aspx?Path=be2ac378-2a36-484c-8016-383699e2e466&LastPage=WebApp.pages.WucIndexPage.

5.4 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to Enter Further Chains of Custody

N/A

6 Evaluation Results

6.1 Principle Level Scores

Table 20. Final Principle scores.

Final Principle Scores	
Principle	**Score**
Principle 1 – Target Species	92.5
Principle 2 – Ecosystem	88.0
Principle 3 – Management System	88.9

6.2 Summary of PI Level Scores

Table 21. Summary of Performance Indicator scores.

Principle	Weight (L1)	Component	Weight (L2)	PI	Performance Indicator	Score at 1st certification	Score by 4th SA	Score at re-certification
One	1	Outcome	0.5	1.1.1	Stock status	90		100
				1.1.2	Reference points	80		90
				1.1.3	Stock rebuilding			
		Management	0.5	1.2.1	Harvest strategy	70	95	95
				1.2.2	Harvest control rules	80		90
				1.2.3	Info/monitoring	75	80	90
				1.2.4	Assessment of stock status	75	90	90
Two	1	Retained spp.	0.2	2.1.1	Outcome	80		90
				2.1.2	Management	85		90
				2.1.3	Information	80		85
		Bycatch spp.	0.2	2.2.1	Outcome	80		80
				2.2.2	Management	85		90
				2.2.3	Information	75	80	85
		ETP	0.2	2.3.1	Outcome	80		85
				2.3.2	Management	80		90
				2.3.3	Information	70	80	80
		Habitat	0.2	2.4.1	Outcome	80		100
				2.4.2	Management	85		85
				2.4.3	Information	85		90
		Ecosystem	0.2	2.5.1	Outcome	85		90

				2.5.2	Management	80		90
				2.5.3	Information	75	80	90
Three	1	Governance and policy	0.5	3.1.1	Legal & customary framework	90		95
				3.1.2	Consultation, roles, responsibilities	95		95
				3.1.3	Long-term objectives	100		100
				3.1.4	Incentives for sustainable fishing	80		80
		Fishery-specific management system	0.5	3.2.1	Fishery-specific objectives	85		90
				3.2.2	Decision-making processes	75	80	80
				3.2.3	Compliance and enforcement	85		90
				3.2.4	Research plan	80		90
				3.2.5	Management performance evaluation	70	80	80

6.3 Summary of Conditions

No Conditions are deemed necessary to be raised against this certification.

6.4 Recommendations

The team has two recommendations for consideration.

1. In terms of ETP species (PI 2.3.1) and the potential mortality of seabirds as a result of strikes on trawl warps the team notes that, based on evidence presented by Artyukhin (2015) on seabird interactions with pollock midwater trawl fishing gear and potential incidental mortality of the birds, it was deduced that pollock trawls in the Sea of Okhotsk can result in aggregations of seabirds around the trawlers (mostly in winter) as a result of the birds' attraction to catch-processing waste discharged overboard during operations. Bird mortality was indeed reported as a result of a combination of collisions with fishing gear, in particular striking warps and echosounder cables, and intense lighting from the vessels**. It is therefore recommended that the PCA undertake from year one of this certification further monitoring of seabird interactions to determine likely mortality levels of seabirds associated with these warp strikes.** As is good international practice in other similar fisheries, mitigation methods to minimise seabird mortality of this form should also be tested or implemented. Depending on the results of these trials, mitigation options could be introduced as standard practice by the pollock-directed midwater trawl fleet to minimise seabird mortality by the end of the certification cycle.

2. In terms of "independent" review (PI 3.2.5), there are two forms evident to the team, one relating to the scientific numerical stock assessment process underlying management and TAC-determination (covered under P1), and one relating to the adequacy of the administrative and legislative system in terms of international standards (covered under P3). MSC Guidance is that independent "external" review can be classified for the first of these two forms as being covered by competent scientists not attached to the organisation conducting the assessment. VNIRO acts competently in this regard and also contracts appropriate experts to assist in the process. However, for the second form of review, occasional external review of the management system can effectively only be made by a Russian-speaking expert knowledgeable about reputable fisheries management systems in other parts of the world who is resident outside the country. Such a review was commissioned and delivered during the first certification to meet a Condition set. There is not such a Condition on this occasion, but it is recommended that such **a review of the Russian fisheries management system as it applies to the UoC fishery be commissioned at least once during each certification cycle of five years**, helping thus to divert criticism of the system that will inevitably arise from those that still believe that the Russian fisheries management system is opaque because much of the documentation is in the Russian language.

6.5 Determination, Formal Conclusion and Agreement

(REQUIRED FOR FR AND PCR.

1. The report shall include a formal statement as to the certification determination recommendation reached by the Assessment Team about whether or not the fishery should be certified.

(Reference: FCR 7.16)

(REQUIRED FOR PCR)

2. The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation.

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

The pre-assessment was conducted prior to first certification, so at this second certification stage, this section is not relevant.

References

Acoura. 2015. On-site surveillance visit. Report for Russian Sea of Okhotsk Midwater Trawl Walleye Pollock Fishery. 2nd Surveillance Audit. Acoura Marine, Edinburgh. 40 pp.

Acoura. 2016. On-site surveillance visit. Report for Russian Sea of Okhotsk Midwater Trawl Walleye Pollock Fishery. 3rd Surveillance Audit. Acoura Marine, Edinburgh. 69 pp.

Acoura. 2017. On-site surveillance visit. Report for Russian Sea of Okhotsk Midwater Trawl Walleye Pollock Fishery. 3rd Surveillance Audit. Acoura Marine, Edinburgh. 80 pp.

Allen, M. J. and Smith, G. B. 1988. Atlas and zoogeography of common fishes in the Bering Sea and northeastern Pacific. NOAA Technical Report NMFS 66. 151 pp.

Artyukhin, Yu. B. 2015. Report on research works for the study of pollock trawl fishery impact on the condition of seabird populations in the Sea of Okhotsk, collection of statistical and analytical data on presence, interaction with fishing gear and accidental by-catch of seabirds and marine mammals in the pollock trawl fishery in the Sea of Okhotsk during 2014/2015 fishing season. Kamchatka Branch of the Pacific Geography Institute, Petropavlovsk-Kamchatsky. 73 pp.

Arzhanova, N. V. and Zubarevich, V. L. 1997. Chemical fundamentals of biological productivity of the Sea of Okhotsk. *In* Complex investigations of the Sea of Okhotsk ecosystem, pp. 86–92. VNIRO, Moscow (in Russian).

Aydin, K. Y., V. V. Lapko, V. V., Radchenko, V. I., and Livingston, P. A. 2002. A comparison of the eastern and western Bering Sea shelf/slope ecosystems through the use of mass–balance food web models. NOAA Technical Memorandum NMFS-AFSC-130.

Babayan, V. K. 2000. Precautionary Approach to Assessment of Total Allowable Catch (TAC). Analysis and Practical Recommendations. VNIRO Publishing, Moscow. 192 pp.

Bezrukov, P. L. 1960. Bottom sediments of the Okhotsk Sea. Trudy Institute Oceanology of the Academy of Science of the USSR, 32.

Blinov, V. V. 1977. Modeling of natural mortality of younger age fish groups. Ichthyology Issues, 17: 572–578.

Burkanov, V. N., Usatov, I. A. and Fomin, S. V. 2015.Organization of monitoring and presence, interaction with fishing gear and accidental by-catch of Steller sea lion and other marine mammal speces in the pollock trawl fishery in the Sea of Okhotsk during 2014-2015 fishing season. Kamchatka Branch of the Pacific Geography Institute, Petropavlovsk-Kamchatsky. 79 pp.

Caddy, J. F. 1998. A short review of precautionary reference points and some proposals for their use in data-poor situations. FAO Fisheries Technical Paper 379.

Chernyavsky, V. I., Bobrov, V. A. and Afanasiev, N. N. 1981. Main productive zones of the Sea of Okhotsk. Izvestia TINRO 105: 20-25 (in Russian).

Chuchukalo, V. I. 2006. Feeding and food relations of nekton and nekton benthos in the Far Eastern Seas. TINRO, Vladivostok. 484 pp.

Dulepova, E. P. 2002. Comparative bioproductivity of the Far East Seas' macroecosystems. TINRO, Vladivostok. 273 pp.

Dulepova, E. P. 2017a. Some results of the study of benthos on the shelf of Western Kamchatka. Powerpoint presentation to the Fourth Surveillance Audit of the Sea of Okhotsk midwater trawl fishery for pollock. TINRO, Vladivostok. 9 pp.

Dulepova, E. P. 2017b. Okhotsk Sea ecosystem structure. Powerpoint presentation to the Fourth Surveillance Audit of the Sea of Okhotsk midwater trawl fishery for pollock. TINRO, Vladivostok. 20 pp.

Dulepova, E. P. and Merzlyakov, A. Yu. 2007. Comparative analysis of the basic components in the southern and northern Okhotsk Sea pelagic subsystems. Izvestia TINRO 148: 23–41 (in Russian).

Fadeyev, N. S. and Wespestad, V. 2001. Review of walleye pollock fishery. Izvestiya TINRO (TINRO Transaction) 128: 75–91 (in Russian).

FAO. 1995. Code of conduct for responsible fisheries. FAO Fisheries Department, Rome.

FAO. 2010. Agreement on port State measures to prevent, deter and eliminate illegal, nreported and unregulated fishing. FAO Fisheries Department, Rome. Vi + 100 pp.

Favorite, F., Dodimead, A. J. and Nasu, K. 1976. Oceanography of the Subarctic Pacific region, 1960–71. International North Pacific Fisheries Commission Bulletin 33. 187 pp.

Federal Fishery Agency (FFA). 2017a. Observer report on Scientific Research undertaken in the Sea of Okhotsk on the FV Captain Kolesnikov from 1 January to 3 April 2017. TINRO, Vladivostok.

Federal Fishery Agency (FFA). 2017b . Observer report on Scientific Research undertaken in the Sea of Okhotsk on the FV Vasily Kalenov from 18 February 2017 to 02 April 2017. TINRO, Vladivostok.

Fournier, D. A., Skaug, H. J., Ancheta, J., Ianelli, J., Magnusson, A., Maunder, M. N., Nielsen, A. and Sibert, J. 2012. AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models. Optimum Methods Software 27: 233–249.

Garcia, S. M. 1994. The precautionary principle: its implications in capture fisheries management. Ocean and Coastal Management, 22: 99–125.

Gunderson, D. R. and Dygert, P. H. 1988. Reproductive effort as a predictor of natural mortality rate. Journal du Conseil International pour l'Exploration de la Mer, 44: 200–209.

Heileman, S. and Belkin, I. 2010. (unpub.) Contributions to the LME (No. 52) report on the Sea of Okhostk. In Sherman, K. and Hempel, G. (Eds) 2008. The UNEP Large Marine Ecosystem Report: a perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies, 182. UNEP. Nairobi, Kenya.

Hønneland, G. 2004. Russian fisheries management: the precautionary approach in theory and Practice. Martinus Nijhoff, Leiden.

Iljinskiy, E. N. and Gorbatenko, K. M. 1994. Main trophic linkages of nekton of the mesopelagic layer of the Sea of Okhotsk. Izvestia TINRO 116: 91–104 (in Russian).

Ilyin O. I., Varkentin, A. I. and Smirnov, A. V. 2016. On one model approach to assessment of state for the stock of walleye pollock (Theragra chalcogramma) in the northern Okhotsk Sea. TINRO Report 186: 107–117.

Intertek. 2013. Russian Sea of Okhotsk mid-water trawl walleye pollock (Theragra chalcogramma) fishery. MSC Public Certification Report. Intertek Moody Marine, Derby, UK. 303 pp.

Ishmukova, I. V. 2004. The multicomponent model of the Okhotsk Sea ecosystem. Electronic Journal "Explored in Russia" http//zhurnal/ape/relarn/ru/article/2004/210pd.

Jamieson, G., Livingston, P. and Zhang, C-I. (Eds) 2010. Report of the Working Group on Ecosystem-Based Management Science and its Application to the North Pacific. PICES Scientific Report 37. 184 pp.

Kachina, T. F. and Sergeeva, N. P. 1978. Spawning stock biomass calculation method for east Sea of Okhotsk pollock. Fishery Journal, 12: 13–14.

KamchatNiro. 2017. Benthos of Northwest Kamchatka. A short report presented to the 4th surveillance audit of the MSC certification of the Sea of Okhotsk midwater trawl fishery for Russian pollock. KamchatNIRO, Petropavlovsk-Kamchatsky. 3 pp.

Kornev, S. I., Varkentin, A. I. and Blokhin, I. A. 2017. Assessment of pollock fishery direct (accidental by-catch and death of animals in fishing gear) and indirect (capture of pollock as potential feeding source) impacts on Steller sea lions in the northern part of the Sea of Okhotsk. KamchatNIRO, Petropavlovsk-Kamchatsky. 57 pp. + Photos and Videos.

Kulik, V. V. 2015. A study of pollock trawling fishery impact on the ecosystem of the Sea of Okhotsk. TINRO, Vladivostok. 126 pp.

Kulik, V. V. 2017. Two Powerpoint presentations on unpublished work in process on trophic relationships in the Sea of Okhotsk, made to the Fourth Surveillance Audit of the Sea of Okhotsk midwater trawl fishery for pollock. (1) ETSO in the north and east parts of the Sea of Okhotsk. (2) Changes of catch-based trophic level in the waters of the coast of Russia in the Region 17. TINRO, Vladivostok.

Kulik, V. V. and Gerasimov, N. N. 2017. A selection and analysis of materials on year-to-year biomass variability and spatial distribution of non-target fish and cephalopod mollusc species in the Sea of Okhotsk. TINRO, Vladivostok. 37 pp.

Kuzin, A. E. 2014. Northern fur seal: monograph. TINRO, Vladivostok. 492 pp.

Kuzin, A. E. 2016. Marine mammals of the Sea of Okhotsk and Kuril Islands (abundance and trophic connections). TINRO, Vladivostok.

Kuznetsov, V. V., Shuntov, V. P. and Borets, L. A. 1993. Food chains, physical dynamics, perturbations, and biomass yields of the Sea of Okhotsk. In K Sherman, L. Alexander and B. D. Gold (eds). Large Marine Ecosystems: Stress, Mitigation, and Sustainability, pp. 69–78. American Association for the Advancement of Science, Washington D.C.

Labay, V. S. and Kochnev, Yu. R. 2008. Long-term changes in the community Nuculana pernula as the indicator of global benthic changes in sublittoral zone of the low-boreal part of the Okhotsk Sea.

Transactions of the Sakhalin Research Institute of Fisheries and Oceanography 10: 173–182 (in Russian).

Lapko, V. V. 1994. Trophic relations in epipelagic ichthyocen of Okhotsk Sea. Abstract of the 3rd Annual Meeting of PICES, Nemuro, Hokkaido, Japan, 15–24 October 1994. p. 28.

Lapko, V. V. and Radchenko, V. I. 2000. Sea of Okhotsk. In Sheppard, C. (ed.) Seas at the Millennium: an Environmental Evaluation, Volume 2, pp. 463–472. Elsevier, New York.

Markina, N. P. and Chernyavsky, V. I. 1984. Quantitative distribution of zooplankton and benthos in the Sea of Okhotsk. Izvestia TINRO 109: 109–119 (in Russian).

Melnik, A. V., Smirnov, A. A. and Baitalyuk, A. A. Undated. Modern principles of resources and pollock fisheries management in Russia. TINRO, Vladivostok.

Melnikov, I. V. and Obraztsov, V. V. 2016. Observer directives for the performance of carrying out scientific research (collection of biological and commercial information) during the pollock season of the Sea of Okhotsk in January–April 2017. TINRO, Vladivostok.

Melnikov, I. V., Smirnov, A. V. and Baitalyuk, A. A. 2004–2009. Principles of resources and pollock fisheries management in Russia. Fisheries legislation reform in Russia. TINRO, Vladivostok.

Melnychuk, M. C., Peterson, E., Elliott, M. and Hilborn, R. 2016. Fisheries management impacts on target species status. Published online at www.pnas.org/cgi/doi/10.1073/pnas.1609915114

Methot, R. D. and Wetzel, C. R. 2013. Stock synthesis: a biological and statistical framework for fish stock assessment and fishery management. Fisheries Research, 142: 86–99.

Ministry of Agriculture. 2017. On the Approval of Fishing Rules for the Far Eastern Fisheries Basin (as last amended on 20 April 2017). Ministry of Agriculture of the Russian Federation Order No. 385 of 21 October 2013. 90 pp. (Amendments: Order 66 of 7 March 2014, Order 485 of 4 December 2014, Order 32 of 4 February 2015, Order 281 of 7 July 2015, Order 510 of 28 October 2015, Order 152 of 19 April 2016, Order 284 of 8 July 2016, Order 188 of 20 April 2017 – the latest at the time of writing)

MRAGS. 2016a. Alaska pollock – Bering Sea–Aleutian Islands. MSC Public Certification Report. 271 pp.

MRAGS. 2016b. Alaska pollock – Gulf of Alaska. MSC Public Certification Report. 180 pp.

Nadtochiy, V. A., Budnikova, L. L. and Bezrukov, R. G. 2007. Some results of benthos appraisal in Russian waters of Far Eastern seas: composition and quantitative distribution (Sea of Okhotsk). TINRO Proceedings, 149: 310–337.

Okunishi, T., Kishi, M. J., Ono, Y. and Yamashita, N. 2007. A lower trophic ecosystem model including iron effects in the Okhotsk Sea. Continental Shelf Research 27: 2080–2098.

Panfilov, A. M., Ponomarev, S. D. and Mitenkova, L. V. 2017. Proceedings of the total allowable catch in areas harvest (catch) of aquatic biological resources in the inland waters of the Russian Federation, in the territorial sea of the Russian Federation, on the continental shelf of the Russian Federation, in the exclusive economic zone of the Russian Federation, Azov and Caspian seas for 2018 (with an environmental impact assessment). Part 2. Fishes of the Far Eastern seas, Volume 2:

61,05 – the Sea of Okhotsk Zone (61.05.1 – the North Okhotsk subarea (herring assessment). Ministry of Agriculture Federal Agency for Fisheries, Federal State Budget for Scientific Institutions (All-Russian Scientific Research Institute of Fisheries and Oceanography), Moscow.

Piatt, J. F., Wetzel, J., Bell, K., DeGange, A. R., Balogh, G., Drew, G., Geernaert, T., Ladd, C. and Byrd, G. V. 2006. Predictable hotspots and foraging habitat of the endangered short-tailed albatross (Phoebastria albatrus) in the North Pacific: implications for conservation. Deep-Sea Research II, 53: 387–398.

Pollock Catchers Association (PCA). 2017a. TAC Planning and Approval Procedure. PCA, Vladivostok.

Pollock Catchers Association (PCA). 2017b. Meeting of the Working Group on monitoring and observation of the Sea of Okhotsk pollock fishery. Vladivostok, 7 December 2017.

Pollock Catchers Association (PCA). 2017c. Overview of the fisheries management system in Russia. As an example of Sea of Okhotsk Pollock fishery. PCA, Vladivostok. 37 pp.

Pollock Catchers Association (PCA) 2017d. Progress Report – 4th Surveillance Audit, September 2017. PCA, Vladivostok.

Pollock Catchers Association (PCA). 2018. Response and supplementary responses to Principle 1 questions for clarification on Sea of Okhotsk pollock. PCA, Vladivostok.

Quinn, T. J. and Deriso, R. B. 1999. Quantitative Fish Dynanics. Oxford University Press. New York. 542 pp.

Radchenko, V. I. 2007. Ecosystem-based principles in contemporary fisheries management on the Russian Far East. presentation delivered at PICES, 16 October 2007.

Radchenko, V. I. 2017. Russian Fisheries Management System performance (the Sea of Okhotsk walleye pollock fishery case study). PCA, Vladivostok. 37 pp.

Radchenko, V. I., Dulepova, E. P., Figurkin, A. L., Katugin, O. N., Ohshima, K., Nishioka, J., McKinnell, S. M. and Tsoy, A. T. 2010. Status and trends of the Sea of Okhotsk region, 2003–2008. In S. M. McKinnell and M. J. Dagg (eds). Marine Ecosystems of the North Pacific Ocean, 2003–2008, pp. 268–299. PICES Special Publication 4. 393 pp.

Savenkov V. V., Pilganchuk, O. A., Shpigalskaya, N. Yu. and Denisenko, A. D. 2017. Sea of Okhotsk pollock differentiation by microsatellite loci: the genetics of populations: progress and prospects. Abstract of materials presented at the International Scientific Conference dedicated to the 80th anniversary of Academician Yu. P. Altukhov (1936–2006) and 45th anniversary of the Yu. P. Altukhov Population Genetics Laboratory, General Genetics Institute of the Russian Academy of Sciences, April 2017. Zvenigorod Biological Station, Biological Department of Moscow State University.

Sharov, A. 2016. Analysis of the Sea of Okhotsk pollock stock assessment model and its effectiveness in addressing all major sources of uncertainty. Report to Pollock Catchers Association, Vladivostok. 36 pp.

Shuntov, V. P. 1972. Seabirds and biological structure of the ocean. Dalnevostochnoe Kniznoyelzdatelstvo Press, Vladivostok.

Shuntov, V. P. 1986. State of knowledge on perennial cycling of fish population size of the Far Eastern Seas. Sea Biology 3: 9–14.

Shuntov, V. P. 1998a. Present state of the Okhotsk Sea biological resources. Rybnoe Khozyaistvo 4: 40–42.

Shuntov, V. P. 1998b. Reorganizations in the Okhotsk Sea pelagic ecosystems. Real fact. Rybnoe Khozyaistvo 1: 25–27.

Shuntov, V. P. 2001. The biology of Russian Far Eastern seas: monograph, Volume 1. TINRO, Vladivostok. 580 pp.

Shuntov, V. P. and Dulepova, E. P. 1996. Biota of Okhotsk Sea: structure of communities, the interannual dynamics and current status. PICES Scientific Report 6: 263–271.

Shuntov, V. P., Volkov, A. F., Temnykh, O. S. and Dulepova, E. P. 1993. Pollock in the Far East seas ecosystems. TINRO, Vladivostok. 426 pp.

Sissenwine, M. P. and Shepherd, J. G. 1987. An alternative perspective on recruitment overfishing and biological reference points. Canadian Journal of Fisheries and Aquatic Sciences 44: 913–918.

Smirnov, A. V., Kulik, V. V., Ovsyannikov, E. E. and Sheybak, A. Yu. 2014. Development of an observer program for monitoring of pollock trawl fishery in North Sea of Okhotsk. Assessment of pollock trawl fishery impact on Sea of Okhotsk ecosystem (scientific and technical deliverables). TINRO, Vladivostok. 30 pp.

Smirnov, A. V., Leonov, V. Ya. and Kravchenko, N. E. 2016. Results of the State monitoring of pollock by group of observers in the Sea of Okhotsk, January 1 — March 31, 2016. TINRO, Vladivostok. 114 pp.

Smirnov, A. V., Leonov, V. Ya., Kravchenko, N. E., and Raklistova, M. M. 2017. Results of the pollock fishery monitoring activities performed by observers in the Sea of Okhotsk during January 1–April 9, 2017. TINRO, Vladivostok. 121 pp.

Sorokin, Yu. I. and Sorokin, P. Yu. 1999. Production in the Sea of Okhotsk. Journal of Plankton Research 21: 201–230.

Stupachenko, I. 2018. Russian Fishery Company upping production of frozen-at-sea pollock fillets. SeafoodSource 5 February 2018. https://www.seafoodsource.com/news/supply-trade/russian-fishery-company-upping-production-of-frozen-at-sea-pollock-fillets?utm_source=informz&utm_medium=email&utm_campaign=newsletter&utm_content=newsletter

Thompson, W. F. and Bell, F. H. 1934. Biological statistics of the Pacific halibut fishery. Effect of changes in intensity upon total yield and yield per unit of gear. Report of the International Fisheries (Pacific halibut) Commission: 8–49.

TINRO. 2017a. West Kamchatka Shelf Greenland halibut harvest control rule analysis. TINRO Report, Vladivostok. 19 pp.

TINRO. 2017b. Information about pollock stock survey programs in the Sea of Okhotsk. TINRO Report, Vladivostok. 9 pp

TINRO. 2017c. Commercial bottom trawl GLM catch rate analysis. T INRO Centre, Vladivostok.

UNCLOS. 1982. United Nations Convention on the Law of the Sea. United Nations, New York. 208 pp.

UNCBD. 1992. Convention on Biological Diversity. United Nations, New York. 28 pp.

UNFSA. 1995. Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. United Nations, New York.

Valdermarsen, J. W., Jørgensen, T. and Engås, A. 2007. Options to mitigate bottom habitat impact of dragged gears. FAO Fisheries Technical Paper 506. 29 pp.

Varkentin, A. I. and Ilyin, O. I. 2014. Analysis of efficiency of the pollock fishery strategy in the north Sea of Okhotsk and uncertainty considerations for pollock stock assessment and TAC planning in the north Sea of Okhotsk. Research Report Kamchatka Research Institute of Fisheries and Oceanography. KamchatNIRO, Petropavlovsk-Kamchatsky. 71 pp.

Varkentin, A. I. and Ilyin, O. I. 2015. Analysis of efficiency of the pollock fishery strategy in the north Sea of Okhotsk and uncertainty considerations for pollock stock assessment and TAC planning in the north Sea of Okhotsk. Research Report Kamchatka Research Institute of Fisheries and Oceanography. KamchatNIRO, Petropavlovsk-Kamchatsky. 92 pp.

Varkentin, A. I. and Ilyin, O. I. 2016. Analysis of efficiency of the pollock fishery strategy in the north Sea of Okhotsk, and uncertainty considerations for pollock stock assessment and TAC planning in north Sea of Okhotsk. Research Report Kamchatka Research Institute of Fisheries and Oceanography. KamchatNIRO, Petropavlovsk-Kamchatsky. 77 pp.

Varkentin, A. I. and Ilyin, O. I. 2017. Analysis of efficiency of the pollock fishery strategy in the north Sea of Okhotsk, and uncertainty considerations for pollock stock assessment and TAC planning in the north Sea of Okhotsk. Research Report Kamchatka Research Institute of Fisheries and Oceanography, Petropavlovsk-Kamchatsky. 78 pp.

Vasilyev, D. 2005 Key aspects of robust fish stock assessment: M. VNIRO Publishing, Moscow. 105 pp.

Zverkova, L. M. 2003. Alaska pollock. Biology, stock status. TINRO, Vladivostok. 248 pp.

Appendices

Appendix 1a – MSC Principles and Criteria

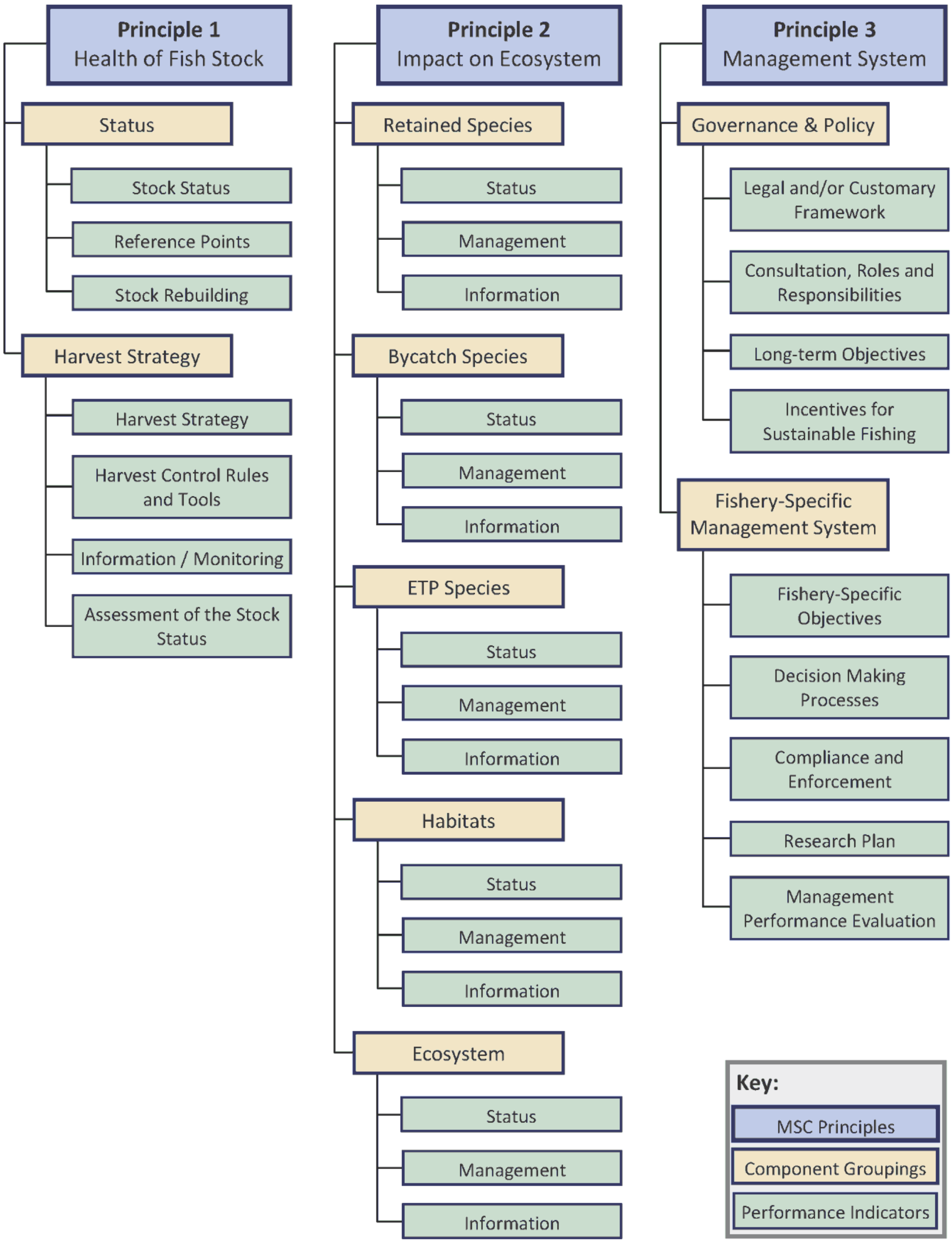


Figure A1. Graphic of MSC Principles and Criteria.

Below is a much-simplified summary of the MSC Principles and Criteria, to be used for overview purposes only. For a fuller description, including scoring guideposts under each Performance Indicator, reference should be made to the full assessment tree, complete with scores and justification, contained in **Appendix 1.1** of this report. Alternately a fuller description of the MSC Principles and Criteria can be obtained from the MSC website (www.msc.org).

Principle 1

A fishery must be conducted in a manner that does not lead to overfishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Intent:
The intent of this Principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short-term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Status
- The stock is at a level that maintains high productivity and has a low probability of recruitment overfishing.
- Limit and target reference points are appropriate for the stock (or some measure or surrogate with similar intent or outcome).
- Where the stock is depleted, there is evidence of stock rebuilding and rebuilding strategies are in place with reasonable expectation that they will succeed.

Harvest strategy / management
- There is a robust and precautionary harvest strategy in place, which is responsive to the state of the stock and is designed to achieve stock management objectives.
- There are well defined and effective harvest control rules in place that endeavour to maintain stocks at target levels.
- Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.
- The stock assessment is appropriate for the stock and for the harvest control rule, takes into account uncertainty, and is evaluating stock status relative to reference points.

Principle 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends

Intent:
The intent of this Principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

Retained species / Bycatch / ETP species
- Main species are highly likely to be within biologically based limits or if outside the limits there is a full strategy of demonstrably effective management measures.
- There is a strategy in place for managing these species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.

- Information is sufficient to quantitatively estimate outcome status and support a full strategy to manage main retained / bycatch and ETP species.

Habitat & Ecosystem

- The fishery does not cause serious or irreversible harm to habitat or ecosystem structure and function, considered on a regional or bioregional basis.
- There is a strategy and measures in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.
- The nature, distribution and vulnerability of all main habitat types and ecosystem functions in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery and there is reliable information on the spatial extent, timing and location of use of the fishing gear.

Principle 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Intent:

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

Governance and policy

- The management system exists within an appropriate and effective legal and/or customary framework that is capable of delivering sustainable fisheries and observes the legal & customary rights of people and incorporates an appropriate dispute resolution framework.
- Functions, roles and responsibilities of organisations and individuals involved in the management process are explicitly defined and well understood. The management system includes consultation processes.
- The management policy has clear long-term objectives, incorporates the precautionary approach and does not operate with subsidies that contribute to unsustainable fishing.

Fishery-specific management system

- Short- and long-term objectives are explicit within the fishery's management system.
- Decision-making processes respond to relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner.
- A monitoring, control and surveillance system has been implemented. Sanctions to deal with non-compliance exist and there is no evidence of systematic non-compliance.
- A research plan provides the management system with reliable and timely information and results are disseminated to all interested parties in a timely fashion.

Appendix 1.1 Performance Indicator Scores and Rationale

PI 1.1.1 Stock Status

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met?	Y	Y	Y
	Justification	Spawning stock biomass (SSB) was below B_{LIM} (2583 kt) during the 1960s but steadily rose to above B_{LIM} and also above B_{TR} (5089 kt) by the mid-1980s where it remained until the late 1990s. Then, as a consequence of excessive fishing pressure, it declined to below B_{LIM}. After 2001, however, and in response to a lowering of fishing mortality, SSB steadily increased again to exceed B_{TR} (by 2009). After that, it declined for a few years, but since 2014, it has once again been increasing owing to maturation of the strong 2011 year class. Overall, SSB has been above B_{TR} and thus B_{LIM} with 95% probability since 2009. The two-year stock projections undertaken as part of the 2018 TAC-setting process indicate that, given TAC_{2017} = 967 kt, there is negligible probability that the SSB by the beginning of 2019 (SSB_{2019}) will decline below B_{LIM} assuming a 2018 catch below ~ 1 100 kt. There is therefore a high degree of certainty that spawning stock biomass is above B_{LIM}, the point below which recruitment would be impaired, so SIa meets SG60, SG 80 and SG100.		
b	Guidepost		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		Y	Y
	Justification	Spawning stock biomass (SSB) was well below B_{TR} during the 1960s and steadily rose to above B_{TR} (5089 kt) by the mid-1980s where it remained until the late 1990s. Then, as a consequence of excessive fishing pressure, it declined to below B_{LIM}. After 2001, hoswever, and in response to a lowering of fishing mortality, SSB steadily increased to above B_{TR} (by 2009). After that, it declined for a few years, but since 2014, it once again started to increase owing to the maturation of the strong 2011 year class. SSB has been above B_{TR} with 95% probability since 2009, which is almost one generation time (T_{GEN} = 9.8 years). Over the longer term (to 2026), assuming the same recruitment patterns as over the past 10 years and fishing mortality set according to the HCR, SSB is expected to first increase and then to stabilize above B_{TR} with >95% probability. There is therefore a high degree of certainty that SSB has been above its target reference point over recent years, so SIb meets SG60, SG 80 and 100.		
References		Intertek (2013), Varkentin and Ilyin (2017)		

Stock Status relative to Reference Points			
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**
Target reference point	$B_{TR} = B_{MSY}$ $F_{TR} = F_{MSY}$	5089 kt 0.24	B_{2016}/B_{TR} = 5991/5089 = 1.18 F_{2016}/F_{TR} = 0.22/0.24 = 0.92
Limit reference point	$B_{LIM} = B_{LOSS}$ $F_{LIM} = F_{35\%}$	2583 kt 0.31	B_{2016}/B_{LIM} = 5991/2583 = 2.32 F_{2016}/F_{LIM} = 0.22/0.31 = 0.71

PI 1.1.1	**The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing**			
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				

PI 1.1.2 Reference Points

PI 1.1.2		Limit and target reference points are appropriate for the stock		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated.	
	Met?	Y	Y	
	Justification	Several biomass and fishing mortality reference points have been estimated for Sea of Okhotsk pollock. The intent of management is to use B_{MSY}-based reference points, but in cases where these cannot be determined, to use B_{MSY}-based proxies. Although target proxies were used prior to 2014, based on a 2012 review of reference points, B_{MSY}-based target reference points have been used since then. Biomass limit (B_{LIM}) and target (B_{TR}) reference points of 2583 kt and 5089 kt, respectively, have been established based on stock dynamics modelling informed by the stock assessment. Fishing mortality limit (F_{LIM}) and target (F_{TR}) reference points of 0.31 and 0.24, respectively, have also been established. Also, a minimum fishing mortality (F_0 = 0) has been established to allow scientific research fishing when the stock is below B_{LIM}. Therefore, the reference points are not generic, being specific to SOO pollock, are appropriate, consistent with the MSC CR1.3 guidelines, and are being estimated. SIa meets SG60 and SG80.		
b	**Guidepost**		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?		Y	Y
	Justification	A B_{LIM} of 2583 kt was chosen as the lowest estimated biomass (2001) in the time-series modelled in the most recent stock assessment (1963–2016). Stock assessments since establishment of this reference point in 2012 provide evidence that the stock has recovered well from that biomass level. The B_{LIM} is 51% of B_{MSY}, consistent with the MSC CR 1.3 guideline. It is considered that B_{LIM} is above the point at which there is an appreciable risk of impairing reproductive capacity. SIb meets SG80. Prior to 2012, no adjustment was made to provide additional precaution in B_{LIM}. During the 2012 review of reference points, B_{LIM} was estimated based on 20%B_0 but with an adjustment for added precaution, with the new B_{LIM} being 3416 kt. Simulation work conducted in 2014 indicated that that procedure was leading to high sensitivity of the TAC to small fluctuations in biomass around B_{TR}, so the limit reference point was re-established at B_{LOSS} (lowest assessed biomass in 2001), but again with added precaution to account for uncertainty: $B_{LIM} = B_{LOSS} \times \exp(t \times SE)$ = 2583 kt. Therefore, the limit reference point includes additional consideration of precautionary issues. The 2016 review of reference points confirmed the current B_{LIM}, and SIb meets SG80 and SG100.		
c	**Guidepost**		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.

PI 1.1.2		Limit and target reference points are appropriate for the stock		
	Met?		Y	N
	Justification	The previous B_{TR} of 5096 kt was a proxy for B_{MSY} based on long-term average biomass given the concerns with the model-based estimate. During a review of reference points in 2012, it was agreed to adopt B_{MSY} based on a stock model employing a Ricker stock–recruitment relationship as B_{TR} (5089 kt); this has been used as the B_{TR} since 2014 to inform TAC-setting. The B_{TR} is consistent with the previous target. A review of the reference points in late 2016 confirmed the model-based estimate of B_{MSY} as the biomass target reference point, so SIc meets SG80. Other than the ramping down of fishing mortality as B_{LIM} is approached, there is no explicit consideration of precautionary issues such as the ecological role of the species in the biomass target reference point. The focus of the harvest strategy is the conservation and protection of pollock with less regard for the potential impact of fishing on the rest of the ecosystem. Further, as per recommendations of an external expert, the uncertainty in the reference points is to be considered in the next review. Although the harvest strategy could be considered precautionary in this regard, evidence is outstanding that it is, so SIc does not meet SG100.		
d	Guidepost		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		Not relevant	
	Justification	The Sea of Okhotsk pollock is not a low trophic level species. Numerous studies demonstrate its trophic status as the dominant pelagic top predator in the SOO ecosystem. It is not in Box CB1 of CR1.3 and does not meet the criteria of CB2.3.13b. Its mean age at maturity is 5 years and it has a generation time of just less than 10 years, and fish as old as 20 years have been observed in the catch. SId is not scored.		
References		Lapko (1994), Caddy (1998), Quinn and Deriso (1999), Sorokin and Sorokin (1999), Aydin *et al.* (2002), Heileman and Belkin (2010), Intertek (2013), Varkentin and Ilyin (2017)		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				

PI 1.1.3 Stock Rebuilding

Not scored because PI 1.1.1 scores >80

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	**Guidepost**	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Y	Y	Y
	Justification	A harvest strategy consists of a harvest control rule (HCR) informed by monitoring and assessment, which elicit a defined management response. The strategy for SOO pollock contains all these elements and is similar to strategies developed for other (well managed) stocks elsewhere in the world. The harvest strategy is responsive to the state of the stock through both short- and long-term projections that evaluate the achievement of objectives under assessed uncertainties. It is designed to achieve these objectives as reflected in target and limit reference points. There is good evidence that TACs are based on the scientific advice and that catch is maintained within the TACs, so SIa meets SG60, SG80 and SG100.		
b	**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 stocks at target levels.
	Met?	Y	Y	N

<table>
<tr><th colspan="2">PI 1.2.1</th><th colspan="3">There is a robust and precautionary harvest strategy in place</th></tr>
<tr><td></td><td>Justification</td><td colspan="3">The harvest strategy has been used to provide TAC advice for the years 2012–2017. Evidence that the harvest strategy is achieving its objectives is provided in the F/SSB phase plot. The results of the most recent stock assessment (Varkentin and Ilyin 2017) indicate that fully recruited fishing mortality (F) was above its target (F_{TR} = F_{MSY}) until 2013 and was reduced to below target by 2014. Since then, the fishing mortality has been maintained at or below F_{TR}. In 2009, SSB was just above B_{TR} and significantly higher until 2012, after which it decreased towards B_{TR}. Since 2015, SSB has been increasing and it is projected to remain at its target until at least 2020. The testing of the harvest strategy and associated HCR consists of two elements, both of which indicate robust performance under the assessed starting stock conditions and uncertainties. The two-year projections undertaken as per the HCR show the risk of fishing mortality increasing above F_{LIM} and SSB decreasing below B_{LIM} during the projection period over a range of assumed TACs. Greater uncertainty in assessed stock conditions results in higher risk for a given TAC and has the effect of reducing the TAC. Ten-year projections have been added since first MSC certification in 2013, confirming the robustness of the harvest strategy to assessed stock conditions and uncertainties over the longer term. They indicate that as long as the HCR is followed, there is 95% probability that SSB will be maintained above both B_{LIM} and B_{TR}. Thus far, the HCR has not been tested to determine its performance assuming a depleted stock in order to judge stock recovery times to B_{TR}. However, TINRO confirmed that if the 10-year projection indicates that the HCR is not sufficiently precautionary, it would be updated. Evidence of this institutional response was available for the West Kamchatka Shelf Greenland halibut stock, which uses a HCR similar to that of SOO pollock. The HCR for that stock was deemed not suitably precautionary and needing change, so it was modified based on a simulation analysis and implemented to set the 2018 TAC, evidence that the management system responds to changes in the strategy as needed. Although the SOO pollock harvest strategy has not been fully tested (e.g. through MSE or a similar robust exercise), the testing that is being conducted and the evidence from the stock assessments indicates that it is achieving its objectives. SIb meets SG60 and 80, but not 100.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td>Monitoring is in place that is expected to determine whether the harvest strategy is working.</td><td></td><td></td></tr>
<tr><td>Met?</td><td>y</td><td></td><td></td></tr>
<tr><td>Justification</td><td colspan="3">Monitoring is in place (i.e. annual stock assessment and associated monitoring programmes) to provide biomass and fishing mortality indicators to inform the strategy's HCR and to allow determination of whether or not the strategy is working. SIc meets SG60.</td></tr>
<tr><td rowspan="2">d</td><td>Guidepost</td><td></td><td></td><td>The harvest strategy is periodically reviewed and improved as necessary.</td></tr>
<tr><td>Met?</td><td></td><td></td><td>Y</td></tr>
</table>

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Justification	The components of the harvest strategy are reviewed and improved as necessary through an annual multi-stage internal and external review process. The HCR is reviewed at least every five years and improved as necessary. This review should next take place during 2018 as part of the 2019 TAC-setting process. Since first certification of the stock in 2013, long-term (10-year) projections have been added to the strategy to ensure achievement of its objectives. Further, evidence from another stock (i.e. West Kamchatka Shelf Greenland halibut) indicates that if the strategy were deemed to be insufficiently precautionary, it would be modified to ensure that it is. SId meets SG100.		
e	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	The Sea of Okhotsk pollock is not a species of shark.		
References		Intertek (2013), Varkentin and Ilyin (2014, 2015, 2016, 2017), Sharov (2016), PCA (2017b), TINRO (2017a)		
OVERALL PERFORMANCE INDICATOR SCORE:				95
CONDITION NUMBER (if relevant):				

PI 1.2.2 Harvest Control Rules & Tools

PI 1.2.2		**There are well defined and effective harvest control rules in place**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Y	Y	
	Justification	The harvest control rule (HCR) is similar to HCRs developed in other (well managed) fisheries elsewhere in the world. It consists of determination of a TAC based on the status of fishing mortality and spawning biomass in relation to limit and target reference points (B_{LIM}, B_{TR}, F_{LIM} and F_{TR}) as well as to F_0, a value set to allow scientific fishing below B_{LIM}. When stock biomass is above B_{TR}, fishing mortality is set at F_{TR}. Fishing mortality is reduced as stock levels decrease between B_{LIM} and B_{TR}, whereas below B_{LIM}, it is set at F_0. The latter allows for scientific fishing while the commercial fishery is closed. The HCR works in concert with the results of the annual stock assessment as part of a two-year projection process in which the current stock biomass along with the upcoming year's TAC is used to project the following year's TAC. The upcoming year's TAC was established by the previous decision process, using the HCR; updates to that TAC are possible based on new survey and fishery observations. The HCR is used to set fishing mortality and hence to establish the TAC for the second year of the projection. The projection is done in a probabilistic manner by sampling the uncertainty in the current year's age 3+ numbers at age, age 2 recruitment during the previous 10 years, and fishery selectivity at age. If the joint probability of fishing mortality and biomass being above and below F_{LIM} and B_{LIM}, respectively, is <5% (one-tailed test), then the results using the HCR can be adopted. Otherwise, the fishing mortality and hence the TAC in the second year of the projection are adjusted down such that the probability that projected fishing mortality and biomass being below and above F_{LIM} and B_{LIM}, respectively, is <5%. This approach ensures that biomass does not fall below B_{LIM}. There is therefore a well-defined HCR in place that is a key part of the harvest strategy and which is designed to ensure that fishing mortality is reduced as B_{LIM} is approached. SIa meets SG60 & 80.		
b	**Guidepost**		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	Met?		Y	N

PI 1.2.2		There are well defined and effective harvest control rules in place		
	Justification	By design and through use of stock assessment outputs, the HCR takes the main uncertainties into account. It allows for the F_{TR} only when biomass is at or above B_{TR} and reduces fishing mortality to near zero when biomass declines from B_{TR} to B_{LIM}. This allows for a precautionary reduction in fishing mortality attributable to the heightened risk of crossing the unknown "true" value of B_{LIM} as a consequence of uncertainty in understanding pollock stock dynamics. The 5% criterion is considered a strong precautionary feature of the HCR in ensuring that biomass does not fall below B_{LIM} and is kept above B_{TR} with a high degree of certainty. To estimate uncertainty in the TAC projections, non-parametric bootstrap sampling of the assessment-model-derived residuals associated with the catch-at-age and stock abundance indices (e.g. CPUE and survey indices) is used in repeated assessment model runs (>100) to characterize uncertainty in the projection inputs (see Section 3.5). Parametric bootstrapping of the latter (current year's age 3+ numbers at age, age 2 recruitment based on the 10 years prior to the projection period and fishery selectivity at age coefficients) is undertaken in repeated projection runs (>100) to characterize the uncertainty in the projections. Greater assessment uncertainty translates into greater uncertainty in the projection inputs which has the effect of making the slope of the risk curve more gradual. This would trigger the 5% criterion of $B<B_{LIM}$ at a lower range of the second year's TAC. In this manner, greater uncertainty in the assessment translates to lower advised TACs. As and when the uncertainty in the assessment inputs change, the updated estimates of uncertainty are incorporated into the HCR and hence the TAC advice. SIb meets SG80. It could be argued that the HCR by design can address a wide array of uncertainties. However, the current formulation is focused on the management of pollock and does not consider the wider implications and uncertainties of fishing mortality on the ecosystem. Further, the 2016 review of the stock assessment made recommendations for enhancements which have yet to be addressed and may identify additional sources of uncertainty. Also, uncertainty in weights and maturity at age are not as yet considered. SIb does not meet SG100.		
c	Guidepost	There is some evidence that tools used to implement harvest control rules 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 harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
	Met?	Y	Y	Y
	Justification	There is a suite of regulatory tools used to implement the TAC produced by the HCR. This includes catch quotas allocated to fleet sectors, gear and mesh regulations, and time/area closures, similar to management efforts elsewhere in the world. Although discarding of juvenile pollock has been a concern in the past, efforts to control it since about 2007 appear to have been effective. All these tools are considered to be appropriate and effective at controlling fishing mortality. Also, the favourable comparison of approved TAC with reported catch is evidence that the tools are effective at controlling fishing mortality. Further, the favourable comparison of science advice and approved TACs indicates that science advice is followed closely by fishery decision-makers. SIc meets SG60 & 80. The F/SSB phase plot provides an indication that the tools in use are effective in achieving the exploitation levels required under the HCR. Fully recruited fishing mortality (F) was above the target rate (F_{TR} = F_{MSY}) until 2013 but dropped to below target by 2014. Since then, the fishing mortality has been maintained at or below F_{TR} by the tools of the HCR. SIc meets SG100.		
References		Intertek (2013), Varkentin and Ilyin (2014, 2015, 2016, 2017), Sharov (2016), PCA (2017b), TINRO (2017a)		

PI 1.2.2	**There are well defined and effective harvest control rules in place**
OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	

PI 1.2.3 Information/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 stock structure, stock productivity and fleet composition is available to support the harvest strategy.	**Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Y	Y	Y

	Justification	Intertek (2013) provide a review of studies conducted on stock structure by Russian and Japanese scientists since the 1970s. The conclusion is that the northern SOO pollock stock is a metapopulation consisting of several spawning components. More recent genetic work has corroborated this conclusion. The spawning distributions and timings of each component are well described as are the seasonal migrations of each group around the Sea. There is some debate as to the status of pollock in East Sakhalin, but this component is not included in the UoC. A wide range of data is available on different features of stock productivity of SOO pollock, including information on age and growth processes, on maturity and fecundity. These data have been and are still routinely collected on surveys and observed fishing trips, and summaries of the data are produced each year as part of the annual stock assessment process. Overall, the number of observations is large. In terms of growth studies, during the years 1996–2003, a transition from scales to otoliths was made in age determination, with comparisons between the two readings showing no problems at least up to age 6. Sources of recruitment variation have been the subject of research over the years, with both Beverton & Holt and Ricker stock–recruitment relationships employed in assessment models. Until 2014, a stock–recruitment relationship was attempted which included age 2 pollock numbers as a function of SSB, mean annual Wolf's number (index of sunspot activity), ice coverage and gross zooplankton weight. This relationship explained 74% of the variability in recruitment, relative to about 7% using Beverton & Holt and Ricker models. However, the relationship has not been pursued since 2014 because it resulted in underestimates of projected stock biomass. There is general understanding that environment and specifically large zooplankton influence pollock recruitment, but there has been no more recent formal analysis of this. Estimates of natural mortality (M) are based on life history parameters, specifically the gonad index (WGSI) for females at maturity state IV. The annual indices for the period 1996 to present are averaged, then used in the equation of Gunderson and Dygert (1988) to provide a long-term estimate of M. This estimate is taken to be representative of M for ages 6–8. The method of Blinov (1977) is then used to estimate the pattern of M across ages. Hence, estimates of M used in the stock assessment have a basis in the life history observations of SOO pollock. Several indices of stock abundance are available for SOO pollock, ichthyoplankton (1972–present), trawl (1998–present), acoustic (1998–present), ecosystem (1995–2008) and commercial catch rate (GLM: 2001–present; observer: 2009–present). The design and methodologies used to analyse the data from these surveys have been considered by TINRO and KamchatNIRO since their inception. The data yield trends in pollock stock abundance since the early 1970s (about 4.6 pollock generations). There are a number of sources of information on the composition of the SOO fishing fleets. These include the FFA vessel licensing system, logbooks and FSB reporting requirements of at-sea activities, scientific observers and fishery inspectors. Further, VMS provides accurate information on fishing location, which supplements that found in the logbooks. Fishery removals are monitored (100% since 2010) by FSB inspectors aboard catch and catcher-processor vessels. The age/size composition of the catch is monitored by at-sea observers and scientific fishing. A 2017 evaluation of observer coverage determined that current levels are adequate to address target species requirements. In terms of other data, a comprehensive array of information exists on the physical and biological oceanography and the ecosystem of the Sea of Okhotsk. Such data are collected routinely on the surveys noted above, are reported in such media as PICES, and are an important supplement to the pollock assessment information. In summary, there is a comprehensive range of information on pollock stock structure, productivity and abundance since at least the early 1970s. Fleet composition and fishery removals data are available to support the harvest strategy. Ecosystem monitoring of the

PI 1.2.3		Relevant information is collected to support the harvest strategy		
		Sea of Okhotsk through the TINRO/KamchatNIRO survey programmes provide a wide range of environmental and other data not directly related to the current harvest strategy but are used in studies of pollock stock productivity. SIa meets SG60, 80 and 100.		
b	Monitoring			
	Guidepost	Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock 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?	Y	Y	N

	Justification	Looking at **stock abundance**, from 1972 to 2010, KamchatNIRO conducted a winter/spring ichthyoplankton survey on the West Kamchatka shelf and TINRO conducted a winter/ spring ichthyoplankton survey covering the whole northern Sea of Okhotsk from 1984. The surveys provide the annual assessment with indices of spawning biomass over 4.6 pollock generations. Since 1998, the TINRO ichthyoplankton survey has been accompanied by trawl sampling. In the first certification of the fishery, it was noted that some of the data from this survey were adjusted for the abundance of pollock observed above the trawl based on echosounder traces. Subsequent statistical analysis concluded that the survey index trend without the adjustment was more consistent with the stock biomass trend estimated by the 2017 assessment. The model did not fit the high voluminosity adjustment (VA)-adjusted survey biomass indices in the latter part of the time-series, suggesting limited influence of those data on the assessment. Since 1998, the TINRO survey has also been accompanied by acoustic monitoring. Considerable effort has been spent on standardizing the design and protocol of that survey, which now provides an acoustic index to the stock assessment. During the period 1995–2008, TINRO conducted an autumn ecosystem trawl survey using the same design and protocol as that used in the TINRO winter/spring survey. That survey was designed to monitor broader changes in ecosystem biodiversity and environmental conditions and provides the stock assessment with an additional index of total biomass. A standardized (GLM) catch rate index is available since 2001 and an additional catch rate index, based on an observed index fleet, is available since 2009, both of which are used in the stock assessment. Monitoring of **fishery removals** is conducted by the FSB's Coastguard aboard catcher and catcher-processor vessels. Landings from the fishery are verified by those inspectors, who are mandated by Russian Law to be aboard the transshipment vessels. Also, when a vessel enters and leaves a subzone, there is mandatory inspection. The inspectors are responsible for verifying the weight of landings delivered by the catcher-processor to the vessel used for transshipment. Verification of the landings and transshipments has been 100% since 2010. Unobserved catch, particularly the discarding of juveniles, had been an issue during the 1990s and early 2000s, when there were multiple violations of the fishery regulations such as young fish discards, concealment of harvests, and fishing activities in prohibited areas and periods, which resulted in TAC overages of the order of 15–20% per year. Owing to changes in markets, monitoring, regulations, enforcement and indeed the stock, however, discarding has been greatly reduced, a situation that has continued to the present. Scientific observers (managed by TINRO) are deployed to the catcher and catcher-processor vessels to collect information on the composition of the catch, including discards of directed species and bycatch species. The observers record information on length composition of catch by species, weight/length data, gut contents, sex and maturity stages of pollock and other relevant observations. The fishery is targeted, with ~95% of the catch being pollock. The seasonal cycle of pollock and fleet movement around the SOO allows biological and catch data to be collected throughout the fishing season with a limited number of scientific observers. Since 2007, the number of observers engaged in the fishery has ranged from 10 to 21; PCA has committed to increasing this to as many as 22 in 2018 (and note that 23 operated in 2018). An analysis of the spatial coverage of the fishery conducted in 2017 indicated that the core areas were well sampled by observers, >90% of fishing activity taking place with at least one observer on one vessel in the core area. When FSB inspectors are included, overall coverage ranges from 13.9% to 23.1%, in line with that in other jurisdictions. An analysis of optimal observer coverage rates indicated that 20–22 observers would be needed to address both target and non-target species requirements. An Observer Working Group has been established that coordinates the training of new observers and facilitates appropriate allocation of observers to vessels throughout the fishing seasons. The research institutes also undertake scientific fishing. Vessels owned and operated by the scientific institutes fish as do commercial vessels against a specific share of the annual TAC

<table>
<tr><td colspan="2">PI 1.2.3</td><td colspan="3">Relevant information is collected to support the harvest strategy</td></tr>
<tr><td></td><td></td><td colspan="3">and collect data similar to that of the observers. Since 2008, the institutes have maintained the operation of this fleet through quota share provide by the industry. About 80% of catch composition information comes from scientific observers and 20% from scientific fishing.

In summary, fishery removals and stock abundance are monitored with sufficient frequency to support the harvest control rule. The stock assessment has been modified such that observation uncertainty in each input dataset is now explicitly estimated. This uncertainty is taken into account in short- and long-term projections of the harvest control rule. SIb meets SG60 & 80. All information required by the HCR is monitored with high frequency and there is good understanding of inherent uncertainties in the information and growing awareness of the robustness of assessment and management to this uncertainty. Although sampling is sufficient to meet the needs of the harvest control rule, it cannot be said to be at a high degree of certainty, so SIb does not meet SG100.</td></tr>
<tr><td rowspan="4">c</td><td colspan="4">Comprehensiveness of information</td></tr>
<tr><td>Guidepost</td><td></td><td>There is good information on all other fishery removals from the stock.</td><td></td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">The other main source of pollock catch is the coastal Danish seine fishery on the West Kamchatka shelf, which takes place primarily during the annual pre-spawning and spawning periods. During the years 2006–2016, pollock landings of that fishery first rose from 5.9% to a maximum of 9.0% in 2012 of the total catch of the northern SOO stock, but declined back to 5.5% by 2016. The at-sea observer coverage of the Danish seine catch is lower than that of the much larger directed pollock trawl fishery owing to difficulties in placing observers on these relatively small vessels. The data collected are used to construct annual Danish seine fishery catch at age for incorporation into the stock assessment. The catch is dominated by the same age/size groups as in the directed pollock fishery, but with a lesser abundance of juveniles, ranging from 2 to 9% of the catch depending on season (Intertek 2013). There are no pollock discards in the fishery and the entire catch is processed. Given the relatively small scale (5.5% of the total pollock fishery catch in 2016) of the fishery, however, it is considered that fishery removals are well monitored and sampling is sufficient to characterize their age/size composition. SIc meets SG80.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Blinov (1977), Kachina and Sergeeva (1978), Intertek (2013), Gunderson and Dygert (1988), Smirnov et al. (2014, 2017), Varkentin and Ilyin (2014, 2015, 2016, 2017), Acoura (2015, 2016, 2017), Kulik and Gerasimov (2017), PCA (2017b, 2018), Savenkov et al. (2017), TINRO (2017b, 2017c)</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>90</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td></td></tr>
</table>

PI 1.2.4 Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		Y	N
	Justification	Prior to 2010, assessments of SOO pollock were based on direct enumeration (biostatistical method) of spawning stock biomass using the winter/spring ichthyoplankton/trawl surveys in each subzone. Since 2010, the “Synthesis” statistical catch-at-age model has replaced the biostatistical method as the basis for management advice. That assessment estimates stock status relative to reference points, which is used to inform a HCR, so SIa meets SG80. The Synthesis model has been tested using simulated data to ensure that it assesses stock dynamics adequately. The model has undergone a number of enhancements with the most recent (the forecast for 2018) being the most developed. It takes account of the major features of the stock and the fishery and is supported by a number of additional indices of abundance that were introduced first in the 2015 assessment. However, a number of improvements have been recommended by both Sharov (2016), specifically related to ujncertainties, and by the various national assessment quality-control mechanisms/groups on both structural and data components that require exploration and evaluation. Until those are done, SIa does not meet SG100.		
b	Guidepost	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	The Russian Synthesis model is similar to statistical catch at age formulations used elsewhere and estimates stock indicators such as spawning biomass and fishing mortality relative to either analytically derived or defined reference points. SIb meets SG60.		
c	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?	Y	Y	Y

PI 1.2.4		**There is an adequate assessment of the stock status**		
	Justification	Estimation of the uncertainty in historical estimates of stock and fishery dynamics has not changed since the evaluation made by Intertek (2013). It involves non-parametric bootstrap sampling of the residuals associated with the catch-at-age and stock abundance indices (e.g. CPUE and survey indices), adding these to the model-predicted data and re-running the assessment with the 'new' input datasets. This process is conducted multiple times to allow characterization of the uncertainty in the stock indicators. An international, independent review of the assessment methodology and in particular of how the main (and some minor) sources of uncertainty are being taken into account was conducted in 2015. It determined that the characterization of uncertainty is one of the most frequent standard approaches used by stock assessment scientists and entirely appropriate by international best standards. The review concluded that the assessment characterizes the major sources of uncertainty, such as uncertainty caused by measurement errors in input data and uncertainty in the model approximation of population dynamics. Therefore, SIc meets SG60 & 80. The SOO pollock Synthesis model estimates uncertainty in current stock indicators and allows determination of the probability of spawning stock biomass and fishing mortality being relative to reference points. The assessment provides the inputs and their uncertainty to a harvest control rule that determines the probability of TAC options exceeding these reference points over 2- and 10-year projection periods. Consequently, SIc meets SG100.		
d	**Guidepost**			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			N
	Justification	The Synthesis model has undergone some testing and has been determined to reconstruct simulated data faithfully. During the 2015 international, independent review of the extant model, several recommendations were made to improve it, some of which have been implemented, but others of which are outstanding. Althernative models (e.g. TISVPA, State Space) have been run and they broadly corroborate the results of the Synthesis model. Notwithstanding this, these investigations have not been, as yet, extensive in terms of their international robustness. For instance, the State Space model is very new and has only recently been explored. At this point in time, therefore, SId does not meet SG100, although the process is amenable to moving in the direction encompassed by SId.		
e	**Guidepost**		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Y	Y

PI 1.2.4		There is an adequate assessment of the stock status
	Justification	The annual scientific peer review process involves preparation of the assessment by KamchatNIRO, review by the Far East Pollock Council, which consists of experts from each regional institute who discuss the draft assessments and TAC advice, review by VNIRO's central Scientific Council, and review by ecological experts such as non-FFA contracted scientists, academics and nature conservation organizations under the auspices of the Ministry of Natural Resources, which is independent of the FFA. The entire review is conducted over a series of meetings within the year before that of the TAC being considered. The initial Far East Pollock Council stage of the Russian peer review involves the scientists of the institutes most immediately engaged in the SOO pollock stock assessment (TINRO, KamchatNIRO, MagadanNIRO and SakhNIRO). It is an internal (to Russia) review although cross-institute expertise is involved. SIe meets SG80. The VNIRO stage of the review is external as defined by MSC directives because it involves assessment scientists not from the Russian Far East. The environmental expert stage of the review is also external as it involves experts independent of the FFA. The 2015 international external review added an additional international component to the peer review process and may well be repeated intermittently in future. Further, an Inter-Institutional Working Group (IWG) has been established under the auspices of VNIRO with experts from the scientific organizations that fall within the FFA to test and verify the methods and models used in stock assessment and TAC development. SIe meets SG100.
References		Vasilyev (2005), Fournier *et al*. (2012), Methot and Wetzel (2013), Intertek (2013), Varkentin and Ilyin (2015, 2016, 2017), Ilyin *et al*. (2016), Sharov (2016), PCA (2018)

OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	

PI 2.1.1 Retained Species Outcome

PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Main retained species are likely to be within biologically based limits (if not, go to scoring issue c below).	Main retained species are highly likely to be within biologically based limits (if not, go to scoring issue c below).	There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points.
	Met?	Y	Y	Y
	Justification	There are 16 TAC species and 19 PY/PC potential candidate species under the retained category that have been reported through the observer sampling scheme. Of these, 7 species have been reported as landed and 6 of the 7 are minor (all <2% of the catch or defined as "minor retained"). The only species defined as a Main species would be herring, a species permitted to be caught by the pollock midwater trawl fishery. Herring catch by the pollock-directed fishery according to landings approximates 4.7% of the current TAC for herring (two stocks), i.e. a percentage that includes all other fisheries. Within the pollock-directed fishery, the herring catch averages 1.75% by weight of the pollock catch. There is a spatial difference in catches, with the northern SOO subzone catching a higher proportion (4.1%) than the Kamchatka–Kuril (0%) and West Kamchatka subzones (1.58%). Reference points for herring in the most recent stock assessment suggest that herring stocks are healthy and well above B_{LIM} and fluctuating between two target reference points B_{TR}. Catches of herring by the pollock fishery approximated 14 400 t in 2017 out of a TAC of 275 000 t. While northern SOO herring biomass dropped to B_{LIM} in the mid-1970s, since then it has fluctuated within the target range and has remained well above B_{LIM}, particularly in recent years. Although herring make up <5% of the target catch, because of its value and because its total catch volume is significant it is treated as a Main species. All other species in the retained category are minor, so SG60 is met. For the main species (herring), it is also highly likely to be falling within biologically based limits, so SG60 & 80 is met. All retained species other than herring catch proportions are <2% and in fact are in most cases significantly <1% or even <0.1%. The midwater trawl fishery catch of these retained species is minimal and there is therefore a high degree of certainty that the pollock fishery is not impacting them. Herring catches in the fishery are taken under strict permit control and within the limits set by the *Fishing Rules*. The most recent herring assessment shows the herring stocks to be within biologically based limits and well above their target reference points, so SG100 is met.		
b	Guidepost			Target reference points are defined for retained species.
	Met?			N
	Justification	Herring is the only Main species landed by the pollock fishery and target reference points have been defined for it. There are five other species or groups that can be classified as retained: 1) cod *G. microcephalus*; 2) halibut (Greenland halibut, *R. hippoglossoides* and Pacific halibut *H. stenolepi*); 3) sole species (grouped); 4) skulpins (grouped); 5) skates. The fishery landings show that the proportions of the retained TAC species caught by the pollock fishery range between 0 and 1.33%. Although some species are subject to formal assessments (cod, halibut), others retained are less easy to differentiate and define for the purposes of this assessment because they are grouped and constitute very small volumes. It cannot therefore be said that target reference points are defined for all retained species, even if they are in relatively small amounts and are minor, so SG100 is not met.		

PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
c	Guidepost	If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.	If main retained species are outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	Not applicable	Not applicable	
	Justification	Not applicable because the only Main retained species (herring) is within biological limits.		
d	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.		
	Met?	Y		
	Justification	The status of the single Main species (herring) is well known. Of the other retained species, catches are insignificant relative to the volume of the fishery. Of PC/PY species, none are defined as retained. There are measures in place that manage retained species. For species that are under TAC control, permits are issued to operators. However, these TAC species are generally not caught by pollock midwater trawls, with the exception of herring, and catches are very small and incidental, as shown in the observer samples. Further, pollock-directed operations are permitted to carry PC permits for species that might be caught incidentally and for these species, precautionary catch limits are set. Apart from this measure, bycatches exceeding 2% require vessels to move immediately at least 5 miles from the area in which the catch was taken. With the exception of herring, all retained species catch proportions are low or insignificant, and little or no impact of the fishery on them is expected, on biologically based limits or hindering recovery. SG60 is met.		
References		Iljinskiy and Gorbatenko (1994), Smirnov *et al*. (2016, 2017), Ministry of Agriculture (2017), Panfilov *et al.* (2017)		

OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	

PI 2.1.2 Retained Species Management

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing retained species.
	Met?	Y	Y	Y
	Justification	The FFA is responsible for managing the pollock fishery and retained catches. Each vessel is issued with a pollock-directed as well as retained species catch permits (either TAC or PC) under the *Fishing Rules*. The primary management measure applicable to retained species is the requirement to have permits to catch them. Catch limits then apply and these are within the allowable catches for each particular species. That situation applies to the only Main species, herring, for which fishing is seasonal and the target fishery gear is a purse-seine. There are two stocks, one in the northern SOO and the other in the West Kamchatka subzones. In the two areas, it is only in the northern SOO subzone that herring is caught in amounts of between 4 and 5% of the pollock catch. Bycatch (incidental) of herring is therefore permitted and controlled under the overall management of herring. Catches exceeding 2% at any one location require the vessel to move immediately at least 5 miles. All catches of herring are nevertheless accommodated within the allowable catch of the vessel as well as within the broader TAC for the species or stock. There are therefore measures in place for main retained species aimed to keep mortality of herring within biologically based limits, and to ensure that the pollock fishery does not hinder their recovery and if necessary rebuilding. SG60 is met. These measures in combination also constitute a partial strategy that is expected to maintain herring (Main retained) within biologically based limits, so SG60 & 80 are met. For all retained species, there is either a determined TAC within which the retained catch in the pollock fishery is accommodated (and therefore within the reference points determined), or a PC permit issued for the possible catch of these species in the fishery and for which there are precautionary catch limits applicable as well as a suite of bycatch measures (e.g. 2% limit and move-on rule). Therefore, SG100 is met.		
b	**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 partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	N

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
	Justification	There is a comprehensive set of *Fishing Rules* that include all the measures applicable to retained species, including catch limits that are apportioned by zone and species. These measures not only apply to the single Main species (herring) but also to other retained species. Some TAC species as well as designated PC species may also be defined under bycatch (minor) in this assessment, because they are not landed. The proportions of these species, when they are taken, are extremely low (incidental) reflecting the overall effectiveness of the midwater trawl as a selective gear. Bycatch excluder devices and codends of a minimum 100 mm mesh are also required under the *Fishing Rules*. Transgressions related to bycatch were not reported and no prosecutions in this regard were noted by the team; vessel operators are penalised heavily for misreporting and risk losing their licenses. The measures that constitute the partial strategy are therefore likely to work, and SG60 is met. The stock assessment as well as the monitoring by observers and proportions of bycatch species (including those designated as retained species) demonstrates that all species are reported, providing evidence and generating confidence that the partial strategy is working. SG80 is met. Information about the retained species and fisheries involved give confidence that the strategy is broadly working, but there is no evidence that it has being explicitly tested. Therefore, SG100 is not met.		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	There is a partial strategy in place through the application of the combined *Fishing Rules* for the pollock fishery. Reporting schedules for the vessels and the levels of inspection generate confidence that the partial strategy is working. Inspectors enforce the move-on rule and monitor bycatch percentages at sea as well as there being regular and strategic scientific observer deployments, so there is an objective basis for confidence that the strategy is working, and SG80 is met. However, because the partial strategy is a combination of several measures, it cannot be said that there is clear evidence that the strategy is being implemented successfully, and SG100 is not met.		
d	Guidepost			There is some evidence that the strategy is achieving its overall objective.
	Met?			Y
	Justification	Compliance levels in the fishery are excellent and there is no evidence of transgressions related to fishing operations and the landing of retained species. Observer data suggest that fishers are generally compliant with bycatch rules, evidence that the strategy is being implemented and is achieving its overall objectives. SG 100 is met.		
e	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 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species
	Justification	Very few shark species are ever seen in the catch.
References		Smirnov *et al*. (2016, 2017), Ministry of Agriculture (2017), official statistics of the FSB Coastguard
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		

PI 2.1.3 Retained Species Information

<table>
<tr><th colspan="2">PI 2.1.3</th><th colspan="3">Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Qualitative information is available on the amount of main retained species taken by the fishery.</td><td>Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.</td><td>Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The sources of fishery-independent and -dependent information on the retained catch include: 1) independent observer reports, 2) catch sampling by FSB inspectors (Costguard), 3) independent scientific studies, and 4) reporting of catch made by the vessels at sea. Scientific observers provide a source of high-quality data on catch composition including other data (such as specialised reports on ETP species). These scientific observers are trained by TINRO and deployed by all the research institutes (TINRO, SakhNIRO, MagadanNIRO, KamchatNIRO), and more recently their deployments have been coordinated through a formally constituted Observer Working Group. Coastguard inspectors are managed and deployed by the national monitoring organization (FSB). Daily catch logs are electronically transmitted to the Centre for Fisheries Monitoring and Communications (CFMC). FSB Coastguard inspectors do not cover all vessels – they are deployed strategically throughout the fleet when working in specific areas, moving from vessel to vessel. On mother vessels (to which the catcher boats discharge), there is 100% coverage by inspectors. Overall, therefore, the information base on catches, including retained and bycatch species, is substantial and there appears to be very little room for misreporting. These data are collated centrally through the FSB and the FFA. Although these organisations focus on quota control and compliance, the scientific data are managed by the research institutes where the information is used for scientific purposes and to cross-reference with catch data. Tallies from inspectors are also cross-referenced with the electronic logs of the catcher vessels, so there is a comprehensive catch reporting and information system and reports are easily obtained from it (demonstrated to the team by the FSB and FFA). Key to reliability and quality of the information base on the fishery is the strategy employed. Both scientific observers and inspectors are deployed strategically to achieve different objectives. Observers aim to generate optimal information on catch composition and other biological scientific information, and the inspectors aim to optimise coverage to maximise compliance aspects. Pollock fishing operations are largely dictated by season and the aggregating nature of the species. The fleet follows aggregations, so information related to both the needs of the science and compliance adapts to this modus operandi, reducing the need for excessive monitoring and optimising the information gathered. The nature of the information is both qualitative and quantitative, so SG 60 is met. The quantitative information available on the fishery is substantial. Not only do independent scientific surveys provide a professional information base on the resources exploited, but the dependent commercial data (quantitative) are substantial, e.g. all vessels report daily and VMS tracking is on all vessels. SG80 is met.

The nature of the scientific work undertaken and the inspector monitoring allows for cross-referencing of information and effective verification. Inconsistency or irregular reporting is quickly picked up with little room for the supply of misinformation in the fishery. The consequences of misreporting to vessel operators would be economically significant (loss of fishing rights). However, explicit evidence substantiating the accuracy of the information is not available, so SG100 is not met.</td></tr>
</table>

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
b	Guidepost	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
	Met?	Y	Y	N
	Justification	For retained and bycatch species, the qualitative information is substantial. It includes mainly scientific observer data and independent scientific surveys. Where pertinent, scientific observers are directed to collecting information on bycatch, including for example a full breakdown of the species in the catches as well as ETP and other information. The pollock fishery is a high-volume targeted fishery, so the use of data to determine outcome status with respect to biological limits is to some extent constrained by the low proportions of bycatch (while recognising that bycatch can still provide supporting information to determine biologically based limits). The most pertinent information from the fishery would be the actual catch proportions and volumes combined with the spatial and temporal trends and overlap with other fishery sectors. The information base is nevertheless qualitatively adequate to assess the outcomes of biologically based limits taking into consideration the scale of the pollock fishery, and SG60 is met. For retained species, although catch volumes are low in the fishery, the information provided contributes to the information used to determine biologically based limits (for example the herring catches). This rationale would also apply to the many minor retained and other bycatch species, and SG80 is met. The information is insufficient to determine quantitatively the outcome status with a high degree of certainty, providing merely a subsample to determine biologically based limits. Therefore, SG100 is not met.		
c	Guidepost	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	N
	Justification	There is only one main retained species, herring. The information collected on the bycatch, including herring, is nevertheless adequate to help determine the measures needed to manage specific Main retained species, so SG60 is met. The information provided through the sampling protocols and catch reporting is adequate also to support the overall strategy to manage retained species, and SG80 is met. However, it cannot be said with a high degree of certainty that the information base is adequate to support the retained species strategy, primarily because of the low volume of the retained species taken in the fishery. SG100 is therefore not met.		
d	Guidepost		Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)	Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.
	Met?		Y	Y

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species	
	Justification	There is an ongoing dedicated sea-based scientific data collection programme. Observer deployments and data collection are systematic and strategically coordinated to optimise the collection of information needed for the management of the fishery (including target and bycatch species). SG80 is met. Scientific observers are also strategically deployed and tasked with specific duties related to retained species and bycatch. Inspectors support the monitoring and ensure that the *Fishing Rules* are complied with, including reporting on all bycatch (retained species included). This allows for a comprehensive record of mortality of bycatch species. SG100 is also met.	
References		Radchenko *et al*. (2010), Artyukhin (2015), Burkanov *et al*. (2015), Kuzin (2016), Smirnov *et al*. (2016, 2017), Kulik and Gerasimov (2017), Ministry of Agriculture (2017), official statistics of the FSB Coastguard	
OVERALL PERFORMANCE INDICATOR SCORE:			**85**
CONDITION NUMBER (if relevant):			

PI 2.2.1 Bycatch Species Outcome

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).	Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).	There is a high degree of certainty that bycatch species are within biologically based limits.
	Met?	Y	Y	N
	Justification	Evaluation of the discard proportions is based on observer estimates and detailed species proportions summarised in successive surveillance audit reports made since first certification. Tables provided and compared between years from observer reports by subzone and in total suggest that discard species make up to 50 minor species. This list needs to be contextualised in terms of the scale of the fishery. Scientific observers that comprehensively sample on a trawl-by-trawl basis consolidate the full bycatch on a zone by zone basis (as the fishery moves between zones). It is important to recognise that observers who are trained in scientific subsampling techniques systematically sort samples by species and obtain weights for each subsample (a protocol made clear in the observer sampling design). These data show that, in pollock catch hauls, some 98.1% is pollock, 1.87% approximates the retained species and 0.03% is discarded material. Based on the 2016 pollock TAC for the SOO (889 054 t) this equates to 175 t. There are therefore no Main bycatch species and, considering the scale of the fishery, the minor bycatch species levels are also insignificant. Up to 55 minor species were recorded (see Table 12 and Table **13** in Section 3.6 above) – cross-checking on the IUCN red data lists and the World Species listing (review at http://www.marinespecies.org) suggests that no species are particularly vulnerable. Sculpins, codlets and grenadiers are commonly reported. The Aleutian skate *Bathyraja aleutica* is on the IUCN red list as of "least concern", as are numerous squid species (e.g. armhooks *Beryteuthis magister* and *Gonathus onxy*). Salmon *Onchorhynchus keta* (chum) and *O. tschawytscha* (Chinook) are also reported in minor quantities. It is concluded therefore that in addition to there being no main bycatch, of the minor species there are no species caught in significant volumes relative to the scale of the fishery. Pollock midwater trawls would systematically catch minor species, none of which can be classified as vulnerable. It is noted, however, that because there are many minor species caught, as well as spatial and temporal variability in midwater trawl operations, based on the data provided by scientific observers, the possibility of a rare or a vulnerable species occurring in the catches cannot be excluded. It can be said, though, that both qualitative and quantitative information available allows for SG60 and SG80 to be met (such species to be within biologically based limits). As there is minor bycatch (i.e. bycatch is not exceptionally rare), however, the impact cannot be said to be negligible and the fishery would not meet SG100.		
b	Guidepost	If main bycatch species are outside biologically based limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.	If main bycatch species are outside biologically based limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	Not relevant	Not relevant	

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
	Justification	There are no Main bycatch species.		
c	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.		
	Met?	Not relevant		
	Justification	There are no Main bycatch species. Quantitative evidence has been provided to show that minor species are reported and that the total quantum recorded is <0.03% of the catch volume. Review of the bycatch species reported and those appearing on the IUCN and the *World Register of Marine Species* suggest that none of these species are vulnerable or at high risk of impact by the fishery.		
References		http://www.marinespecies.org, http://www.iucnredlist.org/about/overview), Smirnov *et al*. (2014, 2016, 2017), Melnikov and Obraztsov (2016), FFA (2017a, 2017b)		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				

PI 2.2.2 Bycatch Species Management

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary, that are expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing and minimizing bycatch.
	Met?	Y	Y	Y
	Justification	There are no Main bycatch species, so SG60 and SG80 are met. At SG 100 there should be a strategy for minimizing and managing bycatch. Under the *Fishing Rules* (Ministry of Agriculture 2017) there is a suite of requirements for vessels fishing for pollock using midwater trawl gear. Specific conditions under these rules that in combination constitute a strategy include: 1. minimum 100 mm codend mesh, and no bottom trawling allowed in the pollock fishery; 2. deployment of observers as directed by the FFA, including specialist marine mammal and bird observers; 3. at-sea vessel monitoring, boarding and inspection by the Coastguard; 4. 100% monitoring of catcher to mother-vessel transshipments; 5. 100% Vessel Monitoring Systems installed; 6. daily fishing log catch reporting (including bycatch); 7. move-on rule when bycatch exceeds limits – vessels must move at least five miles from areas of high bycatch; 8. a full or a partial ban on fishing in specified zones, with no fishing permitted within 30 miles of the coast and a minimum of 5–12 miles from islands, depending on applicable rules; 9. carrying of alternative permits (PC) to allow for permitted bycatch species (defined as retained); 10. fishing closures in place from 1 January to 31 March in Kamchatka–Kuril and West Kamchatka subzones, and from 1 January to 9 April in Northern Sea of Okhotsk subzone; 11. pollock vessels not permitted to retain more than 49% of a bycatch species (as a proportion of the pollock catch per haul), to limit exploitation of such species. These *Fishing Rules* (which were last updated in April 2017) set out the key management measures for Russian pollock fisheries in the Far Eastern Basin (Ministry of Agriculture 2017). In combination, these measures constitute a strategy, so SG100 is met.		
b	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 partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	N

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
	Justification	Given all the management measures in place as well as effective monitoring, it is considered that an effective strategy is in place to manage bycatch. This provides an objective basis for confidence in the strategy. No convictions in terms of breaches of bycatch conditions have been reported, so qualitatively it is assumed that the strategy is successful. There are significant punitive sanctions for non-compliance (*Fishing Rules* section 3.7.2), which is evidence of a disincentive to be found non-compliant. SG60 and SG80 are met. To meet SG100 it is required that the strategy has been tested. The strategy has not been directly or explicitly tested. However, low expected levels of bycatch in midwater directed fisheries would support the qualitative opinion that testing would not be explicitly required. The increasing use of qualified scientific observers and the high level of scientific training provided to these observers would support the view that there is ongoing monitoring of the fishery at a good scientific and compliance level. Trophic modelling of the ecosystem, which includes key bycatch components, is being undertaken. The outputs from these studies is in draft form, but it does demonstrate that research is underway to use the survey and commercial catch data to test whether the fishery is impacting the SOO ecosystem. Nevertheless it cannot be said that the strategy is fully tested, so SG100 is not met.		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	The implementation of a scientific observer system and the regular and rigorous reporting of catch composition as demonstrated by successive surveillance reports, and hence the routineness in determining bycatch in the fishery, is evidence of commitment by the FFA and research agencies to monitoring the bycatch in the fishery. No reports of non-compliance with measures have been reported, specifically relating to the bycatch measures specified in SI(b) above. SG80 is therefore met. It cannot be said, however, that the evidence is "clear" – the measures in place constitute a suite of broad management measures that in combination comprise a partial strategy for bycatch. The adoption of Possible Catch (PC) permits demonstrates that the management authority (FFA) recognises the need to manage possible species of value and that doing so helps to mitigate the potential for dumping or discarding of species of value (when this may happen incidentally). There is therefore some qualitative evidence that the strategy is being implemented, but the level of success is not clearly evident. SG100 is not met.		
d	Guidepost			There is some evidence that the strategy is achieving its overall objective.
	Met?			Y
	Justification	As described in SI(c) above, the bycatch strategy is achieving its overall objective of minimising bycatch and controlling the levels of capture of retained species, so SG100 is met.		
References		Smirnov *et al*. (2014, 2016, 2017), Kulik (2015, 2017), Melnikov and Obraztsov (2016), FFA (2017a, 2017b), *Fishing Rules* for the Far Eastern Basin, last amended April 2017 - Ministry of Agriculture (2017)		

PI 2.2.2	**There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations**	
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		

PI 2.2.3 Bycatch Species Information

<table>
<tr><th colspan="2">PI 2.2.3</th><th colspan="3">Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Qualitative information is available on the amount of main bycatch species taken by the fishery.</td><td>Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.</td><td>Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">There are no Main bycatch species in the fishery. Detailed bycatch tables have been presented (consolidated observer reports). The results of these reports (ex-surveillance audit reports) are consistent with the assessment undertaken in the first certification of the fishery, i.e. the data have been verified. The fishery has both qualitative information (provided by the scientists of TINRO and KamchatNiro) as well as quantified data from regular scientific observations. As bycatch is very low and there are no Main species, and extremely low proportions of minor species such that the impact (and consequences) for the affected populations is highly unlikely. Therefore SG60 and SG80 are met. Although the data presented are consistent in the proportions of bycatch estimated, they have not been verified, so SG100 is not met.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>Information is adequate to broadly understand outcome status with respect to biologically based limits</td><td>Information is sufficient to estimate outcome status with respect to biologically based limits.</td><td>Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.</td></tr>
<tr><td>Met?</td><td>Not relevant</td><td>Not relevant</td><td>Not relevant</td></tr>
<tr><td>Justification</td><td colspan="3">There are no Main bycatch species, and catches are anyway very small relative to the scale of the fishery. The determination of biologically based limits applies only to Main bycatch species or to those species considered vulnerable or caught in quantities that might suggest high vulnerability relative to the scale of the fishery.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td>Information is adequate to support measures to manage bycatch.</td><td>Information is adequate to support a partial strategy to manage main bycatch species.</td><td>Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The ongoing ecosystem-based surveys and studies, the current modelling of trophic structures in the SOO, combined with the collection of scientific observer data in combination provide adequate information to support bycatch measures, so SG60 is met. The rationale provided above is also adequate to support a partial strategy to manage main bycatch (if it occurs), so SG80 is met. The data collected by the scientific observers, the submission of catches on a daily basis by the catcher vessels, and the systematic monitoring reporting of the pollock midwater trawl fleet is adequate to evaluate whether the strategy on bycatch is working. For a high degree of certainty, however, a longer series of information is needed before it can be said that the strategy is working correctly. SG100 is not met.</td></tr>
</table>

PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
d	Guidepost		Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?			Y
	Justification	SG80 is not scored because there are no Main bycatch species. At SG100 the observer reports giving detailed proportions of all bycatch are sufficiently detailed and regular to be able to assess the mortality of these species. SG100 is met.		
References		Smirnov *et al*. (2014, 2016, 2017), Kulik (2015, 2017), Melnikov and Obraztsov (2016), FFA (2017a, 2017b), *Fishing Rules* for the Far Eastern Basin, last amended April 2017 - Ministry of Agriculture (2017)		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				

PI 2.3.1 ETP Species Outcome

<table>
<tr><td colspan="2">PI 2.3.1</td><td colspan="3">The fishery meets national and international requirements for the protection of ETP species
The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.</td><td>The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.</td><td>There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">The main national (Russian) legislation applicable to ETP species is the Red Data Book of the Russian Federation as well as the regional “Red Books”, particularly in this case for Kamchatsky and Primorsky. Internationally, ETP species on the CITES Appendix 1 and IUCN Red List lists are also found in the SOO. In all, 19 marine mammals and 22 seabirds protected by international and Russian federal environmental laws appear in these publications. There are four possible ETP species or groups that could interact with the pollock fishery in the SOO – sea otters, Steller sea lions, short-tailed albatrosses and cetaceans. Sea otters, however, are only found close inshore over the shelf, where the fishery does not operate. To meet conditions raised in the first MSC assessment, research was commissioned specifically to identify potential interactions of two species (short-tailed albatross and Steller sea lion) with the fishery. The studies also looked broadly at potential interactions between the pollock midwater trawl fishery and all cetaceans and seabirds. The studies complemented (and verified to a large extent) what was already known (and reported in the previous assessment of the fishery) about the interactions between the fishery and marine mammals and seabirds, quantified the interactions and reported any mortalities. The studies confirmed the distributions of the potential ETP species already known and also, where applicable, determined if the recorded sightings could be defined as “interacting” with the fishery. Overall, interactions between seabirds and marine mammals with the fishery were deemed within national and international limits, and SG60 is met. Based on historical knowledge and the results of these new studies, the effects of the fishery on marine mammals and seabirds was deemed highly likely to be within national and international requirements, so SG80 is also met.

The verification process used recognised scientists and sea-based studies that reported interactions between the fishery and seabirds and cetaceans at levels of a “high degree“ of certainty that they were within national and international requirements, i.e. in terms of the rare mortalities reported, so SG100 is met.</td></tr>
<tr><td rowspan="2">b</td><td>Guidepost</td><td>Known direct effects are unlikely to create unacceptable impacts to ETP species.</td><td>Direct effects are highly unlikely to create unacceptable impacts to ETP species.</td><td>There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
</table>

<table>
<tr><td>PI 2.3.1</td><td colspan="4">The fishery meets national and international requirements for the protection of ETP species
The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">MSC guidance (GCB3.1.1) specifies that both indirect and direct impacts of the fishery on ETP species need to be considered. Direct effects in the case of the midwater trawl fishery would for example be mortality of marine mammals feeding on the catch, trapped and or drowned in nets, hooked on lines, or striking trawl warps. Interactions between trawl fisheries and seabirds and cetaceans is common in all fisheries globally – interaction levels are generally in proportion to the abundance of these species and also to the scale of the fishery. In the case of the pollock midwater trawl fishery in the SOO, seasonal ice cover and closure of the fishery precludes interaction for large parts of the year. The fishery also has a spatial signal – effectively moving with the pollock aggregations and as the fishing grounds become more accessible as the ice recedes (or freezes). The direct effects reported are consistent with what is known for other similar fisheries. Of the 1140 seabird observations made in 2015, six dead fulmars (not an ETP species) were recorded and only one sighting of a short-tailed albatross was made (an identified ETP species). Of three North Pacific albatross species, only one, the Laysan albatross (categorised as near-threatened by the IUCN) regularly concentrated around trawlers in the southern part of the Kamchatka–Kuril subzone. In terms of marine mammals, Steller sea lions were sighted the most frequently around catcher boats (51%) and were followed in observation numbers in descending order by spotted (largha) seals, ribbon seals, Dall's porpoise, northern fur seals, minke whales, fin whales, killer whales, sperm whales, Baird's beaked whales and North Pacific right whales. Of these marine mammals, only two are on CITES Appendix 1: fin whales and North Pacific right whales, and with Steller sea lions are listed in the Red Data Book of Russia. Of these, only Steller sea lion interactions may result in mortality when interacting with the fishery, and nearly all the others were incidental sightings of animals paying little attention to the fishing vessels. SG60 is therefore met. To meet SG80, any direct effects must be highly unlikely to create unacceptable impacts to ETP species. To be highly likely implies that either qualitatively or quantitatively, more information needs to be provided. Through the raising of conditions in the original certification, the specific studies undertaken provided both qualitative and quantitative information that increased the understanding of the impacts of the fishery on seabirds and cetaceans, and in particular on the two key species of concern, Steller sea lions and short-tailed albatross. SG80 is also met.

In the studies undertaken as well as historical information found, it was clear that short-tailed albatross had no significant interaction with the fishery (although this might be due to its low abundance and temporal distribution). In terms of interactions between seabirds generally and the fishery's trawl warps, there was some concern expressed (through skipper interviews) that the frequency of occurrence of bird interactions (mortality or other) might be higher than observed. Such interactions are expected for seabirds in general, and more specifically with large-winged birds such as albatrosses. Steller sea lions were common and interacted with the nets, with a single drowning recorded during the period of intensive study in 2015. However, because of the uncertainty associated with all the current knowledge about potential mortality of seabirds as a result of warp strikes, it cannot be said that SG100 is met.</td></tr>
<tr><td>c</td><td>Guidepost</td><td></td><td>Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</td><td>There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.</td></tr>
<tr><td></td><td>Met?</td><td></td><td>Y</td><td>N</td></tr>
</table>

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species	
	Justification	Indirect effects would include, for example, broader ecosystem effects attributable to the removal of prey (in this case, pollock) on the diet of ETP species. The results of the modelling undertaken indicated that the fluctuations in abundance observed in the 1960s and 1970s among some pinniped species in the SOO could not be explained by their dependence on (declining) fish resources, in particular on historical and current (the past two years) changes in pollock abundance. This conclusion was supported by the output from a recent modelling exercise (Kulik *et al*. 2017) that there is no link between overfishing at high trophic levels and expected (normal) community structure. SG80 is met. The modelling studies undertaken are ongoing and subject to further investigation and review. Although they suggest that indirect effects are unlikely, it cannot be said at this point in time there is a high degree of confidence in the modelling conclusion of no significant indirect detrimental effects, so SG100 is not yet met.	
References		http://redbookrf.ru/; http://www.kamchatsky-krai.ru/geography/red-book-1/, http://www.iucnredlist.org/about/overview), http://www.russianpollock.com/information/publications/ and http://www.russianpollock.com/ecosystem/protected-species, Piatt *et al*. (2006), Artyukhin (2015), Burkanov *et al*. (2015), Kuzin (2016), Kulik and Gerasimov (2017), *Fishing Rules* for the Far Eastern Basin, last amended April 2017 – Ministry of Agriculture (2017)	
OVERALL PERFORMANCE INDICATOR SCORE:			**85**
CONDITION NUMBER (if relevant):			

PI 2.3.2 ETP Species Management

<table>
<tr><td colspan="2">PI 2.3.2</td><td colspan="3">The fishery has in place precautionary management strategies designed to:
Meet national and international requirements;
Ensure the fishery does not pose a risk of serious harm to ETP species;
Ensure the fishery does not hinder recovery of ETP species; and
Minimise mortality of ETP species.</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>There are measures in place that minimise mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</td><td>There is a strategy in place for managing the fishery's 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.</td><td>There is a comprehensive strategy in place for managing the fishery's 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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The precautionary approach to ETP species is underpinned by specific national legislation, in particular the Russian Red Data Book that identifies key national and internationally distributed species in need of protection. At Russian marine research institutes there are internationally recognised researchers as well as lobby groups advocating protection of such species. The key ETP species likely to be impacted by the fishery have been identified and have been afforded "protection status", meaning that they cannot be harmed or killed and their habitat must be protected. Steller sea lions are protected (no take allowed) in all regions of Russia where they live, as are many seabirds and the (ETP) short-tailed albatross in particular. For the pollock fishery specifically, these requirements (Red Data Book) apply to all ETP marine mammals (mostly cetaceans) and seabirds, which would be protected and fishers obligated by law to mitigate impacts and protect them. Although the species list of ETP species potentially interacting with the SOO fishery for pollock is relatively short, measures that apply more broadly to seabirds and marine mammals are pertinent. Measures of note would therefore relate primarily to sea-based monitoring and recording of interactions and/or impacts on ETP species. The Fishing Rules for Russia's Far Eastern Basin (Section 10) define explicit fishery closure areas designed to protect sea mammals and their primary forage habitats. In the SOO, Steller sea lions are protected in the Kuril and Magadan reserves, where there are both rookeries and haul-outs. Trawling is prohibited within 30 nautical miles of these sites. Although this ban may in the past have been paid lip service, the importance of ETP species has been raised significantly with the provision of recording in vessel logbooks (as a routine in daily recording with catches) as well as observer training and delegation of specific parts of observer duties to record and report on seabird and marine mammal interactions at sea.

There are also area-specific measures in place for some species including the protection of rookeries and seabird breeding sites. The fishery is, however, largely removed from these areas, including seabird and/or sea lion colonies on the Kuril Islands, Kamchatka Peninsula, the Tuleniy Islands and northern Sea of Okhotsk rookeries at Iony Islands. Populations of seabirds and pinnipeds are subjected to regular census, such as at Yamskiye, which has shown stability in populations. These measures in combination are aimed broadly at minimising mortality and facilitating the protection and/or recovery of populations (as needed) and would meet the requirements of both SG60 and SG80 (that there is a confirmed strategy in place). However, while there is a broad strategy in place, it cannot be said that it</td></tr>
</table>

		is either comprehensive or explicit to the midwater trawl-directed pollock fishery in the Sea of Okhotsk, so SG100 is not met.		
b	**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 strategy will work, based on information directly about the fishery and/or the species involved.	The strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.
	Met?	Y	Y	Y
	Justification	The measures are outlined in SI(a) as well as in PI 2.3.1. They are considered likely to work and there is no evidence to suggest that the fishery is having a direct impact on any ETP species, so SG60 is met. The work commisiioned by the PCA using acknowledged Russian scientists and experts in marine mammals and seabirds provides confidence that the information on ETP/fishery-related impacts provides both qualified and quantified information, so SG80 is also met. The broad strategy is based on a range of evidence, some historical on key ETP species (short-tailed albatross and some cetaceans, noting that CITES does not identify Steller sea lions as ETP as they are not on Appendix 1), and other information that is now categorised as direct and quantified about the fishery. SG100 is also met.		
c	**Guidepost**		There is evidence that the strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	The results of specific studies undertaken to close conditions set when the fishery was first certified supports a belief that the measures in place are being implemented to good effect, noting that the short-tailed albatross is potentially the only ETP bird species of significance to the fishery and that sea-based observations suggest that this species likely does not overlap significantly with the fishery. Other cetacean species (marine mammals) are rarely opportunistic feeders around pollock trawls and there is no evidence that they are being impacted negatively. SG80 is met. It cannot be said that there is “clear evidence” of a successful strategy being in place, though we note that the incidence of ETP species interacting with the fishery is low. SG100 is not met		
d	**Guidepost**			There is evidence that the strategy is achieving its objective.
	Met?			Y
	Justification	The stability in populations of ETP species and, in some instances, the recovery of these populations, although not directly related to the fishery, suggests that the objectives are being met and SG100 is met.		
References		http://www.russianpollock.com/information/publications/, Shuntov (1972, 1998a, 1998b), Piatt *et al*. (2006), Smirnov *et al*. (2014, 2016, 2017), Artyukhin (2015), Burkanov *et al*.		

	(2015), *Fishing Rules* for the Far Eastern Basin, last amended April 2017 – Ministry of Agriculture (2017)	
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		

PI 2.3.3 ETP Species Information

<table>
<tr><td colspan="2">PI 2.3.3</td><td colspan="3">Relevant information is collected to support the management of fishery 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.</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.</td><td>Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.</td><td>Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">Fishery-related mortality of ETP species relates in this case only to the short-tailed albatross. No other seabird or marine mammal species is impacted and defined as ETP (including the Steller sea lion). Large marine mammals observed from the fishing vessels are not impacted and no mortality of these species has been found (including grey, fin and Northern Pacific right whales). The information is adequate to estimate the mortality of ETP species qualitatively, so SG60 is met. Studies commissioned under first MSC certification (to meet conditions) provided sigiificant sea-based information of interactions between seabirds/marine mammals and the fishery. Those studies allowed for quantification of the mortality of ETP and non-ETP species, so SG80 is met. Owing to the limited number of sea-based surveys on fishing vessels, however, it cannot be said that the Information is sufficient to estimate quantitatively the outcome status of ETP species with a high degree of certainty, so SG100 is not met.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>Information is adequate to broadly understand the impact of the fishery on ETP species.</td><td>Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.</td><td>Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">Referring to SI(a), the studies undertaken and the historical information (Intertek 2013 refers) available, what we have is adequate to understand broadly the impact of the fishery on ETP species, so SG60 is met. Similarly, the information provided in SI(a) and the studies undertaken provide sufficient background to determine whether the fishery is a threat to the protection and recovery of identified ETP species. Quantitative inputs of predator/prey relationships and fishery mortality in trophic modelling studies generates confidence in the data available to help determine if the fishery is a threat to ETP species. SG80 is met. However, it cannot be said unequivocably that the information available is adequate to determine the magnitude of all impacts, so SG100 is not met.</td></tr>
<tr><td rowspan="2">c</td><td>Guidepost</td><td>Information is adequate to support measures to manage the impacts on ETP species.</td><td>Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.</td><td>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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
</table>

PI 2.3.3		**Relevant information is collected to support the management of fishery 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.**
	Justification	Collectively, based on all the available historical information on short-tailed albatross, including the recent sea-based observations undertaken as a condition of certification, there is adequate information to support measures to manage fishery impacts on ETP species, so SG60 is met. The short-tailed albatross is the only ETP species where there remains some concern. Its distributional range has shrunk because of its low population levels. Its abundance is very low, and this information alone supports (i.e. is sufficient to draw) conclusions and identify the need to develop a full strategy for the species related specifically to the pollock fishery. Broadly, however, this SI relates also to seabird interactions with fishery trawl warps, which was an issue raised in the studies undertaken, but not deemed to be having a significant negative impact on the fishery at the present time. Notwithstanding, SG80 is met. Succinctly, although the information to hand is sufficient to draw broad conclusions and add to the available information on trends in the stocks of short-tailed albatross, it cannot be said with a high degree of certainty that the fishery information *per se* is adequate to confirm that there is in place a comprehensive strategy to manage fishery impacts on seabirds generally. Therefore, SG100 is not met.
References		http://www.russianpollock.com/information/publications/, Piatt *et al*. (2006), Smirnov *et al*. (2014, 2016, 2017), Artyukhin (2015), Burkanov *et al*. (2015), Kulik and Gerasimov (2017)
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		

PI 2.4.1 Habitats Outcome

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
	Met?	Y	Y	Y
	Justification	The pollock fishery switched from bottom trawl to midwater trawl in the 1990s when bottom trawls were banned and a minimum 100 mm mesh introduced. The midwater trawl fishery is directed at the pelagic component of the ecosystem, with vessels operating only in midwater and allowed to trawl only in water at least 30 miles from the coast. Some vessels do carry bottom trawl gear, and occasionally this gear is used when fishing under alternative permits for species such as cod. However, this is not common as generally pollock-directed operations are separated from other species types because the processing on vessels is species-specific. Deploying midwater gear is a technical process that uses a range of sophisticated technology that includes sidescan, the latest echo-sounding equipment, and gear position in the water column. The prohibitive cost of fouling or damaging midwater gear makes it highly unlikely that operators would allow their gear to contact the seabed. The fishery is therefore prosecuted well offshore and is unlikely to reduce habitat structure or function where it could cause serious or irreversible harm. SG60 is met. Elsewhere than in the UoC fishery, however, midwater trawls are deployed close to or occasionally on the bottom, at times resulting in extensive net damage. No evidence was found to suggest that this occurs either on a regular basis or infrequently in the SOO, so SG80 is met. Extensive ecosystem-related research is undertaken during research surveys using both pelagic (midwater) and demersal (bottom trawl) gear. The operational area of the pelagic midwater pollock-directed fleet is well known and reported, including monitoring by VMS. Research on benthos, including the epifauna, is systematically undertaken, although evidence presented relates mostly to areas on the shelf, i.e. shallower than 200 m. Researchers report no significant changes to the structure of the habitat, although over many years, benthic composition proportions may have changed. These changes are not attributed to the fishery (midwater) and were sampled using a bottom trawl. Bycatch proportions and retained species reported by scientific observers do not show any significant presence of bottom-dwelling species that could reflect impacts of midwater gear on the habitat. There is evidence of VMEs, or at least species that are representative of VMEs, in the SOO, but the research gives no indication of habitat alteration as a result of the pollock or any other fishery. There is always the possibility that midwater gear can touch the seabed, so it cannot be stated with 100% certainly that midwater gear does not impact habitat, but it remains highly unlikely to reduce habitat structure and function. SG100 is met.		
References		Bezrukov (1960), Dulepova (2002, 2017), Nadtochiy *et al*. (2007), Valdemarsen *et al*. (2007), Heileman and Belkin (2010)		

OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

PI 2.4.2 Habitats Management

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	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 the fishery on habitat types.
	Met?	Y	Y	Y
	Justification	There is a comprehensive suite of measures to manage the fishery. Direct measures include gear restrictions on operating in midwater. However other measures also support the mitigation of habitat damage by the fishery. These include: (1) if bycatch is in excess of the TAC or the PC, the management authority can enforce time–area closures to mitigate further excess bycatch; (2) if bycatch exceeds 2% of the pollock catch in a single haul, the excess catch must be returned to the sea; (3) multiple species quotas – vessels can have quotas for multiple species, eliminating the need to apply mitigation as long as the allocation to the vessel for the bycatch species is not exceeded; (4) closed seasons applied to fishing outside of 1 January to 31 March (Kamchatka–Kuril and West Kamchatka) and 1 January to 9 April (northern SOO); (5) pollock-directed effort is mainly by midwater trawl with nets of a minimum of 100 mm mesh, and no bottom trawling is allowed; (6) spatial management – there is a full or partial ban in some fishing zones, with trawling not permitted <30 miles offshore and 5–12 miles from islands; (7) when the bycatch exceeds 2%, there is a "move-on" rule of at least 5 miles from the area of such high bycatch; (8) daily vessel records (DVRs) – vessel captains must keep records of bycatch and submit the records daily. These measures are, for example, implemented through the *Fishing Rules* such as those applied to marine mammals (Ministry of Agriculture 2017). These measures are expected to achieve the required Outcome level of performance, so SGs60 and 80 are met. There is a strategy in place for managing habitat impacts (no bottom trawling permitted). This information is based directly on the fishery's operational characteristics – quantitative evidence was also provided by the PCA submission that gear loss attributable to interaction with the seabed is minimal. The no-bottom-trawling rule provides great confidence that the strategy will work, so SG100 is met.		
b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.
	Met?	Y	Y	N

<table>
<tr><td colspan="2">PI 2.4.2</td><td colspan="3">There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">Determination of habitat impacts by midwater gear is difficult to determine quantitatively. The measures in place as stated in SI(a) suggest that these measures will work. The switch from bottom to midwater gear in the fishery in the 1990s was a significant development that effectively mitigated trawl gear impacts of the fishery. SG60 is met. The various scientific institutions have also undertaken research historically on commercial vessels; this is important in the context that independent research is typically done elsewhere on specialised vessels. Ecosystem studies undertaken on these vessels is extensive – studies report only on benthic work when bottom-trawl gear is deployed. Pelagic gear (midwater) descriptions of species relate to many pelagic species; benthic species are absent from these records. SG80 is met.

It cannot be said that explicit “testing” has been undertaken to test these measures, though research surveys on commercial vessels that use pollock-directed gear amounts to indirect testing of the strategy and the measures in place. SG100 is met in part.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>There is some evidence that the partial strategy is being implemented successfully.</td><td>There is clear evidence that the strategy is being implemented successfully.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">Evidence presented in the P3 background section suggests that compliance levels in the fleet are good and that monitoring of gear, operations of the fleet, at-sea inspections and observer coverage is effective, suggesting the strategy is implemented successfully. SG80 is met. However, the evidence available does not constitute “clear evidence” because no specific procedures have been followed to demonstrate specifically that the strategy is being implemented successfully. SG100 is not met.</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td></td><td></td><td>There is some evidence that the strategy is achieving its objective.</td></tr>
<tr><td>Met?</td><td></td><td></td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">Because of the nature of midwater gear and its benign impacts on habitat, presentation of direct evidence that the strategy, partial or otherwise, is working cannot be given with absolute confidence so SG100 is not met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Fishing Rules for the Far Eastern Basin, last amended April 2017 – Ministry of Agriculture (2017)</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>85</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td></td></tr>
</table>

PI 2.4.3 Habitats Information

PI 2.4.3		**Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	Y	Y	Y
	Justification	There is an active benthic research programme for the SOO undertaken by TINRO and other research agencies. The surveys have baselines to compare potential habitat changes in fished areas between the 1980s and the 2000s and extending into recent years. Those that focus on biocoenoses, trophic relationships and benthic communities help evaluate habitat stability or changes, but do not test the impacts of pollock trawling explicitly. Extensive spatial and temporal data are available on the operational location of pollock trawling effort, and there are also spatial maps of substratum type, although the evidence presented does not compare trawl intensity on habitat type (this is not likely to be viable as the gear fishes off the bottom). SG60 is met. At SG80 the vulnerability of the habitat needs to consider the scale and intensity of the fishery. An important consideration is that the fishery is closed for a large part of the year because of the ice cover. The surveys undertaken target the fishery, specifically when the seasons are open and fishing grounds are accessible. The deployment of pelagic gear largely mitigates habitat impacts, the fishery catch and effort is nevertheless known in detail, observers record bycatch in detail, and these data reflect the nature of the fishery with few benthic species recorded. SG80 is met. The distribution of habitat type in the SOO is known and documented – this relates to substratum type and specifically to areas of high fishing intensity, in particular the West Kamchatka shelf and the northern Sea of Okhotsk. Benthic surveys have allowed identification of species associated with potential VMEs (although not officially defined as such). The overall SOO habitat types are therefore well understood, and importantly are subjected to ongoing studies along with ecosystem modelling. SG100 is met.		
b	**Guidepost**	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.	The physical impacts of the gear on the habitat types have been quantified fully.
	Met?	Y	Y	N

<table>
<tr><td colspan="2">PI 2.4.3</td><td colspan="3">Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">Information as described in SI(a) is adequate to understand the nature of the main impacts on habitat of the gear used. Midwater (pelagic) gear of the type used in the pollock fishery is well described and its impacts on habitat benign. Pelagic gear is used extensively globally (with variations), but overall it is the preferred gear for trawling owing to its low impact on habitat. SG60 is met. The spatial and temporal extent of the fishery is well described. SOO habitat type is also known and the overlap between gear, the fishery and the habitat understood. Studies on fishery impacts on habitat tend to focus on areas of high fishing intensity and in areas where other fisheries are active, in particular the Danish seine (for pollock) and other bottom-trawl fisheries, e.g. for cod and Greenland halibut. These fishery types, although overlapping with pollock midwater fisheries in places, may impact habitat, but any impacts that there may be are highly unlikely to reflect impacts resulting from the pelagic midwater trawl fishery (which operates well offshore of the shelf). SG80 is met.

The physical impacts of the midwater gear have not been quantified, primarily because the gear impacts are expected to be minimal, if they occur at all. It cannot be stated unequivocably, however, that midwater trawl gear impacts, if they take place, have been quantified, so SG100 is not met.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>Sufficient data continue to be collected 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).</td><td>Changes in habitat distributions over time are measured.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">Ecosystem research in the SOO is ongoing; the research aims to understand broadly the ecosystem. Habitat-specific studies are done in key areas, and changes in these areas are monitored over time. Modelling of the trophic relationships incorporate benthos and benthic indicator species. Model outputs therefore provide indications of the risk associated with the fishery to the ecosystem as a whole, including habitat, so SG80 is met.
Historical and current ecosystem research surveys of consistent nature and associated modelling measures changes that may be taking place over time. SG100 is met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Shuntov and Dulepova (1996), Lapko and Radchenko (2000), Nadtochiy et al. (2007), Valdemarsen et al. (2007), Radchenko et al. (2010), Smirnov et al. (2016, 2017), KamchatNIRO (2017), Kulik (2017)</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>90</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td></td></tr>
</table>

PI 2.5.1 Ecosystem Outcome

PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	The fishery 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 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.	There is evidence 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.
	Met?	Y	Y	Partial
	Justification	Guidance is provided on serious or irreversible harm, viz. GCB3.17.2 includes *"trophic cascade effects, depletion of top predators and trophic cascade through LTLs, severely truncated size composition of the ecological community, gross changes in the species biodiversity, change in genetic diversity of species caused by selective fishing, etc*". The mass of ecosystem evidence presented as a result of the long-term ecosystem monitoring and studies undertaken reveals no significant changes in ecosystem structure in the SOO. The historical decline and subsequent recovery of the pollock fishery testifies to the resilience of the system to sustain an intensive fishery of the scale of that for pollock. Other large-scale fisheries in the SOO such as that for herring has historically also been subject to heavy exploitation and typically is managed as a LTL species. No noticeable biodiversity changes have been reported; there are some shifts in benthos structure in selected areas but nothing that suggests significant ecosystem stress. This affirms the general qualitative scientific opinion (TINRO), that the pollock fishery has had little impact on the ecosystem and that SOO ecosystem processes vary primarily with large-scale climatic and oceanographic conditions. SG60 is met. Based on qualitative assessment and expert judgement plus, in recent years, detailed trophic modelling of fishery impacts on the ecosystem, the fishery is deemed to be highly unlikely to alter the ecosystem irreversibly. SG80 is met. The test for SG100 is the *Highly Unlikely* requirement. "*Harm to ecosystem functions is normally inferred from impacts on ecosystem processes and properties such as trophic relationships, community resilience, etc, and often have to be inferred from conceptual or analytical models or analyses*". The inferred stability in the ecosystem as well as ongoing rigorous quantitative modelling is partial evidence that underlying ecosystem structure and the function of the SOO ecosystem is highly unlikely to be at or near the point where there could be serious or irreversible harm. SG100 is partially met.		
References		Shuntov and Dulepova (1996), Lapko and Radchenko (2000), Nadtochiy *et al*. (2007), Heileman and Belkin (2010), Radchenko *et a*l. (2010), Smirnov *et al*. (2016, 2017), Kulik (2017), Melnik *et al.* (undated)		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				

PI 2.5.2 Ecosystem Management

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There are measures in place, if necessary.	There is a partial strategy in place, if necessary.	There is a strategy that consists of a plan, in place.
	Met?	Y	Y	N
	Justification	GCB 3.3 guidance defines a "partial strategy" as a "*cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically*". The measures in place have been provided in the general description of the fishery and include: (1) if an incidental bycatch by a pollock-fishing vessel is large, the vessel is permitted to transfer/allocate the catch to another rights-holder with allocation for that species; (2) if bycatch is in excess of the TAC or the PC, the management authority can enforce time–area closures to mitigate further excess bycatch; (3) if bycatch exceeds 2% of the pollock catch in any one haul, the excess catch must be returned to the sea; (4) multiple species quotas – vessels can have quotas for multiple species, eliminating the need to apply mitigation as long as the allocation to the vessel for the bycatch species is not exceeded; (5) closed seasons applied to fishing outside of 1 January to 31 March (Kamchatka–Kuril and West Kamchatka) and 1 January to 9 April (northern SOO); (6) pollock-directed effort is mainly midwater trawling with nets of a minimum of 100 mm mesh, and no bottom trawling is allowed; (7) spatial management – there is a full or partial ban in some fishing zones, with trawling not permitted <30 miles offshore and 5–12 miles from islands; (8) when bycatch exceeds 2%, there is a "move-on" rule of at least 5 miles from the areas of such high bycatch; (9) daily vessel records (DVRs) – vessel captains must keep records of bycatch and submit the records daily. These measures are for example implemented through the *Fishing Rules* such as those applied to marine mammals (Ministry of Agriculture 2017). These measures are applied if necessary, so SG60 is met, and they also constitute a partial strategy if necessary, so SG80 is met. There is no explicit plan outlining the strategy, so SG100 is not met.		
b	**Guidepost**	The measures take into account potential impacts of the fishery on key elements of the ecosystem.	The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	The strategy, which consists of a plan, contains measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
	Met?	Y	Y	N

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function		
	Justification	There is no explicit overarching ecosystem management approach articulated in FFA policy, although the FFA permits aim to minimize any impacts of the fishery on the general ecosystem as well as more broadly through the Federal Law on Wildlife. Ecosystem impacts are primarily controlled through specific measures implemented in the fishery. Part of the scientific recommendation process undertaken annually is for the annual TAC recommendations to be reviewed taking the ecosystem into consideration. With the introduction of MSC certification, as evidenced through successive surveillance audits, meetings and interviews with the FSB and FFA repeatedly affirm the enforcement of the fishery measures that aim to not only manage and control effort on target species, but increasingly also the bycatch (target-directed effort is also managed through catch limits associated with other species, also known as Possible Catch/Yield or PC/PY). Gear limitations include a minimum mesh size to limit the catch of juvenile pollock and the enforcement of move-on rules when juvenile pollock or bycatch volumes exceed permitted levels. SG60 is met. The numerous measures in place constitute a “partial strategy” as defined. Ongoing monitoring of the ecosystem allows for year-on-year assessments of ecosystem baselines, although the nature of this work is understandably slow to respond to changes. The various research institutes (mostly TINRO) undertake ecosystem monitoring routinely. Changes in ice cover have a critical effect on the opening and closing of the target fishery and therefore also the broader ecosystem impacts of the fishery. SG 80 is also met. There is a partial strategy, but it is not articulated as an explicit plan. It clearly underpins much of the ecosystem work undertaken, although it is not clear as to the extent to which changes in ecosystem elements are taken into direct consideration in overall management of the fishery. Since first certification, it is clear that the ecosystem fishery-specific impacts are the subject of directed research and modelling. SG100 is only met in part.		
c	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.
	Met?	Y	Y	Y
	Justification	Implementation of an Ecosystem Approach to Fisheries is a global trend and underpins the MSC sustainable fisheries concept. Although there are many measures in place for the SOO fishery, it is believed that relative to other large-scale fisheries, the measures do work. The SOO is defined as one of the world’s Large Marine Ecosystems (LMEs) and it has been robustly compared with other LMEs. Its seasonal ice cover and high productivity identifies it as a largely unique system but with productivity characteristics similar to many other LMEs. SG60 is met. The SOO fishery is tightly monitored, has effective scientific observer coverage and is closely monitored by the Coastguard. Arguably, therefore, the fishery measures are doing what they are intended to, i.e. to control exploitation of pollock and to ensure that bycatch limits are met, for other commercial species. SG80 is met. The measures in place and the partial strategy including the effective monitoring and the application of the fishery rules support the implementation of the measures in place to mitigate ecosystem impacts by the fishery, and SG100 is met.		
d	Guidepost		There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is evidence that the measures are being implemented successfully.
	Met?		Y	Y

PI 2.5.2	There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function	
Justification	The pollock fishery has recovered from a period of intensive overexploitation and has responded clearly to a more responsive management system. The measures in place, in particular the control of effort and the introduction of TACs, have stabilised the fishery. The seasonal nature of the fishery, which is subjected to periods of closure due to ice cover, is also a contributing factor to sustaining recruitment to the fishery. The measures in place suggest that the partial strategy is being implemented successfully, and SG80 is met. Compliance with the measures is good (see P3 background section) and there is no direct evidence of IUU fishing that might undermine the success of the local midwater pollock fishery; therefore SG 100 is also met.	
References	Shuntov *et al*. (1993), Chuchukalo (2006), Valdemarsen *et al*. (2007), Heileman and Belkin (2010), Radchenko *et al*. (2010), Smirnov *et al*. (2016, 2017), *Fishing Rules* for the Far Eastern Basin, last amended April 2017 - Ministry of Agriculture (2017), http://www.russianpollock.com/information/publications/	
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		

PI 2.5.3 Ecosystem Information

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	Ecosystem-based research has been ongoing in the SOO including multi-year ecosystem monitoring activities that were started in the 1980s. Since 2010 this work has continued incorporating all levels of the ecosystem – trophic structure, biocoenoses, habitat studies, biological oceanography, etc. Biomass and production in the Sea of Okhotsk ecosystem has been reported on since the 1980s and early 1990s There is also a significant established information base on the SOO ecosystem that is published nationally and internationally where the fishery removals are quantified. SG60 is met. The information, both historical and ongoing, provided inputs into modelling of the SOO ecosystem that is both innovative and complex, and is leading to increasingly better understanding of the system (this includes recent studies on operational impacts of the fishery on the ecosystem, including ETP species). SG 80 is met.		
b	**Guidepost**	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated in detail.
	Met?	Y	Y	N
	Justification	Ecosystem research, including recent modelling, has consolidated the available ecosystem information. This includes the key elements of the SOO ecosystem (benthos, biological oceanography, predator/prey and trophic relationships, and fishery-specific removals and impacts). The habitat is not directly impacted by the midwater trawl fishery. Past research and current studies are providing good baseline information used to infer fishery impacts, so SG60 is met. The main functions of ecosystem components have been described and most have been reported in national and international literature in detail. Although the complexity of ecosystems and related studies is never conclusive, all the key elements have been considered and conclusions drawn on their significance to the SOO. Current trophic modelling infers in detail specific impacts of the fishery on the broader ecosystem of the SOO, so SG80 is met. All the main interactions in the SOO ecosystem have been studied (and the work is ongoing) – this includes ETP species and their consideration in complex trophic modelling. The current ecosystem modelling is work in progress, so it cannot be said that SG 100 is met in full. SG100 is not met.		
c	**Guidepost**		The main functions of the Components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.	The impacts of the fishery on target, Bycatch, Retained and ETP species are identified and the main functions of these Components in the ecosystem are understood.
	Met?		Y	N

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
	Justification	The current research programme focuses on all key elements of the ecosystem. For each component, its role in the SOO system is broadly understood, so SG 80 is met. The ongoing work aims to identify the impacts of the fishery on the ecosystem. Although there is now better understanding (relative to that at the first assessment of the fishery), the main functions of the impacts on the SOO ecosystem are not yet conclusively described, so SG100 is not met.		
d	Guidepost		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.	Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?		Y	Y
	Justification	There is a significant database of information on the SOO ecosystem held by TINRO and other research agencies. The database is becoming increasingly sophisticated and the modelling more complex, typically reflecting the complexity of ecosystems in general. Past and current researchers (Russian) have demonstrated that their experience and innovation in terms of ecosystem modelling is of a high standard, and their work is peer-reviewed. The SOO ecosystem has been tested over time and the fishery has gone through low periods and poor management, but more recently improved management and control. Throughout this history, the ecosystem has shown no direct fishery-specific impacts. Current research and modelling focuses increasingly on fishery-specific elements, so SG80 is met. Present modelling of trophic interactions and other ecosystem elements permits inferences on fishery impacts on the SOO ecosystem is general, so SG100 is met.		
e	Guidepost		Sufficient data continue to be collected 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 measures).	Information is sufficient to support the development of strategies to manage ecosystem impacts.
	Met?		Y	Y
	Justification	As discussed in SIs (a)–(d) above, regular and detailed ecosystem studies are undertaken and have been ongoing for many years. They are done in conjunction with biomass surveys both using midwater (pelagic) and bottom trawl (demersal), and the annual surveys are monitored for changes in ecosystem indicators every year. SG 80 is therefore met. The information is sufficient to understand the ecosystem impacts. Even though there is some uncertainty relating to, for example, climate change and shifts in ice cover in the SOO, such uncertainties are traditional in ecosystem research currently, so SG 100 is met.		
References		Shuntov *et al*. (1993), Shuntov and Dulepova (1996), Lapko and Radchenko (2000), Aydin *et al*. (2002), Chuchukalo (2006), Nadtochiy *et al*. (2007), Dulepova (2017a, 2017b), Kulik (2017)		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				

PI 3.1.1 Legal and/or Customary Framework

<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 sustainable fisheries in accordance with MSC Principles 1 and 2; 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 colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>There is an effective national legal system and <u>a framework for cooperation</u> with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.</td><td>There is an effective national legal system and <u>organised and effective cooperation</u> with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.</td><td>There is an effective national legal system and <u>binding procedures governing cooperation with other parties</u> which delivers management outcomes consistent with MSC Principles 1 and 2.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">Russia’s national fishery management system, including that relating to the SOO midwater trawl pollock fishery, is deemed to be effective and to contain legally binding procedures that ensure good standards of cooperation with national and international parties in delivering management outcomes for sustainable fisheries consistent with MSC Principles 1 and 2. The system covering the pollock fishery specifically has also been internationally reviewed independently and critically since first certification (Radchenko 2017) and is deemed to be sound. Also, in terms of quality, credibility, reliability and effectiveness against international standards it was ranked fourth behind the management systems of the USA, Iceland and Norway by Melnychuk et al. (2016) in a critical scientific analysis. It should be stressed here that developments in the country’s fisheries management system have been relatively swift since the end of Soviet-era “closed” or somewhat “opaque” management in the early 1990s and show that Russia is committed to enshrining international best practice in its fisheries governance. The Open Government initiative currently underway is bent on rendering the system transparent to international and national observers and is working well. An array of Acts and official Orders has been promulgated, some already revised and updated since being passed, and many of them specifically define sustainability as a key outcome and objective. National and regional legislative entities have been established with a view to ensuring that sustainable fisheries, in accordance with MSC Principles 1 and 2, are achieved. Russia has signed its adherence to many international (UN) codes, including that of eradicating IUU fishing, a subject about which it has also signed binding agreements with many of its Pacific maritime neighbours. SG60, 80 and 100 are met.</td></tr>
<tr><td rowspan="2">b</td><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 fishery.</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 fishery and has been tested and proven to be effective.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
</table>

<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 sustainable fisheries in accordance with MSC Principles 1 and 2; 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>Justification</td><td colspan="3">The management system incorporates and is subject by law to a transparent mechanism for the resolution of legal disputes that is considered to be effective in dealing with most issues that may arise and is appropriate to the context of the fishery. The established mechanism to resolve disputes is through the Court, and laws (Fishing Rules, etc; Ministry of Agriculture 2017) and enforcement procedures are fully harmonized. Transparent governance mechanisms to preclude and resolve disputes include provisions to allow fishers and owners to propose changes to rules, and there are formal processes for anyone to be involved in reviewing annual TACs. Indeed, all citizens and stakeholders are now able and encouraged to participate in the management process; the State's “Open Government” and the lead agency's (FFA's) “Open Agency” initiatives have led to greater confidence that the process is transparent and fair throughout. Moreover, a transparent auction system helps preclude disputes related to quota allocations, where changes have resulted from either sanction on miscreant fishers or government-initiated redistribution mechanisms. It is clear that the management system and fishery acts proactively to avoid legal disputes and that the system allows the rapid implementation of binding judicial decisions arising from legal challenge. The control methods implemented, such as an active monitoring and inspection capacity, the immediate remedial action and the punitive sanctions sometimes applied are consistent with international practice. The 100% VMS coverage and the at-least daily supplied and ultimate availability to all of up-to-date catch and production information is evidence of a well-managed fishery in which disputes arising from at-sea non-compliance are rare. Overall, given the rapid progress and improvements made to Russian fisheries governance since the early 1990s, it is concluded that, in the context of the pollock fishery, SGs 60 and 80 are met.

However, the team was unable to find real evidence that the mechanism has been rigorously tested and proven to be totally effective, so SG100 is not met.</td></tr>
<tr><td rowspan="2">c</td><td>Guidepost</td><td>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.</td><td>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.</td><td>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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
</table>

<table>
<tr><td colspan="2">PI 3.1.1</td><td>The management system exists within an appropriate legal and/or customary framework which ensures that it:
Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; 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>Justification</td><td>The rights of indigenous peoples (who live in the north of Russia, in Siberia and some in the Russian Far East, hereafter referred to as KMNS) are enshrined in the federal laws “On Fisheries …”, “On Guarantees of the Rights of Small Indigenous Peoples of the Russian Federation”, and “The Communities of Small Indigenous Peoples of the North, Siberia and the Russian Far East”, and are covered in various decrees and orders originally dating from 2000 to 2009 (see Section 3.7). The detailed procedure for implementing KMNS fishing rights and their access to aquatic resources is regulated by regulatory acts of the Ministry of Agriculture and the FFA, as are fishing methods, applications to fish and the receipt of quotas (catch limits) to harvest bioresources aimed at maintaining traditional ways of life. KMNS mainly engage in coastal fisheries and in catching anadromous species, but some quotas for pollock in coastal waters adjacent to Kamchatka and in the Chukotka Autonomous Region are allocated to them (currently they are allocated an annual 119 t of pollock in the SOO). Therefore, there is in law and practice a formal commitment to honour the legal rights of indigenous peoples; SG 60, 80 & 100 are met.</td></tr>
<tr><td colspan="2">References</td><td>Melnikov et al. (2004–2009), Melnychuk et al. (2016), PCA (2017c), Radchenko (2017), various Fisheries Laws, Decrees and Orders</td></tr>
<tr><td colspan="3">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>95</td></tr>
<tr><td colspan="3">CONDITION NUMBER (if relevant):</td><td></td></tr>
</table>

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	**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?	Y	Y	Y
	Justification	All organisations and individuals involved in the management process have been identified and their functions, roles and responsibilities explicitly defined for all areas of responsibility and interaction. The Russian system names and mandates the people and the organizations involved and defines their functions, roles and responsibilities. From discussions held during the site visit and previously during surveillance audits, it is clear that all organizations involved also know how their role complements and supports other aspects of the system. There are relatively few layers and divisions in the management structure, and all roles and responsibilities are defined within its framework. Russian fisheries management is organized through a common coordinating agency, the Federal Fisheries Agency (FFA; or *Rosrybolovstvo*), which operates with executive power under the Russian Ministry of Agriculture, and it has five regional offices in the Russian Far East that administer federal law and policy regionally. Scientific and stock assessment input to management is also coordinated by the FFA, and the organisation is the administration arm of the CFMC, the monitoring agency. Enforcement of fishery laws falls under the responsibility of the Federal Security Service (FSB), but these two organizations (FFA and FSB) operate in effective tandem with a common overall aim of ensuring sustainable fisheries. The available evidence and testimony confirms that SG 60, 80 and 100 for SIa are met.		
b	**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?	Y	Y	N

<table>
<tr><td colspan="2">PI 3.1.2</td><td colspan="3">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</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">The FFA establishes and oversees the Fishing Rules in cooperation with the DVNPS, which receives proposals on the subject from the fishing industry and others, and supports the establishment of Community (Public) Councils as a way to promote transparency, dialogue and cooperation with scientific and public organizations (including NGOs) and individuals. Operationally, the FFA adopts the rules that define catch limits, seasons, gears and fishing grounds. Such rules include standard fishery regulations describing the responsibilities of the operator, lists of the documents to be available on board fishing vessels, details of prohibited areas, seasons and species, fishing gear regulations, minimum sizes for fish and other harvestable species, and bycatch regulations. For all Russian pollock fisheries, the key management measures are enshrined in the "Fishing Rules for the Far Eastern Fishing Basin" (Ministry of Agriculture 2017). The rules themselves are regularly reviewed through a process coordinated by the DVNPS, which considers proposals from fishers and others, acting as a coordinating body for communication, discussion and, if appropriate, confirmation of options and decisions related to the pollock fisheries. In this way, the process takes advantage of local knowledge and broadens public participation in fishery management, within the context of federal law and policy for Russian fisheries. In terms of feedback after due consideration of proposals and information provision, Russia's recently launched Open Government and Open Agency initiatives have stimulated effort to ensure that satisfactory two-way communication is in place, but finding actual proof of this, other than through statements in internally produced documents and minutes (most in Russian) and on various formal websites (some of which include English documentation or summary) proved elusive. Previous to, during and since the site visit, the team spent a lot of time checking on accessibility of the various sources of basic information and official documents and records. Accessibility of the team to such information has been enhanced through the efforts of many officials and client representatives, but there is no written evidence that the management system regularly explains how it uses/does not use the information gathered through its consultative processes. Therefore, only SG60 & 80 are met for SIb.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>The consultation process provides opportunity for all interested and affected parties to be involved.</td><td>The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">The consultation process provides opportunity and plenty of legal encouragement for all interested and affected parties to be involved, and facilitates effective engagement. As stated several times in Section 3.7 and elsewhere in this scoring table, the Russian fishery management system has expanded rapidly over the past 25 years, and full opportunity is now provided for all to become involved in the process of management; encouragement for all to participate is clearly legislated and, although consistency of participation is sought, the process does allow for occasional refreshment of some participants on most established boards. As a result of in-depth discussion and perusal of the written material provided to it, the assessment team is convinced that all appropriate steps are being taken to involve as many of those interested in the fishery and affected by it as possible, as often as feasible, along with as representative a group of stakeholders as possible, in the consultation process. There are numerous opportunities in the management cycle for SOO pollock for stakeholder participation, and many have seemingly taken the opportunity. Consequently, SG 80 and 100 are met for SIc.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">PCA (2017c), Radchenko (2017), Open Government (Government decree #29-p of 30 January 2014) http://open.gov.ru, Open Agency plans of the FFA</td></tr>
</table>

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	
	http://fish.gov.ru/files/documents/otkrytoe_agentsvto/plan-otchet/plan-real-otkr-2016.pdf	
OVERALL PERFORMANCE INDICATOR SCORE:		**95**
CONDITION NUMBER (if relevant):		

PI 3.1.3 Long-Term Objectives

PI 3.1.3		**The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach**		
Scoring Issue		SG 60	SG 80	SG 100
	Guidepost	Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are implicit within management policy	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.
	Met?	Y	Y	Y
	Justification	Hønneland (2004) covers this subject in his evaluation of Russian fisheries management. However, the team also found evidence that clear long-term objectives to guide decision-making, consistent with MSC Principles and Criteria and including the precautionary approach, are explicit within and required by management policy. Although the approach as such is seemingly not incorporated in Russian fisheries legislation anywhere, practical harvest control rules set for the UoC and other Russian fisheries do incorporate a clear precautionary element. The UoC fishery is managed as an assessed fishery, and data, research plans and regulations are tailored to meeting management needs. The pollock fishery is assessed and management duly advised according to the precautionary approach, as explained in the underlying Babayan (2000) stock assessment document and in terms of management as defined by the FAO in its Code of Conduct for Responsible Fisheries (FAO 1995), as well as with due regard for ecosystem health and sustainability, so is fully consistent with MSC Principles (1 and 2) and the binding criteria. Evidence demonstrates the existence of long-term objectives within management policy, objectives defined in federal laws such as the *Fishing Law*, and strategic planning documents such as the "*Development of the Fishing Industry for the period 2013–2020*" and "*Marine Policy of the Russian Federation up to 2020*". Together, these documents define policy objectives for the Russian Far East fishing industry and provide a broad context for managing the pollock fishery. Long-term strategic plans enshrined in these documents include objectives to maintain sustainable stocks and protect the environment while meeting social and economic goals, sometimes including schedules and indicators to guide decision-making. In particular: • The Law entitled "*On Fisheries and Aquatic Biological Resources Conservation*", which is the 2014 update of the *Fishing Law* of 2004, defines key principles for Russian fisheries including priority provisions to conserve aquatic biological resources for human use and to maintain ecosystem health and functioning. To achieve these long-term objectives, there is a management strategy based on a cohesive series of measures and control rules designed to meet short-term goals such as annual TACs consistent with long-term conservation objectives for sustainable use of stocks and avoiding damage to ecological resources. • Under the various updates and amendments to the *Fishing Law*, ten-year quotas and 20-year access to fishing zones are issued, promoting long-term stewardship by the fishing industry and providing tacit support for achieving long-term conservation goals related to the resources and their associated ecosystems. • The *Marine Doctrine to 2020* establishes Russian sovereignty in the EEZ and provides long-term objectives to conserve and manage aquatic biological resources, setting specific goals and targets for national development. It also sets goals for modernizing the fishing fleet, reducing fishing capacity, improving port and processing infrastructure, and encouraging long-term investment. It promotes open access to information and greater transparency in management decisions, supporting evidence of both of which was found, and links the fishery to national food security as it seeks to further develop national fish-processing capabilities and supply chains. *Inter alia*, it advocates broader public		

		participation and more public–private partnerships in the fishing industry, and recommends actions to streamline government processes, remove government obstacles, and increase the capacity and resources of Federation fishery management agencies, seeking to link regional development to sustainable stocks. • Russian Government Edict No. 1057 (2008) describes long-term objectives in the "*Conception of the Russian fishery industry development up to 2020*." The *Conception* links fishing industry development with sustainability of stocks. Key objectives include improving the legal and policy framework, maintaining effective governance, rationalizing the use of aquatic biological resources through limiting fishing pressure, adequate expenditure on relevant scientific research, and maintaining fleet capacity at levels concomitant with the marine resources being exploited. • With explicit support for scientific research in strategic documents, and TINRO and the other Far Eastern scientific institutes operating against clearly defined and published 5-year plans, Russian scientists obtain and share information on marine ecosystem and fisheries science. They participate in the international Pacific marine science organization (PICES), collaborate with American scientists in research in the Bering Sea and adjacent areas, and pay attention *inter alia* to investigating the extent and impacts of bycatch on non-target species and marine habitats. The team considers that SG60, 80 and 100 have been met for this scoring issue.
References		FAO (1995), Babayan (2000), Hønneland (2004), Melnikov *et al*. (2004–2009), Melnychuk *et al*. (2016), PCA (2017c), Radchenko (2017), various Fisheries Laws, Decrees and Orders
OVERALL PERFORMANCE INDICATOR SCORE:		**100**
CONDITION NUMBER (if relevant):		

PI 3.1.4 Incentives for Sustainable Fishing

PI 3.1.4		The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.
	Met?	Y	Y	N
	Justification	Russian fisheries law is mature, and, the management system for pollock in the Russian Far East has created through its policies and guiding principles some positive incentives to fish sustainably and to engender a sense of stewardship of the resource. They include: • In terms of conservation and sustainable operation, the *Fishing Law* (2004) and its 2014 update establishes the primary strategic goal of the fishing industry in Russia as conservation of ABRs. • Long-term plans to develop an integrated fishing industry contain provisions to balance fleet capacity with marine resources, a commitment to resource conservation, ongoing support for marine research, promotion of long-term investment, and the establishment of public–private partnerships to help modernize the fishing industry and ensure sustainability. • To implement longer term strategic plans, five-year target programmes implement specific projects to achieve long-term goals. The federal target programme "*Enhancing the Effective Use and Development of the Resource Potential of the Fisheries Complex from 2009 to 2013*" sought to improve the resource base, matching marine bioresource levels with a controlled fleet production capacity. A fleet refurbishment and rationalization scheme through the use of a small quota incentive is further evidence of the Government's balancing effort between resources and effort potential. • Russia implemented a ten-year quota system from 2010. With quota for such a long period, fishers were given greater incentive to fish sustainably and to invest. Fishers also have 20-year rights to fishing grounds, which are lost if they fail to catch at least 50% of their quota for two years (this proportion will rise to 70% shortly). • With much of the above, the system has attributes and principles that should incentivise fishers and their companies to fish sustainably, promoting their sense of resource stewardship. There is hence a clear attempt to provide stability and/or security for the fisher community and industry despite the uncertainty that always surrounds the term "sustainable fishing". • Likewise, the absence in the region of perverse incentives to fish unsustainably, such as subsidies, is a positive element of the system, leading to confidence that the system is operating in support also of MSC Principles 1 and 2. • All catches taken in Russian territorial seas, the EEZ and over the continental shelf have to be delivered to the Customs territory of the Russian Federation for inspection by the Coastguard. Failure to do so can lead to the loss of the fishing license. • Uniform *Fishing Rules* apply across the Russian Far Eastern basin. The rules define gears, seasons and fishing grounds, and specify documents, licenses and reporting requirements. • With greater ownership of the resource, fishers are proactive in suggesting strengthening of the laws and enforcing the *Fishing Rules*, a good example of how the system is working to favour the resource – buy-in tends always to foster responsibility towards the future. Through the DVNPS, fishers, associations, other stakeholders and even citizens can propose changes to the rules, which are then considered on the basis of rigorous scientific information and review. Also, the Community (Public) Councils provide a consultative and appreciated forum for transparent dialogue among		

		fishing companies, stakeholders and other interested parties, promoting where necessary legal reform, better enforcement and sustainable development. • Rigorous enforcement by the Coastguard along with sanctions such as confiscations of vessels and/or gear and license cancellations provide legal incentives to obey the law. Under current law, fishing licenses can be revoked and quotas cancelled in cases of fishery violations (see Section 3.7 and PI 3.2.3 below). Note too that the cost of being awarded a fishing right now is relatively high by local and international standards (though the cost on first issue was not so high), and to lose it through violation of laws and rules would have severe economic consequences well beyond the cost of the fish so lost for the company placed in that situation. There seems too to be no shortage of potential applicants to join the fishery should an opportunity arise as a result of punitive sanctions being applied to current participants. Repeated offences can of course lead to termination of fishing rights, e.g. for having violated fishery regulations twice or more in a single calendar year and when the violation resulted in large-scale damage to aquatic biological resources (ABRs), for failing to deliver ABR catches to the Customs territory as required, and having, without the required notification, a VMS device on board not working for >48 h in a calendar year. There was no evidence provided or found to demonstrate that the management system explicitly considers incentives in a regular review of management policy or procedures to ensure that current incentives do not contribute to unsustainable fishing practices. Therefore only SG60 & 80 are met for this scoring issue.
References		Melnikov *et al*. (2004-2009), Melnychuk *et al*. (2016), PCA (2017c), Radchenko (2017), various Fisheries Laws, Decrees and Orders, including Russian government edict No. 1057 of 2008 describing long-term objectives in "*Conception of the Russian fishery industry development up to 2020*"
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		

PI 3.2.1 Fishery Specific Objectives

<table>
<tr><td colspan="2">PI 3.2.1</td><td colspan="3">The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system</td><td>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.</td><td>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's management system.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Partial</td></tr>
<tr><td>Justification</td><td colspan="3">Russia's fishery management system is transparent, rigorous and managed legislatively through the FFA to a high standard. The FFA oversees the allocation of quota shares and grants fishers and legal entities the rights to harvest a resource. Currently, quota allocations by percentage of the TAC are for a period of ten years, based on historical performance in the fishery, and a federal government decree specifies the parties, the subject of the contract, its duration, the type of fishing and other terms and conditions. However, the fishing law "On fishing..." provides for early termination of an agreement at the request of one of the parties in accord with civil legislation (Article 33.5), and the public authority has the right to terminate an agreement unilaterally through the court if:
there is need for a bioresource for public use;
the pollock catch is for two consecutive years <50% of the quota issued;
during the calendar year the quota-holder twice or more violates the Fishing Rules;
the quota-holder fails to deliver its catches to the Customs territory of the Russian Federation;
the VMS ceases operation for 48 h or more without due reason.
The above refer to the management system itself, how it operates, and what happens if a fisher defaults. However, to include the most appropriate scientific data and advice in decision-making, the management system includes VNIRO, TINRO and other scientific institutes in regular reviews of fishery management decisions, especially, but not only, in the annual process of setting TACs. Notably, VNIRO is mandated to provide oversight and an arms-length review to ensure scientific rigour and consistency of the proposed decisions with federal fisheries policy and law, and advocates and supports the use of the precautionary approach (Babayan 2000) to assessment, so promoting the principle of short- and long-term sustainability inherent in MSC principles. The transparency imbued in the system through the Federation's Open Government and Open Agency initiatives and the inclusive process of broad consultation throughout assessment and evaluation also generate confidence that MSC P2 requirements are being met. For instance, the regular evaluation of the fishery's performance in terms of avoidance of juvenile pollock and other species as well as its encounters with marine mammals and seabirds, and specifically ETP species, is evidence that P2 objectives are being taken seriously. Moreover, it is clear from the legislation in place and various clear directives and documentation seen that the long-term health of the ecosystem and the environment within which the fishery operates is being taken seriously and actively monitored.

Direct observer coverage (scientific) and compliance inspection (Coastguard) has also been beefed up since first certification (see the tables provided in the background sections to this report) and its adequacy statistically evaluated, allowing the outcomes expressed by MSC Principles 1 and 2 to be assessed effectively. Discard monitoring at sea, although only a sample of vessels can be observed, shows that discarding for any reason is uncommon. It should be emphasised too that the fleet operates with vessels mainly in close proximity to each other and that statistical evaluation has revealed that, although only a few observers are present on relatively few fishing vessels, the catches made by those vessels are</td></tr>
</table>

		representative of a very large proportion of fleet activities at any point in time. Rigorous and expensive scientific monitoring of the SOO's habitat and ecosystem (components) is excellent and now extends to very long time-series of data. Finally, there is no evidence of any IUU fishing associated with the SOO pollock fishery, and the Russian Federation has shown by its actions in signing agreements with its maritime neighbours that its responsibilities in eliminating that practice are being taken seriously. Succinctly, there is good evidence of explicit short- and long-term objectives consistent with MSC Principles 1 and 2 being defined within the management system, so meeting SG60 & 80 for this scoring issue and, because they are to some degree measurable (e.g. juvenile pollock discard avoidance, ETP species stability) making their formal evaluation demonstrable, partially meeting the requirement of SG100. However, there was insufficient evidence of all potential MSC P1 and P2 objectives being measurable, which would be required to fully meet SG100, so a partially measurable score of 90 is awarded for this scoring issue.
References		Babayan (2000), PCA (2017c), Radchenko (2017), various Fisheries Laws, Decrees and Orders

OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	

PI 3.2.2 Decision Making Processes

PI 3.2.2		The fishery-specific 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 under assessment.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Y	Y	
	Justification	The process leading to decision-making in the Russian pollock fishery for the SOO is clear and robust, including in terms of its broad-ranging, comprehensive consultation. The system is based on fully documented (databases, scientific literature and websites) sound science, all available information being used in the process and evaluated by experts initially regionally then federally through VNIRO in Moscow. Independent scientific and economics experts then probe the outcomes of the assessments and ask the questions necessary to achieve the overarching objective of making the fishery sustainable and preserving ecosystem health and function. The evaluation is obviously weighted towards pollock, the target species, but appropriate and relevant environmental/ecosystem questions and issues are also addressed; the questions posed show good understanding of the system in which the pollock fishery is prosecuted. The decision-making process therefore clearly meets the requirements of SG60 & 80 in terms of SIa.		
b	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?	Y	Y	N

PI 3.2.2		The fishery-specific 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 under assessment.		
	Justification	There is a national research plan underpinning the management system that is subject to regular updating, and long time-series of information exist relating to the pollock fishery and the SOO ecosystem. In terms of the formal assessment and its output in terms of providing sound management advice, the decision-making process is fully reactive and adaptive, based on up-to-date catch statistics, the results of several surveys, numerical modelling to an internationally acceptable standard and other relevant research information. The assessment is produced with the same rigour used for certified fisheries in other countries, has been carefully reviewed independently by Sharov (2016), specifically relating to possible uncertainties in the model, and is open to close scrutiny, although until a TAC has been finally announced, understandably not to all, at least initially. Since first certification too, a predominantly English-language website has been launched and populated by the client, and nearly all documentation is uploaded as a means of openness. The official Open Government and Open Agency initiatives are also worth mentioning here, even though their various efforts (e.g. public hearings, Public Councils, websites, media releases) are designed more for the Russian public than English-speakers. Many minutes of relevant meetings are uploaded to websites for public consumption, although administrative and legislative material tends to be found only on the websites of the relevant agency (e.g. the FFA), in Russian. In the five years since first certification, it has become clearer to the team, which does not speak Russian and previously had to rely largely on Google Translate to search for evidence, that the system is responding to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and takes account of the wider implications of decisions. Evidence that all potential issues are being responded too is not available, however, so only SG60 & 80 aremet for SIb, not SG100.		
c	Guidepost		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	
	Justification	Decision-making processes use the precautionary approach and are based on best available information. As stated above, all (and best) information is used in decision-making, at least all natural scientific information. There are few parts of the world where social and economic data are taken into consideration formally, numerically and rigorously in the evaluation process, so the pollock fishery is not unusual in that respect. Explicit in the assessment methodology is the precautionary principle, as explained in the Babayan (2000) document. Overall, adherence to the precautionary principle as defined by FAO (1995) is strong, so SG80 is met for SIc.		
d	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.

PI 3.2.2		The fishery-specific 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 under assessment.		
	Met?	Y	Y	N
	Justification	Explanation is provided in uploaded and official documentation for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation, review and decision-making. Some formal feedback resulting from decisions on management is provided, for instance through publicizing the minutes of the various meetings, but there does not seem to be directed formal reporting to stakeholders unless the latter specifically request it. Before, during and subsequent to the site visit, the team was supplied various data and all the information it requested, much of it obviously produced formally. However, evidence of formal, perhaps automatic, feedback to stakeholders (for instance, the WWF still expresses concern about the issue of engagement) describing how the system has responded to findings and recommendations is absent. It may exist and be opaque because of translation issues, but for now, the team believes that SG60 and 80 are met for SId, but not the principle enshrined in SG100.		
e	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?	Y	Y	N
	Justification	Evidence since first certification in the form of appropriate updating of laws, orders and decrees associated with the management system, and proven actions of the fishing industry, not just the candidate pollock fishery, show that both the official management system and the fishery are complying in a timely fashion with, *inter alia*, judicial decisions arising from legal challenge. No evidence of proactive action to avoid legal challenge was found, however, so just SGs60 and 80 are met for SIe.		
References		FAO (1995), Babayan (2000), Melnikov *et al*. (2004–2009), Melnychuk *et al*. (2016), Sharov (2016), PCA (2017c), Radchenko (2017), various Fisheries Laws, Decrees and Orders		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				

PI 3.2.3 Compliance and Enforcement

<table>
<tr><td colspan="2">PI 3.2.3</td><td colspan="3">Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.</td><td>A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</td><td>A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">Statistics on compliance in the Sea of Okhotsk from 2008 to 2017 are provided and commented on in Section 3.7.3, Table 17, above. The compliance system, which falls under the FSB Coastguard, is well run and effective (sanctions are heavy), with seagoing staff interviewed during the site visit stressing that any non-compliance is not in either their or any fishing company's long-term interests. The FSB collaborates closely in monitoring fishing activity with the FFA's Centre for Fisheries Monitoring and Communications (CFMC), which runs the VMS system operative in the fishery. At the time of first certification of the fishery, there seemed to be a move away from the Inmarsat system most used when the remotely monitored process was set up early in the century towards the apparently more robust Argos system. That situation has now been reversed and the Argos system has been phased out in Russia. The whole UoC fleet compulsorily carries a functioning Inmarsat unit, and the activities of all fishing vessels in the SOO (and in the Russian Far East) are monitored continually by that system, reporting to the CFMC office in Petropavlovsk-Kamchatsky. Russia is also actively developing its own "Gonets" VMS, and that system (which automatically pings through activity information to the control centre every 10 min, more frequently than Inmarsat does) is predicted to replace the Inmarsat system within a few years at most. In tandem, the CFMC is developing an electronic (i.e. continually reporting) logbook system to replace the current system of daily catch and production reporting, done by email, radio or fax. The present system works well and is robustly operated, but the new electronic reporting system will provide real-time data that will permit even better management, necessary especially when quotas are approaching completion. The MCS system in operation appears to the team now to be as effective as many of those operating around the world in other groundfish fisheries, many MSC-certified. Huge strides have been made in recent years in bringing it to a high standard of operation, inclusive of at-sea inspectors, Coastguard, VMS coverage and shoreside inspection. The team is therefore of the opinion that the MCS and compliance capacity covering the UoC fleet is adequate in international terms, given that VMS is just one component of it and that observations are burgeoning annually. The system has been demonstrably consistent in its ability to enforce management measures and rules. Given that the Federation's formal MCS system is supplemented by a fishery-independent but statistically proven adequate scientific observer coverage that meets the requirements within P1 and P2 for information collection, the team has concluded that the fishery is monitored at a level considered highly comprehensive in world terms, and that SG60, 80 and 100 is met for SIa.</td></tr>
<tr><td rowspan="2">b</td><td>Guidepost</td><td>Sanctions to deal with non-compliance exist and there is some evidence that they are applied.</td><td>Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.</td><td>Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
</table>

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
	Justification	Sanctions for non-compliance have been detailed several times in this report, and it is clear that they are powerful and are being applied rigorously. Statistics on their application are provided in Section 3.7 and the FSB widely publicises all cases of transgression, as well as being open to dialogue about fishery performance in terms of the rules it enforces. The team notes in particular that over time there has been some non-compliance-initiated rationalisation of vessel numbers and operator replacement within the fishery. The UoC fishery is valuable both nationally and regionally, and is a significant part of the largest groundfish fishery in the world, so there is no shortage of operators willing to enter the fishery if others default. The sanctions being applied are consistent and work well; the statistics show increasing numbers of inspections, burgeoning fines overall, a generally downward trend in non-compliance, and records of generally minor transgression over the years (for instance, see the Footnote to Table 17). Nearly all potentially serious cases taken to court over the years have been successful and result in heavy sanction. Scoring issue Sib is therefore met at all of SGs60, 80 and 100.		
c	Guidepost	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	N
	Justification	Information obtained during the site visit shows that fishers/fishing companies understand the management system and its components well and that they make every effort to comply fully with the rules. All requisite onboard documentation was available and shown to the team on request. Moreover, the annual level of non-compliance (currently some 2% of inspections result in violations) shown in official statistics provided by the Coastguard is evidence that the fishers allowed to operate in the fishery are well aware of their responsibilities. More boardings/inspections, most unannounced, are made annually now than a decade ago (see Table 17 in Section 3.7.3), and the Coastguard confirms that nearly all recent violations within the UoC fishery are for "minor" transgression. Scientific observations (though not aimed at compliance) supplement the MCS coverage of the fishery, and the planned electronic logbook system will result in remote monitoring of catch and production in virtually real time. In the team's view, the level of MCS overall is good by world standards, though some of those interviewed by the team felt that the extent of scientific observer coverage was not yet as high as perhaps it could and should be. The team found full willingness of those interviewed to provide all information sought by the Coastguard, the CFMC and scientific observers, and to accommodate MCS officials on board, even though such a responsibility is time-consuming and has to be handled by fishing personnel. That fishers comply with regulations is deemed certain, especially given that the sanctions applied to them if they transgress are heavy (heavier than at first certification) and that there are many who would seek the opportunity to take their place in the fishery if it became available. Therefore, from documented and interview information and compliance and observer statistics at the team's disposal, it is considered that SG60 & 80 are met for SIc. The rate of inspection, though adequate by international standards, is however not deemed to provide convincing evidence of performance equating to the requirements of SG100, even though anecdotal evidence exists that that level is being reached.		

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
d	Guidepost		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	There is no evidence of systematic non-compliance by those licensed to operate in the fishery, although allegations of IUU fishing in some areas do exist for the past, notably before Russia signed its adherence to the principle of eradicating IUU fishing and entered into bilateral treaties with its Pacific neighbours. The team is convinced from statistics and documentation perused, however, that IUU fishing in the UoC pollock fishery is at worst virtually non-existent. There is some information in reports of management meetings, so although no formal report was unearthed, SG80 is met for SId.		
References		Smirnov *et al*. (2014, 2017), PCA (2017c), Radchenko (2017), official statistics of the FSB Coastguard		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				

PI 3.2.4 Research Plan

PI 3.2.4		**The fishery has a research plan that addresses the information needs of management**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
	Met?	Y	Y	N
	Justification	An annually issued/published formal research plan does exist and was made available to the team (in Russian, comprehensively covering all Russian resources and ecosystems) and, from stock assessment and ecosystem evaluation perspectives, reliable and timely information is provided with the aim of achieving objectives *inter alia* consistent with those contained in MSC Principles 1 and 2. Impressive state budgets are provided to the research function, supplemented by commercial fishery financial support for certain priority scientific output (e.g. the marine mammal and seabird observation reports commissioned during the period of first certification of the fishery: Artyukhin 2015, and Burkanov *et al*. 2015), although there is an element present of scientists carrying out the research that has always been carried out rather than strategically evaluating the worth of the various components and if necessary changing direction towards more strategically needed scientific outcomes. That is not an unusual situation worldwide, of course, as downward pressure on research budgets is applied federally/centrally. The annual research plans do not seem to differ much from year to year, so are questionably reactive to up-to-date research needs. What is exemplary, however, is the long time-series of information associated with the fishery. Long time-series of data, if accurate and well documented in terms of changes that might have transpired over time, are valuable in managing fisheries, for instance, and in evaluating long-term changes in resources caused by climate change. The research plan is published formally and annually, so is transparent to other stakeholders. SGs60 and 80 are met for SIa, but there is little evidence of the comprehensiveness specified in SG100.		
b	**Guidepost**	Research results are available to interested parties.	Research results are disseminated to all interested parties in a timely fashion.	Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.
	Met?	Y	Y	Y
	Justification	Russian scientists are willing to share their research data with other scientists where relevant, far more so internationally than in the Soviet years, and were willing to share scientific material with the team. Formal peer-reviewed papers are published in internationally accessible media and the research output is made available in timely fashion to those charged with formally assessing the state of the pollock fishery, the main target of the research, as well as to stakeholders and the general public if appropriate. The researchers make themselves available for broad consultation on key outputs, not just to the team, which was impressed with the amount of effort made to meet their manifold requests during this recertification exercise. Since first certification too, the provision by the client of a comprehensive, regularly updated website in the English language has met the requirement that not just Russian-speaking interested parties have access to crucial information and findings emanating from the overall research plan and the research conducted. SG60, 80 and 100 are met for SIb.		

PI 3.2.4	The fishery has a research plan that addresses the information needs of management	
References	Russian National Plan for Research, PCA (2017c)	
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		

PI 3.2.5 Management Performance Evaluation

PI 3.2.5		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	The fishery has in place mechanisms to evaluate some parts of the management system.	The fishery has in place mechanisms to evaluate key parts of the management system	The fishery has in place mechanisms to evaluate all parts of the management system.
	Met?	Y	Y	N
	Justification	The Russian fishery management system is similar to systems in place elsewhere in the world. It is effective in its operation, and given the regularity with which aspects of the legislative system are updated, it is obviously open to development where potential improvements are identified. This applies to all components of the system, including the various bureaucratic, administrative and scientific agencies involved. Many (organizations and people) are involved in the system (see Section 3.7.3 in the background P3 section of this report), and the system's general administrative and bureaucratic transparency is obvious, much more so than at first certification. Development over the years has been both proactive (to need) and reactive (to international developments and requirements). All evidence for SIa points, therefore, to key parts of the system being evaluated thoroughly and regularly (SG60 & 80), but to conclude that all parts of the system are being evaluated is not yet possible (so SG100 cannot honestly be said to be met).		
b	**Guidepost**	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	Y	Y	N
	Justification	The Russian Federation's fishery management system, including the UoC-specific component, is clearly under rigorous and regular internal review, where "internal" here means federally within Russia and regionally in its Far East. What was not so clear at first certification, though, was whether there was much external review of (some of the key aspects of) the management system. The term "external" is generally taken to mean external to the country, but guidance in FAM v2.1 (at 8.3.18) advised that "external review" means external to the fisheries management system, but not necessarily international. Certification requirement v1.2 also advises (CB4.11.1) that "External review" at SG80 and 100 be taken to mean external to the fisheries management system, not necessarily international. It is difficult to find documented evidence that such national external review is taking place, although with the fisheries economy so important to the nation, one would inherently believe that it is. In terms of the advice and subsequent TAC within the management system (especially that related to the formal stock assessment process), Russian scientists do interact regularly with their US and other counterparts in PICES and through bi-national agreements, but the formal external review seems to be that relating to the stock assessment and advisory process of many Russian fisheries convened by VNIRO in Moscow, and of the same parts, of course, through the Far East Pollock Council. Even at PICES, there is no formal review of annual assessments (as happens at ICES), merely opportunity through a scientific forum for researchers to exchange scientific views on matters of mutual interest. In this case, there is also the recently commissioned Sharov (2016) review of the assessment, focusing specifically on the uncertainities inherent in the model. Formal review of the management system itself, however, i.e. related to the processes outside the scientific assessment, was not so obviously taking place at first certification, even though such review is the norm in fisheries management around the world. That is why a Condition was placed on the first certification that an independent and external review of the Russian fisheries management		

		system be commissioned urgently, and this was delivered by Radchenko (2017), in English. Radchenko's conclusion was almost entirely positive in terms of international standards, with just a few recommendations being made for future consideration. The team concurs with Radchenko's findings (SG 60 and 80 met), but there is no guarantee that future completely external reviews of the management system's non-assessment process will be made, so SG100 is not met for SIb.
References		Sharov (2016), Melnychuk *et al*. (2016), Radchenko (2017), Varkentin and Ilyin (2017)
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		

Appendix 1.2 Risk-Based Framework (RBF) Outputs

Not applicable.

Appendix 1.3 Conditions

No Conditions are set on this certification.

Appendix 2 Peer Review Reports

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**Yes**	**CAB Response**
Justification: Principle 1: some data particular those of the stock status recruitment etc. rely on data before 2017 (e.g. intertek 2013). Although these data have been very reliable for previous years but for the estimation of stock size and recruitment until 2020 and later there are some assumption and extrapolations. Principle 2: to transfer by-catch to other rights holder is a little strange. By-catch that exceeds 2% has to be discarded (thrown outboard) makes no sense. ETP species are not well addressed as well as the specimen on the IUCN list although they are not on the red list. Principle 3: agreed on		P1. Stock assessments (including consideration of SSB, fishing mortality and recruitment) always make use of historical data as far back as feasible and extrapolate with assumptions forward. The Russian pollock assessment is no different, and we also note (and report) that data and modelling uncertainties have been rigorously addressed recently by the commissioned work of Sharov (2016) as well as by robust centralized and regional national processes of professional consideration. In the team's opinion, the assessment and modelling (including HCR) work underpinning management advice for SOO pollock is sound and conducted to the highest international standards. P2. Thank you for this observation. We refer to the Fishing Rules directly under 2.1.1a, 2.1.2a and 2.2.2a as well as in section 3.6.3. The assessment team acknowledge all the management measures and are satisfied that, along with other measures in place, does mitigate bycatch impacts and maintains bycatch within the levels required by the MSC standard. Regarding the ETP section specifically, we appreciate confirmation of the additional minor species on the IUCN list. The team notes that the scientific data lists provided by scientific observers are comprehensive and that the incidental catches of minor species indicated in Tables 12 and 14 reflect only miniscule proportions of these species, including the IUCN species noted by the assessment team as well as the others noted by the peer reviewer.

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]***		**CAB Response**
Justification: yes, but the data obtained from crew members for ETP species are very uncertain and I would set a condition here to train the crew in an adequate time and it is not clear if all those species are released.		Again, we thank the peer reviewer for the observation, although we do record that no Conditions have been raised in the assessment so this particular comment is probably not in the right place. We agree that crew observations are not 100% reliable with respect to the reporting of ETP species; this is of course not a problem unique to the pollock fishery. The assessment team was satisfied, however, that awareness of the importance of ETP species observations across the PCA pollock fleet increased significantly during the first certification period. Also, the observers deployed to the fleet are highly trained, including in identifying ETP species – a deliberate strategy met under several conditions of the 1st certification. Observer reporting is now structured to include marine mammal and seabird observations as well as detailed analysis of bycatch (as shown in the bycatch tables). The team's discussions with the patrol units and inspectors revealed a higher level of awareness and monitoring of ETP species especially since 2015. Further, in addition to the directed surveys of seabirds and marine mammals that established a professional baseline, the overall conclusion of the assessment team was that monitoring and reporting on ETP species had attained a level adequate to support the MSC standards expected in a fishery of this nature.

If included:

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:		

Performance Indicator Review

Please complete the appropriate table(s) in relation to the CAB's Peer Review Draft Report:

- For reports using one of the default assessment trees (general, salmon or enhanced bivalves), please enter the details on the assessment outcome using Table 23.
- For reports using the Risk-Based Framework please enter the details on the assessment outcome at Table 24.
- For reports assessing enhanced fisheries please enter the further details required at Table 25.

General Comments on the Assessment Report (optional)

- The correct Scientific name of Alaska pollock is **Gadus chalcogrammus Pallas, 1814 Accepted name.** The fish species should also appear in the title and not only in the agenda (but I know Acoura does not want)
  Noted and the text throughout has been adjusted

- 3.4.1. the depth data are not conform with 3.4.
  The text refers to different things: 3.4 is the distributional range and 3.4.1 refers to the fishery operation

- The source of table 1 should be given as HTML link
  The reference at the bottom of the table is sufficient and correct. The team does not agree that a link is needed.

- Table 3 last line is not relevant and can be deleted because it includes an area which is not certified (05.3)
  The reference to the Far East total catch of pollock has been inserted to provide reader perspective on total pollock extractions from Russian waters, so we prefer to maintain that information in text.

- I would prefer

Table 22. Walleye (Russian) pollock TAC in the UoC (Sea of Okhotsk), and PCA allocations and company shares for the 2017 season (except in the West Sakhalin subzone, where the maximum percentage is maintained at 8%) not of relevance and can be deleted
The previous comment refers – the information provides reader perspective and is maintained in text

- page 72 (excerpts from the report, lines which should be deleted)

In terms of the fishery under assessment and its impact on ETP species, it is important to separate pollock-directed gear types when assessing ETP species, in particular in this case the Danish seine (non-MSC) and midwater trawl (MSC-certified) gears. ~~A further consideration is the area in which ETP species may be found:both the Western Bering Sea and Navarinsky areas (western Pacific) have pollock-directed fisheries, but the distribution of many of the ETP species found there do not generally overlap with that of the same species in the SOO.~~ The Kuril Islands (east, on the Pacific side and west towards Sakhalin Island)are also expected to yield a greater incidence of ETP species, in particular marine mammals and seabirds, owing to their proximity to rookeries and nesting locations.
Once again, we retain this text because it provides useful reader background and perspective on the distribution of ETP species potentially associated with Russian pollock fisheries

The midwater trawl fishery is prosecuted offshore of the Kamchatka Peninsula,~~ and the Sakhalin subzone does not form part of the UoC~~. Further mitigation to reduce impacts of the fishery on ETP species is to some degree supported through closed seasons applied to fishing outside of the periods 1 January to 31 March (Kamchatka–Kuril and West Kamchatka) and 1 January to 9 April in the northern Sea of Okhotsk. Pollock-directed effort is also in midwater with nets of 100 mm mesh, and no bottom trawling is permitted. Additionally, spatial management measures include fishing zones that permit no trawling <30 nautical miles offshore and 5–12 miles from islands. The ice coveragethat closes the fishery for large parts of the year also lessens the likelihood of there being interactions between ETP species and the midwater trawl fishery.

Once again, we retain the text proposed by the reviewer for deletion because it is pertinent to the discussion and team-written justifications in the PI scoring tables.

- The greenweight catch data in table 1 are different to those in the attached table (catches-2016.pdf) which sums up to 933,515 t for the UoC / UoA. (http://russianpollock.com/fishery/catch-data/) and for 2015 it is 882,492t compared to table 1 with only 681,179t.

The differences relate to the UoC only covering the certified part of the SOO pollock fishery, whereas the catch data to which the reviewer is referring covers much more of the total pollock fishery

- Self quotation:-) could not find the original papers

Varkentin and Ilyin (2017) MSC
Kornev *et al*. (2017) MSC
These two papers were provided to the team by the client at the surveillance audit/recertification site visit, but we know full well that the Varkentin and Ilyin (2017) paper will only be broadly released to the general public once the next round of TAC setting (for 2019) has been completed later this year (it contains recommendations that still have to be agreed). The references as listed in that section have been checked carefully against the originals, so are correct.

- Table 12

The TAC for Sculpin and Sole in area 05.1 has gone beyond allowance in 2016???
Herring exceeded the 2% bycatch allowance by 100%
Pollock reported catch data are missing in that table

1. Pollock catch is not provided in the table – the specific table referred to is for retained species only, not directed catch
2. Herring is a permitted catch with a specific TAC. Pollock vessels may be licensed to catch herring and individual vessels are given allowable catches. The species is defined as a main retained one – see explanation in text.
3. Sole and sculpins are within the permitted catch for each species. The table shows clearly the catch of each species in all fisheries and the catch taken by the pollock fishery which is within limits and did not exceed the TAC.
4. Note that the team in constructing this table broke down catches by area deliberately to determine whether there were area-specific proportions of concern. The aggregate catch reflects the proportions used in the estimate.

- Page 63 top

For the purposes of this assessment, although it is acknowledged that bycatch proportions in the mid-water pollock-directed fishery are extremely low (<1% for all species reported except herring and sculpin 1.33% (should be added)),
The team has noted this issue in text. However, it should be noted that sculpins are a large group consisting of several species. The aggregate catch of the groups is <1%)

- Table 14

catch proportion by fishing zone are (I assume should be -%- for all three zones)
formatting of the scientific names (no big space in between) page 66, 67
Noted and corrected in text, thank you. The spacing between species names is normal formatting created in Word.

Gonatopsis japonicusis in the IUCN list
Percis japonicus is a benthic dwelling fish. How it come into midwater trawls?

Noted thank you. The species proportions are nevertheless extremely low and these species are deemed to be taken within biological limits, where known. Occasional catches of bottom-dwelling species are not unexpected if the midwater gear fishes close to the seabed, as it does now and again.

Most likely would be *Alepisaurus ferox* because the other species *Alepisaurus brevirostris* is not found there (therefore better join *Alepisauridae and Alepisaurus ferox*)

Lycogrammoides nigrocaudatus is now Bothrocarina nigrocaudata
Opisthoteuthis californiana is in the IUCN list
Gonatus kamtschaticus is in the IUCN list
Bothrocara zestum obviously wrong better use sp.
Grimpoteuthis albatrossi is in the IUCN list

I would suggest an alphabetic sorting

Thank you for the guidance, but the team prefers to retain the names and the order provided by the Russian scientific observer reports.

- With account for these activities, coverage of the fishery in terms of injuries and accidental by-catch of marine birds and mammals was 8% (1440/18051). Monitoring results confirm that target pollock fishery in the Sea of Okhotsk does not have any significant adverse effects on marine birds and mammals including their accidental by-catch.

- When asked about Steller sea lion by-catch in trawl, 11 interviewees (38%) (all from large-tonnage vessels) said “yes”, 15 ones (52%) said “no” and 3 persons (10%) were unable to answer his question (Fig. 2.3.2)........

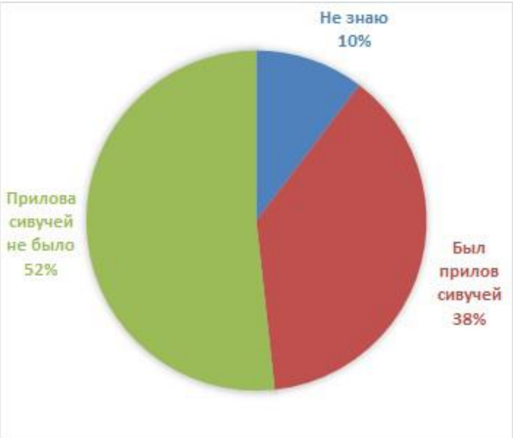


Fig. 2.3.2. Distribution of answers to question “Were there any cases of Steller sea lion by-catch in trawl?” (n=29); I don’t know; No Steller sea lion by-catch; Yes, there was Steller sea lion by-catch

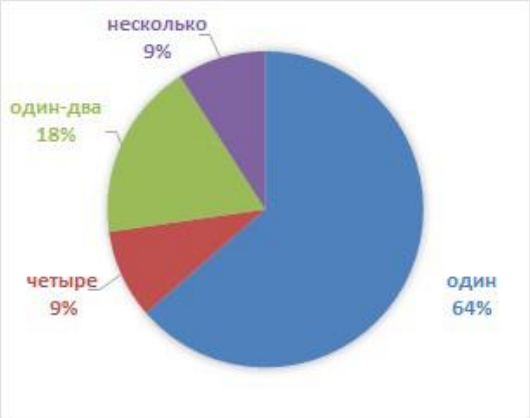


Fig. 2.3.3. Distribution of answers to question “How many were there cases of Steller sea lion capture in trawl per voyage?” (n=11); several; one or two; four; one

the comments and figures above found in the in the Russian report
http://russianpollock.com/upload/iblock/9ee/brief-results-of-soo-fishery-monitoring-2017.pdf

Because of these uncertain answers from the crew it is not clear if ETP are probably caught in bigger amount and it is not sure they are released
Thank you for this observation and summary; certainly the survey yields some uncertainty in the estimates of ETP bycatch. The team found the field studies and analysis to be of high standard and undertaken by respected scientists in their fields of expertise. The team also agrees that the importance of some of the ETP species might justify a recommendation that research be continued to strengthen the knowledge of the impacts of the fishery on ETP species, and one recommendation has indeed been raised.

- 3.6.7 Ecosystem

This can be much shorter. As stated before there is no harm to the bottom ecosystem because only mid water trawls are used.
Thank you for the observation, but the team considers the current description and rationale to be appropriate and to meet MSC reporting standards.

- In table 21 it is stated that 20-30% of the TAC is held by non UoC fishery. From which source are these data? in PI 1.2.3 it is only max. 9%?

Good point. Table 21 (Traceability section) has been adapted to remove this seeming anomaly because the content seen by the peer reviewer was lifted from another source not as reliable as the actual catch statistics database which is the source of the data listed in PI 1.2.3.

PS. After Acoura I should not look into formatting matter but the are a lot of spacing errors between words.
MS Word created spacing

Table 23 For reports using one of the default assessment trees:

Performance Indicator	**Has all available relevant information been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
1.1.1 a	Y	N	NA	There are too many assumption therefore 100 is not met	In all stock assessments worldwide there are always assumptions, but uncertainties are carefully evaluated and the output adjusted to cover for them. No change to scoring
1.1.2	Y	Y	NA		
1.2.1	Y	Y	NA		
1.2.2	Y	Y	NA		
1.2.3 b	Y	N	NA	training the observer is not enough, the crew should also be trained to know when they catch ETP species (see attachment). I would set here a condition.	Aspects related to ETP are dealt with in 2.3
1.2.4	Y	Y	NA		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.1.1 b / c	Y	N	NA	correct with N, but there are some species which are in the IUCN list and there biology is more or less unknown although not listed in the red list. considering a condition that those species are not discarded but released (training needed) (can also fit into PI 2.2.1)	Thank you – please see our specific response in the text preceding this table
2.1.2	Y	Y	NA		
2.1.3 d	Y	N	NA	I think this is not met at SG 100	The team disagrees and believes that adequate supporting evidence justifies this score at 100
2.2.1	Y	Y	NA		
2.2.2	Y	Y	NA		
2.2.3 d	Y	Y	NA	by-catch is monitored but the mortality and recruitment of those species is not that detailed and sufficient to give SG 100	Again the team disagrees; successive reports on bycatch estimates have been reviewed and compared with the situation at the original certification. Over time the proportions of bycatch have been consistently low

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.3.1 a	Y	N	NA	as long there is no clear information by the crew if ETP species have been caught yes or no SG 100 is too high	The team has retained the score of 100 and is of the view that the evidence and scoring rationale provided supports it; we stress again that crew reporting of ETP species catch is never reliable even if it was available. The observer data are reliable
2.3.2	Y	Y	NA		
2.3.3	Y	Y	NA		
2.4.1	Y	Y	N/A		
2.4.2 b	Y	N	NA	why not SG 100 there is no harm at all because of mid water trawl 2.4.2 c: I thinkl it does not apply and should be SG 100	Again the team disagrees with the reviewer – the key scoring issue relates to "testing" and "clear evidence". The information available does not support these critical aspects relating to habitat even though midwater trawl impacts on habitat are expected to be insignificant. Therefore SG100 cannot be met
2.4.3	Y	Y	NA		
2.5.1	Y	Y	NA		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.5.2 b	Y	Y	NA	if SG 100 met partial why not writing the same score as in PI 2.5.1 a	Noted – the key element here relates to there being an explicit plan, so a score of 100 is not justified for 2.5.2b
2.5.3	Y	Y	NA		
3.1.1	Y	Y	NA		
3.1.2	Y	Y	NA		
3.1.3	Y	Y	NA		
3.2.1	Y	Y	NA		
3.2.2	Y	Y	NA		
3.2.3	Y	Y	NA		
3.2.4	Y	Y	NA		

Table 24 For reports using the Risk-Based Framework:

Performance Indicator	Does the report clearly explain how the process(es) applied to determine risk using the RBF has led to the stated outcome? Yes/No	Are the RBF risk scores well-referenced? Yes/No	Justification: Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response:
1.1.1				
2.1.1				
2.2.1				
2.3.1				
2.4.1				
2.5.1				

Table 25 For reports assessing enhanced fisheries:

Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary) can be added below and on additional pages

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**Yes**	**CAB Response**
Justification:		

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]	**NA**	**CAB Response**
Justification:		

If included:

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]	**NA**	**CAB Response**
Justification:		

Performance Indicator Review

Please complete the appropriate table(s) in relation to the CAB's Peer Review Draft Report:

- For reports using one of the default assessment trees (general, salmon or enhanced bivalves), please enter the details on the assessment outcome using Table 23.
- For reports using the Risk-Based Framework please enter the details on the assessment outcome at Table 2.
- For reports assessing enhanced fisheries please enter the further details required at Table 25.

Table 26 For reports using one of the default assessment trees:

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.1	Yes	Yes	N/A		
1.1.2	Yes	Yes	N/A		
1.1.3	NA	NA	NA		
1.2.1	Yes	Yes	N/A		
1.2.2	Yes	Yes	N/A		
1.2.3	Yes	Yes	N/A		
1.2.4	Yes	Yes	N/A		
2.1.1	Yes	Yes	NA		
2.1.2	Yes	Yes	NA		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.1.3	Yes	Yes	NA		
2.2.1	Yes	Yes	NA		
2.2.2	Yes	Yes	NA		
2.2.3	Yes	Yes	NA	I make it 85, not 90	We agree - score adjusted to 85
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		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.5.1	No	Yes	NA	a)Other ecosystem impacts also have to be considered – these include unintended consequences of operation such as lost gear, fuel and oil pollution, waste and litter. Is Russia a signatory of the International Convention for the Prevention of Pollution from Ships (MARPOL) ? And as such it would thus be responsible for dealing with any marine pollution issues	Thank you for this valid comment - we have taken note of the unintended consequences aspect and have made appropriate reference in the text and scoring sections.
2.5.2	Yes	Yes	NA		
2.5.3	Yes	Yes	NA	I make this 90, rather than 95	We agree – score adjusted to 90
3.1.1	Yes	Yes	NA		
3.1.2	Yes	Yes	NA		
3.1.3	Yes	Yes	NA		
3.2.1	Yes	Yes	NA	Why 85 and not 90 as partial score?	Thr reviewer is correct, so the score has been changed to 90
3.2.2	Yes	Yes	NA		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.2.3	Yes	Yes	NA	I make this 90, not 95	We agree – score adjusted to 90
3.2.4	Yes	Yes	NA		
3.2.5	Yes	Yes	NA		

Table 27 For reports using the Risk-Based Framework:

n/a

Table 28 For reports assessing enhanced fisheries:

n/a

Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary) can be added below and on additional pages

1. Is the species name for the target species *Theragra chalcogramma* still correct? It appears that the species name is now *Gadus chalcogrammus*. (see: https://www.fishbase.de/Nomenclature/SynonymsList.php?ID=318&SynCode=1918&GenusName=Gadus&SpeciesName=chalcogrammus); and: http://www.marinespecies.org/aphia.php?p=taxdetails&id=254539

Where possible (not feasible for material imported into the report) we have changed this throughout the text, stating up front the recent change in taxonomic name

2. Scoring issue 1.2.4a – SG80 is met. The reason for not meeting SG100 is given as: 'However, a number of improvements have been recommended on both structural and data components that require exploration and evaluation. Until those are done, SIa does not meet SG100'. It is not clear who 'have been recommended' refers to. On first reading it seemed as if the assessment team had recommended this – but obviously that wouldn't be the case. In order to avoid ambiguity, maybe include a reference here (the 2015 assessment?)

   Scoring text amended slightly, with the scoring section cross-referencing to the background section where this is explained in greater detail

3. Table 10: what is meant by 'stations for observation for marine mammals and seabirds'?

   This has been clarified. Inserted on Table 10 header: Note: after PCA (2017d), reference to "stations" refers to the number of trawl locations at which observations were made.

4. P2: In Section 3.6.3 just above Fig. 33 the paragraph starting with 'Separation of retained species…..' , the second half of that para does not seem relevant anymore, dealing with biomass estimates of more than 20yrs ago (Iljinskiy and Gorbatenko 1994). We agree – deleted.

   Fig 33 provides a visual overview of species composition trends, and maybe that could be highlighted in itself, pointing out the observed changes since 1980', ie increase in pollock, decrease in Clupea (it is unfortunate that the definition of the green segment changes in each pie-chart, so no direct straight forward visual comparison is possible)

   Thank you for your observation – we have adjusted the text (noting the Figure referred to is 34 and not 33) - text added is: "Further, as shown in Figure 34, the relative proportion of pollock increased in the periods 1991–1995 and 1996–2005 from 57.5% to 80.2% while herring decreased in the same periods from 20.5% to 12.3%.

   Text removed is: ~~The estimated biomass of mesopelagic nekton was 27.8 million tonnes (Iljinskiy and Gorbatenko 1994).~~

5. Table 12 seems to show that in the Northern SOO Sub-zone 5.1a fairly high proportion of Sculpins were caught (1.3% of pollock trawl mean catch proportion – is that a typo for 2017?) The number is correct and as provided to the assessment team

6. Section 3.6.3: Could you please clarify whether the pollock fishery discards unwanted fish? As in some Russian fisheries (Barents Sea) discarding is not allowed anymore. So the fishery retains all those species for which there is a TAC (therefore of commercial value, and a management plan in place?), and is allowed to discard all those species which do not have a TAC? (Just a clarifying sentence would be useful here).

   Thank you – the bycatch rules are clear under para. 3.6.3 bullet points. Bycatch in excess of 2% of pollock catch must be returned to the sea and the move-on rule applies, i.e. unwanted fish can be discarded. This applies to bycatch. Permitted catch (PC or PY) is not allowed to be discarded and must be retained as long as it is within the PC allocated for the species concerned.

7. PI 2.1.2c – ‘clear evidence’ would also be in the form of more extensive observer coverage (rather than the 2.2-6.1% described in main text Section 3.5.4, page 37 Noted – we have adjusted the text and the scoring rationale.
8. It would be helpful to have a recent map of the actual location of the fishery vessels – aggregated VMS plots, so one can use it as a base map for underlying ecosystem issues (habitat/ ETPs distribution etc). Thank you for this observation. We have referenced numerous monitoring reports provided in the surveillance audits that show regular and consistent operational spatial patterns of the pollock fleet that can be referred to by the reader as needed rather than adding these to an already detailed and comprehensive set of spatial maps. We therefore do not add an aggregated map to the report.
9. Fig 42. Is the distribution of Alcyonacea the only VME indicator species in the area, or is this just an example of the kind of research done? I realize of course that semi-pelagic fishing gear is used, hence distribution of benthos is of little relevance here. Noted. Yes - several other indicator species were discussed in the reference material to which the team had access. However, the team felt it was important to demonstrate through an example of at least one indicator species that cognizance had been taken of potential VMEs in the SOO but that the likelihood of impacts on VMEs from midwater gear was extremely low.
10. Section 6.4. In order to improve clarity, I would suggest to note the Component under which each recommendation is made, eg Rec 1 – P2 ETPs; Rec 2 – P3 ? Noted: thank you for this guidance – we have adjusted the text accordingly.
11. Appendix 3: To improve clarity, maybe list the stakeholder submissions in logical order: eg Mr Gilmore’s application to submit something, then his letter/text (with a date), followed by the team’s response; then the next application In this Appendix the team merely added the material submitted and responded to in the order in which it was supplied to and responded by the team. In other words, despite the unfortunately unclear manner/order in which it is presented in the report, it was deemed inappropriate to adjust the material in any way, so no change has been made
12. It might be useful to cross-reference Appendix 3 in Section 4.4.2 Good point - done
13. Table 19: out of interest, would you know what kind of violations were most commonly recorded? No change necessitated by this comment. Recently, the violations have been mainly minor ones relating to issues such as mentioned in the footnote to Table 19 plus relatively simple paperwork and active VMS contraventions. However, that was not always the case historically, in which quota fulfilment, fishing area transgressions and notification slip-ups have been listed. Over the years of pre-certification and certification, the Coastguard and Client have been very willing to share such information with the team(s), but it would de diversionary to go into great detail in this report, especially as the more recent violations have been demonstrably minor.

It was a pleasure to read through this report – very interesting, and good to note the changes and management improvements implemented since the initial certificate.

Appendix 3 Stakeholder submissions

Comments received prior to Site Visit

Comments from the At-sea Processors Association

Comments from the At-sea Processors Association on MSC Final Surveillance and Reassessment of the Russian Sea of Okhotsk Mid-water Trawl Walleye Pollock Fishery
(To be read with File: MSC Template for Stakeholder Input v2.0 SOO S4RA comments)

Comments on the PCA Website
The PCA website has many blank pages and broken links. It is not possible to find key papers such as a review by Sharov (2016) of the way in which the stock assessment treats uncertainty. The review is critical to closing Condition 3 (see below under Conditions 1 and 3) and lack of availability makes it difficult to judge the appropriateness of closing Condition 3 at the third surveillance. The reference provided in the surveillance report report is: *Sharov, A. Analysis of the Sea of Okhotsk pollock stock assessment model and its effectiveness in addressing all major sources of uncertainty. Pollock Catchers Association, Vladivostok. 36 pp*.

The PCA website also does not include any information on stock assessment, annual stock status updates and how TACs are adjusted using the supposed Harvest Control Rule (HCR). We find this perplexing both in terms of transparency, but also because the surveillance reports do not make any of this clear, referring only for example in the third surveillance to: *The modus operandi for determining the annual level of TAC is the same as determined during the original assessment, with all catch and effort and scientific survey data being made available and subjected to rigorous scientific analysis by KamchatNIRO and TINRO before the output is evaluated under the auspices of VNIRO in Moscow (VNIRO takes the lead on this overview analysis for all Russian fisheries). The advice and input of some academics and experts on many scientific disciplines other than direct fisheries science, particularly of ecosystem components, is solicited in that overarching evaluation, which is conducted annually before the TAC is announced.*
There are no clear stock assessment outputs, however, that show updated assessments, and explicitly link the TACs to biomass and fishing mortality estimates as outlined in the HCR that was scored at SG80 in the 2013 PCR. These issues are considered further below in comments on the PCR.

Comments on Conditions

i. **Condition 1:** PI1.2.1: At the time of initial assessment, there had been no testing of a then new harvest strategy (HS). The PCR therefore set a condition with annual milestone requirements for information and intended rescoring by the fourth surveillance. At the third surveillance, all appears to be on target but the third surveillance Team commented that: *The requirement to meet this Condition is currently on target, but the Client should note that to close it at the fourth surveillance next year, additional written evidence will be required to demonstrate that the harvest strategy has undergone rigorous testing to explore its robustness to management and assessment uncertainties. Moreover, it is hoped that next year's report that also takes cognizance of the recommendations associated with the review commissioned under Condition 3 will also touch on the VNIRO evaluation of the means of TAC calculation.*
ii. From third surveillance reporting and considerations, it looks like this condition will get closed but will need scrutiny as it is complex. The guidance by the assessment team at the third surveillance notes also Condition 3 - this has been closed following a review by Alexei Sharov

but it is unclear how extensive this is (see above) re PCA Website and difficulty in obtaining information.

iii. It is also of concern that the team views the Sharov paper (condition 3) as relevant to the way in which VNIRO will evaluate the means of TAC calculation – is this not already meant to be in place through use of a well-defined HCR?

iv. **Condition 2:** PI1.2.3: The condition relates to monitoring/observer improvements. At the third surveillance, progress was judged to be on target ("*just*") but the commentary mixes progress on stock (P1) and bycatch (including ETP) issues(P2). Issues need to be kept separate and clear with respect to conditions 2 and 4.

v. **Condition 3:** PI1.2.4: The condition requires a report by the third surveillance on how the stock assessment deals with uncertainty. This condition has been closed following the report by Sharov (2016). Please see our comments above about the availability of this report. Without access to the Sharov report and also stock assessment updates (see below) it is unclear how the third surveillance team concluded the condition should be closed.

vi. **Condition 4:** PI2.2.3 (Main Bycatch species): The condition is about analysis of observer data. Closure was intended at the second surveillance but occurred at the third. There is a need to look in detail at the fourth surveillance to ensure appropriate continuing analysis/coverage.

vii. **Condition 7:** PI3.2.2: Re decision-making. As noted by the team, this is a difficult condition given language/translation needs. We are concerned at the reliance and potential double use of matters related to MCS performance evaluation and do wonder if there is not more information available (for translation) form any of the processes, for example, outlined in (http://fish.gov.ru/files/documents/otraslevaya_deyatelnost/sistema_VBR/Etapy_ustanovleniya_ODU.pdf).

Comments on 2013 PCR and Reassessment – PRINCIPLE 1

PI1.1.1 (and 1.2.4) This will need a complete update at reassessment. We can find no new stock assessments referenced in any surveillances to date, nor on the PCA website (at http://pollock.ru/en/pollock-sustainability/stock-status/stock-assessment.html). The site refers only to surveys which provide information to an unspecified assessment process. Without regular updates in the stock assessment, it is unclear how the HCR is being implemented and how status is being determined. We are surprised that the surveillances do not report updates to stock status and the basis for any TAC adjustments.

We can find this (http://russianpollock.com/stock/stock-assessment/) and (http://fish.gov.ru/files/documents/otraslevaya_deyatelnost/sistema_VBR/Etapy_ustanovleniya_ODU.pdf) but the links to assessment methods and TAC-setting processes are in Russian only and have no dates. Using Google Translate does not reveal anything not in the PCA submissions in 2011 and while we can identify processes we cannot find specific articulation of assessments or their use in TAC-setting (see also below). We recognise that we may be missing information in translation and would welcome clear information provision.

We have found this (https://link.springer.com/article/10.1134/S1063074014070062), which appears to be a 2013 paper by TINRO scientists which uses surveys only to estimate biomass in SOO and refers to this as stock assessment. Given this and no other clear stock assessment documents as such (that would reflect what was used to score PI1.2.4), we are left unsure as to what stock assessments have been taking place and how TAC updates have been made.

Some recent (July 2017) information is available through Fishsource (https://www.fishsource.org/stock_page/1820). If accurate, this seems to confirm a lack of recent analytical stock assessment with reliance only on surveys and with TINRO updating two-year forecasts on an unclear basis. It also suggests SSB has been at/below target (Bmsy proxy) for a decade or so; the PCR interpreted this as "at or around" the target but was arguably generous.

We think there is a need for clarification on the nature of stock assessments, updates, how these are used with the HCR, and transparency. All of these should be looked at closely at reassessment.

PI1.2.2 We cannot find source materials that confirm the HCR as outlined and scored in the PCR is defined in law, policy, management plan, etc, as opposed just to practice, or (see above) how stock assessment outputs are used within the HCR. The references in the PCR are to "PCA 2011b", which is the 2011 English language submission from PCA for the initial assessment. The HCR schema presented there is as used in the PCR scoring tables but it refers only to a general scheme outlined in a paper by Babayan and not to any clearly mandated HCR. For reassessment, there is a need for clarification of the management status of the HCR. It is not clear that the HCR is in fact "in place" nor even that it is in practice being followed as outlined in the PCR.

Contact Information Make sure you submit your full contact details at the first phase you participate in within a specific assessment process. Subsequent participation will only require your name unless these details change.				
Contact Name	*First* Jim		*Last* Gilmore	
Title	Director of Public Affairs			
On behalf of (organisation, company, government agency, etc.) – *if applicable*				
Organisation	*Please enter the legal or registered name of your organisation or company.* At-sea Processors Association (APA)			
Department				
Position	*Please indicate your position or function within your organisation or company.* Director of Public Affairs			
Description	*Please provide a short description of your organisation.* APA is a seafood trade association comprised of six member companies that, among other, commercial fishing and seafood processing interests, operates U.S.-flag catcher/processor vessels in the Alaska pollock fishery. APA engages in a number of sustainability initiatives on behalf of the association's members, including serving as the fishery client in the Alaska pollock fishery, which was first certified in 2005.			
Mailing Address, Country	4039 21st Avenue W., Suite 400, Seattle, WA 98199			
Phone	**Tel**	+ 1 206 285 5139	**Mob**	+ 1 (206) 669-6396
Email	**jgilmore@atsea.org**		**Web**	www.atsea.org
Assessment Details				
Fishery	Russia Sea of Okhotsk pollock			

CAB	Acoura

Assessment Stage* Clicking on the section numbers will bring you to the appropriate section for providing input to the respective assessment stage. It is only necessary to complete those sections corresponding to stages where you wish to comment.	
	Fishery announcement and stakeholder identification—go to section 1 Opportunity to indicate that you are a stakeholder and identify other stakeholders.
	Defining the assessment tree—go to ~~section 2~~ Opportunity to review and comment on the assessment tree in relation to the fishery if a modified tree is used.
	Information gathering and stakeholder meetings—go to section 3 Opportunity to engage with and provide information to the CAB about the specific details and impacts of the fishery.
	Public review of the draft assessment report—go to ~~section 4~~ Opportunity to review and comment on the draft report, including the CABs draft scoring of the fishery.
	Annual surveillance—go to section 5 Opportunity to provide information to the CAB about any changes in the fishery since certification and/or the achievements made towards conditions.
* Note, to register an objection following the publication of the Final Report and Determination, please see www.msc.org/get-certified/fisheries/assessment/objections	

Section 1 • RETURN TO PAGE 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
x ☐ Fishery announcement and stakeholder identification[3] Opportunity to indicate that you are a stakeholder and identify other stakeholders.	Russia Sea of Okhotsk pollock	9/29/17	Austin Estabrooks, At-sea Processors Assn. (APA) Glenn Reed, Pacific Seafood Processors Assn. (PSPA) Ruth Christiansen, United Catcher Boats (UCB)

Nature of Comment (select all that apply)		Additional Information/Detail Please attach additional pages if necessary.
e.g. ☒ ☐	I wish to indicate that I am a stakeholder in this fishery. Please keep me informed about each stage of the assessment process.	*Example: My company has been operating five charter boats for recreational fishing on this fish stock for 20 years, and I would like to be informed and involved as this MSC assessment progresses. In addition, we have kept detailed logs over the years of our client's' catches, including sizes, weights and fish caught per trip and would be happy to share these with the assessment team.* Please see section 3 for i) a request for a conference call during the on-site visit, and ii) an indication of concerns about the existing assessment and surveillances. At section 5, we also refer to section 3. The At-sea Processors Association is a seafood trade association with six member companies. Among other seafood harvesting and processing interests, all six companies operate U.S.-flag catcher/processor vessels in the Bering Sea/Aleutian Islands pollock fishery. APA serves as the client for the Alaska pollock certifications. Please include APA's Austin Estabrooks on CAB notices regarding Russian SOO pollock audit and reassessment announcements. Austin.Estabrooks@atsea.org. The Pacific Seafood Processors Association (PSPA) is a nine-member seafood trade association. Most PSPA member companies participate in a cost-sharing arrangement in maintaining the Alaska pollock certifications. PSPA is also the client for the Alaska salmon certification, the first major fishery certified under the MSC program. Please include PSPA's Glenn Reed on CAB notices regarding Russian SOO pollock audit and reassessment announcements. The United Catcher Boats (UCB) is a trade association comprised of vessel owners operating trawlers in various Bering Sea, Gulf of Alaska and U.S. West Coast groundfish fisheries. Most of the member companies/vessels participate in the Alaska pollock fishery. As with members of APA and PSPA, UCB members participate in a several MSC certified fisheries, including the Pacific
☐	I wish to suggest information or documents important for the assessment of this fishery *(you may either attach documents or provide references)*.	
xx ☐	I wish to suggest other individuals or organisations who should be considered stakeholders in the MSC assessment of this fishery *(please provide contact information)*.	

[3] MSC Fisheries Certification Requirements, v2.0 section 7.8

☐	Other (please specify)	whiting, Pacific cod, and Alaska flatfish fisheries. Please add UCB's Ruth Christensen on CAB notices regarding Russian SOO pollock audit and reassessment announcements. Ruth.Christiansen78@gmail.com.

• **SECTION 3** • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☐ Information gathering and stakeholder meetings[4] Opportunity to engage with and provide information to the CAB about the specific details and impacts of the fishery.	Russia Sea of Okhotsk pollock	9/29/17	Jim Gilmore/Austin Estabrooks, APA Glenn Reed, PSPA Ruth Christiansen, UCB

	Nature of Comment (select all that apply)	**Additional Information/Detail** Please attach additional pages if necessary.
☐	I wish to request an in-person meeting with the site team during their assessment visit (meetings without the fishery client present may be requested at this phase of the process if desired).	*Example: I am unable to attend the scheduled on-site meetings with the assessment team about this fishery but would like to ensure the following documents are considered when the team reviews the available information:* *1. Doc A; 2. Doc B; 3. Doc C.* *All of these are available for download at the following web address…* Meeting: We would have welcomed the opportunity to discuss issues with the team during the site visit. However, visiting Vladivostok is costly and not straightforward, requiring lengthy visa processes and letters of invitation. However, we would like instead to be able to discuss our comments with the team by conference call. Dr. Kevin Stokes, who is working with our consortium of interested parties, will lead in contacting the team and arranging for stakeholder consultation. Our written comments are attached and are relevant here and for section 5 (on the final surveillance). We are not submitting new information on the fishery. Rather, at this stage, we are highlighting some of our concerns with the existing certification and surveillances and are seeking information that may alleviate these concerns. At this stage, we are concentrating on Principle 1 though some of our
e.g. ☒	I wish to submit written information about the fishery and its performance against the default tree and/or RBF to the assessment team *(please provide documents or references).*	

4 MSC Fisheries Certification Requirements, v2.0, section 7.8.4

☐	Other (please specify)	comments on existing conditions touch on issues elsewhere. We hope that raising concerns now provides the team with an opportunity to address them early instead of at the Public Comment stage. Our primary aim is to ensure the integrity of pollock assessments and to this end we wish to make sure the SOO assessment is robust and credible. Our preference would have been to see the assessment conducted using MSC Version 2 requirements, noting UoA definition and other matters would influence outcomes. However, we note that the timing of the reassessment announcement is such, but only by the matter of a day that the fishery will instead be reassessed using Version 1.3. We would have had many additional concerns under Version 2 but do not include these.

• SECTION 5 • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☐ Surveillance[5] Opportunity to provide information to the CAB about any changes in the fishery since certification and/or the achievements made towards conditions.	Russia Sea of Okhotsk pollock	9/29/17	Jim Gilmore/Austin Estabrooks, APA Glenn Reed, PSPA Ruth Christiansen, UCB

Nature of Comment (select all that apply)		Justification Please attach additional pages if necessary.
e.g. ☒	I wish to alert the assessment team to important changes in the circumstances of this fishery relevant to the MSC certification.	*Example: Since this fishery was certified 2 years ago, government scientists have been working closely with the fishery client to develop a system for monitoring stock status capable of ensuring a precautionary harvest strategy. Although not published, the progress on this work to date can be found in the following report (attached)…* Our written comments are attached and are relevant here and for section 3.
☐	I wish to provide information relevant to fulfilment of the conditions of certification.	
☐	Other (please specify)	

5 MSC Fisheries Certification Requirements, v2.0 section 7.23

Team Response:

14 November 2017
(communicated by email)

Mr Jim Gilmore
Director of Public Affairs
At-Sea Processors Association
4039 21st Avenue W.
Suite 400
Seattle, WA 98199
USA

Dear Mr Gilmore and colleagues (Dr T. Kevin Stokes, consultant;
Mr Austin Estabrooks, APA; Ms Ruth Christiansen, United Catcher Boats)

Thank you for sharing with us your issues and concerns relating to the current MSC certification of the Russian (walleye) pollock fishery in the Sea of Okhotsk. As you are aware, all three of the assessment team were in Russia during October 2017, conducting the fourth surveillance audit of the fishery for the CAB named in this letterhead. Input from committed stakeholders such as yourselves is critical to us getting the facts right about this fishery, so be assured that both your input and this response will form part of the report into the 4th surveillance audit. That report along with relevant documentation will be appearing on the MSC website shortly, after it has been thoroughly checked by all interested parties.

In response to your email, I would like to address each of the subjects you raise individually (annotated by paragraph number in your email), to let you know our thinking on them at the moment, including how we have addressed them, adequately we hope.

Introductory general comment
The PCA website (www.russianpollock.com) did indeed have some blank pages and broken links. This has hopefully been largely addressed recently. For instance, the Sharov (2016) report in English is now uploaded and available, and the surveillance team stand by the earlier team's belief that Condition 3 was rightly closed as a result. Comment on uptake of that report's recommendations is contained in this surveillance report and in Appendix 1 of Varkentin and Ilyin (2017)'s stock assessment report. The lack of updated stock assessment reports on the site is regrettable, but understandable given that management recommendations on future TACs are stated in all reports, and until the VNIRO-convened review of the assessment has been completed and TACs announced, it would be inappropriate to make them publically available. The Varkentin and Ilyin (2015) paper that was used in his analysis by Sharov (2016) is now uploaded, and uploading of the subsequent Varkentin and Ilyin (2016) assessment paper is imminent because the VNIRO review is at this time of year and 2018 TACs will shortly be announced. Varkentin and Ilyin (2017) will be uploaded towards the end of 2018.

Condition 1 and third surveillance reporting (items i and ii)

The testing of the harvest strategy to explore its robustness to management and assessment uncertainties has been done and in the surveillance team's opinion is rigorous (comment included in this report and in Varkentin and Ilyin (2017). The Sharov (2016) paper is now available on the website and its provision and content supports the closure of Condition 3 in late 2016.

Sharov paper relevance to TAC calculation (item iii)
A valid point and perhaps the way the VNIRO evaluation of TAC and the report of Sharov should have been kept separate, as they have been done better in this report.

Condition 2 on monitoring/observer improvements (item iv)
The mixing of progress on stock (P1) and by-catch (P2) issues in the third surveillance report is regretted and has not arisen in this report, where new text is provided to close the condition.

Condition 3 and uncertainty monitoring (item v)
The third surveillance team did have access to the Sharov report, and now so does everyone else who is interested. The fourth surveillance team supports the decision made in 2016 to close Condition 3.

Condition 4 and main by-catch species (item vi)
Extensive comment is made in the fourth surveillance report about the extent of formal monitoring coverage, and the decision to close Condition 4 at the third surveillance audit is supported by the current team.

Condition 7 and decision-making (item vii)
We do not agree that the previous closure of Condition 7, or the wording, relied on the double use of matters related to MCS evaluation; that is a personal opinion of APA. The team did look at the document suggested by APA, but found nothing to enhance understanding regarding translation issues. Language translation issues will always arise in fisheries prosecuted in non-English speaking countries, and the provision of the largely English-dominated www.russianpollock.com website has proved a great help to all the surveillance teams working on this fishery.

Principle 1 comments
Updated stock assessments and other new documents are provided on the website mentioned above. These and other documents currently not allowed to be uploaded to the website but reviewed in full by the surveillance team in this comprehensive surveillance report answer many of the constructive comments offered here by the APA. We hope that this suffices for the present time. The Fishsource information outlined by APA is regrettably inaccurate, but we hope that the extensive comment provided in this report have laid to rest some of the concerns that the APA team have expressed. Finally, we cite the policy basis for the HCR in summary as the actual order enshrining it in Russian law (FFA Executive Order 104 dated 6 February 2015 [amended 4 April 2016]. The surveillance team has seen and reviewed the order, and are content that it serves its purpose to international norms for such documents and orders.

The surveillance team reiterates its thanks to APA for its meaningful suggestions for improving confidence in the belief that the Russian Pollock fishery in the Sea of Okhotsk is being prosecuted sustainably. We understand that many of the comments are intended to place down markers of concern and accuracy in advance of a possible recertification exercise, but are grateful for the effort made in reviewing the manifold documents that have helped us better structure and lay out evidence during the current surveillance.

Best regards

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Surveillance team 4th SA, [and Recertification team] PCA SOO Poll
Acoura

Appendix 4 Surveillance Frequency

Level 4 – This surveillance level has been chosen as there are no conditions on the fishery. There are two recommendations which should be monitored leading to the suggestion of an onsite second report.

Table 4.1 : Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
1	Off-site audit	3	

Table 4.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
1	May 2014	e.g. July 2014	e.g. Scientific advice to be released in June 2014, proposal to postpone audit to include findings of scientific advice

Table 4.3: Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 5	Off-site surveillance audit	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit & re-certification site visit

Appendix 5 Objections Process

(REQUIRED FOR THE PCR IN ASSESSMENTS WHERE AN OBJECTION WAS RAISED AND ACCEPTED BY AN INDEPENDENT ADJUDICATOR)

The report shall include all written decisions arising from an objection. *(Reference: FCR 7.19.1)*