Marine Stewardship Council fisheries assessments

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Sea of Okhotsk crab trap

Photo obtained from an article about the client

Public Certification Report

Conformity Assessment Body (CAB)	UCSL United Certification Systems Limited
Assessment team	Geir Honneland, Jo Gascoigne and Petr Vasilets
Fishery client	Ostrovnoy-Krab LTD, Russian Federation, 694520, Sakhalin Region, Yuzhno-Kurilskiy District, Malokurilskoye village, Sovetskaya Street, 8, office 3
Assessment type	Initial Assessment
Date	16 June 2022

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List of Symbols and Reference Points

B_{lim}	Minimum biomass below which recruitment is expected to be impaired or the stock dynamics are unknown.
B_{MSY}	Biomass corresponding to the maximum sustainable yield.
B_{tr}	Biomass target reference point = Bmsy.
F_{lim}	Fishing mortality rate that is expected to be associated with stock 'collapse' if maintained over a longer time (precautionary reference point).
F_{MSY}	F giving maximum sustainable yield (biological reference point).
F_{tr}	F target reference point = Fmsy.
FSB	Commercial stock biomass.
FSN	Commercial stock abundance.
MSY	Maximum sustainable yield.
N_{lim}	Minimum stock abundance below which recruitment is expected to be impaired or the stock dynamics are unknown.
N_{MSY}	Stock abundance corresponding to the maximum sustainable yield.
N_{tr}	Target stock abundance = Nmsy.
SSB	Spawning stock biomass.
SSN	Spawning stock abundance.
TSB	Total stock biomass.

1. Glossary

ABR	Aquatic biological resources
AIS	Automatic Identification System
AMNR	Agency for Monitoring of Natural Resources (Rosprirodnadzor)
B	Biomass
BKC	Blue king crab
CAB	Conformity Assessment Body
CFMC	Centre for the Monitoring of Fisheries and Communications
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPUE	Catch Per Unit Effort
CSM	Commercial size males (commercial stock)
CW	Carapace width
ETP	Endangered, Threatened or Protected (species)
F	Fishing mortality rate
FAO	Food and Agriculture Organisation of the United Nations
FCR	Fisheries Certification Requirements
FFA	Federal Fisheries Agency (Rosrybolovstvo)
FGBNU	Federal State Budgetary Research Institution
FR	Fishing Rules
FSB	Fishing Stock Biomass
FSBR	Federal Security Service of Russian Federation
GLM	Generalized Linear Model
GKC	Golden (Brown) king crab
HCR	Harvest Control Rule
IPHC	International Pacific Halibut Commission
IUU	Illegal Unreported and Unregulated (fishing)
IWC	International Whaling Commission
KamchatNIRO	Kamchatka branch of the All-Russian Science Research Institute of Fisheries and Oceanography (VNIRO)
KKS	Kamchatka-Kuril Subzone
KMNS	Minorities indigenous peoples of the North, Siberia and Far East
kt	thousand tons
LME	Large marine ecosystems
LTL	Low Trophic Level (species)
LZI	Latitudinal zoning index
M	Natural mortality rate
MagadanNIRO	Magadan branch of the All-Russian Science Research Institute of Fisheries and Oceanography (VNIRO)
MAR	Ministry of Agriculture of Russia
MLS	Minimum Legal Size
MNRER	Ministry of Natural Resources and Environment of Russia
MSC	Marine Stewardship Council

MSE	Mean Squared Error
NAFO	Northwest Atlantic Fisheries Organization
N/A (or NA)	Not applicable
NETA	North-Eastern Territorial Administration of Federal Fisheries Agency
NPFC	North Pacific Fisheries Commission
NSOOS	Northern Sea of Okhotsk Subzone
OTA	Okhotsk Territorial Administration of Federal Fisheries Agency
PI	Performance Indicator
PRI	Point of Recruitment Impairment
RBF	Risk-Based Framework
RC	Recommended (or possible) Catch (yield)
RF	Russian Federation
RG	Russian Government
RKC	Red king crab
SI	Scoring Issue
SOO	Sea of Okhotsk
SSB	Spawning Stock Biomass
t	tons or tonnes
TA	Territorial administration
TAC	Total Allowable Catch
TINRO	Pacific branch of the All-Russian Science Research Institute of Fisheries and Oceanography (VNIRO)
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
UoA	Unit of Assessment
UoC	Unit of Certification
VNIRO	All-Russian Science Research Institute of Fisheries and Oceanography
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
WKS	West Kamchatka subzone
WWF	Worldwide Fund for Nature

2. Executive summary

This report is the Public Certification Report (PCR) for **Sea of Okhotsk crab trap** fishery. Also, it's necessary to mention that the previous version of report was totally revised and sent for ASI's confirmation before its final publication, according to ASI's MSC Fisheries Desk review Assessment (Assessment no. A-20220145992) held from 14/02/2022 to 18/02/2022. The process began with the publication of the Announcement Comment Draft Report (ACDR) was published on 30th March 2021.

A review of information presented by the client has been evaluated by the assessment team and through the publication of the ACDR and the site visit that followed (held remotely week commencing the 14th June 2021), the ACDR scores have been reviewed by the assessment team and amended as appropriate – please note this **does not** represent a final scoring or a certification decision.

Stakeholders are encouraged to review the scoring presented in this assessment and use the Stakeholder Input Form to provide evidence to the team of where changes to scoring are necessary.

The Target Eligibility Date for this assessment is the date of publication of the PCDR (27 Oct 2021).

The team determined that the **UoA 1** and **UoA 2** passed the assessment with scores over 80 for each Principle; however, the assessment raised five Conditions related to Principles 2 and 3. Also, it should be mentioned that initially there were seven conditions set for the fishery, but after this last revision, two of them related to **UoA 3** were eliminated respectively.

Although there was Golden (Brown) king crab (*Lithodes aequispinus*) in the assessment (**UoA 3**) up to the FDR stage, after the last revision and rescoring, the team decided to remove the **UoA 3** from the assessment, because it failed the weighted average score of 80 for all PIs under Principle 2 (78.6). In this case, it was required to withdraw that UoA 3 as the target P1 species from the report and only include it as P2 species instead.

The assessment team for this fishery assessment comprised of Dr. Geir Hønneland (Team Leader and Principle 3 specialist), Dr. Jo Gascoigne (Principle 2 specialist) and Dr. Petr Vasilets (Principle 1 specialist).

Client fishery strengths

- The long time-series of data available on Red and Blue crabs.
- Good science in support of management
- Adequate administrative and scientific management system that is responsive of the state of the stocks.
- There is no evidence bycatch of ETP species.
- Small habitat impacts. According to reports of research institutes, in conditions of trouble-free operation, there is practically no technological pulling of traps along the bottom, and there is no destructive effect on the bottom, as well as on bottom communities of organisms.
- Minimum ecosystem impacts. No significant disruption of predator-prey relationships or trophic structure and function.
- The fishery operates within an established management framework, with effective decision-making procedures, consultation mechanisms and enforcement system.

Client fishery weaknesses

- Levels of dead discards of crabs in trawl fisheries are not known.
- Information on catches of ETP species needs to be improved.
- There is no external review of the stock assessment or the fishery-specific management system.
- The information on all other fishery removals needs improving.
- Although subject to internal reviews, the fishery-specific management system is not subject to external review.
- The client is a new actor in the Sea of Okhotsk crab fishery, and thus there is no established track record, both in terms of P2-relevant data collection, nor in terms of compliance.
- There are no on-board measures in place to record P2-related bycatch and observations.
- Existing information on bycatch was taken from the literature. We need reports in such a form so that long-term trends can be traced.
- Compliance levels have not been confirmed by enforcement authorities.

It is noted that information for all three Principles will be reviewed and verified throughout the assessment process, including during the site visit.

Summary of key issues discussed during the site visit

- Dead discard estimates in directed fishery as well as in other fisheries.
- Observer coverage.
- Implementation of self-reporting system on bycatch.
- Detailed data over a longer time period to support measures to manage the impacts on ETP species.
- Information on how stakeholders perceive their opportunities to get involved in the management process.
- Confirmation of inspection coverage and compliance level by enforcement authorities.
- Information about possible external reviews of the fishery-specific management system.

Determination

On completion of the initial review of information and scoring, the assessment team concludes that no PI is likely to score below 60 nor weighted average score for any of the three principles to score below 80. Based on the PDCR provisional scoring and revised version of PCR, the assessment team recommends the Sea of Okhotsk crab trap fishery for MSC certification. However, the assessment identified five Conditions in Principles 2 and 3 described in Table 6 and section 8.5.

3. Report details

3.1. Authorship and peer review details

The assessment of the Sea of Okhotsk crab trap fishery was conducted by the following Team from UCSL United Certification Systems Limited:

Team Leader and Principle 3 Lead: Dr. Geir Hønneland

Geir Hønneland holds a PhD in political science from the University of Oslo and an LL.M. in the law of the sea from the Arctic University of Norway. He has studied international fisheries management (with main emphasis on enforcement and compliance issues), international environmental politics and international relations in Polar regions for more than 25 years. He has been affiliated with the Fridtjof Nansen Institute in Oslo as PhD student and research fellow (1996-2006), research director (2006-2014), director (2015-2019) and now adjunct professor. Among his fisheries-related books is Making Fishery Agreements Work (Edward Elgar, 2012; China Ocean Press, 2016). Before embarking on an academic career, he worked five years for the Norwegian Coast Guard, where he was trained and certified as a fisheries inspector. Geir has been involved in MSC assessments since 2009 and has acted as P3 expert in more than 50 full assessments and re-assessments, as well as a number of pre-assessments and surveillance audits. His experience from full assessments includes a large number of demersal, pelagic and reduction fisheries in the Northeast Atlantic, the North Pacific and Southern Ocean, including crustaceans, as well as inland, bivalve and enhanced salmon fisheries. In the Northeast Atlantic, he has covered the international management regimes in the Barents Sea, Norwegian Sea, North Sea, Skagerrak, Kattegat and the Baltic Sea, and the national management regimes in Norway, Sweden, Denmark, Iceland, Faroe Islands, Greenland, Finland, Russia, Poland, the UK, the Netherlands and Germany, as well as the EU level. He is qualified as an MSC Team Leader (Fisheries Standard v2.0, Fisheries Certification Process v2.2) and Chain of Custody Auditor (v2.0) and has also passed the ISO 19011-2018 course as Lead Auditor – Management Systems Auditing.

UCSL confirms that Geir Hønneland meets the competency criteria in MSC FCP Annex PC Table PC1, PC3 requirements as well as MSC GCR Table 1 and 6.1.3 requirements for team leader as follows:

- He has an appropriate university degree and more than five years' experience in management and research in fisheries;
- He has passed the MSC team leader training;
- He has the required competencies described in Table PC1;
- He has passed the MSC Traceability training module;
- He meets ISO 19011 training requirements;
- He has the required competencies described in Table PC3 (Fishery Management and operations).
- He has undertaken two fishery assessments as a team member in the last five years, and
- He has experience in applying different types of interviewing and facilitation techniques and is able to effectively communicate with clients and other stakeholders.

UCSL confirms that Geir Hønneland has no conflicts of interest in relation to the fishery under assessment.

Principle 2 Lead: Dr. Jo Gascoigne

Jo Gascoigne is a former research lecturer in marine biology at Bangor University, Wales and a shellfisheries expert, with over 20 years' experience working in the fisheries sector. Dr Gascoigne has a PhD from the Virginia Institute of Marine Science in the USA, which was completed on the Allee effects of the queen conch, *Strombus gigas*. She is a fully qualified MSC Team Member and has been involved as expert and lead auditor in over 15 MSC pre- and full assessments. She was involved in a number of ongoing full assessments including the FROM Nord North Sea and Eastern Channel pelagic trawl herring fishery and the Granville Bay Basse Normandie whelk fishery. She therefore has an in-depth understanding of the MSC fisheries standard and MSC fisheries certification requirements. During her experience as an MSC auditor, Jo has gained a great deal of experience in interviewing and facilitation techniques.

UCSL confirms that Jo Gascoigne meets the competency criteria in FCP Annex PC Table PC2, PC3 requirements as well as Annex PC for team member as follows:

- She has an appropriate university degree and more than five years' experience in management and research in fisheries;
- She has undertaken at least two MSC fishery assessments or surveillance site visits in the last five years;

- She has passed the MSC RBF training module;
- She is able to score a fishery using the default assessment tree and describe how conditions are set and monitored.
- She has the required competencies described in Table PC3 (i.e., Fishing impacts on aquatic ecosystems; Use of the Risk-Based Framework (RBF) (passed RBF Module).
- She has the appropriate skills and experience required to serve as a principle 2 assessor as described in FCP Annex PC table PC3.

UCSL confirms that Jo Gascoigne has no conflicts of interest in relation to the fishery under assessment.

Principle 1 Lead: Dr Petr Vasilets

Petr Vasilets has worked for over 25 years as a fishery scientist at the Kamchatka branch of VNIRO (Russian Federal Research Institute of Fisheries and Oceanography). In 2000 he defended his PhD thesis on ichthyology "The smelts in the coastal waters of Kamchatka". He has over 50 scientific publications on various aspects of fisheries science. In 2020, he successfully completed the MSC online training, including the MSC Risk Based Framework (RBF), for the role "Fishery Team Member". Petr has participated in six assessments conducted by CAB Marine Certification LLC and later in UCSL United Certification Systems Limited, first as a trainee and then as a team member.

UCSL confirms that Petr Vasilets meets the competency criteria in FCP Annex PC Table PC2, PC3 requirements as well as Annex PC for team member as follows:

- He has an appropriate university degree and more than five years' experience in management and research in fisheries;
- He has undertaken at least two MSC fishery assessments or surveillance site visits in the last five years;
- He has passed the MSC Traceability training module;
- He has passed the MSC RBF training module;
- He is able to score a fishery using the default assessment tree and describe how conditions are set and monitored.
- He has the required competencies described in Table PC3 (i.e., in Fish Stock Assessment; Fish stock biology / ecology; Current knowledge of the country, language and local fishery context; Understanding of the CoC Standard and CoC Certification Requirements (passed Traceability Module); Use of the Risk-Based Framework (RBF) (passed RBF Module).
- He has the appropriate skills and experience required to serve as a principle 1 assessor as described in FCP Annex PC table PC3.

UCSL confirms that Petr Vasilets has no conflicts of interest in relation to the fishery under assessment.

Use of the Risk-Based Framework (RBF):

Jo Gascoigne and Petr Vasilets have been fully trained in the use of the MSC's Risk Based Framework (RBF).

Peer Reviewers:

Peer reviewers used for this report were PRA, PRB and PRC. The peer review college proposed 4 peer reviewers for this assessment and 3 were chosen. A summary CV for each is available in the Assessment downloads section of the fishery's entry on the MSC website and reproduced for clarity below.

Gudrun Gaudian

Dr 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. Since 2010, Dr Gaudian has been working on fisheries certification applying the MSC standard for sustainable fisheries, primarily as Principle 2 assessor, both as Team Leader and Team Member. Other relevant work carried out includes pre-assessments, peer reviews and MSC workshops. 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 and Law of the Sea. Dr Gaudian has passed MSC Team Leader training v1.3 and v 2.0, as well as ISO 19011 training.

Jerry Ennis

Dr Ennis completed a Ph.D. in marine biology at the University of Liverpool in the early 1970s, following undergraduate and graduate degrees at Memorial University of Newfoundland in the 1960s. He retired in 2005 following a 37-year research career with the Science Branch of the Department of Fisheries and Oceans. He has produced an extensive list of scientific/technical reports and journal articles (40 in the primary, peer reviewed literature) focused primarily on lobster fishery and population biology and on various aspects of larval, juvenile and adult lobster behavior and ecology in Newfoundland waters. As Head of Shellfish Section for 27 years, Dr Ennis oversaw research projects lead by 4-5 other scientists focused primarily on fisheries management related research on northern shrimp, snow crab, scallops, squid and other shellfish throughout the Newfoundland-Labrador area of the Northwest Atlantic. Throughout his career, Dr Ennis was heavily involved in the review and formulation of scientific advice for management of shellfish in Atlantic Canada as well as the advisory/consultative part of managing the Newfoundland lobster fishery. Since retiring, Dr Ennis has published several articles aimed at presenting fishery science primarily to harvesters and has participated in most aspects of the MSC certification process for several Atlantic Canada fisheries.

Nick Caputi

Dr Nick Caputi obtained his PhD from Murdoch University in 1989 with a thesis based on stock-recruitment relationships for crustacean fisheries in Western Australia. From 1974 to 1998 he worked as a statistician for the Department of Fisheries (Western Australia) working on fisheries projects from all major commercial and recreational fisheries. Since 1998 he has been the Supervising Scientist of the Invertebrate Branch of the Department, which is responsible for research on rock lobster, pearl oyster, prawns, scallop, blue swimmer crab, deep sea crab and abalone. Seven of these fisheries have achieved the Marine Stewardship Council certification with the western rock lobster fishery being the first. Dr Caputi's research focus is stock assessment but he has also been involved with MSC P2 and P3 issues with over 40-years' experience and publication of over 60 peer-reviewed papers (18 as lead author), 25 reports and 18 book chapters. His research includes catch predictions based on pre-recruit abundance, environmental effects on recruitment, spawning stock-recruitment relationships, climate change effects on fisheries, harvest strategies and maximum economic yield. The management of the western rock lobster fishery is based on a bio-economic model and a length-structured stock assessment model. He has participated in 6 Center of Independent Experts' reviews of fisheries in the USA, on invertebrate fisheries and climate change. He has also participated in stock assessments in Mozambique on the shrimp fishery (1998-2004), rock lobster (2007) and artisanal shrimp (2003).

3.2. Version details

Table 1 – Fisheries program documents versions

Document	Version number
MSC Fisheries Certification Process	**Version 2.2**
MSC Fisheries Standard	**Version 2.01**
MSC General Certification Requirements	**Version 2.4.1**
MSC Reporting Template	**Version 1.2**

4. Unit(s) of Assessment and Unit(s) of Certification and results overview

4.1. Unit(s) of Assessment and Unit(s) of Certification

4.1.1. Unit(s) of Assessment

UCSL United Certification Systems Limited as the Conformity Assessment Body confirms that the Sea of Okhotsk crab trap is in scope for MSC assessment through meeting the following scope requirements:

- The fishery does not target amphibians, reptiles, birds or mammals (7.4.2.1, MSC 2020a);
- The fishery does not use poisons or explosives (7.4.2.2, MSC 2020a);
- The fishery is not conducted under a controversial unilateral exemption to an international agreement (7.4.2.3, MSC 2020a);
- The client or client group does not include an entity that has been successfully prosecuted for a forced or child labour violation in the last 2 years (7.4.2.4, MSC 2020a);
- The client or client group does not include an entity that has been convicted for a violation in law with respect to shark finning (7.4.2.10, MSC 2020a);
- There is a mechanism for resolving disputes, and disputes do not overwhelm the fishery (7.4.2.11, MSC 2020a).

There are two Units of Assessment (Table 2). One for each of the two species: Red king crab (*Paralithodes camtschaticus*) and Blue king crab (*Paralithodes platypus*). The species are harvested with a single type of gear – bottom conical crab trap. The fishing activities are performed in the Sea of Okhotsk in two management subzones: 61.05.2 – Western Kamchatka, and 61.05.4 – Kamchatka-Kuril (Figure 1).

Ostrovnoy-Krab LTD traps fishery of crabs is carried out in the following fishing subzones: Western Kamchatka – WKS (61.05.2) – Red and Blue king crabs; Kamchatka-Kuril – KKS (61.05.04) – Red king crab.

There are two Units of Assessment all fished by the same company - Ostrovnoy-Krab LTD.

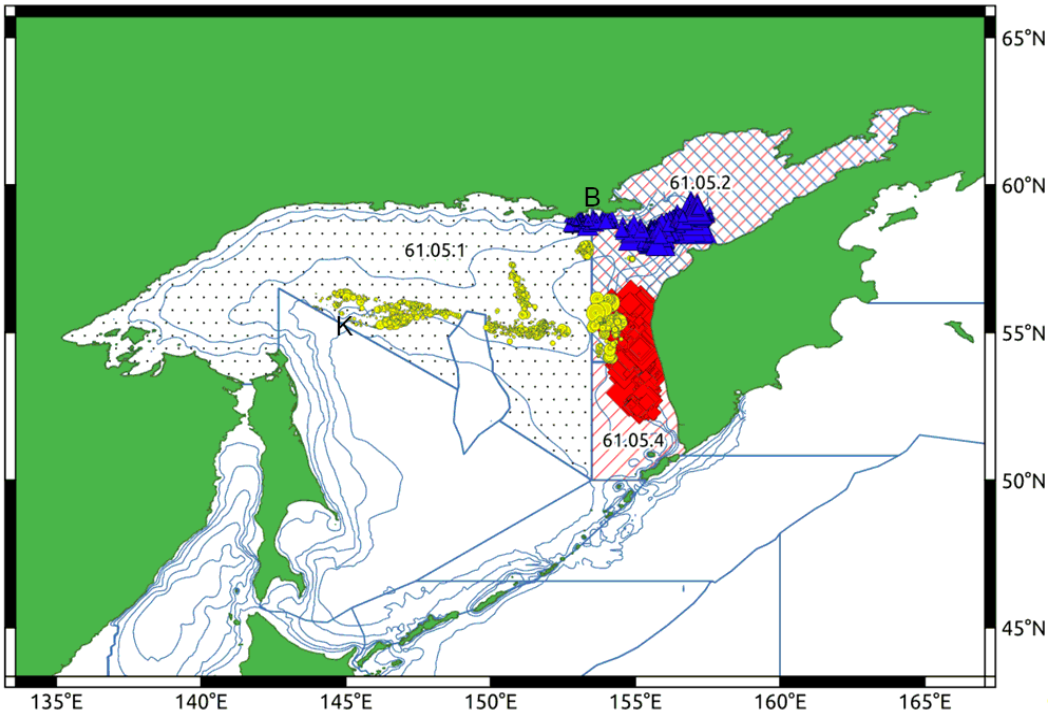


Figure 1 Map of fishing subzones and location of king crabs' fisheries in 2018.
WKS (61.05.2), KKS (61.05.04). The symbols represent the average coordinates of the days when the vessels have a catch: blue triangle – Blue king crab, red diamond – Red king crab. The size of symbol depends on the size of the catch. K – Kashevarov Bank, B – Babushkin Bay.

Table 2 – Unit(s) of Assessment (UoA)

UoA 1	Description
Species	Red king crab (*Paralithodes camtschaticus*) – in Russian: Камчатский краб
Stock	Sea of Okhotsk Russian Stock
Fishing gear type(s) and, if relevant, vessel type(s)	Traps
Client group	Ostrovnoy-Krab LTD
Other eligible fishers	No other companies are proposed to share the certificate. Other companies that fish for Red king crab in this area include Akva-Invest LLC, Antey LLC, Atlantik Crab LLC, Voskhod LLC, Kamchatka Crab LLC, Mag-Si Interneshnl LLC, Pacifik Crab LLC, Sever LLC, TRK LLC (FFA, 2019)
Geographical area	FAO zone 61.05 – the Sea of Okhotsk, subzones 61.05.2 (Western Kamchatka) and 61.05.4 (Kamchatka-Kuril)
UoA 2	Description
Species	Blue king crab (*Paralithodes platypus*) – in Russian: Синий краб
Stock	Sea of Okhotsk Russian Stock
Fishing gear type(s) and, if relevant, vessel type(s)	Traps
Client group	Ostrovnoy-Krab LTD
Other eligible fishers	No other companies are proposed to share the certificate. Other companies that fish for Red king crab in this area include Akva-Invest LLC, Antey LLC, Atlantik Crab LLC, Voskhod LLC, Kamchatka Crab LLC, Mag-Si Interneshnl LLC, Pacifik Crab LLC, Sever LLC, TRK LLC, Dal'nevostochnoe poberezh'e LLC (FFA, 2019)
Geographical area	FAO zone 61.05 – the Sea of Okhotsk, subzone 61.05.2 (Western Kamchatka)

Notes: UoA means the overall fishery (i.e. the full TAC)

4.1.2. Unit(s) of Certification

It is anticipated that the Units of Certification (UoC) with description in Table 3 will be the same as the UoAs, as detailed in Table 2 above. This will be confirmed in the Public Certification Report.

Table 3 – Unit(s) of Certification (UoC)

UoC 1	Description
Species	Red king crab (*Paralithodes camtschaticus*) – in Russian: Камчатский краб
Stock	Sea of Okhotsk Russian Stock
Fishing gear type(s) and, if relevant, vessel type(s)	Traps

Client group	Ostrovnoy-Krab LTD
Geographical area	FAO zone 61.05 – the Sea of Okhotsk, subzones 61.05.2 (Western Kamchatka) and 61.05.4 (Kamchatka-Kuril)
UoC 2	Description
Species	Blue king crab (*Paralithodes platypus*) – in Russian: Синий краб
Stock	Sea of Okhotsk Russian Stock
Fishing gear type(s) and, if relevant, vessel type(s)	Traps
Client group	Ostrovnoy-Krab LTD
Geographical area	FAO zone 61.05 – the Sea of Okhotsk, subzone 61.05.2 (Western Kamchatka)

Notes: UoC means the client's share of the fishery

4.1.3. Scope of assessment in relation to enhanced or introduced fisheries

Sea of Okhotsk crab is not enhanced nor is it an introduced species-based fishery (ISBF). Therefore, enhanced and ISBF fishery assessment considerations do not apply.

4.2. Brief overview of the fishery, and the gear type

4.2.1. Brief description of the client

The Ostrovnoy-Krab LTD was established in May 2019 as part of Far Eastern Rybak Management Company JSC (https://www.mcfef.com). In October 2019, 5% of the company was acquired by Sberbank Investments LLC. Far Eastern Rybak Management Company is one of the twenty largest fish producers in the Far East.

The Ostrovnoy-Krab LTD currently has 7 crab fishing vessels. In addition, the company is building two crab fishing vessels within the framework of the state program “crab catching quotas for investment purposes” (https://www.kommersant.ru/doc/4340275).

The company official address: Russian Federation, 694520, Sakhalin Region, Yuzhno-Kurilskiy District, Malokurilskoye village, Sovetskaya Street, 8, office 3.

4.2.2. Vessel Details

The following 7 vessels are involved in this fishery and part of the UoAs (Table 4) (Client information, September 2020).

Table 4 – The vessels, involved in the UoAs

Name	Type	Length, m	Deadweight tonnage	IMO №
Ostrovnoy-2	Fishing Vessel	26.5	67	2941832
Ostrovnoy-5	Fishing Vessel	32.67	141	9065364
Ostrovnoy-7	Fishing Vessel	41.2	429	9009516
Bekas	Fishing Vessel	48.09	303	8827480
Krechet	Fishing Vessel	48.6	293	9183685
Arina	Fishing Vessel	48.12	332	8723921
Regul	Fishing Vessel	48.12	257	8727733

The vessels are equipped with all units needed for production of finished products in the high sea during fishing. Freshly caught crabs are fed straight to the processing factory onboard the vessel where the raw material is processed into the finished products. Then the finished fish products are frozen, packed and placed in the freezing holds, where the products are kept before transhipment onboard transport vessel or before unloading in a port. In addition to frozen products, the crab can be delivered to the buyer alive, for which the vessel is equipped with special seawater tanks.

The client is currently building two new crab catcher-vessels (Client information, August 2020).

4.2.3. Gear Description

The crab trap is designed as follows (Figure 2):

The size:

- Height – 55 cm;

- Top diameter – 70 cm;

- Bottom diameter – 150 cm.

According to fishing rules (FR, 2019), clause 32.10, on the side of the trap a rectangular opening is cut (size of at least 35 cm in width and 40 cm in height). The piece is sewn to the trap with vegetable thread with a diameter of 2-3 mm, not impregnated with substances that exclude the process of decay.

A crab fishing vessel can hold up to 5000 traps. There are 200 traps in each line. The majority of traps employed in the crab fishery, regardless of their designs, are deployed at depths 100 – 300 m (Client information, 2020).

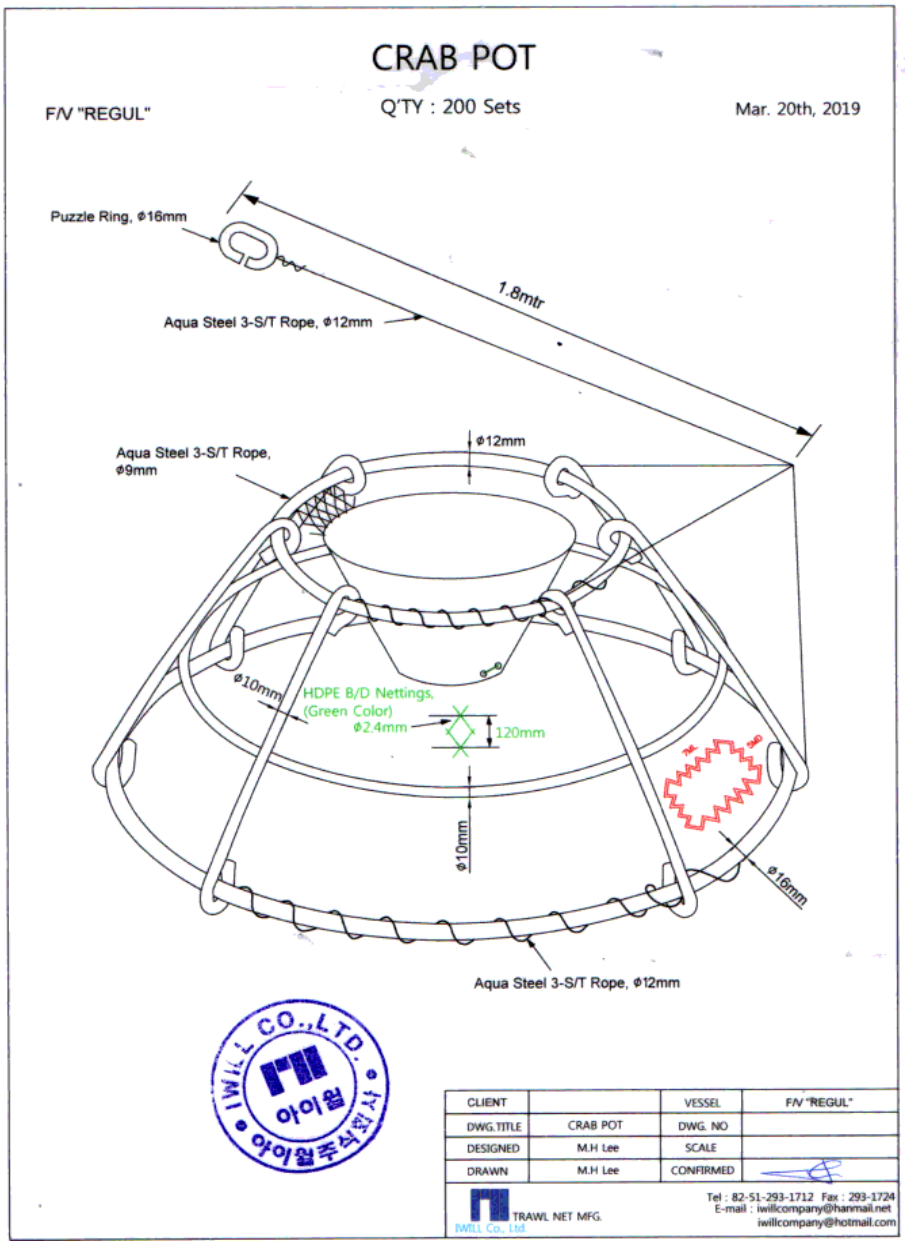


Figure 2 Crab trap (Client information, 2020).

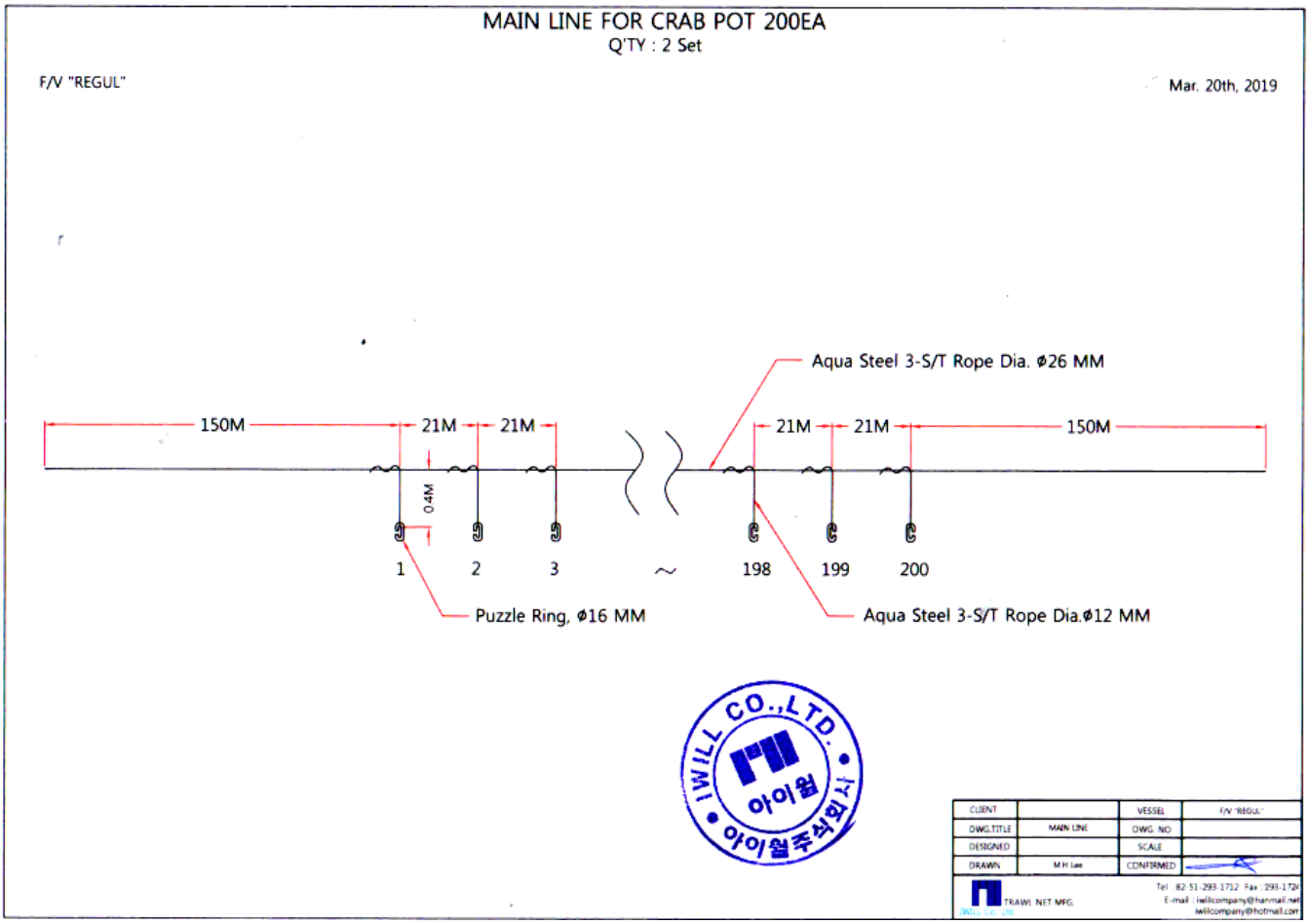


Figure 3 Line of traps for crab fishery (Client information, 2020).

4.3. Assessment results overview

4.3.1. Determination, formal conclusion and agreement

Following stakeholder input of initial scoring in the ACDR, site visit, client, peer and MSC review and PCDR consultation, the assessment team recommends the Sea of Okhotsk crab trap fishery for certification. As described in Table 5, scores for all three Principles exceeded 80. However, the assessment identified five Conditions in Principles 2, and 3 described in Table 6.

4.3.2. Principle level scores

Table 5 Principle level scores

Principle	UoA 1	UoA 2
Principle 1 – Target species	84.2	84.2
Principle 2 – Ecosystem impacts	80.33	80.0
Principle 3 – Management system	88.1	88.1

4.3.3. Summary of conditions

Table 6 Summary of conditions

Condition number	Relevant UoA	Condition	Performance Indicator (PI)	Deadline	Exceptional circumstances?	Carried over from previous certificate?	Related to previous condition?
1	All UoAs	Direct impacts do not hinder recovery of N. Pacific right whales	2.3.1	**4th annual surveillance**	**No**	**NA**	**NA**
2	All UoAs	Strategy to avoid impacts on right whales, with objective basis for confidence that it will work	2.3.2	**4th annual surveillance**	**No**	**NA**	**NA**
3	All UoAs	Adequate information to evaluate if the UoA is a threat to right whales, and to support a strategy	2.3.3	**3rd annual surveillance**	**No**	**NA**	**NA**
4	All UoAs	The fishery must provide some quantitative evidence that the measures / partial strategy for protecting vulnerable habitats are being implemented specifically. Specifically, no evidence was provided that the Code of	2.4.2	**2nd annual surveillance**	**No**	**NA**	**NA**

		Conduct is being implemented in relation to vulnerable habitats.					
5	All UoAs	The fishery-specific management system is subject to regular internal and occasional external review.	3.2.4	**3rd annual surveillance**	**No**	**NA**	**NA**

5. Traceability and eligibility

5.1. Eligibility date

It is anticipated that the eligibility date would be set as the publication date of the Public Comment Draft Report (PCDR) version of the assessment report. This would be confirmed at the publication of the PCDR, if desired by the client and if product harvested after the eligibility date and sold or stored as under-assessment fish can be handled in conformity with the MSC requirements as detailed in 7.8 (MSC, 2020a).

5.2. Traceability within the fishery

There is a multistage control system in the Russian crab fishery. The first stage is conducted by Coast Guard vessels in the region of catching. Inspectors check catch permits, number of and construction (technical parameters) of traps, production ratios, quantity of production and so on. The second stage is conducted in port. If a vessel goes to port it is obliged to send out preliminary information 72 hours before landing and more detailed information 24 hours before landing, where the status of the information about catch permits, quantity of production, quantity of crab caught (in green weight) is checked. All unloading procedures are made under the control of Border Control authorities. Thus, the risk of non-certified gear used within the fishery and a possibility of vessels from the UoA fishing outside the UoA or in different geographical areas are close to zero.

All vessels are equipped with VMS, which permanently sends information about the vessel's coordinates to the State CFMC. All logistic procedures (including moving products from catching vessel to transport one) in the Russian Economic Zone must be fulfilled in the presence of a Border Control inspector who checks the catch permits, production ratios, quantity of production and so on. In addition, the vessel will have to fulfil all above-mentioned procedures, so it will almost be impossible to catch crab illegally.

There are strict internal procedures on board the vessels (required by Russian law) and a sophisticated system of enforcement measures at sea and on land to ensure that these requirements are complied with. Therefore, the risk of substitution of mixing certified (target species) and non-certified (by-catch species) catch is minimal.

All planned trans-shipments have to be reported in advance to Russian enforcement authorities, so that they have the possibility to check the operations physically. Logbooks are kept on both catch and transport vessels for one year; then they are kept by the fishing company for three more years. Separate written documentation is also issued for the transaction.

Catching vessel may tranship products to transport vessel at sea, then transport vessel will land the products in Russian and/or foreign port (but transport vessels will deliver cargo via Russian port as all marine living resources caught in the Russian EEZ or on the Russian continental shelf have to be taken to Russian port before being exported). Also, the catching vessel may land products in Russian port by itself. Catching vessels have on board only products caught and processed by themselves. There are two points of ownership change for the products (that is points from which subsequent Chain of Custody should start): transport vessel or port.

Table 7 – Traceability within the fishery

Factor	Description
Will the fishery use gears that are not part of the Unit of Certification (UoC)? If Yes, please describe: - If this may occur on the same trip, on the same vessels, or during the same season; - How any risks are mitigated?	*No, the fishery will only use those gears that are the part of the Unit of Certification (UoC).*
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, please describe: - If this may occur on the same trip; - How any risks are mitigated?	*Vessels in the UoC cannot fish outside the UoC geographic area on the same trip.* *Vessels in the UoC may fish outside the UoC geographic area on their next trip. But in this case, before the next trip, all certified products must be unloaded at a port or on a transport vessel.*

Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate? This refers to both at-sea activities and on-land activities. - Transport - Storage - Processing - Landing - Auction If Yes, please describe how any risks are mitigated.	*The vessels of UoC periodically master other quotas through agreements with other companies, performing the harvest by themselves. Risk of mixing between UoC and other areas is minimal because of the prohibition on moving between subzones with product onboard, and accurate labelling of production.* *Each vessel identifies its production, so the risks of mixing between client and non-client fleet catches are also minimal.*
Does transhipment occur within the fishery? If Yes, please describe: - If transhipment takes place at-sea, in port, or both; - If the transhipment vessel may handle product from outside the UoC; - How any risks are mitigated.	*Reloading at sea – often.* *If a third-party transport vessel is used, before chartering, the vessel is checked on the relevant website (whether it is on the blacklist). Frozen products of the same title / species, type of processing, and gradation are placed on one pallet. The holds with the products are sealed. During transhipment a bill of lading is issued, which is signed by the consignor and consignee. Information on the status of products (MSC, certificate number) is indicated on the bill of lading, and the cargo owner is also indicated there. Certified and non-certified products are issued with separate bills of lading.* *Transhipment onboard a fishing vessel for subsequent transportation to the port of discharge.* *- Rarely, it is used only for transhipment of products of own production. The transhipment procedures are the same as for transhipping to a third-party transport vessel. If the vessel is owned by the company, then additional checking of the vessel in blacklists is not required.* *Unloading in the cold store is made according to the principle: Frozen products of the same title / species, type of processing, and gradation are placed on one pallet. It is not allowed to mix certified and non-certified products on one pallet.*
Are there any other risks of mixing or substitution between certified and non-certified fish? If Yes, please describe how any risks are mitigated.	*No*

5.3. Eligibility to enter further chains of custody

The fishery assessment covers all products from Sea of Okhotsk crab trap fishery landed from Ostrovnoy-Krab LTD vessels operating in the UoA until the point of landing. Therefore, the scope of certification ends at the point of landing. Downstream certification of the product requires the appropriate chain of custody certification.

The fishery certificate is applicable to all Ostrovnoy-Krab LTD vessels that are legally licensed to fish for Red king crab in the subzones 61.05.2 (Western Kamchatka) and 61.05.4 (Kamchatka-Kuril) (including only the Russian EEZ); Blue king crab in subzone 61.05.2 (Western Kamchatka);

Any Red and Blue king crabs products landed by Ostrovnoy-Krab LTD vessels operating within the UoA is considered to be within scope.

The Ostrovnoy-Krab LTD vessels are detailed in Table 4 (correct at the time of drafting the CPRDR). If required, an up-to-date list will be available from UCSL United Certification Systems Limited upon request.

Beyond the point of landing, any company taking ownership of Red and Blue king crabs products originating from the fishery and wishing to identify it as MSC certified will need to hold a valid chain of custody certificate.

In order for subsequent links in the distribution chain to be able to use the MSC logo, companies and/or individuals must enter into a separate chain of custody certification, and be able to track product to the client group companies and member companies.

6. Scoring

6.1. Summary of Performance Indicator level scores

Table 8 – Draft Performance Indicator scores (at PCR).

Principle	Component	Performance Indicator (PI)		UoA1[1]	UoA2[2]
1	Outcome	1.1.1	Stock status	90	90
		1.1.2	Stock rebuilding	N/A	N/A
	Management	1.2.1	Harvest strategy	80	80
		1.2.2	Harvest control rules & tools	80	80
		1.2.3	Information & monitoring	80	80
		1.2.4	Assessment of stock status	85	85
2	Primary species	2.1.1	Outcome	85	85
		2.1.2	Management	90	90
		2.1.3	Information	85	80
	Secondary species	2.2.1	Outcome	90	90
		2.2.2	Management	90	90
		2.2.3	Information	80	80
	ETP species	2.3.1	Outcome	70	70
		2.3.2	Management	60	60
		2.3.3	Information	60	60
	Habitats	2.4.1	Outcome	80	80
		2.4.2	Management	75	75
		2.4.3	Information	80	80
	Ecosystem	2.5.1	Outcome	90	90
		2.5.2	Management	80	80
		2.5.3	Information	90	90
3	Governance and policy	3.1.1	Legal & customary framework	95	95
		3.1.2	Consultation, roles & responsibilities	95	95
		3.1.3	Long term objectives	80	80
	Fishery specific management system	3.2.1	Fishery specific objectives	90	90
		3.2.2	Decision making processes	85	85
		3.2.3	Compliance & enforcement	100	100
		3.2.4	Monitoring & management performance evaluation	70	70

Note: [1] Red king crab; [2] Blue king crab

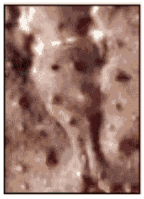
6.2. Principle 1

6.2.1. Principle 1 background

6.2.1.1. Red king crab

6.2.1.1.1. Biology

Red king crab has 6 prominent spines on mid-dorsal plate.



The Red king crab (*Paralithodes camtschaticus*) (not a LTL species) is among the world's largest arthropods, reaching ~220 mm carapace length, a weight over 10 kg (Powell and Nickerson 1965a, Powell and Nickerson 1965b), and living up to 20 years (Kurata, 1961). It is native to the Northern Pacific Ocean (Figure 4) with reported range from the Korea and Japan, Kamchatka, the Aleutian Island chain, Alaska, and southeast to Vancouver Island, Canada (Rodin 1990, cited by Jørgensen and Nilssen, 2011). There are no known major widespread threats to this species.

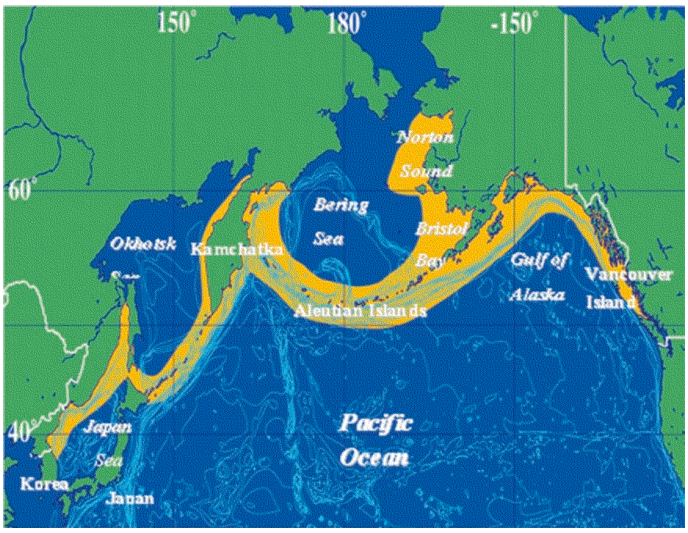


Figure 4 The native distribution of the Red king crab (yellow colour) along the coasts of Korea, Japan, Russia, Alaska, and Canada (Jørgensen and Nilssen, 2011).

In Asian waters, seven populations of Red king crab are found in following areas: the Primorye, Ayan-Shantar, South and North Kuril Islands, West Kamchatka, Karaginsky Gulf, and Hokkaido. In Alaskan waters, large populations occur in Norton Sound, Bristol Bay, the Aleutian Islands, the western Gulf of Alaska, and Southeast Alaska. In Atlantic waters, an invasive Red king crab population occurs in the Barents Sea. Historically, in USSR/Russian waters only the Primorye and West Kamchatka populations were commercially important. At present, the West Kamchatka, Ayan-Shantar and Barents Sea populations have the highest commercial value (Dvoretsky and Dvoretsky, 2017).

The western Kamchatka shelf is the most important fishing area for Red king crabs in Russian waters. They are found along the entire western Kamchatka shelf and form concentrations of commercial density at depths of 50–200 m. The area was divided into six divisions according to stock concentrations and migration patterns of Red king crabs in these subareas as follows (from north to south): (a) Khairyuzovskiy (called Kovran in Japanese), from 57°00' to 57°30' N; (b) the Severny Zapretny district, from 56°20' to 57°00' N; (c) Ichinskiy, from 55°10' to 56°20' N; (d) Kolpakovskiy, from 54°00' to 55°10' N; (e) Kikhchikskiy, from 53°00' to 54°00' N; (f) Ozernovskiy, from Cape

Lopatka (the southern tip of Kamchatka Peninsula), or from 51°00' N to 53°00' N (Dvoretsky and Dvoretsky, 2017) (Figure 5).

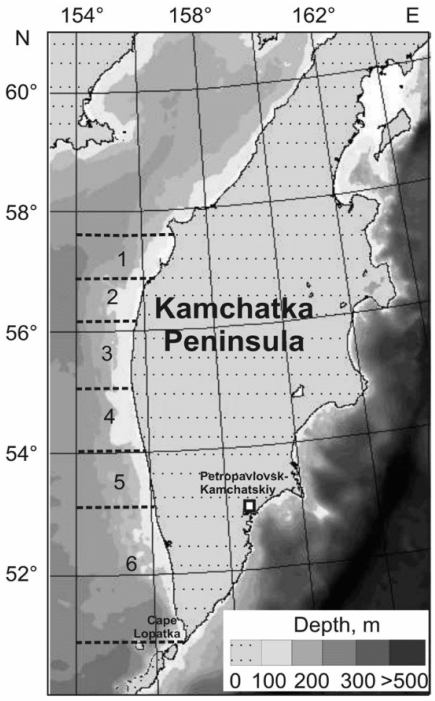


Figure 5 Subdivision of the western Kamchatka shelf into fishing districts for crab fishery. 1 – Khairyuzovskiy district, 2 – Severny Zapretny district, 3 – Ichinskiy district, 4 – Kolpakovskiy district, 5 – Kikhchikskiy district, 6 – Ozernovskiy district (Dvoretsky and Dvoretsky, 2017).

Spawning occurs in spring (May-June) at shallower depths (< 50 m, sometimes 10 m). Mass moulting in males occurs after mating, in summer (Ivanov, 2002). Upon hatching, larvae drift with currents along the western Kamchatka coastline north toward the Khairyuzovskiy district and the Severny Zapretny district (Rodin, 1985). This is where postlarval settlement and yearling growth mostly occurs. The most favourable sites for settling can be found here, viz., hard ground, pebbles, and stones with complex biogenic habitat such as hydrozoans, bryozoans, and macro algae. Thus, the northern areas act as nursery grounds for the whole of the metapopulation in the eastern part of the Sea of Okhotsk (Ivanov, 2002). Ontogenetic migrations are directed southward, against prevailing currents. Recruitment in southern areas comes from the north. Seasonal migrations are observed when Red king crabs move from deep water (100–250 m) where they spend winter months, to shallow water (4–50 m) for reproduction, and then to medium depths for feeding.

Typically, the northern areas of western Kamchatka are characterized by high crab density, high female abundance, and relatively small mean size of males because of a high proportion of young and sublegal males. In contrast, the southern sub-populations are characterized by relatively low densities of crabs and a larger mean size of males than in northern areas (Vinogradov, 1969, 1970). In the waters off the West Kamchatka coast, Mollusca (mainly the bivalves *Siliqua media*, *Tellina lutea* and *Mytilus sp*.) and Crustacea (mainly barnacles *Balanus sp*.) are the dominant food groups for Red king crabs in terms of percentage wet weight and frequency of occurrence, with fish as the next most important group of prey (Fenuk, 1945; Kulichkova 1955; Takeuchi, 1967; Nadtochy *et al*., 1998; Melnik *et al*., 2014).

Male crabs may be able to copulate with up to seven females within a single spawning season, but the fertilization rate is significantly reduced after the first two or three copulations (Paul and Paul, 1997). The fertilization rate is also dependent on size, with the largest male crabs being the most successful. The mean individual fecundity of a female Red king crab increases from north to south, averaging 60,000 eggs in the Khairyuzovskiy district, 78,000 eggs in Ichinskiy, 120,000 eggs in Kolpakovskiy, 150,000 eggs in Kikhchikskiy, and 220,000 in Ozernovskiy (Rodin and Lavrentiev, 1974).

In males, molting occurs immediately after the mating season, mostly during the first half of summer (Rodin 1985; Levin 2001). Molting starts earlier in southern areas, and the area of intensive molting gradually shifts northward. The Ozernovskiy district is strikingly different from other areas in terms of molt behaviour. There, some crabs molt in winter and such crabs do not molt during the following summer. Winter molting was also recorded in the northern areas (Levin, 2001).

Size of maturity of female Red king crabs is 85–95 mm carapace width (CW, the greatest straight-line distance across the carapace excluding spines) (Lysenko, 2005). In males, spermatozoa are found in crabs as small as 80 mm CW (Levin 2001). The growth rate is slow off western Kamchatka: an 8-year-old crab measures 80 mm, a 10-

year-old specimen measures 100 mm, a 13-year-old crab measures 135 mm, and a 14- to 15-year-old crab measures 145–155 mm CW. Males measuring 80–130 mm CW are already able to mate (Levin, 2001).

Crabs in the northern shelf area (Khairyuzovskiy and the Severny Zapretny district, as well as northern Ichinskiy) represent an independent subpopulation, i.e., one that is self-sustainable solely through self-propagation (Rodin, 1969, 1985). Farther to the south (Kolpakovskiy and Ichinskiy districts), a semi-independent subpopulation is capable of self-propagating but would be decreased should it fail to be replenished from the north (Lavrentiev 1963; Vinogradov 1969). Finally, the Red king crab subpopulation in the southern part of the shelf (Kikhchikskiy and Ozernovskiy districts) is not independent and requires constant inflow of recruits from other areas (Rodin 1969, 1985). Whatever self-propagation takes place is quite inefficient and offspring perish before reaching maturity or are carried away from the area by currents (Vinogradov, 1969; Lavrentiev, 1963; Rodin, 1969, 1985).

Studies of Red king crab growth show a linear increase in size in *P. camtschaticus* during the first 5 years of life, progressive growth retardation after onset of maturity, and little increase in size classes estimated to be age 10+ and older (Stevens and Jewett, 2014) (Figure 6).

Moiseev and Moiseeva (2010), evaluated the visible pathological changes in the long term after a single ascent to the surface in traps for Red king crabs. For the experiment, males that reached commercial size were selected from the catch. After lifting the traps, the individuals selected for the experiment were exposed to air for 8–10 minutes during various manipulations with them, and then for 1.5 hours in a container with running water before preparing the experimental trap for descent. There was no special feeding of the crabs during the experiment. The stagnation of the trap was 55 days – from September 19 to November 12, 2008. During the experiment, the death of crabs was not recorded. After the experiment, the motor activity of the crabs and the condition of the outer integument were assessed. At anatomical autopsy, visible pathological changes in internal organs were described. The results obtained were compared with the data for control individuals - crabs from commercial catches in the same fishing area. The motor activity of the experimental individuals was high, comparable to the motor activity of the crabs of this species from the catches. External examination revealed no signs of erosion of the exoskeleton. The incidence of pathological changes in the gills in experimental crabs did not change significantly in comparison with the control.

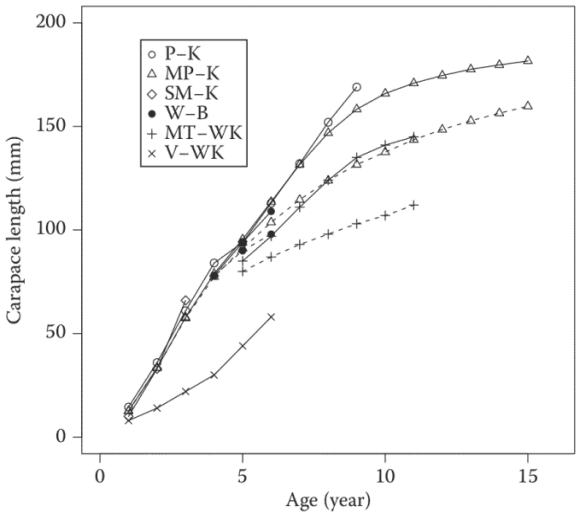


Figure 6 Estimated size at age for RKC from various studies.
Solid lines are males or both sexes (as juveniles); dashed lines are females. Sources and locations: P–K, Powell (1967), Kodiak (observed); MP–K, McCaughran and Powell (1977), Kodiak (predicted); SM–K, Stevens and Munk (1990), Kodiak (predicted); W–B, Weber and Miyahara (1962), and Weber (1967), Bering Sea (observed); MT–WK, Matsuura and Takeshita (1976), West Kamchatka (observed); V–WK, Vinogradov (1968), West Kamchatka (observed) (Cited by Stevens and Jewett, 2014).

6.2.1.1.2. Fishery

The following history of the fishery is adapted from Dvoretsky and Dvoretsky (2017). West Kamchatka Red king crabs were historically fished mainly in spring (from April until the first half of June) in shallow coastal waters at the approximate depth of 10–30 m where Red king crabs gather for mating. During summer and autumn months, fishing follows Red king crab migration to depths greater than 35 m and then down to 100 m.

The Red king crab fishery along the western Kamchatka coastline was started as early as 1920 by Japanese fishers. At that time the virgin population of the crabs was so dense that fishing was mainly performed in the southern part of the shelf (at present it is mostly conducted in the north). It was not until 1926 that abundant Red king crab stocks were discovered in the northern Khairyuzovskiy district. Landings of the West Kamchatka Red king crab varied considerably. Large-scale fisheries started in 1925, and by 1927 annual landings were as high as 30,000,000 crabs.

These levels were relatively stable over a 4-year period. Tangle nets were the predominant gear used, which has low selectivity. It was estimated that the catch of commercial size males (> 150 mm CW) noted above was accompanied with a bycatch of 20,000,000 females and sublegal males. These high catches led to a significant decrease in the total number of Red king crabs. Annual landings in 1932–1935 decreased to 14,000,000–21,500,000 individuals. The abundance of P. camtschaticus sharply decreased in southern areas. In the Ozernovskiy district, the fishermen harvested no crabs, and in the Kikhchikskiy district the fishery was concentrated on juveniles and male crabs with CW < 150 mm (Vinogradov, 1955). In 1937–1938, landings of Red king crabs returned to 1927–1930 levels, but crab cannery production decreased from 501,000 cases in 1930 to 458,000 in 1938 (Levin 2001). In that period, Russian Red king crab landings in waters off West Kamchatka varied from 19 to 33% with a mean annual level as low as 25%. The rest of the crabs (75%) were caught by Japanese fishermen.

During World War II, king crab harvests along West Kamchatka were almost zero. Growth in catch efforts after the war was fairly slow. This resulted in a sharp increase in the abundances of all subpopulations, especially in 1946–1949. Landings went up significantly starting in 1955 when fisheries were handled by two large Japanese motherships. However, the Soviet Red king crab harvesting fleet was also developing, and the problem of Red king crab fisheries regulation and management became acute because increasing pressure on the population (harvest rates reached 1930s levels) reduced the number of commercial size males (Vinogradov, 1957; Galkin, 1959). After diplomatic relations were restored between the USSR and Japan (interrupted during WWII) the Soviet-Japanese Fisheries Convention took effect in 1956. The convention was designed to develop measures for the sustainable management of fish resources. Based on that convention, the Soviet-Japanese Fisheries Commission was established, and it introduced national Red king crab fishing quotas in 1957. In 1956 and 1957, combined Russian and Japanese landings were 28,800,000 and 29,500,000 crabs. Total production during those years was 408,000 and 394,000 cases, respectively (Levin, 2001).

Based on the 1957–1963 annual trawl surveys, scientists from Pacific Fisheries Research Center (TINRO, Vladivostok) detected a clear pattern of reduced mean crab catch per trawl. This value in 1963 was 2.5, 7, and 2 times lower than in 1957 for Commercial size males, juveniles and females, respectively (Lavrentiev, 1963). Owing to the high importance of the northern shelf for recruitment of *P. camtschaticus*, the Severny Zapretny district was created in 1959 to protect nursery grounds and the area of crab propagation. The closing was made effective by an administrative act, i.e., adopted by a resolution of the USSR Ministry of Fisheries. The sanctuary remains in effect (Ivanov, 2002).

In 1964–1968, annual landings were 25,500,000–28,300,000 commercial size males and the majority of these crabs (60–70%) were harvested in the main reproduction area, to the north of 57°00´ 00 N. Because of the deficiency of male Red king crabs, the proportion of females with empty clutches increased from 6% in 1969 to 23% in 1974. The decrease in both the total number of males and mean size of animals led to an increase in the number of crabs required for producing 1 standard case pack (48 cans at 454 g each) from 64 to 90 individuals. The total area occupied with aggregations of commercial size males decreased from 31,500 km^2 in 1964 to 14,400 km^2 in 1976. For sublegal males and females, these values decreased similarly from 19,400 to 11,500 km^2 and from 14,500 to 7500 km^2, respectively (Levin, 2001). The total number of 60–230 mm CW males decreased from 180,000,000 to 74,000,000 (Levin, 2001). The annual catches of crabs continued to drop: from 24,100,000 crabs in 1969 to 14,500,000 crabs in 1974. Since 1975, crab fishing has been performed exclusively by Soviet/Russian vessels. Japanese landings of *P. camtschaticus* in waters off West Kamchatka are presented in Figure 7a.

In 1975, the Russian fleet switched to Red king crab harvesting with pots. Pots are in many respects more efficient and, crucially, less destructive to females and sublegal males than tangle nets. The total closed area was increased, and the main harvesting areas were distributed to the southern regions. In 1977, the legal size limit was raised from 130 to 150 mm carapace width. As a result of decreased fishing pressure on areas used for reproduction (48.7% of the total catch was harvested there in 1971 vs. only 21.4% in 1981), the total number of commercial males increased considerably and reached 131,000,000 in 1981 (Rodin, 1985). In 1975–1981, landings were relatively low, averaging 8,500,000 crabs per year.

Annual stock assessment trawl surveys for the West Kamchatka Red king crab have been conducted by scientists from the KamchatNIRO since 1996 (Shaginyan *et al*., 2012). In 1996–2000, Russia dominated world king crab fisheries and produced 80–90% of the total supply (Otto, 2014). The reported catches (23,600–37,700 t) were lower than the real ones (56,000–59,400 t) (SFP, 2010; Dvoretsky and Dvoretsky, 2014). High landings led to a 2 to 7-fold decline in the abundance of commercial males in the southern areas where the fishery was the most intensive (Shaginyan *et al*., 2012). A further decrease in abundance indices was indicated in 2001–2004. In that period, reported landings gradually decreased from 16,060 to 2100 t; actual landings were 3.5 times higher than the official ones (Ivanov, 2016). In 2005, the West Kamchatka Red king crab fishery was closed. In 2006, trawl survey data from KamchatNIRO indicated positive trends in the population dynamics of *P. camtschaticus*. The abundances of commercial and sublegal males in the southern areas were 3.1 times higher than in 2005 (Shaginyan *et al*., 2012).

The West Kamchatka fishery was reopened in 2007 with a TAC of 3927 t. The fishing vessel participation of 91 vessels was extremely high. Official landings for Red king crab were 4700 t and actual landings were 13,500 t, or 6,000,000 crabs (SFP, 2010). As a result, the fishery was closed again. Negative tendencies in population

abundance were observed in 2008–2010. Since 2011, positive trends have been noted for all size groups of the West Kamchatka Red king crab (Shaginyan *et al*., 2012). In the period of fishery closure, the TACs were as low as 0.1–1300 t (for research purposes only) but the actual catches were much higher accounting for 10,000–18,000 t (Ivanov, 2016).

The summer trawl survey conducted by KamchatNIRO and TINRO in 2013 found that maximum catches per trawl increased from 151 crabs in 2012 to 177 crabs in 2013 in the Ozernovskiy district, from 42 to 455 crabs in the Kikhchikskiy district, from 97 to 1,200 in the Kolpakovskiy district, from 58 to 880 in the Severny Zapretny district (Lysenko and Shaginyan, 2013). Maximum abundances of *P. camtschaticus* were recorded in the northern areas. The main population characteristics reached or exceeded levels recorded in the late 1990s. The fishery closure had a positive effect on the West Kamchatka Red king crab population, so it was recommended to open the commercial fishery but only in traditional areas. Exploitation rate was set at 10% of the estimated commercial stock (Lysenko and Shaginyan, 2013).

The commercial fishery of *P. camtschaticus* in the western Kamchatka waters was reopened on November 22, 2013 and the fishery season lasted until December 31 with a total catch of 6,785 t. In 2014–2016, this parameter increased from 6,400 to 9,700 t (Ivanov, 2016). The annual dynamics of Red king crab landings in the West Kamchatka shelf are summarized in Figure 7b. Catch in the Figure is shown in million crabs. An average weight of a RKC commercial male is 2.14 kg.

Distribution of the catch of Red king crab in the Sea of Okhotsk in 2018 is shown in Figure 8. Daily dynamics of the catch of Red king crab in the northern part of the Sea of Okhotsk in 2018 is presented in Figure 9. Monthly dynamics of fishing effort and catch by subzones is given in Table 9.

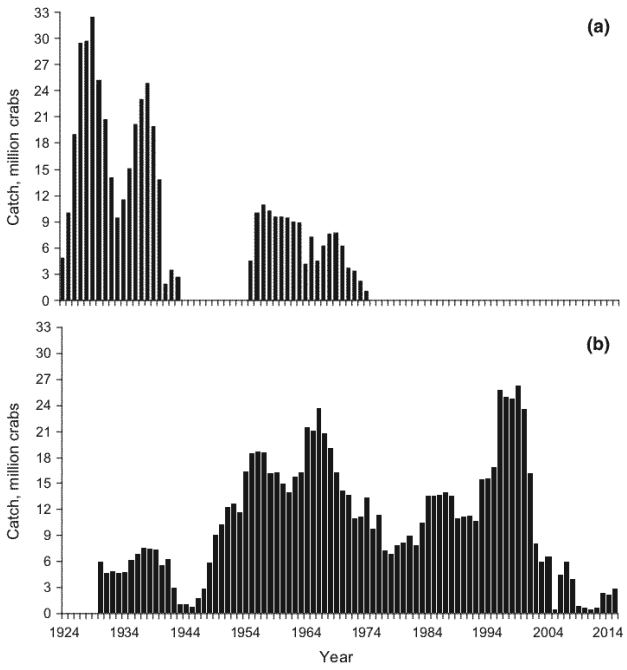


Figure 7 Catch data for Red king crab in the Kamchatka shelf from 1924–2015. a – Japanese catch, b – USSR/Russian catch (Cited by Dvoretsky and Dvoretsky, 2017).

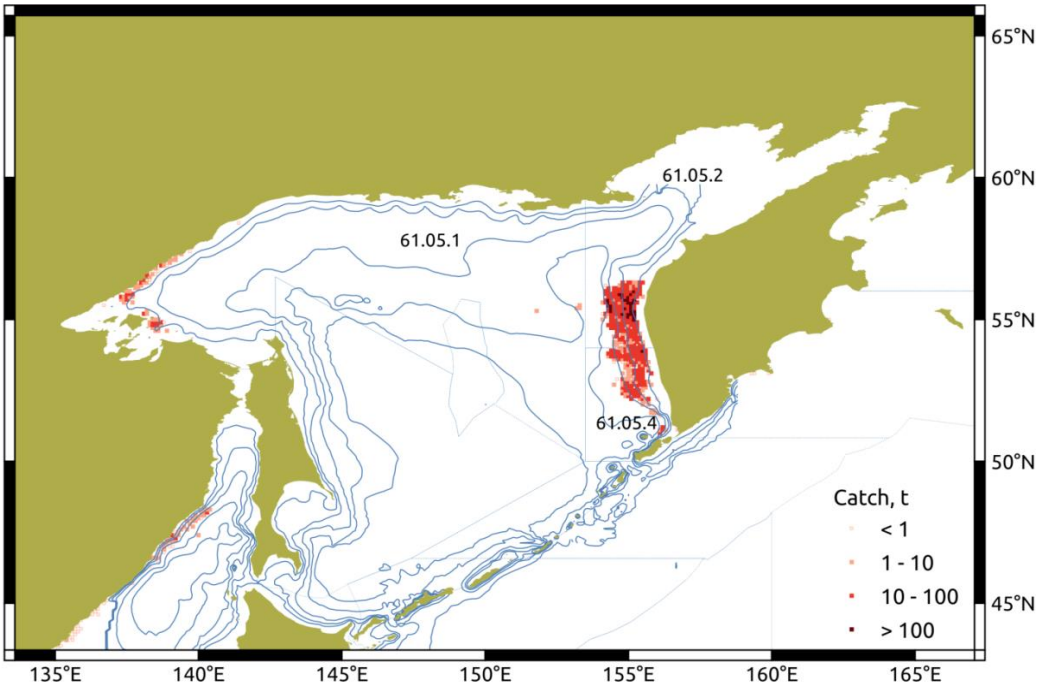


Figure 8 Map showing the distribution of the catch of Red king crab in the Sea of Okhotsk in 2018. NSOOS (61.05.1), WKS (61.05.2) and KKS (61.05.4), in tonnes per one hundredth of a degree trapezoid. Dashed blue line – boundaries of fishing subzones, solid blue lines – isobaths (50, 100, 200, 500 and 1000 m)(Vasilets, Chernyh, 2020).

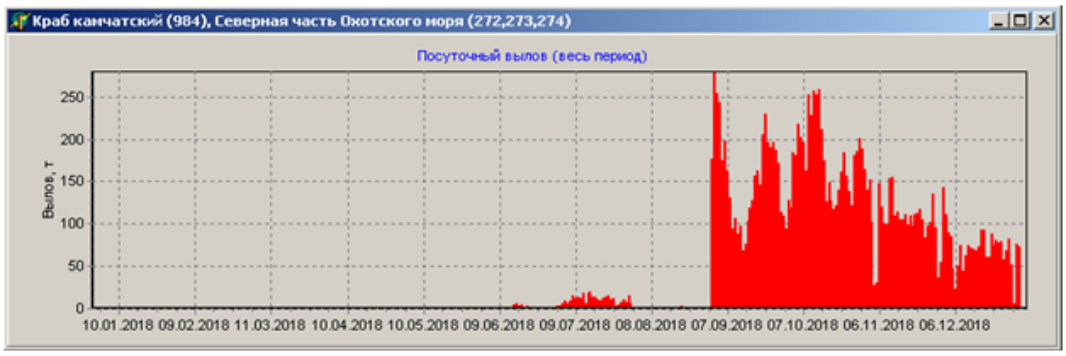


Figure 9 Daily dynamics of the catch of Red king crab in the northern part of the Sea of Okhotsk in 2018. Subzones: NSOOS + WKS + KKS. Y-axis – catch in tonnes (Vasilets, Chernyh, 2020).

In "Materials justification for changes to previously approved TAC's forecast..." (KamchatNIRO. 2020b) it is written that the estimates of the volume of the real catch of Red king crab off Western Kamchatka in 1996–2016 were obtained based on data from the customs of Japan, the Republic of Korea, the USA, Canada on the volume of imports of crab products from the Russian Federation. An algorithm for assessing the actual catch of the Kamchatka crab of the western Kamchatka shelf is given in the paper by Ivanov (2016). The actual catch obtained was included in the TAC calculations. The catch in 2017-2019 was taken equal to the official one in VMS.

Regulations for Red king crab fisheries state that the crab has to be used only for food purposes, and only crab traps (pots) can be used for harvesting. Crabbing is banned during seasons of intensive molting, the period of the ban is proposed by local research institutions. Usually, the closed season off western Kamchatka lasts from May 1 to August 31. Fishing is banned between 57° N and 58° N using trawling gear at depths of 200 m or less, between 56°20´0 and 57°00´0 N using any fishing gears except longlines at depths of 300 m or less, and using trawls and bottom nets in the area between 54°00´0 and 56°20´0 N at depths of 400 m or less. Fishing for Walleye pollock by trawl at the latitude of Cape Lopatka to 54° N at depths of 100 m or less is prohibited. These limitations are to protect the areas of Red king crab concentrations. The minimum legal size for Red king crab is 150 mm CW, except for the Ayano-Shantarskiy Islands area of the SOO where the legal size is 130 mm CW. In fisheries using trawls and other fishing gears, incidental bycatch of crabs shall not exceed 2% by weight of the targeted species. If the by-catch exceeds 2%, it must be returned to the sea and the vessel must change its fishing location (move-rule).

In directed crab fisheries, sublegal and female incidental catch shall be allowed within 0.2% of the daily catch. It must be returned to the sea. There are also the minimum daily volumes of crab catch per one vessel engaged in industrial and coastal fishing. For the Red king crab in WKS it equal 5.5 tonnes per day and in KKS – 4.0 tonnes per day for medium-tonnage vessels (MAR, 2019). This means that if the quota for the Red king crab for a medium-tonnage vessel in the WKS is 55 tonnes, then the vessel has the right to catch the crab for only 10 days. The fishing period is indicated in the fishing permit.

Table 9 Monthly dynamics of fishing effort (per vessel-day of fishing) and catch (tonnes) of Red king crab by traps in the northern part of the Sea of Okhotsk in 2018 (Vasilets, Chernyh, 2020).

Month	Subzones					
	WKS		KKS		NSOOS	
	Catch	Vessel-days	Catch	Vessel-days	Catch	Vessel-days
5	-	-	-	-	6.214	16
6	-	-	-	-	23.536	29
7	-	-	1.015	3	315.423	96
8	-	-	1.32	3	-	
9	2,432.223	251	2,000.951	266	224.111	60
10	4,426.758	497	1,064.575	157	-	-
11	2,564.244	417	568.004	93	-	-
12	1,515.16	188	696.994	122	-	-

Red king crab bycatch in other fisheries.

Comparative analysis was carried out for species composition of the catches from major types of fishing gears near the west coast of Kamchatka (in the Kamchatka-Kuril and West-Kamchatka subzones) based on the data of the vessel monitoring system (VMS) of the Federal Fisheries Agency and the research data from commertial fishing vessels in 2003–2017 (Matveev et al., 2019).

In 2003-2017, observers from Fisheries Research Institute (VNIRO) took part in 23 cruises of fishing vessel (936 fishing operations) with using of Midwater trawl, 25 cruises of fishing vessel (571 fishing operations) with using of Danish seine, 8 cruises of fishing vessel (669 fishing operations) with using of Bottom longline. This represents less than 2% of the total fishery. Fisheries statistics in the VMS cover 100% of all fisheries.

The ratio in the total catch of aquatic biological resources (in the exception of salmon) in the Kamchatka-Kuril and West-Kamchatka subzones (in sum) in 2003-2017 according to VMS data were next: Midwater trawl - 75.5%, Danish seine - 19.1%, Bottom longline - 2.3%.

In Midwater trawl fishery, the bycatch of Red king crab according to VMS data was 0.01% and according to research data was less than 0.01%. In Danish seine fishery, the bycatch of Red king crab according to VMS data was 0% and according to research data was less than 1.44%. In Bottom longline fishery, the bycatch of Red king crab according to VMS data was 0% and according to research data was less than 0.23%.

6.2.1.1.3. Stock Status

According to the data obtained in the time of scientific monitoring of the Red king crab fishery in the fishing season of 2013–2016, the indicators of the average daily catch of commercial males per trap remained at a high, relatively stable level Table 10. The results of the monitoring of the fishery in 2017 showed that the increase in the average catch of commercial males per trap per day, noted since 2014, has continued. In the WKS, this indicator has grown by more than a third over the year, and in the KKS, it has doubled. The dynamics of catches of non-commercial males in 2017 changed slightly: a decrease in catches of pre-recruits in the WKS gave way to their significant increase, and in the KKS, catches of these functional groups turned out to be minimal over a four-year observation period. In 2018, catches of commercial males in both subzones decreased. At the same time, if in the WKS this indicator changed slightly, remaining at a high level, then in the KKS it decreased by more than half compared to 2017. Catches of commercial males in fishing season 2019 changed little and amounted to 8.4 Red king crab males per a day per trap. The catches of non-commercial males were also relatively stable, slightly exceeding the indicators of the previous year.

In general, the results of scientific monitoring of the fishery confirm a good fishing situation for the Kamchatka crab catch over the past seven years (Ivanov, 2020).

Table 10 Catches of West Kamchatka Red king crab males per a day per trap in 2013-2019 (Ivanov, 2020).

Males	2013	2014	2015	2016	2017	2018	2019
				WKS			
Commercial size	6.4 ± 0.4	5.7 ± 0.5	4.9 ± 0.2	6.3 ± 0.3	9.6 ± 0.9	8.8 ± 0.7	8.4 ± 0.6
Pre-recruits I*	1.6 ± 0.1	1.3 ± 0.1	1.1 ± 0.1	0.7 ± 0.1	2.6 ± 0.4	0.9 ± 0.1	1.2 ± 0.2
Pre-recruits II**	1.3 ± 0.1	1.3 ± 0.1	1.0 ± 0.1	0.5 ± 0.0	2.0 ± 0.4	0.6 ± 0.1	0.8 ± 0.1
				KKS			
Commercial size	5.1 ± 1.2	4.3 ± 0.7	4.8 ± 1.4	6.3 ± 0.9	12.5 ± 2.9	6.1 ± 1.1	
Pre-recruits I*	0.5 ± 0.3	0.6 ± 0.2	0.3 ± 0.1	0.5 ± 0.2	0.2 ± 0.0	0.4 ± 0.1	-
Pre-recruits II**	0.2 ± 0.2	0.3 ± 0.1	0.2 ± 0.1	0.3 ± 0.1	0.1 ± 0.1	0.2 ± 0.0	

* – carapace width 140–149 mm; ** – carapace width 130–139 mm (Ivanov, 2020).

Dynamics of the Red king crab abundance in the period from 1996 to 2019 at West Kamchatka on the data of bottom trawl surveys is shown on Figure 10. During this period, the stock of Red king crab experienced significant changes, and therefore the catch fluctuated sharply. In the 1990s, uncontrolled fishing pressure on the West Kamchatka stock has increased significantly. The unofficial catch in the second half of the 1990s was almost 2 times, and in the early 2000s it was 3–7 times higher than the official catch. In 2005, a ban was introduced on the Kamchatka crab fishery near Western Kamchatka, which (with the exception of 2007) was in effect for 8 years. From 2002 to 2010, the minimum number of Red king crab males was observed for the entire period of population monitoring. In 2008, it was recorded that the decline in the number of males stopped, and its increase began. At present (2017–2019) the population of the Red king crab of the West Kamchatka is characterized by a high abundance of the commercial stock (Ivanov, 2020).

The commercial stock of the Red king crab in 2019, according to the results of bottom trawl surveys, in the KKS was estimated at 7.531 million individuals or 18,074 tonnes (with an average weight of a commercial male 2.40 kg). In the areas of the WKS, where fishing is permitted (Kolpakovsky and Ichinsky districts), the current commercial stock is estimated at 37.346 million individuals or 79,920 tonnes (with an average weight of a commercial male 2.14 kg), and in total in two subzones, in areas permitted for fishing – 44.877 million individuals or 97,994 tonnes. The commercial stock of the Red king crab on the entire investigated area of the shelf of Western Kamchatka (including forbidden areas) amounted to 60.313 million individuals in 2019 or 131,028 tonnes. According to model estimates, the total number of commercial males at the beginning of 2019 in the KKS and the WKS is estimated at 82.8 million individuals, biomass – 188,900 tonnes (KamchatNIRO, 2020a).

Size composition of males in 2013–2015 remained stable. Since 2016, the results of his analysis have shown an annual increase in the size of males along the entire shelf from Shelikhov Gulf to Cape Lopatka, which can be clearly seen in Figure 11 (Ivanov, 2020).

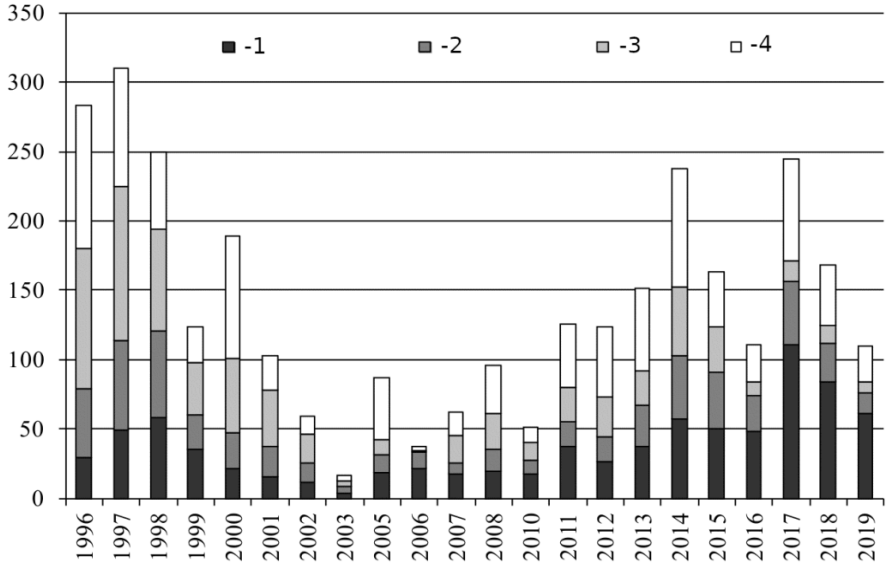


Figure 10 Dynamics of the Red king crab abundance at West Kamchatka on the data of bottom trawl research surveys in 1996–2019, 10^6 ind. (Ivanov, 2020).
1 – commercial size males, 2 – pre-recruits, 3 – juveniles, 4 – females.

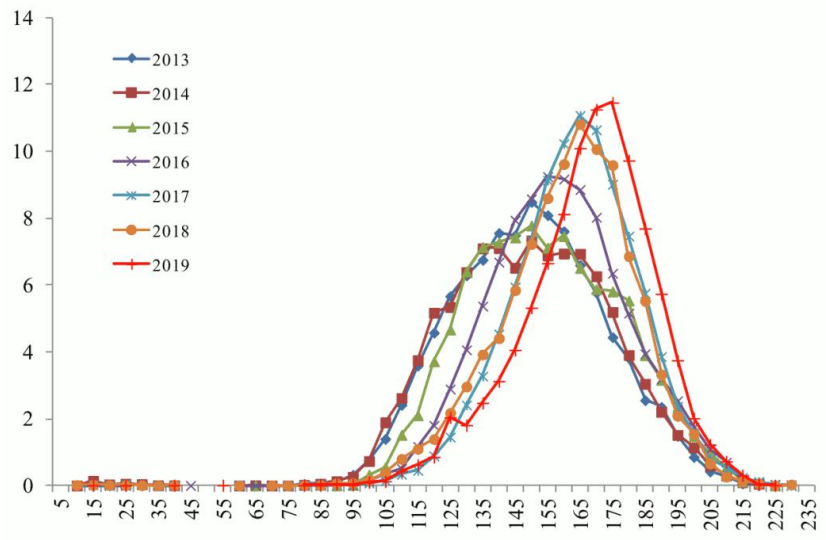


Figure 11 Size composition of Red king crab males on the shelf of western Kamchatka in 2013–2019, on the data of trawl catches (Ivanov, 2020).
X-axis – carapace width, mm; Y-axis – % in catch.

In 2000 and 2001, when the number of Red king crab males was several times lower than the current one, and at the same time the state of the population was not yet a cause for concern, the removal rate was 30% of the stock. In subsequent years (2002–2004), due to a decrease in the stock, it was reduced to 15% and in the years when fishing was prohibited (2005–2012) – to 10% (only for scientific research). In the first two years of the opening of the fishery (2013–2014), the precautionary removals rate was 10%, after which it was increased to 15% in 2015. According to KamchatNIRO specialists, confirmed by the analysis and diagnostics of the results obtained, in the last three years, from 19.5 to 33.4 thousand tonnes of Red king crab could be harvested annually at West Kamchatka without damage to the population (Ivanov, 2020).

In the last seven years, including 2019, the removal rate has been in the range of 5–16% of the crab stock counted in the authorized fishing areas, which is a very precautionary approach (Figure 12). The modern measures of regulation of the Red king crab fishery, expressed in an extremely prudent approach to the determination of TAC values, such that commercial removals do not cause any damage to the Red king crab population of western Kamchatka.

Figure 13 compares the results of the model assessment and trawl survey data for the number of commercial males, pre-recruits + recruits, and catches of commercial males per trap. The results of the model estimates are in fairly good agreement with the trawl survey data and the data on catches per trap (KamchatNIRO, 2018).

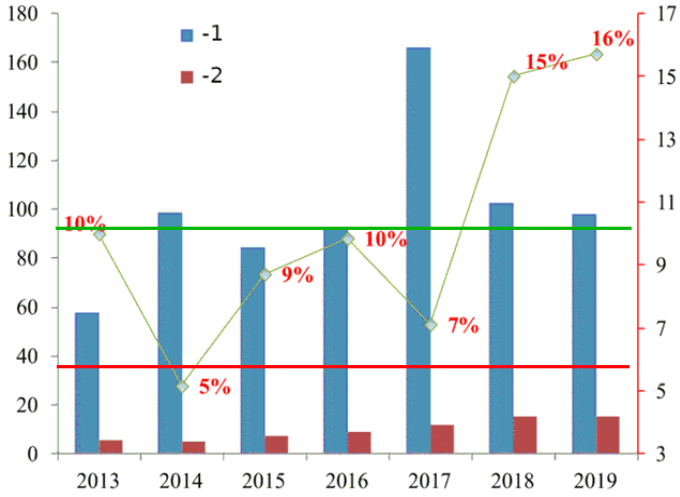


Figure 12 Commercial stock, TAC, and TAC/stock ratio for Red king crab in western Kamchatka in 2013–2019 (Based on Ivanov, 2020). X-axis – years; left Y-axis, thousand tonnes: 1 – Commercial stock (blue bars); 2 – TAC (red bars); red horizontal line – Blim; green horizontal line – Btr; right Y-axis – TAC / stock ratio, % (green line with symbol).

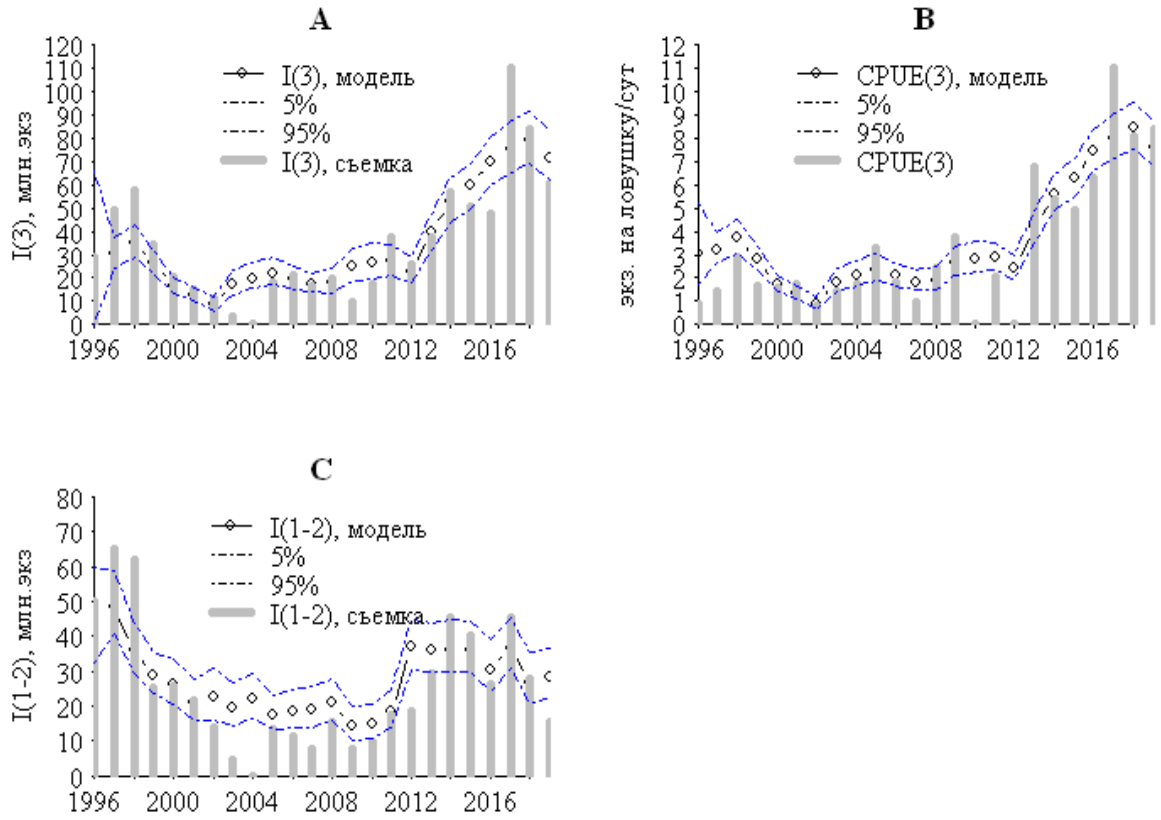
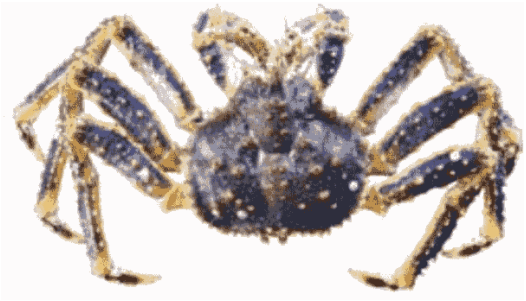


Figure 13 Real and model data on the number of CSM (A), pre-recruits + recruits (C), catches of CSM per trap (B).
Blue dotted lines show 90% confidence interval, grey bars – real data, black line with symbols – model data. X axis – years, Y – axis: A and C – billion ind., B – specimen per trap per day (KamchatNIRO, 2020).

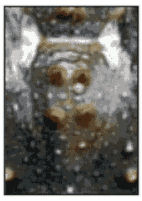
In 2021, the TAC for UoA1 is set at 15,405 tonnes (11,883 tonnes in WKS, 3,522 tonnes in KKS) (KamchatNIRO, 2020a).

6.2.1.2. Blue king crab

6.2.1.2.1. Biology



Blue king crab has 4 prominent spines on mid-dorsal plate.



The Blue king crab (*Paralithodes platypus*) is the large king crab species (not a LTL species). It distributed in cold temperate and sub-polar latitudes of the North Pacific Ocean. It lives on soft bottom habitats throughout the Bering Sea, the Sea of Okhotsk, the Sea of Japan and adjacent waters (Figure 14). There are no known major widespread threats to this species.

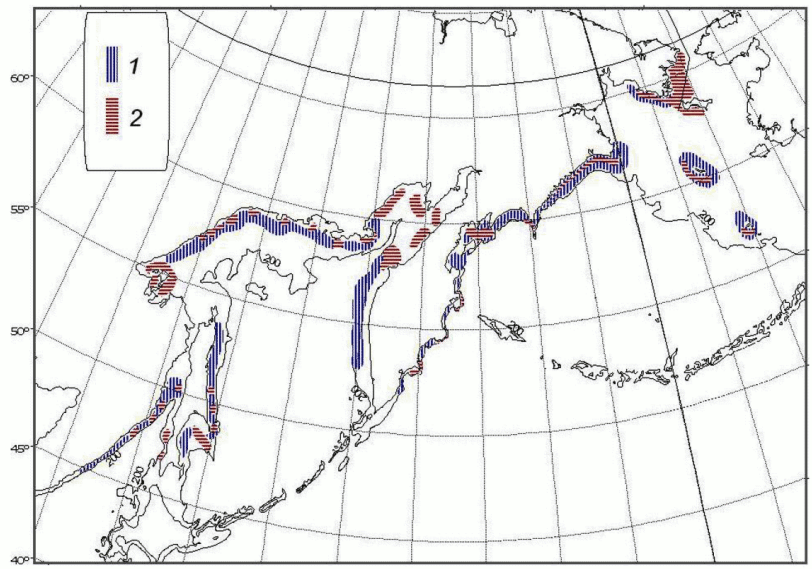


Figure 14 Distribution of the Blue king crab in the Bering Sea, Sea of Okhotsk, and Sea of Japan according to the data of studies in 1969–1986 (Cited by Koblikov *et al.*, 2010).
1 – distribution of mature individuals; 2 – findings of nonmigratory juveniles.

In article of Fedotov and Chernienko (2019) growth rates of Blue king crab males are analyzed using the data from 8 bottom trawl surveys conducted in the western Bering Sea in summer-fall seasons within the period from 2005 to 2017 (Figure 15). Maximum carapace width was 200 mm, maximum age – 20 years, and maximum weight – 3.3 kg. Age of the male crab's entry into the commercial cohort is estimated as 8 years.

The habitat of the Blue king crab in the north-eastern part of the Sea of Okhotsk is characterized by complex bottom topography (Shaginyan, 2019). The Blue king crab lives in a wide range of depths – from shallow coastal waters to depths of 400–500 m, and its distribution is subject to a certain pattern. In the autumn-winter period, the crab concentrates in the deep-water canyon adjacent to the Shelikhov Gulf, or on its eastern slopes. In the spring-summer period, the Blue king crab migrates to the shallow waters to participate in the reproduction and feeding processes, which entails noticeable changes in the distribution pattern. In contrast to the winter season, commercial males are concentrated outside the canyon on the 100–200 m isobaths. In autumn, the Blue king crab migrates back to the canyon for wintering (Shaginyan, 2019).

Reproduction.

According Melnik *et al*. (2014), fecundity of the Blue king crab ranges from 25 to 169 thousand eggs. The minimum carapace width of a female with eggs on the pleopods was 64 mm.

Analysis of ovarian index and oocyte diameter evidences that females of the Blue king crab in north-eastern part of the SOO have two-year ovarian cycle, and two generations reproducing in odd and even years are in the population. Females extrude a clutch of eggs in March – early in April, the release of the embryos from April to May of the next

year, i.e. the embryonic period is 12-13 months. In odd years in April females with eggs and barren females are 42 % and females with embryos and empty egg cases are 50.9 % of total females number. In spring at the depth less than 100 m increasing of relative number of generation releasing embryos occurs. The females with eggs start to migrate to shallow waters after extruding eggs. In summer the aggregations of females with empty egg cases are situated deeper than females with eggs. In autumn females with eggs linger in coastal waters, whereas both immature females and females with empty egg cases cluster at the depth 120-130 m. In December females with empty egg cases migrate to deeper than 200 m, where main aggregations of Blue king crab males spend the winter. Females (molting, pairing and extrusion of the eggs) occur there in spring. After that the migration cycle is repeated the same way again. Consequently the females in studied population have pronounced reproductive migrations during a year, at the same time migrations of generations reproducing in dissimilar years differ both in time and depth (Lysenko, 2001).

Nutrition (Feeding).

Blue king crabs are omnivorous and will eat just about any dead or decaying organic matter (plant or animal) and a variety of living invertebrates. Klinushkin (2018) analyzed the composition of the food of Blue king crab in Babushkin Bay (the Sea of Okhotsk) from catches in July 2011. The main element of the benthic fauna was represented by barnacles of the genus *Balanus*, and it also was the main food component of Blue king crab. Analysis of the weight of stomach content of the crab demonstrated different feeding structure for males and females. Crustaceans dominated (92.1%) in the food of females, while the contribution of the other components (molluscs, polychaetes, algae) was minor. Males generally consumed more molluscs (33.3%) and polychaetes (10.0%), although barnacles were similarly important (51.2%) for males as for females. The contribution of algae and detritus to the diet was minor. Although the food was similarly available for males and females, the gender feeding intensity was different. Females, both mature and immature, demonstrated intense feeding – the average index of stomach filling was 19.97 and 25.26 parts per thousand, respectively. Feeding of non-commercial males was less intense – 7.6 parts per thousand.

According to study of Metelyov and Shcherbakova (2018), in the northern part of the Sea of Okhotsk in August and September 2013, the major component of the food of Blue king crab included fish species (18.0% of the total mass). Spongia, Polychaeta, Mollusca, Decapoda and Echinodermata were minor components (10.2%, 9.7%, 9.6%, 8.1% and 7.2%, respectively). The average index of stomach fullness was 12.9 parts per thousand (Table 11).

Predators.

The different life stages of the crab are food for a variety of marine fish, king crabs and octopuses.

Table 11 The composition of the diet of blue king crab in the northern part of the Sea of Okhotsk (Metelyov, Shcherbakova, 2018).

Компоненты питания Diet components	ЧИН (PSI), ‰	Доля по массе (weight contribution), %	Частота встречаемости (occurrence frequency), %	Частота доминирования (dominance frequency), %
Crustacea	**1,73**	**12,42**		
Copepoda (*Neocalanus cristatus*, *Oithona similis*)	0,03	0,20	18,2	–
Decapoda (*Pagurus* sp., *Pandalus* sp., молодь декапод)	1,13	8,12	36,4	12,5
Cirripedia	0,24	1,74	18,2	–
Amphipoda	0,33	2,35	18,2	–
Echinodermata	**0,93**	**7,16**		
Ophiuroidea	0,05	0,33	9,1	–
Echinoidea (*Strongylocentrotus* sp.)	0,88	6,83	18,2	12,5
Mollusca	**1,24**	**9,58**		
Bivalvia	1,24	9,58	54,6	12,5
Polychaeta	**1,26**	**9,74**	27,3	25,0
Rhizopoda	**0,01**	**0,02**	9,1	–
Spongia	**1,32**	**10,21**	54,6	12,5
Pisces	**2,32**	**17,96**	27,3	25,0
Детрит / Detritus	0,03	0,26	9,1	–
Песок / Sand	1,78	13,79	36,4	–
Растительные остатки / Plant residuals	0,22	1,71	27,3	–
Неопределенные остатки Undetected residuals	2,12	16,39	63,6	–
Средний ИНЖ / Average SFI, ‰		12,9		

Note. PSI – particular stomach index; SFI – stomach fullness index.

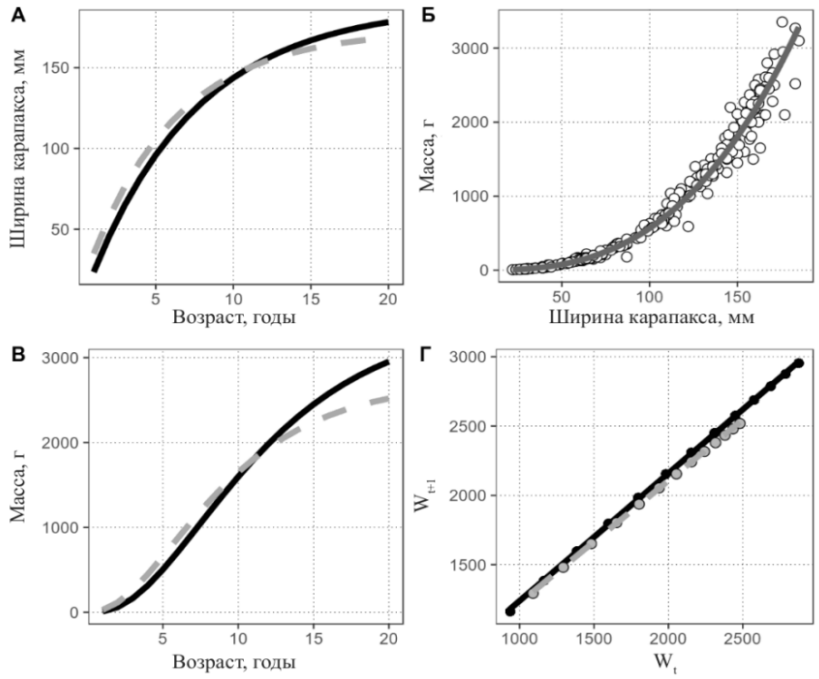


Figure 15 Estimation of the growth rate of Blue king crab males in the western Bering Sea:
А — linear growth; Б — size-weight dependence; В — weight growth; Г — Ford-Walford equation. Solid line — Shepherd's Length Composition Analysis, dotted line — Electronic Length Frequency Analysis. X axis: A and B – Age, years; Б – CW, mm. Y axis: A – CW, mm; Б and B – weight, g. (Fedotov and Chernienko, 2019).

Moiseev and Moiseeva (2010), evaluated the visible pathological changes in the long term after a single ascent to the surface in traps for Blue king crabs. For the experiment, males that reached commercial size were selected from the catch. After lifting the traps, the individuals selected for the experiment were exposed to air for 8–10 minutes during various manipulations with them, and then for 1.5 hours in a container with running water before preparing the experimental trap for descent. There was no special feeding of the crabs during the experiment. The stagnation of the trap was 55 days - from September 19 to November 12, 2008. During the experiment, the death of crabs was not recorded. After the experiment, the motor activity of the crabs and the condition of the outer integument were assessed. At anatomical autopsy, visible pathological changes in internal organs were described. The results obtained were compared with the data for control individuals - crabs from commercial catches in the same fishing area. The motor activity of the experimental individuals was high, comparable to the motor activity of the crabs of this species from the catches. External examination revealed no signs of erosion of the exoskeleton. The incidence of pathological changes in the gills in experimental crabs did not change significantly in comparison with the control.

6.2.1.2.2. Fishery

There are several large populations of Blue king crab in the Far Eastern seas of Russia, but one of the most numerous inhabits the north-eastern part of the Sea of Okhotsk and in the Shelikhov Gulf, where his industrial fishing is conducted. Until the early 1990s, the specialized fishery for Blue king crab in the West Kamchatka subarea was practically not carried out. Small numbers of this species were caught in Khairyuzovskiy district (Figure 5), where it was the main object of bycatch in the Red king crab catch.

Until 2008, Blue king crab could be caught in the WKS everywhere, with the exception of fishing in the Severny Zapretny district. In the north of the WKS (mainly in the Khairyuzovskiy district), Blue and Red king crabs live together, and the bycatch of Red king crab in the Blue king crab fishery can reach significant values comparable to the specialized fishery.

From 2006 to 2017, with the exception of 2009–2010, the status of Blue king crab stocks was at a high level. The imposition of restrictions on the Blue king crab fishery in 2009–2010 had a significant impact on the total catch of this species, which turned out to be the lowest in the last decade.

Since 2012, an additional measure for the management of the Blue king crab fishery was the establishment of a minimum daily catch of crab per medium-tonnage vessel, the main goal of which was to prevent unreasonable presence of vessels in the fishing area. For the Blue king crab in WKS minimum daily catch equal 3.0 tonnes per medium-tonnage vessel per day (MAR, 2019).

In subsequent years, the state of the Blue king crab stock, despite the increased pressure from the fishery, continued to be satisfactory (Shaginyan, 2014, 2019). Data on the crab catch and TAC are shown in Figure 16.

Distribution of the catch of Blue king crab in the Sea of Okhotsk in 2018 is shown in Figure 17. Daily dynamics of the catch of Blue king crab in the northern part of the Sea of Okhotsk in 2018 is presented in Figure 18. Monthly dynamics of fishing effort and catch by subzones is given in Table 12.

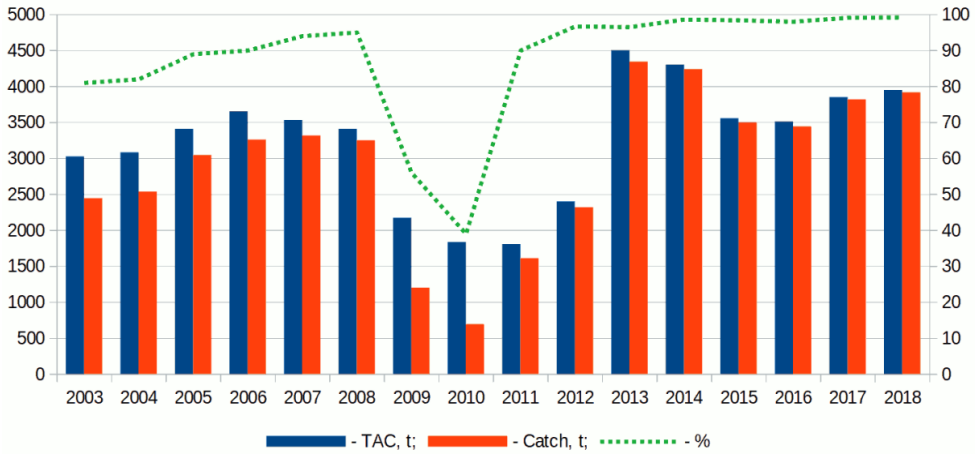


Figure 16 The interannual dynamics of the TAC, catch and the ratio catch / TAC (%) for Blue king crab in the West-Kamchatka subzone (on data from Shaginyan, 2014, 2019). X axis – year; Y axis: left –tonnes, right – %.

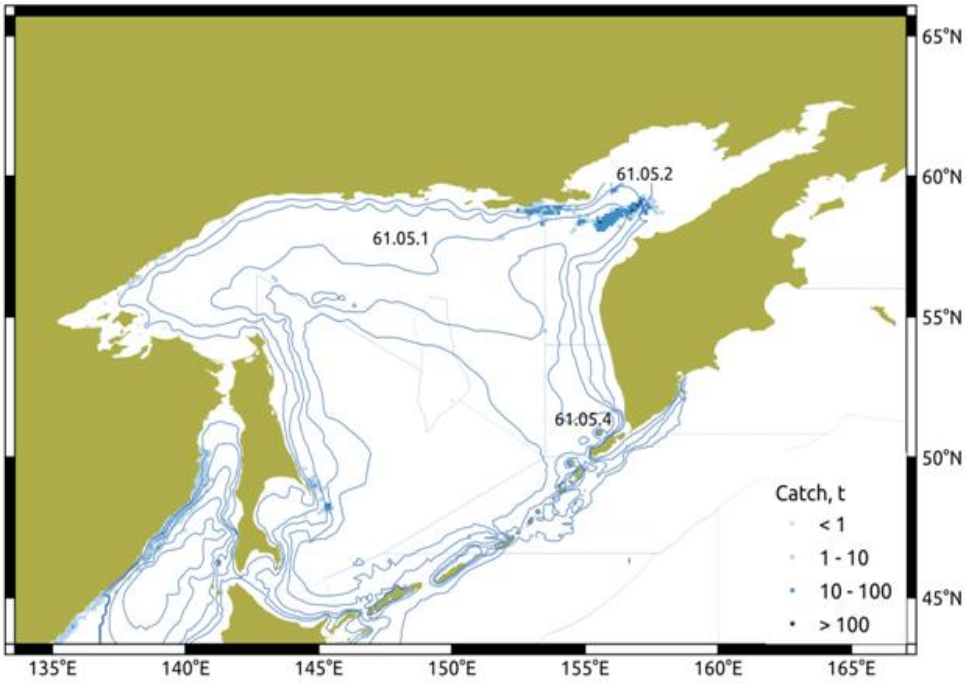


Figure 17 Map showing the distribution of the catch of Blue king crab in the Sea of Okhotsk in 2018. NSOOS (61.05.1), WKS (61.05.2) and KKS (61.05.4). In tonnes per one hundredth of a degree trapezoid. Dashed blue line – boundaries of fishing subzones, solid blue lines – isobaths (50, 100, 200, 500 and 1,000 m) (Vasilets, Chernyh, 2020).

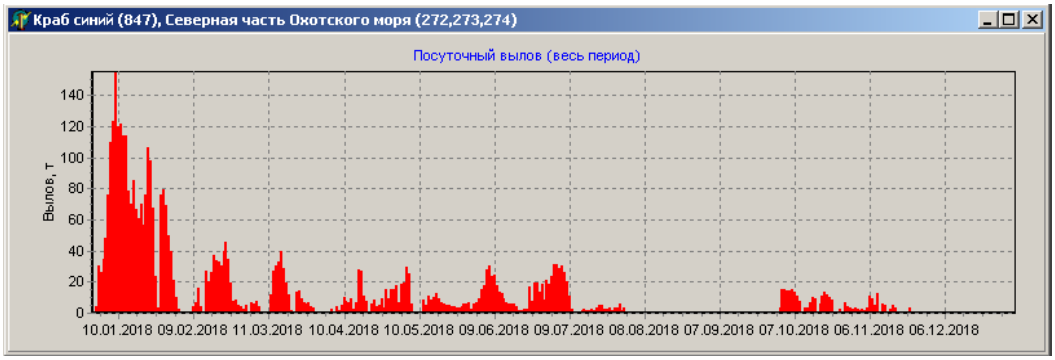


Figure 18 Daily dynamics of the catch of Blue king crab in the northern part of the Sea of Okhotsk in 2018. Subzones: NSOOS + WKS + KKS. Y-axis – catch in tonnes (Vasilets, Chernyh, 2020).

Table 12 Monthly dynamics of fishing effort (per vessel-day of fishing) and catch (tonnes) of Blue king crab by traps in the northern part of the Sea of Okhotsk in 2018 (Vasilets, Chernyh, 2020).

Month	Subzones					
	WKS		KKS		NSOOS	
	Catch	Vessel-days	Catch	Vessel-days	Catch	Vessel-days
1	2,251.046	260	-	-	5.839	2
2	438.43	66	-	-	-	-
3	300.458	43	-	-	-	-
4	186.672	43	-	-	34.879	5
5	235.759	44	-	-	14.725	19
6	255.123	42	-	-	122.163	49
7	113.227	21	-	-	162.359	54
10	85.257	14	-	-	143.664	22
11	45.925	13	-	-	30.775	8

Blue king crab bycatch in other fisheries.

Comparative analysis was carried out for species composition of the catches from major types of fishing gears near the west coast of Kamchatka (in the Kamchatka-Kuril and West-Kamchatka subzones) based on the data of the vessel monitoring system (VMS) of the Federal Fisheries Agency and the research data from commertial fishing vessels in 2003–2017 (Matveev et al., 2019).

In 2003-2017, observers from Fisheries Research Institute (VNIRO) took part in 23 cruises of fishing vessel (936 fishing operations) with using of Midwater trawl, 25 cruises of fishing vessel (571 fishing operations) with using of Danish seine, 8 cruises of fishing vessel (669 fishing operations) with using of Bottom longline. This represents less than 2% of the total fishery. Fisheries statistics in the VMS cover 100% of all fisheries.

The ratio in the total catch of aquatic biological resources (in the exception of salmon) in the Kamchatka-Kuril and West-Kamchatka subzones (in sum) in 2003-2017 according to VMS data were next: Midwater trawl - 75.5%, Danish seine - 19.1%, Bottom longline – 2.3%.

In Midwater trawl fishery, the bycatch of Blue king crab according to VMS data was 0.02% and according to research data was less than 0.01%. In Danish seine fishery, the bycatch of Blue king crab according to VMS data was 0% and according to research data was less than 0.02%. In Bottom longline fishery, the bycatch of Blue king crab according to VMS data was 0% and according to research data was less than 0.17%.

6.2.1.2.3. Stock status

Since 2008, the number of Blue king crab has been estimated exclusively to the north of 57°40' N. In 2013, a detailed trap survey was carried out covering the large water area. The survey results made it possible to significantly increase the TAC, which also entailed a significant increase in the fishing pressure on the population. Despite this, the abundance of the Blue king crab, estimated from the results of surveys, is in a relatively stable state (Table 13).

Table 13 Stock abundance of blue king crab according to trap research data for 2006–2017, billion individuals (Shaginyan, 2019).

Year	Commercial males	Pre-recruits I (120–129 mm)	Pre-recruits II (110–119 mm)	Young	Females	Surveyed area, km ^{2}
2006	9.019	2.367	1.983	3.301	3.472	15,940
2007	7.506	4.242	3.930	3.064	17.026	12,533
2008	6.850	4.242	5.070	7.729	-	16,642
2009*	5.432	3.351	3.045	1.905	-	10,170
2010	6.787	2.983	2.017	2.045	-	9,812
2011	7.415	3.330	3.555	7.162	11.698	5,300
2012	7.312	3.816	2.948	5.662	0.642	4,870
2013	13.330	5.810	4.050	4.140	25.190	13,245
2014	12.506	5.533	3.657	4.128	24.989	15,656
2015	13.381	5.055	3.589	2.955	9.315	15,605
2017	9.510	1.761	1.120	1.420	12.699	17,881

* Since 2009, the abundance of Blue king crab has been estimated to the North from 57°40´ N.

The results of the 2017 survey showed a significant decrease in the number of males of all functional groups and a noticeable increase in the number of females, compared with the data of 2015. The number of commercial males and pre-recruits of the 1st order decreased by 3.871 and 3.294 million accordingly, the number of females increased by about the same (3.384 million individuals). The number of pre-recruits of the 2nd order decreased by 2.469 million individuals. Possibly, this is the result of incomplete sampling of males and, on the contrary, successful coverage of females in the study. It should be noted that in 2017 the average daily catch of Blue king crab was the highest in the last decade (Shaginyan, 2019).

Studies of the size structure of males have shown that the size-frequency distribution is quite variable. Figure 19 shows that a fairly high proportion of undersized males (recruitment) in 2011–2012 led to a noticeable decrease in the relative number of large males (136–155 mm): from 39.5–42.0% in 2009–2010 to 24.5-30.4% – in 2011-2012. In the next three years (2013–2015), the relative number of large-sized males in the total catch increased to 46.3–48.7%, and in 2017 it was more than half of the total number of males – 53.3% (Shaginyan, 2019).

Data of the model estimation of the number of pre-recruits I and II, the number of commercial size males, and the coefficients of commercial mortality of the Blue king crab in the NSOOS are presented in Figure 20.

To identify changes in the population in recent years, due to an increase in the fishery efforts, an analysis of the 2013–2017 data was carried out. Data for April and November 2013–2017 show that, despite the high fishing intensity, crab removal rates remained at a consistently high level. In April, the catch varied within 5.1–10.6 ind./trap/day (on average - 9.4 ind./trap/day) and in November 6.7–8.8 ind./trap/day (on average - 7.8 ind./trap/day) (Table 14).

Table 14 CPUE of blue king crab in the commercial fishery in the WKS (KamchatNIRO, 2018).

Vessel	Period of fishing	Catch/trap/day, Individuals		
		Commercial males	Pre-recruits I	Pre-recruits II
«Dezhnevo»*	2013, April	9.2	5.7	4.1
	2013, May	8.7	3.7	2.7
«Seawind»	2013, November	8.7	1.7	1.0
«Kamchatskiy losos»	2014, April	5.1	2.3	2.3
«Odissey 1»	2014, April	6.0	1.5	1.0
«Gefest»	2014, November	6.7	2.8	3.4
«Seawind»	2015, April	10.6	2.5	1.4
	2015, May	8.0	2.5	1.6
	2015, June	9.2	3.5	2.5
«Sparta»	2015, April	6.2	1.6	0.9
«Alaid»	2016, November	6.9	1.8	1.4
«Orlan»	2016, November	8.8	1.7	1.5
«Asacha»	2017, April	9.0	1.9	1.1

* Starting from 2015, the vessel Dezhnevo has a different name – Rashkov.

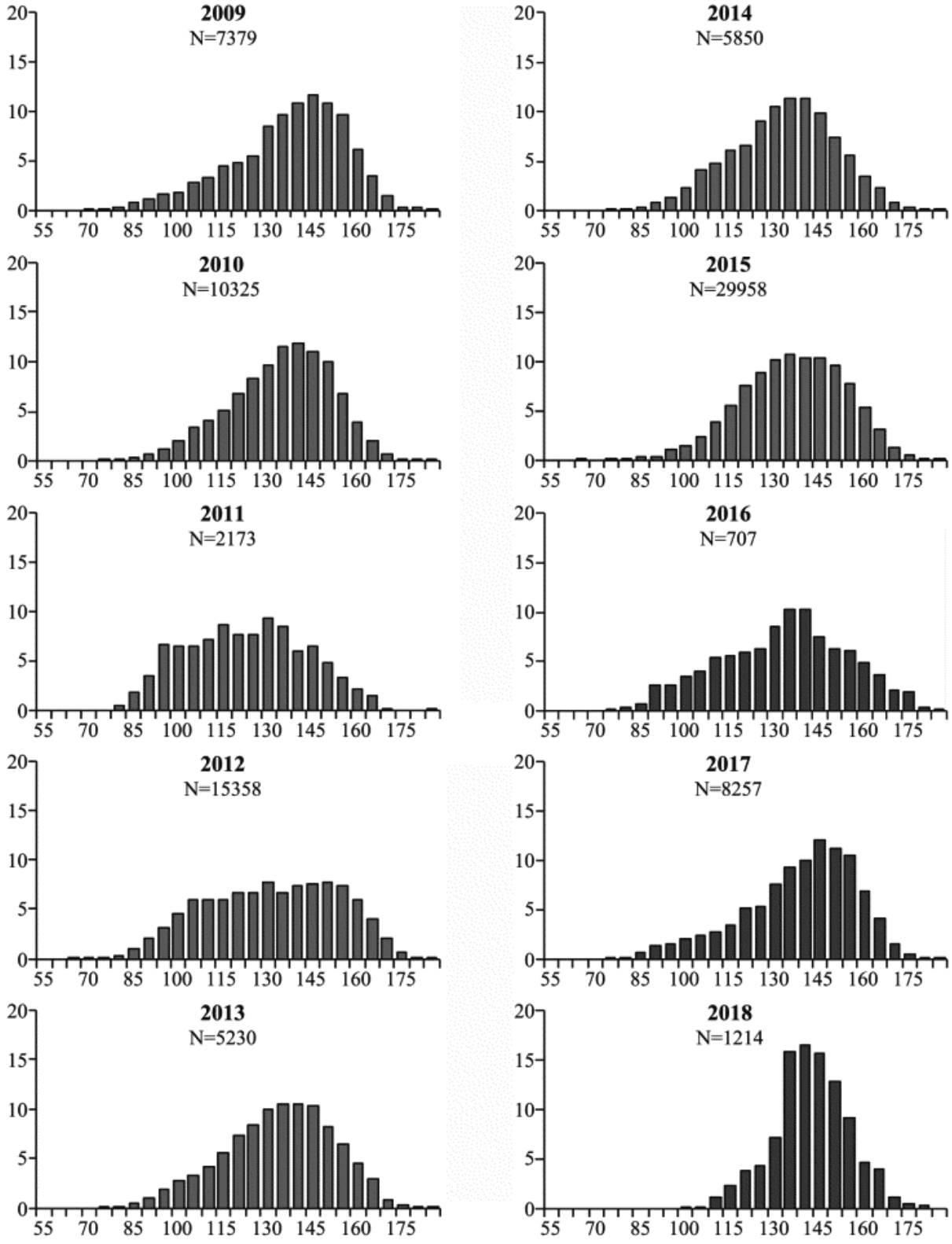


Figure 19 The interannual dynamics of the size composition of the Blue king crab males in the West-Kamchatka subzone (KamchatNIRO, 2018)
X axis – carapace width, mm; Y axis – part in the catch, %.

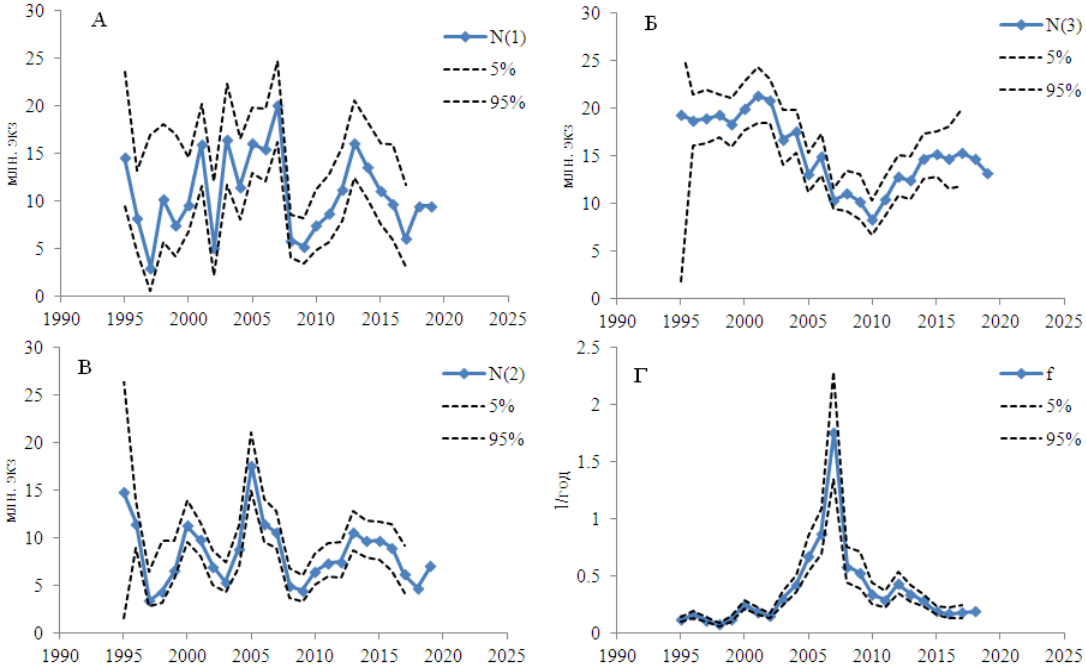


Figure 20 The number of pre-recruits II (А) and pre-recruits I (В), the number of Commercial size males (Б), and the coefficients of commercial mortality (Г) of the Blue king crab in WKS according model estimates.
Dotted lines show 90% confidence intervals. X axis – Years; Y axis – for А, Б, В – mln specimens, for Г – 1/year (KamchatNIRO, 2018).

The final view of the harvest control rule with the specified stock trajectory, including the time period from 2010 to 2020, is shown in Figure 21.

Since no trap survey was performed in 2018, there was no data on the composition of catches by functional group in 2018 at the time of writing the forecast. As a result, there is significant uncertainty in the assessment of the terminal status of the stock and there is an approximately 25% risk that in 2020 the commercial stock will decrease below the target for commercial biomass Figure 22 (KamchatNIRO, 2018).

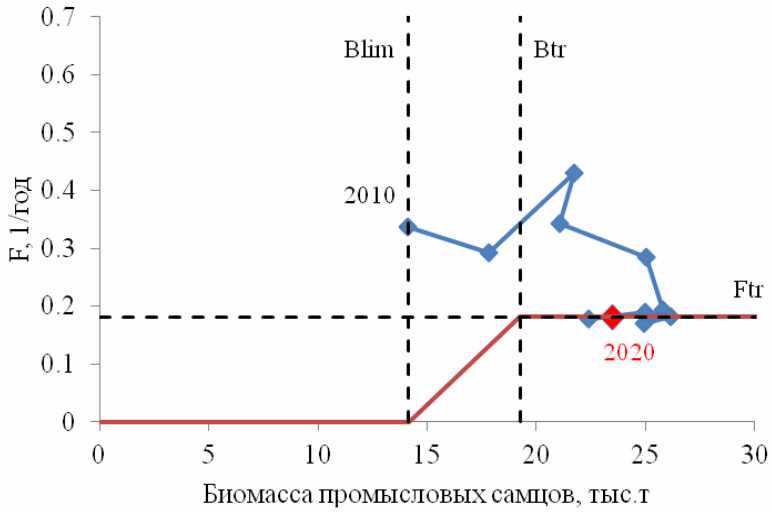


Figure 21 Implementation of the HCR for Blue king crab in the WKS in 2010–2020
X axis – CSM stock biomass, thousand tonnes; Y axis – 1/Year (KamchatNIRO, 2018).

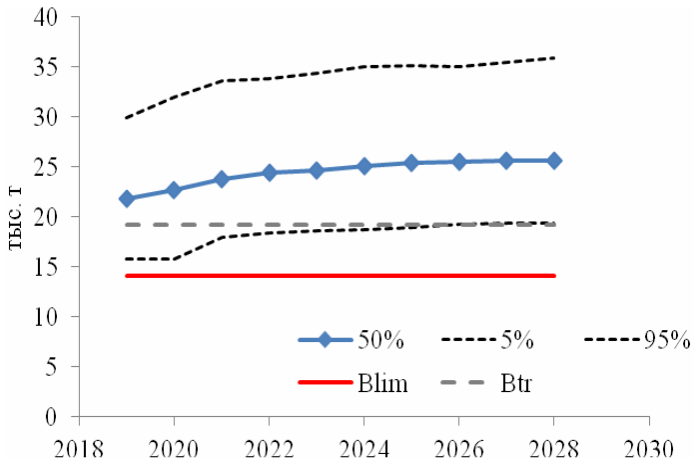


Figure 22 Model dynamics of the Blue king crab commercial stock biomass in WKS at the rate of removal recommended according to the HCR: X axis – years, Y axis – thousand tonnes (KamchatNIRO, 2018).

In 2021, the TAC for UoA2 is set at 2,916 tonnes (KamchatNIRO, 2020a).

6.2.2. Reference points

Limit and target reference points for red and blue king crabs are given in Table 15. A detailed description for each species is given below.

Table 15 Limit and target reference points for king crabs

Species	Subzones	B_{lim}, (tonnes)	B_{tr}, (tonnes)	F_{tr}, (1/year)
P. camtschaticus	61.05.2 and 61.05.4	36,600	92,560	0.202
P. platypus	61.05.2	14,170	19,250	0.181

Red king crab

The process of determining target and limit reference points for red king crab stock in Western Kamchatka is described in the article by Ilyin and Ivanov (2015). The percentiles of the bootstrap distribution of some biological reference points are shown in Table 16. The first four of the benchmarks presented are quite often used as "proxies" for Fmsy and as targets for fishing mortality, while the last two are generally the main candidates for biomass limit points.

The limit reference point for the biomass of commercial males Blim was taken equal to the high bound of the 95% confidence interval for Bloss (36.6 thousand tonnes). In 2002-2003, the commercial stock had already dropped to this level, after which it recovered to the level of high productivity (see Figure 10). For these reasons, the use of Bloss as a boundary reference point, considering the uncertainty, is quite justified.

The lower bound of the 95% confidence interval for the F45% was taken as a target for fishing mortality. Ftr = 0.202 / year (or 16.6% in terms of removal rate). The corresponding target for the biomass of commercial males, Btr, was determined from the curve of the equilibrium commercial biomass per pre-recruitment (Figure 23). With the number of pre-recruits II at the average long-term level (the median estimate is 27.1 million individuals) and the average weight of commercial males of 2.28 kg, it will be 92.56 thousand tonnes. The formula for finding the values of the equilibrium commercial biomass per pre-recruit has the form -

$$\frac{FSB}{N_1}(f) = \frac{2.28N_3}{N_1}(f) = 2.28\frac{p_1 p_2 \exp(-fs_1 - M_1)\exp(-fs_2 - M_2)}{(1-\exp(-fs_3 - M_3))(1-(1-p_2)\exp(-fs_2 - M_2))}$$

(Ilyin, Ivanov, 2015).

Therefore, the target and limit reference points are analytically determined. Blim = 40%Btr.

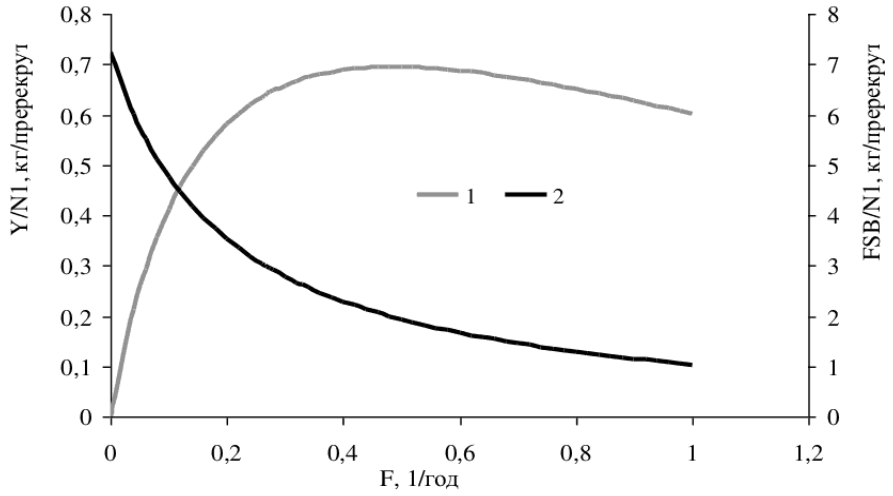


Figure 23 Sustainable catch per prerecruit (1) and sustainable biomass of commercial males of red king crab stock in Western Kamchatka per prerecruit (2) (Ilyin, Ivanov, 2015).

Table 16 Interval estimates for biological reference points males of Red king crab stock in Western Kamchatka (Ilyin, Ivanov, 2015).

Reference point	2.50	50	97.50
Flim (Caddy, 1998), 1/year	0.227	0.236	0.243
F45%, 1/year	0.202	0.218	0.231
F40%, 1/year	0.243	0.264	0.282
F0.1, 1/year	0.222	0.245	0.265
Bloss, thousand tonnes	19.99	26.67	36.61
B20%, thousand tonnes	35.30	42.24	50.22

Blue king crab

To determining target and limit reference points for the blue king crab in the WKS, the same methodology was used as for the red king crab (Table 17) (KamchatNIRO, 2018).

The limit reference point for the biomass of commercial males Blim was taken equal to the high bound of the 95% confidence interval for Bloss (14.17 thousand tonnes). In 2008-2010, the commercial stock had already dropped to this level, after which it recovered to the level of high productivity (see Figure 20).

The lower bound of the 95% confidence interval for the F40% was taken as a target for fishing mortality. Ftr = 0.181 / year. The corresponding target for the biomass of commercial males, Btr, was determined from the curve of the equilibrium commercial biomass per pre-recruitment (Figure 24). With the number of pre-recruits II at the average long-term level (the median estimate is 7.65 million individuals) and the average weight of commercial males of 1.7 kg, it will be 19.25 thousand tonnes. The formula for finding the values of the equilibrium commercial biomass per pre-recruit has the form -

$$\frac{FSB}{N_1}(f) = \frac{1.7N_3}{N_1}(f) = 1.7\frac{p_1 p_2 \exp(-fs_1 - M_1)\exp(-fs_2 - M_2)}{(1-\exp(-fs_3 - M_3))(1-(1-p_2)\exp(-fs_2 - M_2))}$$ (KamchatNIRO, 2018).

Therefore, the target and limit reference points are analytically determined. Blim = 74%Btr.

Table 17 Interval estimates for biological reference points for the blue king crab in the WKS (KamchatNIRO, 2018).

Reference point	2.50	50	97.50
Flim (Caddy, 1998), 1/year	0.191	0.213	0.229
F45%, 1/year	0.153	0.183	0.208
F40%, 1/year	0.181	0.218	0.251
F0.1, 1/year	0.16	0.196	0.231
Bloss, thousand tonnes	13.88	14.03	14.17
B20%, thousand tonnes	6.28	9.12	13.05

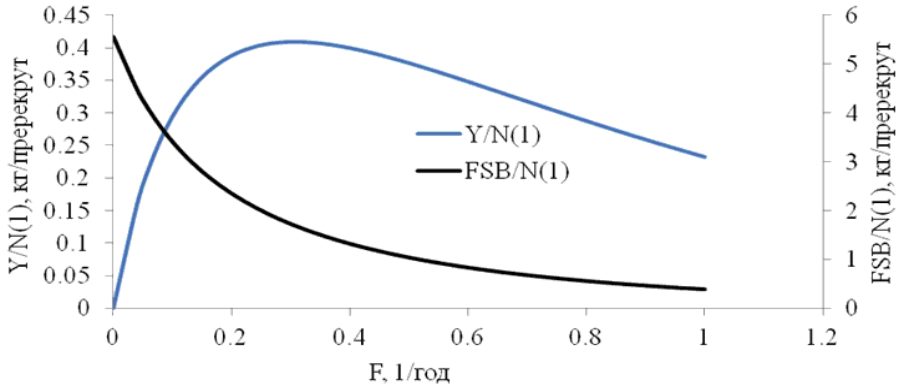


Figure 24 Sustainable catch per prerecruit (1) and sustainable biomass of commercial males of blue king crab stock in WKS per prerecruit (2) (KamchatNIRO, 2018).

6.2.3. Harvest Strategy and Control Rules

The harvest strategy for all species of king crabs includes a precautionary annual TACs based on estimates of commercial stock biomass in relation to the limit and target reference points that have been implemented in HCR.

The key harvest control rule (HCR) is that the annual TAC is set based upon the estimate of stock biomass in relation to designated target and limit biomass reference points (Figure 25) as follows:

- If the commercial stock biomass B_i is within the healthy zone, i.e. above the target reference point Btr, then the exploitation level F_i is set at no higher than the target exploitation level F_{tr};
- If the commercial stock biomass B_i is in the cautious zone, i.e. above the biomass limit reference point B_{lim}, but below the biomass target reference point B_{tr}, the exploitation level is estimated as $F_i = F_{tr} \times (B_i - B_{lim})/(B_{tr} - B_{lim})$;
- If the commercial stock biomass is in the critical zone, i.e. below the limit reference point, the exploitation level is set to zero ($F_i = F_0 = 0$). The fishery is therefore closed and only fishing for science is permitted.

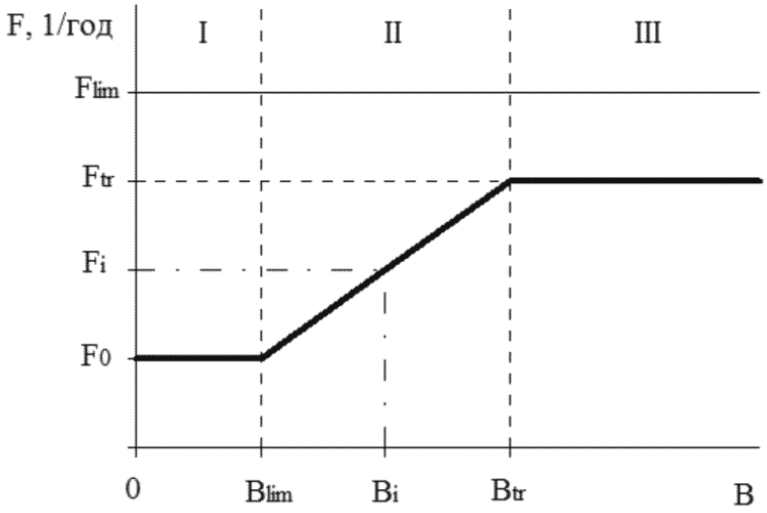


Figure 25 Scheme of the harvest control rule.

Limit and target reference points for all king crab species are shown in Table 15. There are other rules for the regulation of fishing: catch quotas for each legal participant in commercial fishery, a minimum legal size (MLS), closed seasons and closed areas, technical specifications for fishing gears design. To ensure compliance, a comprehensive monitoring, control and surveillance system is in place. This is described in the Fishing rules (2019), an extract from which is given below and in Principle 3.

Fishing rules and limitations

The current fishing rules (Fishing rules, 2019) contain the following restrictions on the fishing of the fisheries of red, blue, and Golden (Brown) king crabs in the Sea of Okhotsk:

1) Forbidden areas in the internal sea waters of the Russian Federation, territorial sea of the Russian Federation, the continental shelf of the Russian Federation and the exclusive economic zone of the Russian Federation.

Clause 23. It is forbidden to harvest all kind of aquatic biological resources (ABR):

23.3. With using trawling fishing gears everywhere at depths less than 20 m (except for the catch of cod in December – February in the Terpeniya Bay for the purpose of coastal fishing, where catch can be carried out at depths of 14 m and more);

23.5. With all fishing gear (except for vessels carrying out fishing by longlines) in the area between the parallels 56° 20' N. and 57° 00' N – to the east of the line passing through the points with coordinates:
56° 20' N – 154° 09' E;
56° 46' N – 154° 12' E;
57° 00' N – 154° 23' E;

23.6. Trawls and bottom gillnets (except for vessels fishing with bottom gillnets from March 15 to October 31) in the area between the parallels 54° 00' N and 56° 20' N – to the east of the line passing through the points with coordinates:
54° 00' N – 154° 31' E;
55° 40' N – 154° 25' E;
56° 20' N – 154° 20' E;

23.8. Bottom gillnets in the NSOOS in the area bounded: from the north – by the parallel of 56° 00' N, from the south – by the parallel of 55° 00' N, from the west – by the meridian 144° 30' E, from the east – by the meridian 148° 00' E.

2) Clause 24. It is forbidden to harvest aquatic biological resources (ABR), which in the following areas, irrespective of the percentage of other types of ABR, provides consistently highest catches of this species by a specific fishing gear or with a certain fishing method, i.e. specialized fishing:

24.1. Walleye pollock:

a) Trawls in the KKS in the area bounded by the latitude of Cape Lopatka (50° 52' N, 156° 40' E) and parallel 54° 00 N, – to the east of the line passing through points with coordinates:
50° 55' N – 156° 00' E;
51° 21' N – 156° 20' E;
52° 06' N – 155° 14' E;
53° 00' N – 154° 45' E;
54° 00' N – 154° 24' E;

c) Trawls and Danish seines in the WKS in the area between the parallels 57° 00' N and 58° 00' N;

24.4. Red king crab in WKS to the north from the latitudes 56° 20' N.

24.7. Halibuts of all kinds – by bottom gillnets and trawls in the SOO to the east of the meridian 150° 00' E during the spawning period from October 1 to November 30;

24.9. Blue king crab in West Kamchatka subzone to the south from the latitudes 57° 40' N.

24.10. Tanner crab in the Kamchatka-Kuril subzone in the area bounded from the north by latitude 54° 00' N, from the west by the border of the Kamchatka-Kuril subzone, from the east by the coastline, from the south by latitude 52° 30' N;

3) Clause 28. Specialized fishing is prohibited:

28.6. Red king crab:

a) in KKS – from January 1 to August 31;

b) in WKS to the south from the latitudes 56°20' N – from January 1 to August 31;

c) in NSOOS – from August 1 to August 31;

28.7 Blue king crab:

a) in NSOOS – from August 1 to September 30;

b) in WKS – from July 15 to October 10;

28.9. Golden (Brown) king crab:

In WKS – from July 15 to October 15.

4) Minimum Legal Size (MLS):

Red king crab in NSOOS – 13 cm, in other subzones – 15 cm;

Blue and Golden (Brown) king crabs in all subzones – 13 cm;

MLS of crabs is measured across the largest width of the carapace excluding spines.

5) Clause 31. It is forbidden to harvest the following ABR:

a) female crabs of all species – everywhere.

6) Types of forbidden tools and methods of extraction (catch) of ABR.

Clause 32. It is forbidden to harvest ABR:

32.10. Use in the specialized fishery for crabs of all types other tools for catching, except for traps, on the side of which a rectangular opening is cut (size of at least 35 cm in width and 40 cm in height).

The opening may be covered with a panel connected to the trap with a vegetable thread with a diameter of 2-3 mm, not impregnated with substances that exclude the process of decay. Or trap must have a vegetable lash thread with a diameter of 2-3 mm, attaching the netting to the frame and not imbued with substance that prevents decay. Similar requirements apply to crab traps in Alaska (Sill, 2020).

7) Clause 38. Bycatch of juveniles of size less than MLS:

38.1. In a specialized fishing for other species and in other areas, bycatch of juveniles is set up not more than 8 % in terms of quantity per one operation from the catch of target species.

8) Clause 39. In the specialized fishery for crabs of all species, the use of metal trays on board crab vessels is mandatory to return juvenile and female crabs to their natural habitat in a live form with the least damage.

9) Bycatch of some species in the implementation of the harvest (catch) of other types of ABR.

Clause 40. When harvesting ABR, it is prohibited to catch and leave on board a vessel bycatch of ABR prohibited for harvesting, specified in paragraph 31. Bycatch should be released into its natural habitat with the least amount of damage. In this case, the license holder is obliged to change the place of catch (the next trawl track, the catching gear must be set at least 5 nautical miles from any point of the previous trawl, catch, or (including catches at the places of delivery and unloading) not less than 5 nautical miles from any point of fishing operations performed on the last voyage), the relevant information should be recorded in the vessel's documents, fishing logbook (with the exception when catches are recorded in places of delivery and unloading as referred to in paragraph 10 of the Fisheries Regulation) and to send information about this to the appropriate territorial body of FFA.

10) Clause 44. In the specialized vessel fishery of all types of crabs it is compulsory to use special trays to return the bycatch of other crab species into their natural habitat, regardless of the state, with the least damage.

11) Since 2012, an additional measure for the management of the crab fisheries was the establishment of a minimum daily catch of crab per medium-tonnage vessel, the main goal of which was to prevent unreasonable presence of vessels in the fishing area (MAR, 2019). For the Red king crab in WKS minimum daily catch equal 5.5 tonnes per day and in KKS – 4.0 tonnes per day for medium-tonnage vessels. For Blue king crab in WKS it equal 5.5 tonnes per day. This means that if the quota for the Red king crab for a medium-tonnage vessel in the WKS is 55 tonnes, then the vessel has the right to catch the crab for only 10 days. The fishing period is indicated in the fishing permit.

6.2.4. Information and monitoring

There is a stock monitoring programme. VMS is the main source of detailed online information the fleet composition and UoA removals by fishery fleet. Data about position of vessel come in real time and data about catches ones a day. The vessel's position data is received in real time, and the catch data is received once a day.

Biological characteristics and stock status are monitored during research surveys.

Red king crab in WKS and KKS (UoA1)

KamchatNIRO assesses the state of the red king crab population in the WKS and KKS annually. To assess the state of the red king crab stock in Western Kamchatka in 2019, was used the data of the accounting bottom trawl survey on the West Kamchatka shelf in June-July 2019 (Figure 26).

The survey trawls were carried out using a standard grid of stations, a bottom trawl with a horizontal opening of 16 m and an average trawling speed of 2.9 knots. The coefficient of catching capacity of the trawl for the king crab is taken equal to 0.75. In total, 218 trawls were carried out in the Kamchatka-Kuril and West Kamchatka subzones within the depths of 11–275 m. 9,257 specimens of red king crab were subjected to biological analysis. The total surveyed area was about 51.2 thousand km².

To analyze the size range of red king crab males and to obtain indicators of catches per effort as input parameters of the model, were used materials obtained by KamchatNIRO in the commercial crab fishery in September and October 2019 (Figure 27 А). In the monitoring mode of the fishery, a total of 52 set of traps were processed, a biological analysis of 10 537 specimens of crab was carried out.

As an additional source of information, was used the data of the accounting works carried out on the R/V “Engineer Martynov” in June within the territorial waters of the southernmost part of the Kamchatka-Kuril subzone (Figure 27 Б). 32 control stations (8 traps each) were processed, 217 specimens of red king crab were taken for biological analysis.

For a retrospective analysis of the state of the stock and adjusting the model, was used long-term (1996-2019) data from accounting bottom trawl and trap surveys, as well as materials collected during these years on fishing vessels in the monitoring mode of the red king crab fishery.

Figure 26 Schematic map of trawl stations of the accounting bottom survey on the west Kamchatka shelf in 2019 (KamchatNIRO, 2020).

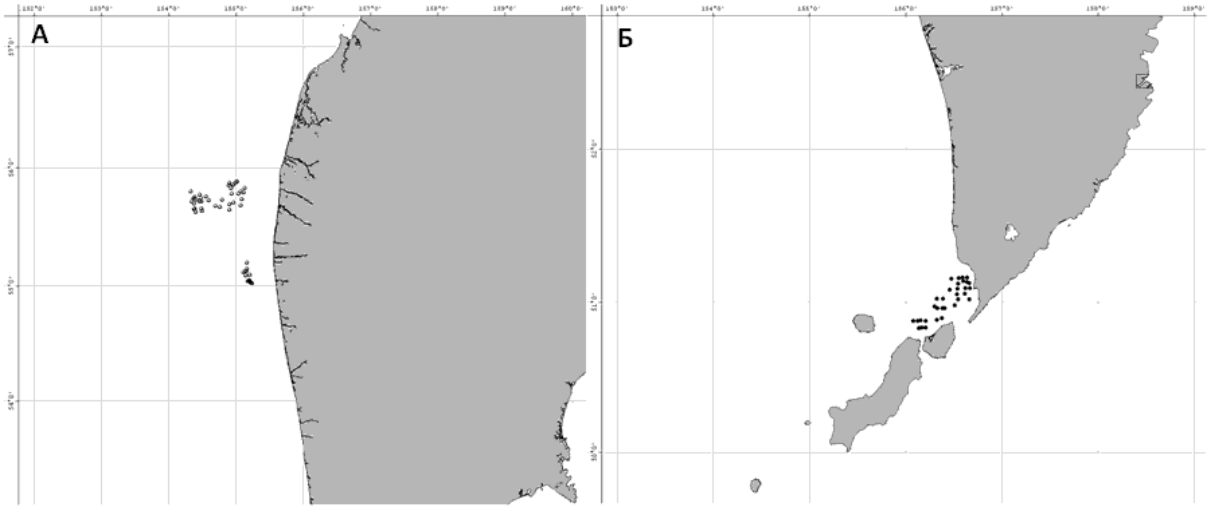


Figure 27 Schematic map of commercial lines of traps in September-October in WKS (А) and research trap stations in June in KKS (Б) in 2019 (KamchatNIRO, 2020).

Blue king crab in WKS (UoA2)

KamchatNIRO assesses the state of the blue king crab population in the WKS annually. Trap accounting surveys are more effective than bottom trawl surveys in the blue crab fishing area due to ground conditions. Such research surveys are conducted almost annually. The areas surveyed and the number of biological analyzes performed are shown in Table 18. In April 2017, a survey trap survey was carried out on two vessels in the water area, limited by coordinates 57° 45' – 59° 15' N, 155° 00' – 157° 20' E in the range of depths 98–430 m (Figure 28). When calculating the stock of blue crab, the catch area of one cone trap was taken equal to 8 500 m².

In 2016 and 2018, for organizational reasons, it was not possible to conduct a research survey on the blue king crab stock. Biological analyzes were collected when performing an accounting bottom trawl survey on the Western Kamchatka shelf and in the monitoring mode of the red king crab fishery.

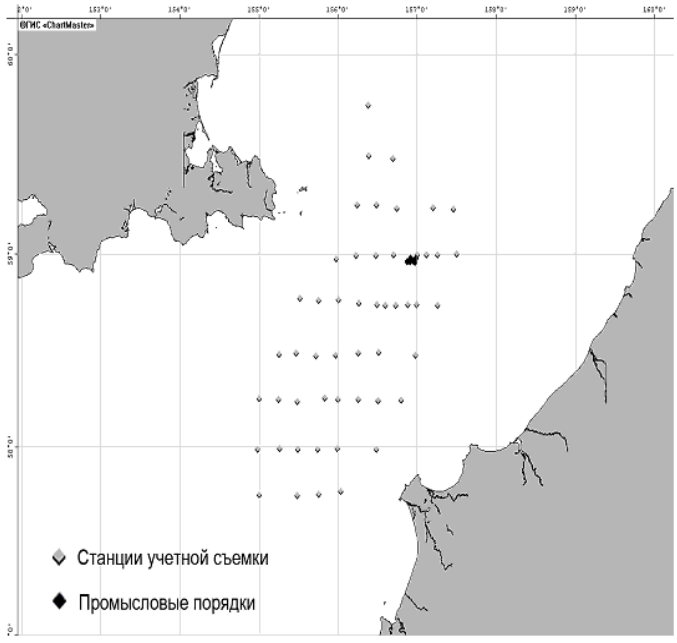


Figure 28 Schematic map of the blue king crab survey area in the WKS in April 2017 (KamchatNIRO, 2018).

Table 18 Data on trap surveys in the blue king crab fishery in the WKS (KamchatNIRO, 2018).

Year	Bio analyzes performed, individuals	Surveyed area, km²
2009	7,379	10,170
2010	10,325	9,812
2011	2,173	5,300
2012	15,358	4,870
2013	5,230	13,245
2014	5,850	15,656
2015	29,958	15,605
2016	707	-
2017	8,257	17,881
2018	3,482	-

For all UoAs in general

The analysis of the commercial fishery was carried out according to the data of the ship's daily reports (DA) from the vessel monitoring system (VMS) of the FFA. VMS is the main source of detailed information the fleet composition and UoA removals.

To estimate the actual catch of crab, was used the data of the customs of Japan, the Republic of Korea, the USA, Canada on the volumes of imports of crab products from the Russian Federation. A detailed assessment methodology is presented in the article by Ivanov (2016).

Ecosystem surveys are carried out annually in the Sea of Okhotsk, when plankton and water chemistry samples are taken after trawl stations. So, the species compositions, biological parameters, food supply, quality of environment are monitoring. Also, the institutes of the VNIRO system have access to satellite information related to meteorology, oceanology, hydrology, for example, chlorophyll concentrations, surface water temperatures, ice cover, currents and tides. But the assessment team do not have evidence that all this additional information is used for evaluate and forecast stock conditions and is directly related to the current harvest strategy.

There is a stock monitoring programme. Research surveys provide quantitative indicators of crab distribution, abundance and biological characteristics. The research surveys are usually performed annually. In addition, there is a scientific observer program on board fishing vessels to collect information on the composition of the catches and the biological parameters of the species caught. Fisheries observers are on board some vessels throughout the fishing season. These data supplement the information of research surveys or are used independently if the research survey could not be organized for some reason. VNIRO runs this observers programme, and it chose the vessels for programme. Vessels of the fishery under assessment will host such observers. Observers collect information on the composition of the catches (including non-target species bycatch) and the biological parameters of target species. VNIRO has a special training program for observers.

The main sources of uncertainty in estimates of stock abundance are variations associated with annual research surveys, uncertainty in predicting annual recruitment and all other fishery removals from the stock, including IUU fishing. They are taking into account through the setting of precautionary TACs. The official catch of the king crab was 50% lower than the actual (calculated) in 2013, by 39% in 2014 and by 11% in 2015. IUU fishing is taken into account when assessing stock abundance (Ivanov, 2016). Starting from 2017, catch of Red king crab off Western Kamchatka was taken equal to the official one in VMS (KamchatNIRO, 2020b).

6.2.5. Stock assessment

Stock assessments for each stock are carried out annually by local branches of VNIRO (KamchatNIRO for all crab species in the WKS and KKS, and MagadanNIRO for the NSOOS). Methods of mathematical modelling are used to estimate the crab population. Direct accounting methods, commercial fishery parameters and biological indicators are used to adjust the models. The TAC forecast is carried out for 2 years ahead. The process consists of 3 stages. To obtain the TAC for 2020 you need:

1) assess the actual state of the stock in 2018;

2) predict the state of the stock in 2020;

3) based on the HCR, calculate the TAC for 2020.

Model for assessment red king crab in WKS and KKS and blue king crab in WKS

For mathematical modelling the dynamics of crab stock is used three-stage catch-survey analysis (CSA), which is a stock assessment method that is applicable in data-limited situations. It requires time series of catch and relative abundance divided into three categories: pre-recruits, recruits and post-recruits. This method is particularly useful for invertebrate populations (e.g., crabs) that cannot be aged but can be classified by their size distributions (Collie et al., 2005). This type of modelling is used in assessments of Barents Sea red king crab stock by Lloyd's Register (2020).

Since the "stock-fishery" model is a system of stochastic difference equations of linear regression, the methods of linear optimal filtering and interpolation are applied. Observations are accompanied by random errors, which mean that we should not talk about determining the state of the system, but about evaluating it through statistical processing of the observation results. The input data for the model are the catches of pre-recruits, recruits and commercial males in the fishery and according to trawl and trap research surveys and data on the size composition of crabs. Observation noise considers the cumulative effects of sizing errors, functional grouping, catch errors, and direct counting data. The probability of the output biological parameters is estimated using bootstrap technique.

The algorithm of the presented model of the dynamics of functional groups with the Kalman filter and taking into account the molt probability is implemented in the form of scripts for the statistical programming language R. The model is described in detail in the article by Ilyin and Ivanov, (2015).

The input parameters of the model for assessing the real state of the red king crab stocks in 2018 were:

- data on the actual catch of males (million individuals) of Kamchatka crab by functional groups (pre-recruits, recruits, commercial males) and years (1996-2019). Estimates of the volumes of real catches in 1996–2016 were obtained based on the data of the customs of Japan, the Republic of Korea, the USA, Canada on the volume of imports of crab products from the Russian Federation. Based on these data, the actual catch of Kamchatka crab off Western Kamchatka was roughly estimated, assuming that it is proportional to the share of TAC for Kamchatka crab on the western Kamchatka shelf of the total TAC of Kamchatka crab in the Far Eastern fishing area. An algorithm for assessing the actual catch of the Kamchatka crab of the western Kamchatka shelf is given in the work of Ivanov (2016). The actual catch obtained was included in the calculations, while the catch in 2017-2019 was taken equal to the official one.

- instantaneous natural mortality rates were taken equal to 0.2 1/year for all three functional groups;

- the probability of molting by functional groups (Lysenko, 2001a).

The model was adjusted using the following indices:

- data of accounting bottom trawl surveys on the number of commercial males and pre-recruits of Red king crab on the shelf of Western Kamchatka in 1996-2019;

- data on catches of commercial males per unit of fishing effort based on the results of trap surveys and materials collected on board vessels in the commercial fishing regime (MagadanNIRO, 2018; Shaginyan, 2019; Ivanov, 2020).

The input parameters of the model for forecast of the red king crab stock status at the beginning of 2020:

- instantaneous natural mortality rates were taken equal to 0.2 1/year for all three functional groups;

- the average number of recruits over the last 10 years was taken as a replenishment (median estimate –29.05 million individuals);

- the abundance of the stock for 1 year ahead was estimated by the formulas of the used model:

$$N_{i,2} = p_1 N_{i-1,1} S_{i-1,1} + (1-p_2) N_{i-1,2} S_{i-1,2},$$
$$N_{i,3} = p_2 N_{i-1,2} S_{i-1,2} + N_{i-1,3} S_{i-1,3},$$
$$S_{i,j} = \exp(-Z_{i,j}),\ Z_{i,j} = M_{i,j} + F_{i,j}, \quad i = 1,2$$

where:

Ni, 1, Ni, 2, Ni, 3 — the number of functional groups - pre-recruits, recruits and commercial males in the i-th year; Mi, j — instantaneous natural mortality rates; Fi, j - instantaneous commercial mortality rates in the i-th year; Z i, j — instantaneous rates of general mortality in the i-th year; S i, j — survival rates in the i-th year; pj is the probability of molting in the j-th functional group; j = 1,2,3.

At the beginning of 2020, the predicted number of commercial males will be 84.0 million specimens (see Figure 13), biomass – 191.5 thousand tonnes. The lower limit of the 90% confidence interval of this estimate (71.6 million specimens and 163.3 thousand tonnes) exceeds the Btr for this stock. But in general, according to model estimates, a decrease in the commercial stock of the red king crab on the shelf of Western Kamchatka is predicted in 2020 (KamchatNIRO, 2020).

TAC 2020 justification

The TAC is calculated according to the HCR (Figure 25), depending on the predicted state of the stock in relation to the reference points (Table 15).

The model and the list of input parameters for the model are identical for red king crab in UoA1 and blue king crabs in UoA2, so the last stage of the process (TAC justification) will be considered using the **example of the blue king crab**.

The value of the commercial males biomass obtained at the previous stage corresponds to the level of exploitation of the restored stock (HCR mode III, see Figure 25). Therefore, the intensity of harvesting must be at the level of the Btr. F of the CSM of the blue king crab in WKS in 2020 will be 0.181 1/year (or 15.1% in terms of the share of removals). The catch in the *i*-th forecast year was calculated using the formula:

$$C_{i,3} = N_{i,3} \frac{F_{reci,3}}{(F_{reci,3} + M_{i,3})} (1 - \exp(-(F_{reci,3} + M_{i,3})),$$

where F_{reci} is the recommended value of the fishing intensity in the *i*-th forecast year.

The statistical characteristics of the estimates of the biomass of commercial males and the possible catch of blue king crab in WKS in 2020 are presented in Table 19. The median estimate of the possible catch in 2020 is 3.426 thousand tonnes (KamchatNIRO, 2018).

Table 19 Statistical characteristics of the TAC assessment of the blue king crab in the WKS in 2020 (KamchatNIRO, 2018).

	σ	5%	10%	15%	50%	85%	90%	95%
FSB	5.089	15.774	17.216	18.126	22.686	28.465	29.692	31.959
TAC	1.139	0.805	1.614	2.169	3.426	4.284	4.469	4.810

Analysis and diagnostics of the results obtained

The final and important stage in testing the management strategy is to assess the likelihood that, in the long term (10 years ahead), the biomass of the commercial stock of blue king crab in WKS will not fall below the Blim at a given constant rate of exploitation. Within the framework of statistical simulation modelling using the Monte Carlo method, this probability was estimated. With the intensity of fishing for 10 years at the level of the target Ftr, the risk of overfishing by recruitment does not exceed the recommended level α = 0.1 - 0.2 (Babayan, 2000). Hence, the management strategy can be adopted (KamchatNIRO, 2018). Model dynamics of the blue king crab commercial stock biomass in WKS at the rate of removal recommended according to the HCR is shown in Figure 22 (KamchatNIRO, 2018).

6.2.6. Catch profiles

Table 20 Annual catch (tonnes) by UoA, in 2003-2020 (total catch for whole fishery).

Year	UoA 1	UoA 2
2003	2,835	2,436
2004	1,515	2,424
2005	533	3,019
2006	1,313	3,241
2007	3,266	3,278
2008	764	3,137
2009	343	1,201
2010	109	738
2011	141	1,650
2012	44	2,098
2013	5,331	4,282
2014	4,946	4,238
2015	7,198	3,497
2016	8,950	3,449
2017	11,787	3,817
2018	15,312	3,863
2019	15,319	3,282
2020	15,300	3,300

UoA 1 – Red king crab (*P. camtschaticus*) in the WKS and KKS;

UoA 2 – Blue king crab (*P. platypus*) in the the WKS;

6.2.7. Total Allowable Catch (TAC) and catch data

The organizational steps of the TAC determination procedure are detailed in section 7.4.1.2 Fisheries management.

Table 21 – Total Allowable Catch (TAC) and catch data

UoA 1, Red king crab in 61.05.2 and 61.05.4				
TAC	Year	**2020**	Amount	**15,405 mt**
UoA share of TAC	Year	**2020**	Amount	**1,395.321 mt**
UoC share of TAC	Year	**2020**	Amount	**1,395.321 mt**
Total green weight catch by UoC	Year (most recent)	**2020**	Amount	**1,387.882 mt**
Total green weight catch by UoC	Year (second most recent)	**2019**	Amount	**1,199.163 mt**
UoA 2, Blue king crab in 61.05.2				
TAC	Year	**2020**	Amount	**3,316 mt**
UoA share of TAC	Year	**2020**	Amount	**123.804 mt**
UoC share of TAC	Year	**2020**	Amount	**123.804 mt**
Total green weight catch by UoC	Year (most recent)	**2020**	Amount	**123.804 mt**
Total green weight catch by UoC	Year (second most recent)	**2019**	Amount	**247.186 mt**

6.2.8. Principle 1 Performance Indicator scores and rationales

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	Stock status relative to recruitment impairment			
	Guide post	It is **likely** that the stock is above the point where recruitment would be impaired (PRI).	It is **highly likely** that the stock is above the PRI.	There is a **high degree of certainty** that the stock is above the PRI.
	Met?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – Yes**
Rationale				

UoA 1 – Red king crab (*P. camtschaticus*) in the WKS and KKS.

The upper limit of the 95% confidence interval of the Bloss was taken as the limit reference point for the biomass of commercial size males (Blim) (Table 16). This is a precautionary measure of the point at which recruitment is impaired given the technical measures in place: (a) females are fully protected, (b) there is a closed area to protect spawning and early development sites, as well as part of adult stock, and (c) the minimum legal size for males is above the size at which 50% of males are expected to be mature.

For Red king crab in the WKS and KKS in total, Blim = 36,600 tonnes. Biomass estimates for this stock have been above Blim since 2003 and generally more than double the Blim in 2013-2020 (Figure 12). In 2002, biomass was close to Blim, but due to conservation measures, it increased 5 times by 2017. Then it declines but remains high in 2019. The commercial stock of the Red king crab in 2019, according to the results of bottom trawl surveys, in the KKS was estimated at 7.531 million individuals or 18,074 tonnes (with an average weight of a commercial male 2.40 kg). In the areas of the WKS, where fishing is permitted (Kolpakovsky and Ichinsky districts), the current commercial stock is estimated at 37.346 million individuals or 79,920 tonnes (with an average weight of a commercial male 2.14 kg), and in total in two subzones, in areas permitted for fishing – 44.877 million individuals or 97,994 tonnes. The commercial stock of the Red king crab on the entire investigated area of the shelf of Western Kamchatka (including forbidden areas) amounted to 60.313 million individuals in 2019 or 131,028 tonnes. According to model estimates, the total number of commercial males at the beginning of 2019 in the KKS and the WKS is estimated at 82.8 million individuals, biomass – 188,900 tonnes (KamchatNIRO, 2020a). **SG 80 is met**.

According to KamchatNIRO (2020a), with a probability of 95%, the Red king crab stock in the UoA 1 in 2020 will be higher than Blim. Since Blim is precautionary measure of PRI, there is a high degree of certainty that the stock is above the PRI and **SG 100 is met**.

UoA 2 – Blue king crab (*P. platypus*) in the the WKS.

The upper limit of the 95% confidence interval of the Bloss was taken as the limit reference point for the biomass of commercial size males (Blim) (Table 17). This is a precautionary measure of the point at which recruitment is impaired given the technical measures in place: (a) females are fully protected, (b) there is a closed area to protect spawning and early development sites, as well as part of adult stock, and (c) the minimum legal size for males is above the size at which 50% of males are expected to be mature.

For Blue king crab in the WKS, Blim = 14,170 t. From 2011 to the present, biomass of legal-size males (commercial stock) has ranged from 17,900 to 26,800 tonnes, i.e. was higher than Blim (Figure 21). Blim is considered to be a proxy for the PRI. Addition research surveys (2013-2019) show high biomasses of recruitment and commercial size stock. **SG 60 and SG 80 are met**.

According to model calculations, with a probability of 95%, the stock in 2020 and 2021 will be higher than Blim (Figure 22). Blim is precautionary measure of PRI, there is a high degree of certainty that the stock is above the PRI and **SG 100 is met**.

b	Stock status in relation to achievement of Maximum Sustainable Yield (MSY)			
	Guide post		The stock is at or fluctuating around a level consistent with MSY.	There is **a high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		**All UoA – Yes**	**All UoA – No**

Rationale

UoA 1 – Red king crab (*P. camtschaticus*) in the WKS and KKS.

The process of determining target and limit reference points for red king crab stock in Western Kamchatka is described in the article by Ilyin and Ivanov (2015). The percentiles of the bootstrap distribution of some biological reference points are shown in Table 16. The corresponding target for the biomass of commercial males, Btr, was determined from the curve of the equilibrium commercial biomass per pre-recruitment (Figure 23). With the number of pre-recruits II at the average long-term level (the median estimate is 27.1 million individuals) and the average weight of commercial males of 2.28 kg, it will be 92.56 thousand tonnes.

For Red king crab in the WKS and KKS in total, Btr = 92,560 tonnes. The Red king crab commercial stock biomass in WKS and KKS was above Btr in 2014 and from 2016 to 2019. In 2013 and 2015, it was below Btr (Figure 12). The stock is fluctuating around a level consistent with MSY and **SG 80 is met**.

The stock has not been consistently above the target level across recent years. **SG 100 is not met**.

UoA 2 – Blue king crab (*P. platypus*) in the the WKS.

To determining target and limit reference points for the blue king crab in the WKS, the same methodology was used as for the red king crab (Table 17) (KamchatNIRO, 2018). The corresponding target for the biomass of commercial males, Btr, was determined from the curve of the equilibrium commercial biomass per pre-recruitment (Figure 24). With the number of pre-recruits II at the average long-term level (the median estimate is 7.65 million individuals) and the average weight of commercial males of 1.7 kg, it will be 19.25 thousand tonnes.

For Blue king crab in the WKS, Btr = Bmsy = 19,250 tonnes. Since 2011, biomass of the Blue king crab commercial stock in WKS has ranged from 17 900 to 26,800 tonnes (Figure 21). The stock is fluctuating around a level consistent with MSY and **SG 80 is met**.

The stock has not been consistently above the target level across recent years. **SG 100 is not met**.

References

- Babayan, 2000;
- Buyanovskiy, 2012;
- Ilyin, Ivanov, 2015;
- Ivanov, 2020;
- KamchatNIRO, 2018, 2020, 2020a;
- Khovansky, 2020;
- MagadanNIRO, 2018, 2020a.

Stock status relative to reference points

	Type of reference point	Value of reference point, tonnes	Current stock status (**2019**) relative to reference point

Reference point used in scoring stock relative to PRI (SIa)	*Blim* *(Commercial male stock biomass, tonnes)*	UoA 1 – 36,600 UoA 2 – 14,170	UoA 1 – 97,994/36,600 = 2.68 UoA 2 – 23,000/14,170 = 1.62
Reference point used in scoring stock relative to MSY (SIb)	*Btr* *(Commercial male stock biomass, tonnes)*	UoA 1 – 92,560 UoA 2 – 19,250	UoA 1 – 97,994/92,560 = 1.06 UoA 2 – 23,000/19,250 = 1.19

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**90**
Condition number (if relevant)	**NA**

PI 1.1.2 – Stock rebuilding

PI 1.1.2		Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Rebuilding timeframes			
	Guide post	A rebuilding timeframe is specified for the stock that is the **shorter of 20 years or 2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.		The shortest practicable rebuilding timeframe is specified which does not exceed **one generation time** for the stock.
	Met?	**NA**		**NA**
Rationale				
Rebuilding is not required. SIa was not scored because PI 1.1.1 scores ≥ 80.				
b	Rebuilding evaluation			
	Guide post	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.	There is **evidence** that the rebuilding strategies are rebuilding stocks, **or it is likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the **specified timeframe**.	There is **strong evidence** that the rebuilding strategies are rebuilding stocks, **or it is highly likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the **specified timeframe**.
	Met?	**NA**	**NA**	**NA**
Rationale				
Rebuilding is not required. SIb was not scored because PI 1.1.1 scores ≥ 80.				
References				
None				

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**NA**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**NA**
Condition number (if relevant)	**NA**

PI 1.2.1 – Harvest strategy **(All UoAs)**

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guide post	The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG 80.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 SG 80.	The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 SG 80.
	Met?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**

Rationale

There is a harvest strategy with an objective to avoid overfishing. For all 2 species it includes: male-only fishery, females are fully protected; a precautionary annual TAC and catch quota for each legal fisherman. In addition, it includes a minimum legal size (MLS), closed seasons and closed areas, and technical specifications for fishing gears design. To ensure compliance, a comprehensive monitoring, control and surveillance system is in place. Details of the MCS system can be found in section PI 3.2.3. The harvest strategy is expected to achieve stock management objectives. **SG 60 is met**.

Limit and target reference points for stock biomass have been implemented. The TAC based upon estimates of commercial stock biomass in relation to those reference points. Ftr for Red king crab = 0.202 and for Blue king crab = 0.181 (Table 15). The harvest strategy is therefore responsive to the state of the stock. There is robust enforcement of fishery management regulations, the logbook completion is mandatory after each fishing operation. Fishermen must also submit statistical reports to the controlling organizations twice a month. The authorities carry out regular checks on the compliance of the amount of fishery products on board the vessel with the statistics on the catch of the fishery. This approach makes it difficult for the quotas to be exceeded. There is a stock monitoring programme. It seems reasonable to conclude that the elements of the current harvest strategy will work together to maintain productivity and have a low risk of recruitment overfishing, and therefore achieve stock management objectives. **SG 80 is met**.

No strong evidence was provided to the assessment team that the harvest strategy in UoAs is responsive to the state of the stocks and is designed to achieve stocks management objectives reflected in PI 1.1.1 SG80. In addition, there has not been sufficient time to fully evaluate the performance of the harvest strategy in practice, to demonstrate that it can clearly maintain the stock at Bmsy. **SG 100 is not met**.

b	Harvest strategy evaluation			
	Guide post	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?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**

Rationale

For all 2 species **t**he strategy is based on the standard harvest control rule that requires proportional reduction in fishing mortality as the population biomass falls below the target (Figure 25). Variations of this HCR were adopted around the world and were shown to work successfully (Kvamsdal *et al*., 2016). Other measures such as harvest limit (TAC), minimum sizes, female protection, area and season closures were also shown to be part of the successful management strategy in many fisheries.

Stock biomass and size structure have been reasonably stable, without a sign of recruitment overfishing (according to **www.fishbase.in**, recruitment overfishing - the rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced). This is confirmed by data collected in annual research surveys with using of bottom trawl or traps and model assessments. Evidence from the history of the fishery indicates that the strategy is working. When the TAC was reduced (in 2005-2012 for RKC, in 2009-2012 for BKC) and other measures to reduce fishing mortality were introduced during a downturn in stock abundance (see Figure 13A for Red king crab; Figure 20Б for Blue king crab), the stock responded positively, showing growth. Therefore, the harvest strategy worked well and achieved the stock management objectives. **SG 60 and SG 80 are met**.

The assessment team has not been provided with evidence that the harvest strategy has been fully evaluated. The stock has been above Bmsy for less than a generation period for all 2 species. **SG 100 is not met**.

c	Harvest strategy monitoring			
	Guide post	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	**All UoA – Yes**		

Rationale

For all of king crab species monitoring of the fishery includes commercial catch rate and landings, biological measurements during the commercial fishery, and research surveys (see section 6.2.4). There is a comprehensive monitoring, control and surveillance system in place. Each vessel reports daily to the CFMC detailed information on its activity, catch by species, number and total time of fishing operations, depth and gear. Also, the vessel reports the amount of each type of production, used bait and various products onboard. Apart from the daily information it collates, the CFMC also provides operational reports (twice a month) by vessel and company from the start of each season and quarterly statistical reports by company. These allow a determination of whether the harvest strategy is working. **SG 60 is met**.

d	Harvest strategy review			
	Guide post			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			**All UoA – No**

Rationale

No strong evidence was provided to the assessment team that the harvest strategy is periodically reviewed and improved as necessary. **SG 100 is not met**.

e	Shark finning			
	Guide post	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	**NA**	**NA**	**NA**

Rationale

Sharks are not a target species in this fishery, so this scoring issue is not scored.

f	Review of alternative measures			
	Guide post	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**

Rationale

This information applies to each of the 2 king crab species. Some bycatch of juveniles and females takes place, but they are released and research shows that their mortality is on acceptable level, especially if they experience only a single lifting on-board. In the experiment with the return to the bottom for 55 days in a closed trap, the crabs previously raised to the surface, mortality was not recorded (Moiseev, Moiseeva, 2010). There has been review of the potential effectiveness and practicality of alternative measures to minimize UoAs mortality of non-target king crabs (undersized and females). Move-on rules were brought in during the period of low stock abundance to minimize mortality of undersized and female king crabs. To prevent the death of animals in lost traps, in the fishery can be used only the traps, on the side of which a rectangular opening is cut (size of at least 35 cm in width and 40 cm in height). The opening may be covered with a panel connected to the trap with a vegetable thread with a diameter of 2-3 mm, not impregnated with substances that exclude the process of decay (Fishing rules, 2019). In the specialized fishery for crabs of all species, the use of metal trays on board crab vessels is mandatory to return juvenile and female crabs to their natural habitat in a live form with the least damage (Fishing rules, 2019).

SG 60 is met.

These and other alternative measures are potential topics at regular fishery council meetings, where management authorities receive feedback on management practices from the industry and other interested stakeholders. Changes in Fishing rules (2019) are made following the results of such meetings. While no written report on these meetings was available to the reviewers, they interpret that regular fishery council meetings provide evidence that potential measures are kept under review, and that this process **meets the intent of SG 80**.

No strong evidence was provided to the assessment team that there is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate. **SG 100 is not met**.

References

- Fishing rules, 2019;
- Ilyin, Ivanov, 2015;
- Ivanov, 2020;
- KamchatNIRO, 2018, 2020, 2020a;
- Khovansky, 2020;
- Kvamsdal et al., 2016;
- MagadanNIRO, 2018, 2020a;
- Moiseev, Moiseeva, 2010.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**All UoAs – 80**
Condition number (if relevant)	**NA**

PI 1.2.2 – Harvest control rules and tools **(All UoAs)**

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guide post	**Generally understood** HCRs are in place **or available** that are **expected** to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	**Well defined** HCRs are **in place** that **ensure** that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock **fluctuating around** a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.	The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, **most** of the time.
	Met?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**
Rationale				

The harvest control rules (HCRs) apply to all 2 fisheries. They are used to set an annual TAC based upon the estimate of stock biomass or abundance in relation to designated target and limit reference points as follows:

• If the commercial stock biomass is within the healthy zone, i.e. above the target reference point, then the exploitation level is set at no higher than the target exploitation level Ftr;

• If the commercial size males stock is in the cautious zone, i.e. above the limit reference point, but below the target reference point, the exploitation level (Ftr) will be reduced proportionally;

• If the legal stock is in the critical zone, i.e. below the limit reference point, the exploitation level is set to zero (Ftr = 0). The fishery is therefore closed and only fishing for science is permitted;

This is a well-defined HCR, and it ensures that the exploitation rate is reduced as the PRI (Blim) is approached, reaching ~zero at and below Blim. It has maintained the stocks fluctuating around Btr (Bmsy) (see 1.1.1b).

SG 60 and SG 80 are met.

The HCRs for all UoAs are designed, tested and expected to keep stock biomass at or above the Bmsy level in the long term. However, it has not been tested that biomass will be at or above the MSY level most of the time. Additional observations on the stock dynamics in variable environments and with variable recruitment patterns are needed for a more certain conclusion at 100 level. **SG 100 is not met**.

b	HCRs robustness to uncertainty			
	Guide post		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties.
	Met?		**All UoA – Yes**	**All UoA – No**
Rationale				

The main sources of uncertainty in estimates of stock abundance are variations associated with annual research surveys, uncertainty in predicting annual recruitment and all other fishery removals from the stock, including IUU fishing. They are taking into account through the setting of precautionary TACs. IUU fishing is taken into account when assessing stock abundance. Mainly this problem had to do with Red king crab. In "Materials justification for changes to previously approved TAC's forecast..." (KamchatNIRO, 2020b) it is written that the estimates of the

volume of the real catch of Red king crab off Western Kamchatka in 1996–2016 were obtained based on data from the customs of Japan, the Republic of Korea, the USA, Canada on the volume of imports of crab products from the Russian Federation. An algorithm for assessing the actual catch of the Kamchatka crab of the western Kamchatka shelf is given in the paper by Ivanov (2016). The actual catch obtained was included in the TAC calculations. The catch in 2017-2019 was taken equal to the official one in VMS.

During the visit, Kamchatniro representatives confirmed that since 2017, they consider the IUU catch of all crab species to be insignificant and use the official annual catch from the VMS as the actual catch.

While determining the TAC, the research institute uses risk-based approach, including IUU fishing in the stock assessment, to avoid stock decline with certain probability in both short-term and long-term prospective. TAC is allocated two years before the fishing season and can be corrected based on more recent data. **SG 80 is met**.

The ecological role of the stocks in the UoAs have not been evaluated in relation to the HCRs. **SG 100 is not met**.

	HCRs evaluation			
c	Guide post	There is **some evidence** that tools used **or available** to implement HCRs are appropriate and effective in controlling exploitation.	**Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**

Rationale

Based on experience in other fisheries, the HCR based on limit and target reference points and a target exploitation rate is appropriate and effective in controlling exploitation.

Evidence indicates that the tools in use (TACs, minimum legal size (MLS), closed seasons and areas, and technical specifications for fishing gears design) are effective in achieving the required exploitation levels. For all species, there were periods when stock abundance declined and the TAC was reduced or set to 0 (in 2005-2012 for RKC, in 2009-2012 for BKC). Reductions in TAC had the desired effect on exploitation rate, stocks achieved sustainable levels. **SG 60 and SG 80 are met**.

The biomass of commertial males was last below the Btr level in 2015 for the RKC, in 2011 for the BKC. Additional observations on the stock dynamics are needed for a more certain conclusion at 100 level. **SG 100 is not met**.

References

- Ilyin, Ivanov, 2015;
- Ivanov, 2016;
- KamchatNIRO, 2018, 2020, 2020b;
- Khovansky, 2020;
- MagadanNIRO, 2018.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**All UoAs – 80**
Condition number (if relevant)	**NA**

PI 1.2.3 – Information and monitoring (**All UoAs)**

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			
	Guide post	**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 are 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?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**
Rationale				

The fishing companies maintain daily catch records that are monitored on a routine basis to determine the cumulative catch. This enables strict control over the catch to prevent the quota being exceeded. Environmental monitoring of the fishery by the government is required under chapter 5, article 42 in Federal Law 166-FZ (RG, 2004), which explicitly mentions the distribution, abundance, quality and reproduction of aquatic bio resources and habitats, the fishery and preservation of aquatic bio resources. According to the law, branches of VNIRO perform annual research surveys in SOO to collect data on the species composition, biological parameters, food supply, quality of environment etc. The data are collected and analysed to estimate the stock structure and calculate TAC. Therefore, sufficient relevant information related to the distribution and structure of the stock, biological information on the stock productivity, fleet composition and gear used, stock abundance, level of fishery removals and some environmental and ecological data are available to support the harvest strategy. **SG 60 and SG 80 are met**.

No strong evidence was provided to the assessment team that a comprehensive range of information is available. **SG 100 is not met**.

b	Monitoring			
	Guide post	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?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**
Rationale				

Stock abundance is estimated annually using research surveys and stock modeling. Unit of assessment removals are regularly monitored by the collection of catch data obtained from daily catch reports sent by fishing vessels via the national VMS. **SG 60 is met**.

Stock abundance is estimated annually using research surveys and stock modeling. The stock assessments provide the basis for TAC determination. In this case, the HCR applies. Commercial catch and products are daily monitored

through VMS. These data are used in models for the stock assessment that supports the harvest control rule. Research surveys provide quantitative indicators of crabs' distribution and abundance. The research surveys are usually performed annually. In addition, there is a scientific observer program on board fishing vessels to collect information on the composition of the catches and the biological parameters of the species caught. Fisheries observers are on board some vessels throughout the fishing season. These data supplement the information of research surveys or are used independently if the research survey could not be organized for some reason. **SG 80 is met**.

No strong evidence was provided to the assessment team that all information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is no evidence of a good understanding of inherent uncertainties in the information and the robustness of assessment and management to this uncertainty. **SG is not 100**.

	Comprehensiveness of information			
C	Guide post		There is good information on all other fishery removals from the stock.	
	Met?		**All UoA – Yes**	

Rationale

There is some information on other fishery removals of red and blue king crabs from stocks (Matveev *et al*., 2019; Terentyev *et al*., 2010; KamchatNIRO, 2020, 2020a, 2020c).

According to Matveev et al. (2019), comparative analysis was carried out for species composition of the catches from major types of fishing gears near the west coast of Kamchatka (in the Kamchatka-Kuril and West-Kamchatka subzones) based on the data of the vessel monitoring system (VMS) of the Federal Fisheries Agency and the research data from commertial fishing vessels in 2003–2017. In 2003-2017, observers from Fisheries Research Institute (VNIRO) took part in 23 cruises of fishing vessel (936 fishing operations) with using of Midwater trawl, 25 cruises of fishing vessel (571 fishing operations) with using of Danish seine, 8 cruises of fishing vessel (669 fishing operations) with using of Bottom longline. This represents less than 2% of the total fishery. Fisheries statistics in the VMS cover 100% of all fisheries. The ratio (by weight) in the total catch of aquatic biological resources (in the exception of salmon) in the Kamchatka-Kuril and West-Kamchatka subzones (in sum) in 2003-2017 according to VMS data were next: Midwater trawl - 75.5%, Danish seine - 19.1%, Bottom longline - 2.3%. The bycatch of Red king crab in Midwater trawl fishery, according to VMS data was 0.01% and according to research data was less than 0.01%; in Danish seine fishery, according to VMS data was 0% and according to research data was less than 1.44%; in Bottom longline fishery, according to VMS data was 0% and according to research data was less than 0.23%. The bycatch of Blue king crab in Midwater trawl fishery, according to VMS data was 0.02% and according to research data was less than 0.01%; in Danish seine fishery, according to VMS data was 0% and according to research data was less than 0.02%; in Bottom longline fishery, according to VMS data was 0% and according to research data was less than 0.17%.

During the site visit, scientists from the KamchatNIRO said they have good information on all other fishery removals from the stock. There has been substantial effort to reduce bycatch and associated mortality of king crabs. This has included the closure of extensive areas to bottom trawling. Other measures include move-on rules when other fisheries are catching king crab of any sex and size on distance of not less than 5 nautical miles from the position where bycatches of king crab were reported. **SG 80 is met**.

References

- KamchatNIRO, 2020, 2020a, 2020c;
- Khovansky, 2020;
- Matveev et al., 2019;
- Nikolenko, 2010;
- RG, 2004;
- Terentyev *et al*., 2010.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	60-79
Information gap indicator	**More information sought** *on all other fishery removals from the stock.*

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**All UoA – 80**
Condition number (if relevant)	**NA**

PI 1.2.4 – Assessment of stock status **(All UoAs)**

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guide post		The assessment is appropriate for the stock and for the harvest control rule.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.
	Met?		**All UoA – Yes**	**All UoA – No**
Rationale				

The assessment provides estimates of the biomass of commercial size males, the exploitation rates and TACs as is required by the harvest control rule. The methods used have been applied in other crustacean fisheries. They are appropriate for the stock and HCR. **SG 80 is met**.

Some important features of the biology of species in the UoAs are accounted for. Some uncertainty in annual recruitment is accounted for through simulation. Stock models provides overall annual estimate of stock biomass, but they do not consider for example stocks stages structure and may not handle well large variability in recruitment.

SG 100 is not met.

b	Assessment approach			
	Guide post	The assessment estimates stock status relative to generic reference points appropriate to the species category.	The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.	
	Met?	**All UoA – Yes**	**All UoA – Yes**	
Rationale				

The assessment estimates stock status relative to reference points appropriate to the species category. **SG 60 is met.**

Reference points were developed based on expert knowledge and reference to a production model fitted to a time series of abundance. The upper limit of the 95% confidence interval of the Bloss was taken as the limit reference point for the biomass of commercial size males (Blim). The corresponding target points for the biomass of commercial males, Btr, were determined from the curves of the equilibrium commercial biomass per pre-recruitment. The process of determining target and limit reference points for king crab stocks is described in the article by Ilyin & Ivanov (2015). For more information, see PI 1.1.1. Therefore, the team concludes that the assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.

SG 80 is met.

c	Uncertainty in the assessment			
	Guide post	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?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**
Rationale				

The assessment identifies major sources of uncertainty e.g. changing level and quality of information over time; the variation associated with the annual research surveys, and the uncertainty in predicting annual recruitment.

SG 60 is met.

Uncertainty was accounted for in the development of reference points by considering different approaches to their estimation. Uncertainty is accounted for in model estimates by providing confidence intervals. **SG 80 is met**.

There is some evidence that the assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way (KamchatNIRO, 2018). However, more recent information is needed to get the highest score. **SG 100 is not met**.

d	Evaluation of assessment			
	Guide post			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			**All UoA – No**

Rationale

No relevant evidence was provided to the assessment team that alternative hypotheses and assessment approaches have been rigorously explored. **SG 100 is not met**.

e	Peer review of assessment			
	Guide post		The assessment of stock status is subject to peer review.	The assessment has been **internally and externally** peer reviewed.
	Met?		**All UoA – Yes**	**All UoA – Yes**

Rationale

KamchatNIRO scientists conduct the stock assessment and estimate a TAC for the crabs. Results are presented and reviewed at institutes' Scientific Councils. The assessment is modified in light of comments at the above review and if appropriate, it is forwarded to the head of the fisheries research institute, VNIRO (Moscow).

Given the institutes peer review, **SG 80 is met**.

VNIRO scientists review the material they receive on the TAC for the stocks in the UoAs and make their comments and proposals at an extended meeting of Scientific Council with participation of scientists from VNIRO and other FFA fisheries institutes. KamchatNIRO then revise the draft advice in response to the VNIRO comments. The final TAC recommendations are further reviewed by the independent Ecological Council of the Ministry of Nature comprised of independent scientists representing Academy of Science and universities. The VNIRO and the Ministry of Nature Councils' peer review is external. **SG 100 is met**.

References

- Ilyin, Ivanov, 2015;
- KamchatNIRO, 2018, 2020;
- Khovansky, 2020;
- MagadanNIRO, 2018.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**

Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**All UoAs – 85**
Condition number (if relevant)	**NA**

6.3. Principle 2

6.3.1. Principle 2 background

6.3.1.1. Principle 2 definitions

P2 definitions according to MSC Fisheries Standard v2.01:

Primary species in P2 are those for which all of the following criteria are met:

1) Species in the catch that are not covered under P1 because they are not included in the UoA;

2) Species that are within scope of the MSC program as defined in FCP Section 7.4; and

3) Species where management tools and measures are in place, intended to achieve stock management objectives reflected in either limit or target reference points.

Secondary species in P2 are species in the catch which are not covered under P1 because they are not included in the UoA and:

1) Are not considered 'primary' as defined above for primary species; or

2) Species that are out of scope of the program, but where the definition of ETP species is not applicable.

We designate "main" primary and secondary species as those which comprise at least 5% of the total catch, or at least 2% of the total catch for "more vulnerable/less resilient" species, whose life history characteristics may make them more prone to overexploitation. All "out of scope" secondary species must be classified as "main."

6.3.1.2. Data available from the UoA for Principle 2

For the other commercial crab species caught alongside the target species, monitoring and assessment follows the same process as described for the target species in P1 – i.e. based on annual fishery-independent trawl surveys (time series since the 1950s) plus fishery data (catch, catch size composition) (see description in 6.2.4). Commercial catch data may not have been accurate prior to ~2015 due to underreporting, but appears now to be robust (RCCA, 2020).

Data on bait species and quantity were provided by the client.

The fishing vessels do not record non-commercial bycatch, which is discarded immediately, along with undersized crabs. Data to evaluate discarded bycatch comes from scientific observer data from the crab fleet (not the client vessels specifically). There were also discussions with two vessel captains and one former observer from MagadanNIRO during the site visit.

The total number of observer trips from 2013-19 is summarised in Table 22, while the observer data used in the bycatch evaluation by KamchatNIRO (2020) is summarised in Table 23.

Table 22 Summary table of scientific observer trips conducted by KamchatNIRO on board vessels of the Russian Crab Catchers Association in the Russian Far East, 2013-2019 (Russian Crab Catchers Association, 2020).

Year/Vessel	Area	Operations	Bioanalysis	Vessel-days
2013				
Seawind	West Kamchatka	40	8225	28
Dezhnevo	West Kamchatka, Kamchatka-Kuril	45	8335	36
Total		**85**	**16560**	**64**
2014				
Odyssey-1	West Kamchatka	53	9687	27
Shantar-1	Karaginakaya, West Bering Sea	92	7523	37
Gefest	West Kamchatka	49	5081	41
Odyssey-1	West Kamchatka, Kamchatka-Kuril	56	10212	38
Andrey Smirnov	West Bering Sea	68	4189	43
Total		**318**	**36692**	**186**
2015				
Seawind	West Kamchatka	128	34090	60
Solid	West Bering Sea	4	885	
Tamango	West Bering Sea	8	1568	
Andrei Smirnov	West Bering Sea	68	9345	65
Shantar-1	West Bering Sea	8	1773	
	Karaginskaya	51	5158	
Svyatogor	West Kamchatka	42	9773	25
Total		**309**	**62592**	**150**
2016				
Rashkov	West Kamchatka	51	13331	
Svyatogor	West Kamchatka	17	4206	43
Alaid	West Kamchatka	5	471	9
Seawind	Kamchatka-Kuril	52	11220	36
Potapovo	Karaginakaya, West Bering Sea	200	4745	37
Total		**125**	**29228**	**125**
2017				
Real	Kamchatka-Kuril	28	5633	36
Olafsson	West Bering Sea	7	825	13
Asacha	West Kamchatka	21	4643	8
Real	Kamchatka-Kuril	6	1206	8
Rashkov	West Kamchatka	31	4050	45
Total		**93**	**16357**	**110**
2018				
Seawind	Kamchatka-Kuril	39	6427	24
Uzon	West Kamchatka	48	10176	39
Seawind	West Kamchatka, Kamchatka-Kuril	38	7872	24
Total		**125**	**24475**	**87**
2019				
Uzon	West Kamchatka	30	4133	15
Andrey Smirnov	West Kamchatka	26	4069	16
Solid-1	Petropavlovsk-Kommandorsky	19	2288	8
Florin		18	2097	7
Asacha	West Kamchatka	15	4165	3
Arka-35	West Kamchatka	37	8654	24
Total		**93**	**12587**	**73**
GRAND TOTAL		**1400**	**216055**	**795**

Table 23. Information used for the report used in this assessment to evaluate red (Камчатский) and blue (синий) crab bycatch (KamchatNIRO, 2020c). Columns: Year, Fishing area, Target species, Date, Coordinates and depth, Field operations, Samples.

Таблица 1

Количество, сроки и районы сбора материала, использованного в отчете

Год	Подзона	Целевой вид	Сроки	Координаты, глубины	Промысловые операции	Биоанализы, экз.
2017	61.05.4	Камчатский	03–04.09	53°40'-53°50' с.ш., 52–67 м	6	1207
	61.05.2	Камчатский	28.09–12.11	55°04'-55°30' с.ш., 54–105 м	31	4050
	61.05.2	Синий	21–26.04	58°57'-58°60' с.ш., 207–265 м	6	1683
2018	61.05.2	Камчатский	02.10–10.11	54°37'-56°02' с.ш., 50–312 м	48	11178
2019	61.05.2	Синий	14–28.01	57°46'-58°36' с.ш., 193–418 м	18	2811
	61.05.2	Синий	14–29.01	58°04'-58°27' с.ш., 323–356 м	15	1675
	61.05.2	Камчатский	01–04.09	55°01'-55°13' с.ш., 59–63 м	14	4165
	61.05.2	Камчатский	05–29.10	55°37'-55°54' с.ш., 59–284 м	37	8654
2020	61.05.2	Синий	09–16.03	57°40'-57°57' с.ш., 342–385 м	18	4295
	61.05.2	Синий	27–30.04	58°14'-58°25' с.ш., 252—362 м	12	1948
	61.05.4	Камчатский	04.10–02.11	51°02'-54°00' с.ш., 53–273 м	71	9243
	61.05.2	Камчатский	09–14.11	54°37'-54°51' с.ш., 55–163 м	23	5247
Всего	12 промысловых рейсов				299	56156

6.3.1.3. Catch Composition

In the trap fishery for red and blue king crabs, bycatch of other species is usually low (Terentyev *et al*., 2013; Moiseev, Moiseeva, 2016, 2017, 2019; KamchatNIRO, 2020; Khovansky, 2021). According to Cook *et al*. (2015), the low incidence of bycatch can be attributed to trap design: the top entry conical traps excludes many fish species, while the trap is constructed of netting of large mesh size (Figure 2).

Bycatch species include (references as above):

- Commercial crabs: Golden crab *Lithodes aequispinus,* Snow crab *Chionoecetes opilio*, Tanner crab *C. bairdi*, triangle Tanner crab *C. angulatus*.
- Fish: Greenland halibut (Pacific subspecies) *Reinhardtius hippoglossoides matsuurae*, rays *Bathyraja* spp., Pacific cod *Gadus macrocephalus*, walleye pollock *Gadus chalcogrammus,* gray rockfish *Sebastes glaucus,* shortraker rockfish *S. borealis,* great sculpin *Myoxocephalus polyacanthocephalus,* dragon poacher *Percis japonica*, salmon snailfish *Careproctus rastrinus*, Okhotsk snailfish *Liparis ochotensis*, Pacific halibut *Hippoglossus stenolepis*, Northern rock sole *Lepidopsetta polyxystra*, Yellowfin sole *Limanda aspera*, Alaska plaice *Pleuronectes quadrituberculatus*, dipline eelpout *Lycodes soldatovi,* broadbanded thornyhead *Sebastolobus macrochir,* Bering flounder *Hippoglossoides robustus,* flathead sole *H. elassodon,* Alaska snailfish *Careproctus colletti,* sculpins Cottidae spp., Irish lords *Hemilepidotus sp.*
- Other invertebrates: Hair crab *Erimacrus isenbeckii*, Verill's crab *Paralomis verilli*, lesser toad crab *Hyas coarctatus,* Chestnut octopus *Octopus conispadiceus*, pale sea urchin *Strongylocentrotus pallidus,* gastropods *Buccinum sp*. and *Neptunea sp*., starfish of genuses *Pteraster, Leethasterias and Evasterias*, common basket star *Gorgonocephalus caryi (eucnemis)* and sponges Porifera.

6.3.1.3.1. Bycatch composition

Bycatch in the red and blue crab fishery was analysed by KamchatNIRO (2020), based on scientific observations on board commercial vessels as described above. The results of this analysis are summarised in Table 24. For the red crab (UoA 1), blue crab and Tanner crab are main bycatch species, depending on fishing zone, while for the blue crab (UoA2), golden (brown) crab is a main bycatch species.

Table 24 Crab catch by species (%) according to main target species of the fishery and fishing areas (zone); target species in grey and 'main' bycatch species in bold (KamchatNIRO, 2020).

Fishing zone		**61.05.04**	**61.05.02**	**61.05.02**
Target species		**red**	**red**	**blue**
Red crab (%)	*Paralithodes camtschaticus*	83.4	88.4	3.3
Blue crab (%)	*P. platypus*	1.6	**8.9**	88.3
Golden (Brown) crab (%)	*Lithodes aequispinus*	2.5	1	**5.9**
Snow crab (%)	*Chionoecetes opilio*	0	0.1	2.4
Tanner crab (%)	*C. bairdi*	**12**	1.7	0.1
Hair crab (%)	*Erimacrus isenbeckii*	0.1	0.01	0

KamchatNIRO (2020) evaluated non-crab bycatch for the red crab fishery only. For the purpose of this ACDR we have assumed that the non-crab bycatch species composition in the blue crab fishery is the same as for the red crab fishery in zone 61.5.2. According to Igor Khovansky (MagadanNIRO), a scientist who has in the past been an observer, non-crab bycatch varies as a function of area and depth, more than by target species, but the same main taxa are represented across all three fisheries – i.e. eelpout, halibut, sculpins, snailfish and flounders, as well as whelks and octopus.

KamchatNIRO (2020) also evaluated non-crab bycatch separately from the above analysis of crab bycatch, meaning that we cannot directly compare the percentages of non-crab bycatch with the overall catch. However, they present data on crab bycatch in individuals per trap and other bycatch as individuals per trap line. Since we know that there are 200 traps in a trap line, we can use these data to make a rough comparison. However, this provides an estimate of % bycatch by individual abundance rather than weight, as stipulated by MSC. Bearing in mind that there is a size restriction on the individuals of any species that can enter the trap (the size of the trap entrance) there are not likely to be major disparities in size and therefore weight between the target crabs and the bycatch species, unless the bycatch species are smaller, in which case scoring by % individuals is more precautionary than scoring by weight. Nevertheless, for added precaution we have halved the thresholds used to determine main bycatch species to 2.5% and 1% depending on vulnerability.

Table 25 estimates the catch of crab (individuals) per trap line and estimates mean and minimum 2.5% thresholds (i.e. threshold for main bycatch species), as well as 1% thresholds (for vulnerable species). Table 26 shows bycatch of non-crab species (individuals) by trap line. It is clear that no species reaches close to the minimum 1% threshold in terms of individuals per trap line.

Table 25 Mean and minimum estimates of crab catch (all species) per trap line, by target species and zone, and corresponding thresholds for 'main' bycatch species. Blank = no data. Data from KamchatNIRO (2020).

Individuals (all crab species combined)	**Target species / fishing subzone**		
	Red / 61.05.4	**Red / 61.05.2**	**Blue / 61.05.2**
Individuals per trap 2017	12.9	10.2	21.4
Individuals per trap 2018		12.2	
Individuals per trap 2019		10.2	10.7
Individuals per trap 2020	0.8	4.9	13.1
Average individuals per trap 2017-2020	6.85	9.38	15.1
Average multiplied to line of 200 traps	1370	1876	3013
Lowest annual value multiplied to line of 200 traps	160	980	2140
2.5% of average (i.e. threshold value for main bycatch species, by individual)	34.3	46.9	75.5
2.5% of lowest (minimum threshold for main bycatch species, by individual)	4.0	24.5	53.5
1% of average (i.e. threshold value for main bycatch species, if vulnerable)	13.7	18.8	30.2
1% of lowest (minimum threshold for main bycatch species, if	1.6	9.8	21.4

vulnerable)			

Table 26 Non-crab bycatch, individuals per trap line (200 traps). 0.0=<0.05, blank = none. Data from KamchatNIRO (2020).

Species	Individuals per trap line 61.05.4	Individuals per trap line 61.05.2
Careproctus sp.	0.2	0.4
Gadus macrocephalus	1.2	2.6
Hemilepidotus sp.	1.1	2.4
Hippoglossoides sp.	0.0	0.2
Limanda aspera	-	0.7
Liparis sp.	0.6	1.1
Myoxocephalus sp.	0.7	1.3
Sebastes glaucus	0.1	0.7
Octopus sp.	1.3	0.5
Buccinum sp.	0.1	0.2
Neptunea sp.	0.4	4.8
Lethasterias sp.	0.3	0.2
Evasterias sp.	-	0.2
Gorgonocephalus caryi	0.0	1.3
Hyas coarctatus	-	0.3
Strongylocentrotus sp.	0.0	-
Porifera	0.0	0.9

6.3.1.3.2. Main bycatch species

The main bycatch species associated with each UoA are summarised in Table 25 based on the analysis above. See also a full list in Table 27 below.

Table 27 Main bycatch species and their categorisation, by UoA.

UoA	Main bycatch species		Management based on reference points?	Primary or secondary?
Red crab (UoA 1)	Blue crab	*P. platypus*	Yes	Primary
	Tanner crab	*C. bairdi*	Yes	Primary
Blue crab (UoA 2)	Golden (Brown) crab	*Lithodes aequispinus*	Yes	Primary

6.3.1.4. Primary bycatch species

Other than the target species, already discussed under Principle 1, the list of primary species in UoAs includes: Tanner (Baird's) crab *C. bairdi* (main), golden crab *Lithodes aequispinus* (main), snow crab (minor), triangle Tanner crab *C. angulatus* (minor), Pacific cod (minor), walleye pollock (minor), Pacific halibut (minor), hair crab (minor) and Greenland halibut (minor). These are species for which there is management in place based on reference points. Below we describe the stock status and management for the main primary species, and minor primary species in less detail. The target species already discussed under Principle 1 are not considered further here, but are included in P2 scoring as per MSC requirements.

6.3.1.4.1. Golden crab (main in UoA 2)

Golden crab is a target species in its own right, fished in a mixed fishery with snow crab in the NSOOS (where it is essentially distributed). It also represents a small percentage of the crab bycatch in the blue crab UoA, sufficient to make it a 'main' bycatch species.

Because golden crab is a target species, it has the same management strategy and regulations as blue and red crab (described in detail under Principle 1). An annual TAC is set based on a HCR defined using a target and limit biomass reference point (Btr and Blim) and a target level of fishing mortality. The TAC is set based on F=Ftr if B>Btr; if B<Blim the TAC is set to zero, and between (Btr>B>Blim) is a linear sliding scale of F. Btr is estimated to be consistent with Bmsy, and is set based on an estimate of B0 (50%B0), while Blim for this stock is set at 43% of Btr (Bmsy; 21.5% of B0).

For the golden crab NSOOS stock, Blim is set at 11,146 t and Btr at 25,721 t. The most recent biomass estimate (2018) estimated that biomass was around the target level (in the range 23-50,000 t, best estimate for current biomass ~30,000 t) (MagadanNIRO 2020).

6.3.1.4.2. Tanner crab *C. bairdi* (main in UoA 1)

In 2009-2018, annual Tanner crab catch in the KKS varied from 781 to 4159 t, according to the TAC, although in 2018, only 70% of the TAC was taken (Figure 29). In KKS in 2019 the abundance of Tanner crab was below Nlim (10.4 million individuals) and hence following the HCR fishing in 2019–2021 is prohibited except for research purposes (TAC = 20 t) (Figure 30).

According to KamchatNIRO specialists, the target abundance of Tanner crab in KKS is 23.1 million legal size males (Ilyin, Ivanov, 2018). It should be noted that the KamchatNIRO assessment of Tanner crab does not include mature large-clawed males with CW less than 120 mm, or immature small-clawed males, even if their carapace is wider than 120 mm. There is no TAC for Tanner crab in WKS and NSOOS, and low catch in these areas (see Table 28).

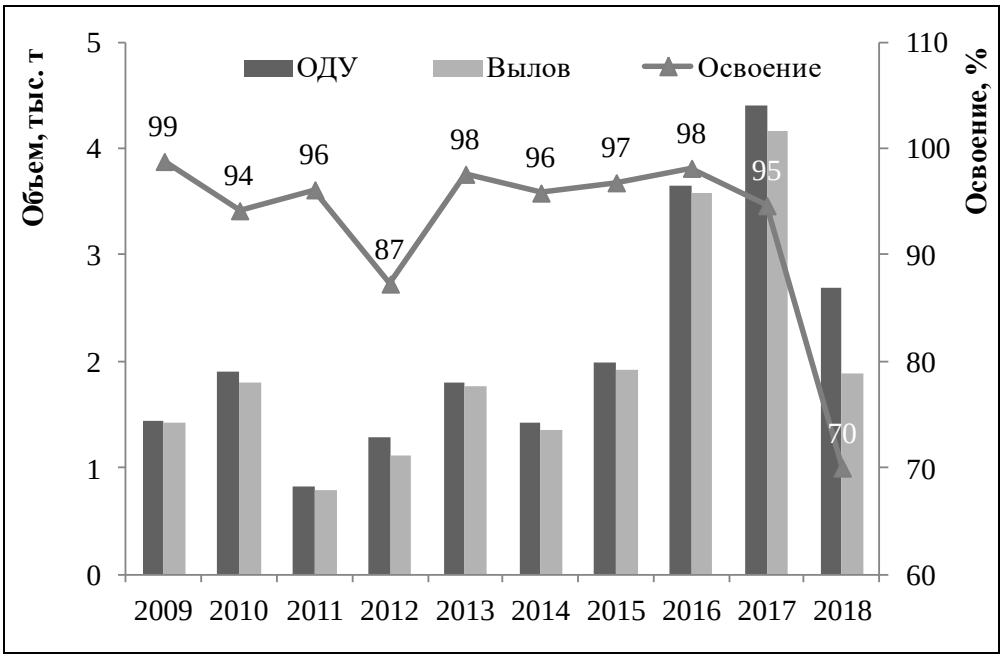


Figure 29 Interannual dynamics of TAC, catches and utilization of TAC of Tanner crab in the KKS in 2009–2018.
X axis – years, Y axes: left axis – volume, thousand tons (dark bars – TAC, light bars – catch); right axis – utilization of TAC, % (line with triangles) (KamchatNIRO, 2018).

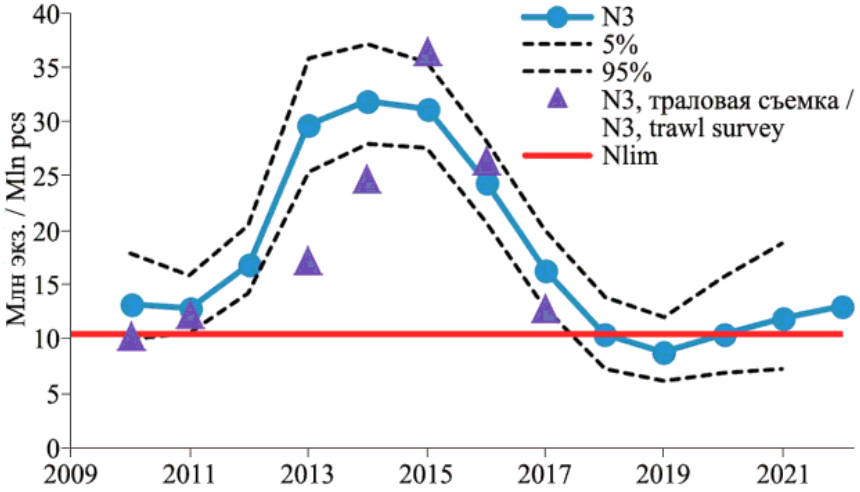


Figure 30 The abundance of the Tanner crab commercial large-clawed males (CW > 120 mm) in the Kamchatka-Kuril subzone south of 52° 30' N. (Ilyin, Ivanov, 2018).

6.3.1.4.3. Minor primary bycatch species

The stock situation for the minor primary species is summarised in Table 28. In all cases, the stock status is estimated to be satisfactory.

Table 28 Stock status in relation to reference points for the minor primary species (KamchatNIRO, 2020, 2020c). For Pacific halibut reference points are expressed in terms of an index biomass. FSN for hair crab is Fishing Stock Numbers (numbers of commercial-sized males).

Species		Stock	Reference points		SB 2019	Stock status	TAC 2021
			Limit	Target			
Tanner (triangle) crab	*Chionoecetes angulatus*	NSOOS	2700 t	9300 t	27600 t (2018)	FSB_{2018}>TRP	2458 t
Snow crab	*C. opilio*	NSOOS	39,100 t	130,400 t	364,600 t (2017)	FSB_{2017}>TRP	20,400 t
		WKS	3.7 million indivs	22.4 million indivs	6.4 million indivs (2018)	N<Ntr but >Nlim	200 t
Greenland halibut	*Reinhardtius hippoglossoides*	NSOOS, WKS, KKS	We do not have this information		165,000 t (SB)	'consistent with reference points' (MagadanNIRO, pers. comm.)	9,000 t
Walleye pollock	*Gadus chalcogrammus*	NSOOS, WKS, KKS	2.58 million t	5.09 million t	6.7 million t	SB_{2019}>TRP	1.06 million t
Pacific cod	*G. macrocephalus*	WKS, KKS	36930 t	50020 t	62300 t	SB_{2019}>TRP	25700 t
		NSOOS	Not targeted – unprofitable. Catch 2009-18 in range 80-580 t/yr				
Pacific halibut	*Hippoglossus stenolepis*	NSOOS, WKS, KKS	1024 t (min index B)	3829 t (max index B)	1997 (index B 2019)	Within range of index biomass	549 t
Hair crab	*Erimacrus isenbeckii*	WKS, KKS (no catch in NSOOS)	0.754 million individuals	2.478 million indivs	3.359 million indivs	FSN>target	48 t

6.3.1.5. Secondary bycatch species

No main secondary bycatch species have been identified for the blue and red crab fishery. There are a large number of minor secondary species, which are not considered individually.

6.3.1.6. Bait

SA3.1.7 The team shall consider species used as bait in the UoA, whether they were caught by the UoA or purchased from elsewhere, as either primary or secondary species using the definitions provided under SA 3.1.3 and SA 3.1.4 respectively.

All baits are caught outside the UoAs by companies belonging to the Far Eastern Rybak Management Company JSC. According to the client, the bait used for all UoAs is Pacific herring (*Clupea pallasii*) and Japanese sardine (*Sardinops melanostictus*). In 2019, 2,020 t of crabs were caught across all UoAs for 99 t of Pacific herring and 99 t of Japanese sardine; i.e. 4.9% of total crab catch for each kind of bait. Since this is close to the 5% threshold in each case and since we only have one year of data, we consider both bait species to be 'main' on a precautionary basis. These stocks are managed via a TAC based on reference points so they are primary species. Other species that were used as bait (11 t each) included heads of Pacific cod and Commander squid *Berryteuthis magister*. Both of these are considered minor primary species (Pacific cod is evaluated in Table 28 above).

6.3.1.6.1. Pacific herring (main primary, all UoAs)

Pacific herring is the second most important species in the Sea of Okhotsk in terms of catch volume after pollock. The stock is evaluated annually based on fisheries data, surveys and an aerial survey of spawning grounds (MagadanNIRO, 2020a), and biomass is estimated directly. A TAC is set based on a maximum % removal of spawning biomass, which is set depending on the age at maturity of the females in the stock.

The latest stock assessment of Pacific herring, conducted by MagadanNIRO (2018), indicates that herring is not overfished and overfishing is not occurring. The 2020 TAC for Pacific herring in NSOOS was 265,000 t (FFA 2019a). SSB (2018) is estimated at 1,632,300 t; i.e. the TAC is ~16% of SSB.

6.3.1.6.2. Japanese sardine (main primary, all UoAs)

This is a shared stock with Japan (Pacific stock). The stock is known to fluctuate on decadal timescales due (it is thought) to oceanographic processes which drive recruitment. The maximum annual catch of 4.5 million t was taken during a period of high abundance in the 1980s. The current stock biomass in the Pacific waters is low compared to the 1980s, but since 2009 there has been a steady increase in total and spawning biomass, confirmed by research surveys and fishery statistics, both Russian and Japanese. The stock is assessed using cohort analysis, and in 2018 total biomass was estimated at 3.484 million t, and spawner biomass at 1.629 million t.

The 2020 Recommended Catch for *Sardinops melanostictus* in Russian waters was 235,000 t and for 2021 it has been set at 429,080 t. Japanese catch of sardines in 2019 amounted to 525,000 t.

6.3.1.6.3. Commander squid (minor primary, all UoAs)

The latest stock assessment, conducted by TINRO (2020), indicates that Commander squid is not overfished and overfishing is not occurring. Blim is set at 110,000 t and Btr at 212,000 t. The 2020 TAC in the North Kuril zone was set at 85,000 t (FFA, 2019a).

6.3.1.7. ETP species

6.3.1.7.1. Definitions

The CAB team shall assign ETP (endangered, threatened or protected) species as follows:

1) Species that are recognised by national ETP legislation;

2) Species listed in the binding international agreements given below:

a) Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacted by the UoA under assessment is not endangered.

b) Binding agreements concluded under the Convention on Migratory Species (CMS), including:

ii. Annex 1 of the Agreement on Conservation of Albatross and Petrels (ACAP);

iii. Table 1 Column A of the African-Eurasian Migratory Waterbird Agreement (AEWA);

iv. Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS);

v. Annex 1, Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS);

vi. Wadden Sea Seals Agreement;

vii. Any other binding agreements that list relevant ETP species concluded under this Convention.

3) Species classified as 'out-of scope' (amphibians, reptiles, birds and mammals) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

6.3.1.7.2. ETP species in the area

The Sea of Okhotsk is important area for feeding, seasonal concentrations and breeding aggregations for 16 ETP species of marine mammals (Table 29) and 13 ETP species of seabirds (Table 30).

According to KamchatNIRO (2020c), MagadanNIRO (2020) and Khovansky (2021), ETP species are not found in bycatch during fishing crabs by traps in the Sea of Okhotsk. KamchatNIRO and MagadanNIRO have concluded that either the fishery has no impact on ETP species or the impact is extremely insignificant.

Seabirds

In relation to seabirds, however, scientists met (remotely) during the site visit stated that there is no specific information on seabird bycatch for this fishery, but in their view, given the nature of the gear it is unlikely. Dr Khovansky of MagadanNIRO, who has experience as an observer in the Golden (Brown) crab fishery, stated that birds may use the vessels as resting points but that he does not believe that there is any negative bycatch impact.

NOAA (US federal government) estimates seabird bycatch in the Alaska groundfish fishery annually, including the groundfish pot fishery. Although these traps are different from those used to target crab in this fishery, they give an indication of the possibility of seabird bycatch in a pot fishery in this region. The 2018 report (Krieger *et al*., 2019) notes that the pot fishery was the groundfish fishery with the lowest bycatch (accounting for 2.5% of the total bycatch on average). Most of the bycatch is surface foraging birds (gulls, fulmars, shearwaters) which do not enter the pot when deployed but most likely enter or crash into the pot on deck during poor weather. Some divers such as guillemots and puffins have also been found as bycatch; in some cases these may have been predated by the Pacific cod (target species of the fishery). Taking the annual average seabird bycatch 2010-2018 for groundfish pot fisheries in Alaskan federal waters, the total is 165 seabirds per year, of which 134 are northern fulmar (*Fulmarus glacialis*); all other species have an average annual bycatch of <20 birds.

Mammals

There is a data received from observers, which states that no any interactions were observed between mammals and the fishery (Tatiana Shulezhko, pers. comm.). Lowry *et al*. (2018) note that a total of 52 entangled gray whales were reported along the US west coast during 2012−2016. In 11 cases, the fishing gear involved was from the Dungeness crab *Cancer magister* pot fishery. Total entanglements increased to 31 in 2017 and 45 in 2018 (Tatiana Shulezhko, pers. comm.). The reason for this apparent increase is not known, although the timing of migration in relation to warming waters may be a factor. Humpback, grey and blue whales were involved.

NOAA has conducted some modelling of potential fishery sources of mortality to large whales in the US northwest and Alaska (overlap of large whales with distribution of fishing gear of different types), and concluded that the Dungeness crab pot fishery posed the highest risk to large whales of any fishery. Similar modelling for the Sea of Okhotsk suggests that the crab fishery poses the second highest risk to large whales of any fishery in the area.

However, there is at present no direct evidence for any large whale entanglements in this fishery equivalent to the situation in the US, even though vessels must mark traps and ropes so in cases where strandings are found with gear, the fishery and even vessel could be identified. Part of the reason could be that the critical hotspot for large whales in the region (the Kuril Strait) is not part of the fishing area for this fishery, and there are also likely to be differences in the distribution of effort (less concentrated) and the set up of the traps in terms of the amount of ropes and buoys.

The risk to other cetaceans (toothed whales), seals and other mammals is thought to be low, according to Dr Shulezhko.

Filatova *et al*. (2022) evaluated the distribution of the main cetacean species in and around the Sea of Okhotsk based on sightings during surveys and opportunistic data collection (tourist cruises) from 2003-2017. Their analysis can be combined with the fishery footprint in Figure 8, Figure 17 to evaluate whether there is any plausible overlap of these cetacean species with the fishery.

Table 29 Endangered, Threatened or Protected (ETP) species of marine mammals in the Sea of Okhotsk based on data from Kuzin (2016), sites: www.redbookrf.ru, www.iucnredlist.org and www.russianpollock.com.

Name of species	Status of habitation in Russian Far Eastern seas	Likely geographical overlap with fishery based on Filatova *et al*. (2022)	Protection status*
LARGE WHALES			
Gray whale, *Eschrichtius robustus* Lilljeborg, 1861	Gray whales live in the northern half of the Pacific Ocean only, from the Chukchi Sea and the Sea of Okhotsk to the coast of Japan, North Korea and Mexico. Its Chukotka-California stock spends winter in Mexican and Californian waters and feeds in the Chukchi Sea and the Bering Sea in summer. Its Okhotsk-Korean feeding grouping spends winter in Japanese waters and off Korean Peninsula and feeds in the Sea of Okhotsk. Its key feeding areas in the Sea of Okhotsk are coastal waters off Northeast coast of Sakhalin Island where the feeding population was estimated at 271-311, excluding calves, in 2016 (Cooke 2018).	No overlap in sightings with crab fishing area	RL IUCN(LC), RB RF(5) Gray whale commercial hunting has been prohibited by the International Whaling Commission since 1946.
North Pacific Right whale, *Eubalaena japonica* Lacepede, 1818	It lives in the northern part of the Pacific Ocean including the southern part of the Bering Sea (to the south of Olyutorsky Bay), the Sea of Okhotsk and farther south till 20–30° N. In summer, this whale stays in its feeding areas in the Sea of Okhotsk, off Kuril and Commander Islands, and in winter it travels to the southern part of its geographic range. The low number of sitings in surveys make the population size difficult to quantify.	No overlap with sightings with crab fishing area; but since the population is very small this cannot be relied on	RL IUCN(EN), RB RF(1) Hunting was fully prohibited in 1946.
Bowhead whale, *Balaena mysticetus* Linnaeus, 1758	Bowhead whales belonging to two stocks –the Bering-Chukchi and the Sea of Okhotsk stocks –live near Kamchatka	Observed to be a coastal species; low overlap with	RL IUCN(LC), RB RF(3) Bowhead whale

Name of species	Status of habitation in Russian Far Eastern seas	Likely geographical overlap with fishery based on Filatova *et al*. (2022)	Protection status*
	shores. The Bering-Chukchi stock spends winter in the Bering Sea staying along north-eastern shores of Kamchatka and Chukotka. As ice melts, whales migrate to the Chukchi Sea. In the Sea of Okhotsk, bowhead whales stay during summer in the area ranging from West Kamchatka coast to Sakhalin Island in the south.	blue and possibly Golden (Brown) crab areas; none with red	commercial hunting was initially prohibited by the International Whaling Convention in 1935. This ban was confirmed by a resolution of the International Whaling Commission in 1946.
Fin whale, *Balaenoptera physalus* Linnaeus, 1758	Its Asian stock is distributed from the Chukchi Sea to Taiwan Island. From its wintering areas in southern seas, fin whale migrates to its summer feeding areas in the Sea of Okhotsk and the Bering Sea. In summer, it stays along Kamchatka's western and eastern coast and off Commander Islands.	Yes	RL IUCN(EN), RB RF(2) Since 1946, this whale has been protected by international environmental laws. Hunting for this whale is prohibited.
Humpback whale, *Megaptera novaeangliae* Borowski, 1781	It populates the World Ocean from tropics to Arctic seas but its abundance is very low everywhere. In the northern part of the Pacific Ocean, one stock (American) migrates from the Chukchi Sea to Lower California and Mexico and the another one (Asian) migrates from Olyutorsky Bay to Hawaii and Taiwan.	No overlap in sightings with crab fishing area	RL IUCN(LC), RB RF(1) Since 1966, this whale has been protected by international environmental laws; hunting for this whale is prohibited.
Blue whale *Balaenoptera musculus* Linnaeus, 1758	In the western part of the North Pacific, blue whale is distributed south of the Bering Sea to Taiwan Island (1). It spends winter in waters off Southeast Japan and of North Korea but seldom appears in the Sea of Japan (2). In spring, it migrates along Kuril Islands and eastern shores of Kamchatka to the Olyutorsky Bay (1). In earlier times, it migrated up to the Chukchi Sea.	(Not included in analysis but based on the description from IUCN, no geographical overlap with the fishery)	RL IUCN(EN), RB RF(1) Hunting for blue whale was prohibited in all areas in 1955.
TOOTHED WHALES / SMALL CETACEANS			
Harbor porpoise (North Pacific subspecies) *Phocoena phocoena vomerina* Gill, 1865	In Far Eastern waters, this porpoise lives in the coastal strip from the Sea of Japan and the Sea of Okhotsk to the Chukchi Sea. Off Kamchatka and Commander Islands, it is observed virtually everywhere.	Yes	RL IUCN(LC), RB RF(4)
Common dolphin	In Russian waters, this species was	(not including the	RL IUCN(LC)

Name of species	Status of habitation in Russian Far Eastern seas	Likely geographical overlap with fishery based on Filatova *et al*. (2022)	Protection status*
Delphinius delphis Linnaeus, 1758	observed in the south of the Bering Sea, in the Sea of Okhotsk (except its northern part and Gizhigin Bay) and in the Sea of Japan. It inhabits waters off Commander and Kuril Islands. Possibly, its mass and regular migrations are seasonal for this region. Modern taxonomic studies are needed for common dolphin living in Russia's Far Eastern seas.	analysis)	
Beluga whale *Delphinapterus leucas* (Pallas, 1776)	Belugas occur in two well-separated regions of the Okhotsk Sea. In the north-eastern region, they summer along the coast and in estuaries of Shelikhov Bay and winter along the ice edge of the Bay and north-western Kamchatka. Based on surveys in 2010, Shpak and Glazov (2013) estimated there were 1,333 surface-visible Belugas in the north-eastern Okhotsk Sea, resulting in an estimate of 2,666 total whales when corrected for availability bias (animals not seen because they were diving). In the western Okhotsk Sea, Belugas occur in the northern Sakhalin Bay and Amur River region as well as several smaller bays along the Shantar coast (Ulbansky Bay, Udskaya Bay, Tugursky Bay and Nikolskaya Bay. There Shpak and Glazov (2013) estimated 4,780 visible Belugas and 9,560 in total.	Yes	RL IUCN(LC)
Sperm whale, *Physeter catodon (macrocephalus)* Linnaeus, 1758	Its geographic range is normally limited by areas of abrupt drops of depth combined with cyclonic currents where warm and cold waters mix together.	Observed in the fishery area but at low sighting rates – core area (Kurils) does not overlap with fishery	RL IUCN(VU) Commercial hunting for sperm whale stopped in 1979.
Risso's dolphin *Grampus griseus* Cuvier, 1812	In the Pacific, it lives in the waters of China, Japan and California. In the Far East, it is distributed from the Sea of Japan to Commander Islands including the Pacific coast of Kamchatka.	(Not included in analysis but based on the description from IUCN, no geographical overlap with the fishery)	RB RF(4)
Orca *Orcinus orca* Linnaeus, 1758	The orca, as the taxon is presently defined and recognized, does not meet any of the IUCN Red List criteria for a	Not observed in crab fishing areas	RL IUCN(DD), RB RF(4)

Name of species	Status of habitation in Russian Far Eastern seas	Likely geographical overlap with fishery based on Filatova *et al*. (2022)	Protection status*
	threatened status. Killer Whales are numerically abundant (at least tens of thousands of mature individuals) and very widely distributed. Experts agree that the present taxon likely includes more than one subspecies, and possibly multiple species. Some small regional populations are known to have declined significantly and would easily qualify for a threatened status if assessed individually (Reeves et al., 2017).		
PINNIPEDS / OTHER			
Sea otter *Enhydra lutris* (Linnaeus, 1758)	Near Russia's Asian coast, sea otter lives in Kamchatka Peninsula from Cape Sivuchiy on its western coast to Cape Africa on its eastern coast and in Kuril Islands and Commander Islands. Their distribution is likely to be too strictly coastal to overlap with the fishery.	n/a	RL IUCN(EN), RB RF(5)
Steller's sea lion *Eumetopias jubatus* (Schreber, 1776)	In Russian waters, this sea lion is distributed from the Bering Strait to Japan. It is observed year-round near Kamchatka and Commander Islands. Its distribution noticeably varies on a seasonal basis. In winter, sea lions live both in coastal waters and at ice edge and also stay in the high seas in pollock and herring fishery areas.	n/a	RL IUCN(NT), RB RF(2)
Common seal (Kuril subspecies — Western Pacific harbor seal) *Phoca vitulina stejnegeri* J. Allen, 1902	Near Russia's Asian coast, this seal lives in Kamchatka Peninsula from Cape Sivuchiy on its western coast to Bolshaya Chazhma R. mouth on its eastern coast, and on the coast of Kuril and Commander Islands. Occasional individuals may travel 100 km and more north of the above said boundaries in Kamchatka.	n/a	RB RF(3)
Northern fur seal, Callorhinus ursinus	The global population of Northern Fur Seals includes breeding areas extending from the Kuril Islands of Russia, across the Bering Sea, south to the west coast of the United States with the southernmost rookery in the Channel Islands of California. The population has shown inconsistent trends at particular areas with the most dramatic change occurring at the largest breeding rookery,	n/a	RL IUCN(VU)

Name of species	Status of habitation in Russian Far Eastern seas	Likely geographical overlap with fishery based on Filatova *et al*. (2022)	Protection status*
	St. Paul Island, Pribilof Islands, Alaska.		

Note: * RL IUCN – Red List of IUCN, protection status indicated in parentheses: DD – Data deficient, EN – Endangered, LC – Least concern, NT – Near threatened, VU – Vulnerable ; RB RF – Red Book of Russia, protection status indicated in parentheses: 1 – endangered, 2 – decreasing, 3 – rare, 4 – uncertain status, 5 – rehabilitated and rehabilitating.

Table 26 Endangered, Threatened or Protected (ETP) bird species in the Sea of Okhotsk based on data from sites: www.redbookrf.ru, www.iucnredlist.org and www.russianpollock.com.

Name of species	Status of habitation in Russian Far Eastern seas	Protection status *
Short-tailed albatross *Phoebastria albatrus* (Pallas, 1769)	Nesting on Torishima Island (Izu Islands) and Minami Kojima Island (Senkaku Islands). This species migrates all over the North Pacific north of the trade wind zone including Far Eastern seas.	RL IUCN (VU), RB RF (1) Listed in the Red Book of Asia, CITES Annex 1, Bonn Convention Annex 1, Annexes to bilateral agreements concluded by Russia with Japan on migratory birds protection.
Black-footed albatross *Phoebastria nigripes* (Audubon, 1839)	Its main nesting colonies are found in Hawaii Islands and small numbers breed in Mukoshima, Torishima and Senkaku Islands south of Japan. Their migration area encompasses nearly entire subtropical and temperate zones of the North Pacific, except shelf waters.	RL IUCN (NT) Listed in the Red Book of Asia, Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.
Leach's storm petrel *Oceanodroma leucorhoa* (Vieillot, 1817)	This petrel's nesting area includes sea coasts and islands of the Atlantic and the Pacific Oceans, primarily in the temperate zone of the Northern hemisphere. In the Pacific region, its distribution area extends from Hokkaido across Kuril and Aleutian Islands to the Gulf of California on the American coast. These migratory birds are common in adjacent deep-water areas of the Pacific Ocean and sometimes travel to the south-western part of the Bering Sea. Its main wintering areas are found in the tropical zone and south of the subtropical zone of the Pacific.	RL IUCN (VU) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.
Fork-tailed storm petrel *Oceanodroma furcata* (Gmelin, 1789)	Its nesting area extends from the central group of Kuril Islands across Aleutian Islands to California coast. Its main wintering areas are located in the high seas of the Pacific toward south to 35° N. Small numbers of these birds spend winter in the southern part of the Bering Sea and off Kamchatka on its Pacific side.	RL IUCN (LC) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.

Name of species	Status of habitation in Russian Far Eastern seas	Protection status *
Red-faced cormorant *Phalacrocorax urile* (Gmelin, 1789)	It nests on the sea coasts of the southern part of Kamchatka Peninsula and in Commander Islands. The northern boundary of its distribution area on the eastern coast of Kamchatka passes across Stolbovoy Island. In Commander Islands, its distribution area encompasses all main islands of this archipelago.	RL IUCN (LC) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.
Glaucous-winged gull *Larus glaucescens* Naumann, 1840	Its nesting area extends from Commander Islands along Aleutian Islands and Pacific coast of America till the state of Oregon. In Kamchatka region, it regularly nests in Commander Islands only. Large numbers of this gull migrate along the eastern coast of Kamchatka during seasonal migrations. Small numbers of migrating birds reach the coast of the Sea of Okhotsk. In winter, this species is common in Commander Islands, near Kamchatka in the Bering Sea and the Pacific Ocean.	RL IUCN (LC) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.
Aleutian Tern *Onychoprion aleuticus* Baird, 1869	Its geographic range is located in the North Pacific on two continents: North America where this species inhabits the coast of Alaska and Aleutian Islands, and Asia where it inhabits Sakhalin, Kamchatka, Anadyr Estuary, Shantar Islands and, sporadically, mainland coast of the Sea of Okhotsk. Thus, in Asia it inhabits the territory of the Russian Federation only.	RL IUCN (LC), RB RF (3) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.
Pigeon guillemot *Cepphus columba* Pallas, 1811	Its nesting area is located from Commander Islands to Adak Island in the central part of Aleutian Islands. In Commander Islands, these birds inhabit all major islands of this archipelago – Bering I., Medny I., Toporkov I. and Ariy Kamen I. The nesting grounds of its Commander population were not identified exactly. In winter, individual birds are observed near Commander Islands but the majority of population seems to migrate to Aleutian or Commander Islands.	RL IUCN (LC), RB RF (3) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.
Kittlitz's murrelet *Brachyramphus brevirostris* (Vigors, 1829)	Its nesting area and migration range are not clearly known. In Asia, it nests on the coast of Chukotka Peninsula, Arctic coast till De Long Strait and Wrangel Island, north-eastern coasts of the Sea of Okhotsk and eastern coast of Kamchatka north of Kamchatka Bay. In winter, it is observed in ice leads off the southern coast of Chukotka, in Kamchatka waters and off Kuril Islands. Outside Russia, it lives in West and South Alaska, Aleutian and Diomede Islands.	RL IUCN (NT), RB RF (3) Listed in the Red Book of Asia, Annex to bilateral agreement between Russia and USA on migratory birds protection.
Ancient murrelet *Synthliboramphus antiquus*	Its nesting area extends from the northern coast of China across the Sea of Japan and the Sea	RL IUCN (LC), RB RF (4) Listed in Annexes to bilateral

Name of species	Status of habitation in Russian Far Eastern seas	Protection status *
(Gmelin, 1789)	of Okhotsk, Aleutian Islands and the Gulf of Alaska to British Columbia. This species was quite common (abundant in some places) all over the coastal area from the northern boundary of Koryak Autonomous District to the extreme south of Kamchatka. In Commander Islands, it was observed in Bering, Medny and Ariy Kamen Islands in the breeding season. In winter, ancient murrelet was registered in Commander Islands but normally it spends winter south of Kamchatka.	agreements between Russia and USA, Japan, Republic of Korea and DPRK on migratory birds protection.
Whiskered auklet *Aethia pygmaea* (Gmelin, 1789)	Its nesting area encompasses Aleutian, Commander, Kuril Islands and islands of the Sea of Okhotsk. In Commander Islands, this bird was registered in all major islands of this archipelago but its nesting behaviour was credibly proven for Medny Island only. In the season of summer-autumn migrations, this bird is observed near the coast of East Kamchatka. Wintering locations are not clearly identified for whiskered auklets nesting in the north of the Far East. In Commander Islands, they are possibly resident and spend winter in waters around these islands.	RL IUCN (LC), RB RF (3) Listed in Annex to bilateral agreement between Russia and USA on migratory birds protection.
Least auklet *Aethia pusilla* (Pallas, 1811)	It nests primarily on sea coasts and islands of the Bering Sea and the Sea of Okhotsk. Only two breeding locations were identified in Kamchatka region – Toporkov Island (Commander Islands) and Verkhoturov Island. Intensive migrations of least auklets nesting in large numbers in the northern part of the Bering Sea are observed during their seasonal migrations along the coast of East Kamchatka. It spends winter in large numbers south of Commander Islands and Southeast Kamchatka till Korean Peninsula.	RL IUCN (LC) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.
Parakeet auklet *Cyclorrhynchus psittacula* (Pallas, 1769)	It nests on sea coasts and islands southward of Bering Strait along the Asian coast till Tuleniy Island and along the American coast till Prince William Sound. In Kamchatka region, there are colonies on Vasily Island, Verkhoturov Island and all major islands belonging to Commander Archipelago – Bering I., Medny I., Toporkov I. and Ariy Kamen I. It is expected that wintering locations of the majority of birds are found in the high seas of the northern part of the Pacific Ocean. Small numbers of these auklets spend winter in the ice-free southern part of the Bering Sea and along continental coasts.	RL IUCN (LC) Listed in Annexes to bilateral agreements between Russia and USA and Japan on migratory birds protection.

Note: * RL IUCN – Red List of IUCN, protection status indicated in parentheses: DD – Data deficient, EN – Endangered, LC – Least concern, NT – Near threatened, VU – Vulnerable ; RB RF – Red Book of Russia, protection status indicated in parentheses: 1 – endangered, 2 – decreasing, 3 – rare, 4 – uncertain status, 5 – rehabilitated and rehabilitating.

6.3.1.8. Habitats

6.3.1.8.1. Mapping of habitats and benthos

The West Kamchatka shelf (main habitat and reproductive zone of the red and blue king crabs) is one of the most well-studied regions in the Far Eastern seas, due to its high biological productivity and commercial importance. The distribution of bottom habitats and forage benthos on the Western Kamchatka shelf were initially presented in the "Atlas of Oceanographic Data of the Fishing Regions of the Bering and Okhotsk Seas" (Atlas…, 1957), and the benthic community has been assessed in numerous research studies since that time (e.g., Kuznetsov, 1980; Nadtochy, 1984; Nadtochy, Koblikov , 2001).

VNIRO regularly conducts bottom trawl surveys of the shelf and continental slope of the western coast of Kamchatka, and the results of these studies are published in a large number of publications, including those published in recent years (Volvenko, 2014; Gorbatenko, 2018; Shuntov, Temnykh, 2018 a, b; and many others; cited in KamchatNIRO, 2020, and MagadanNIRO, 2020). There is an active benthic research program for the Sea of Okhotsk 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. These studies provide broad understanding of the types and distributions of main habitats, as well as the nature, distribution, and vulnerability of the main habitats in the UoAs areas (KamchatNIRO, 2020; MagadanNIRO, 2020).

Figure 31 shows a map of bottom sediments of the Sea of Okhotsk. Most of the seabed is soft sediment, and factors such as distribution of grain size, carbon and calcium carbonate content and sediment formation and dynamics are understood (e.g. Romanova, 2014).

The area is highly volcanic (part of the Pacific 'ring of fire') and in some areas of the Sea of Okhotsk the sediment is characterised by methane seeps and a reducing (deoxygenated) environment. Karaseva *et al*. (2019, 2020) mapped these areas using siboglinids – polychaetes characteristic of these ecosystems. Siboglinids more commonly known from abyssal depths can be found in the Sea of Okhotsk at depths of less than 400 m where sediment methane concentration is high (Figure 32).

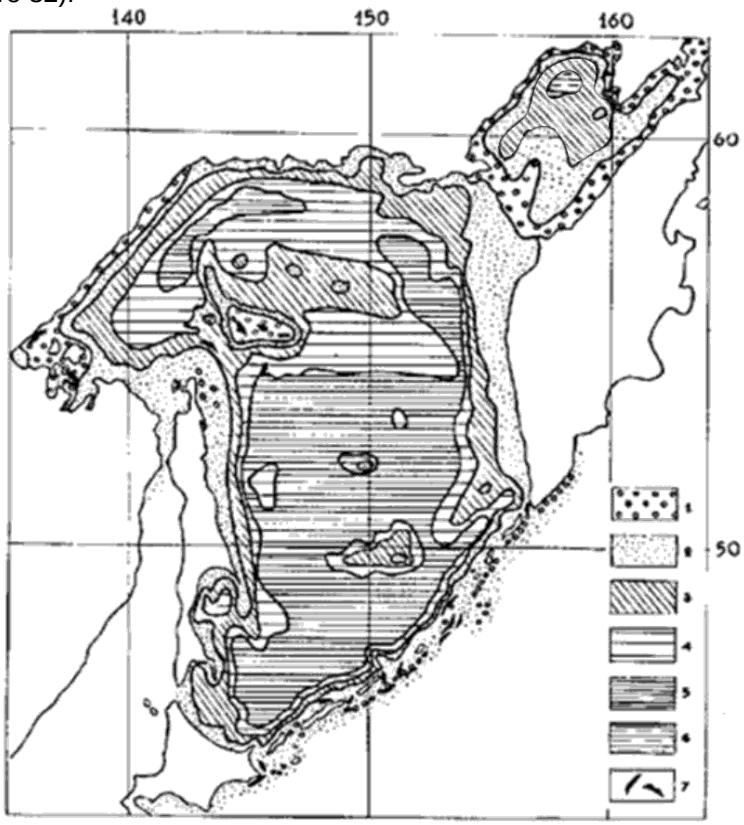


Figure 31 Bottom sediments of the SOO.
1 – boulder-gravel-pebble; 2 – sand; 3 – silt; 4 – silty-clayey diatom muds; 5 – clayey diatom muds; 6 – silty-clayey muds without silica; 7 – rock outcrops (Bezrukov, 1960).

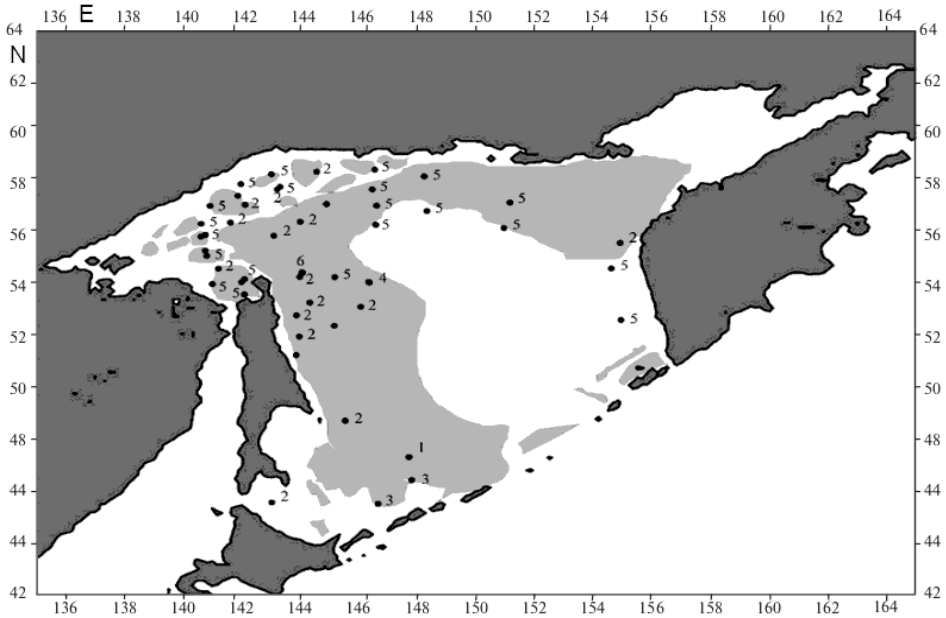


Figure 32 Distribution of finds of Siboglinid in the Sea of Okhotsk (numbers indicate different species). The light grey area covers the 'siboglinid zones' where the methane concentration in the sediment is >5 x10³ ml/kg (Karaseva *et al*., 2019).

6.3.1.8.2. VMEs

Russian legislation does not specifically designate any types of marine habitat as VMEs, so in our analysis here we follow the methodology used by CABs assessing other Russian fisheries, in considering a suite of potential VME indicator taxa (Lloyd's Register, 2020a).

The distributions of the main benthic taxa are mapped (Nadtochy *et al*., 2007); including urchins, bivalves, polychaetes, holothurians and total macrobenthic biomass (Figure 33, 34), as well as potential VME indicators such as sponges (Figure 35) and Alcyonacea (soft corals; Figure 36). Species richness and species diversity/evenness is also mapped (Volvenko, 2015; Benthic macrofauna, 2014). There is extensive research available on different macrobenthic groups; for example, recent studies of the bryozoan fauna on the western continental shelf and slope of Kamchatka have detected numerous new bryozoan species in the area, as well as one new cyclostome genus and four new cheilostome genera, indicating a more complex endemic and mixed local bryozoan fauna than previously thought.

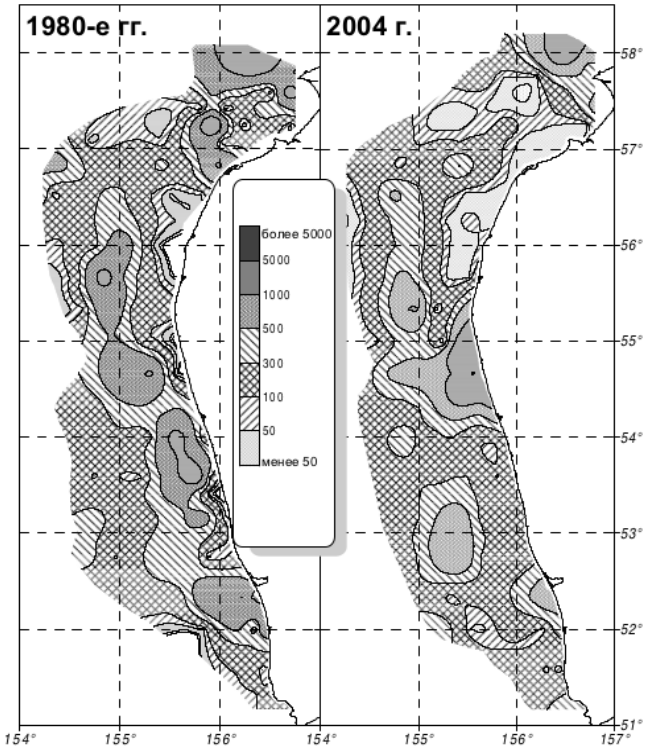


Figure 33 Distribution of macrobenthos biomass on the shelf of western Kamchatka, g/m² (Nadtochy *et al*., 2007).

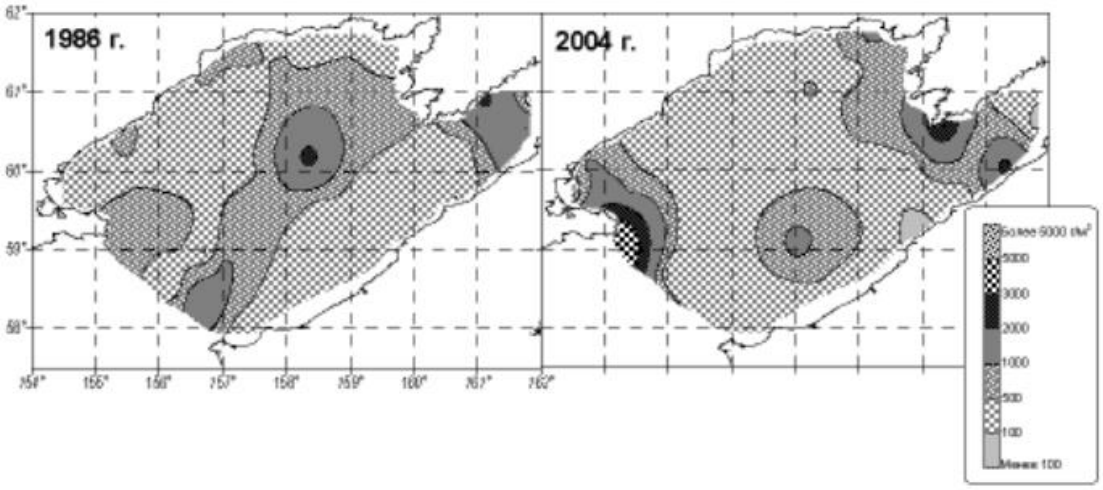


Figure 34 Distribution of macrobenthos biomass on the shelf of Shelikhov Bay, g/m² (Nadtochy *et al*., 2007).

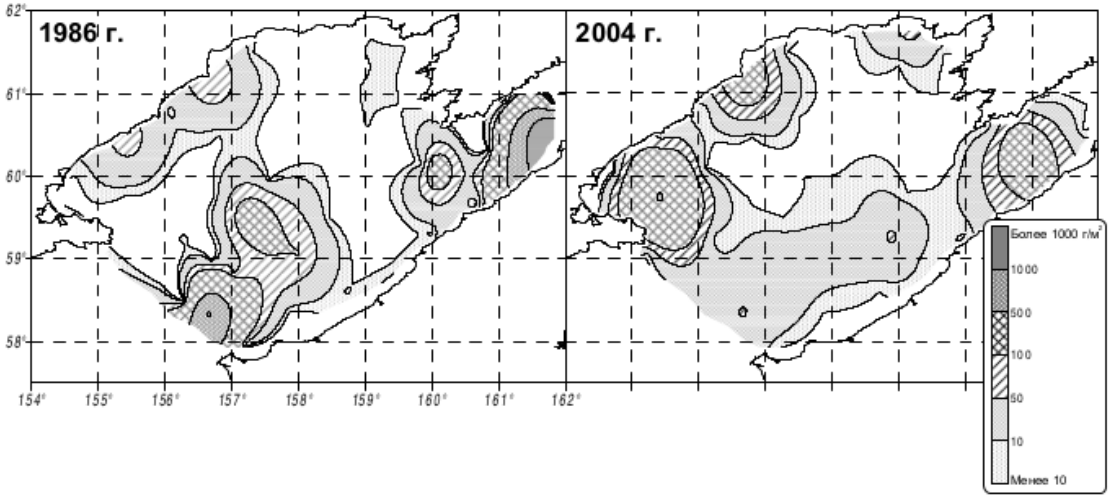


Figure 35 Distribution of sponge biomass on the shelf of Shelihov Bay, g/m² (Nadtochy *et al.*, 2007).

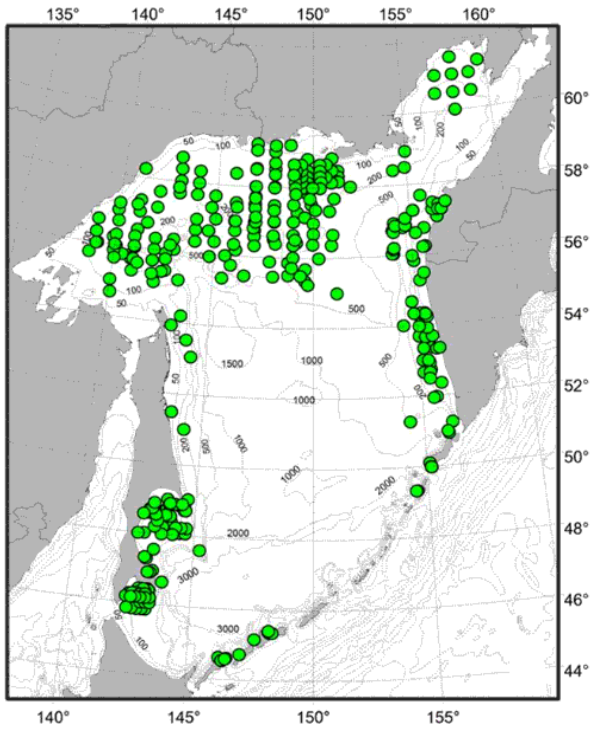


Figure 36 Distribution of Alcyonacea (soft corals; VME indicator species) in the Sea of Okhotsk according to trawl surveys (1963–2013), (Dulepova, 2017, cited in Acoura Marine, 2018).

6.3.1.8.3. Overlap of the fishery with different habitats

The red crab fishery (UoA 1) takes place in areas of soft sediment such as sand, silt and mud (Figure 8, Figure 31), which makes up the 'commonly-encountered habitat' for this UoA. Based on the potential overlap of the fishing area (Figure 1) with VME indicator taxa (e.g. soft corals; Figure 36), we cannot rule out VME encounters for this UoA.

The blue crab fishery (UoA 2) in the northern part of the WKS (Shelikhov Bay and Babushkina Bay) is mainly confined to boulder-gravel-pebble grounds (Figure 17, Figure 31). The rest of the fishery is confined to soft sediments. Again, however, we cannot rule out encounters with VMEs based on the presence of indicator taxa in these areas (soft corals, sponges; Figure 35, Figure 36).

6.3.1.8.4. Gear impacts on habitats

According to reports of research institutes (KamchatNIRO 2020, MagadanNIRO 2020), in conditions of normal operation traps are not pulled along the bottom, and they report that there is not considered to be any destructive impacts on the seabed or on benthic communities. Traps (pots) are considered less damaging than trawls or

dredges because they are static gears (NOAA, website accessed 26 July 2020: http://www.fishwatch.gov/profiles/red-king-crab) and make contact with a small area of the seafloor. Traps can affect habitat, however, because they do not always remain entirely stable on the seafloor. In the case of this fishery, they can get dragged across the seafloor when being removed, especially during a storm. Morgan and Chuenpagdee (2003) conducted a study to gauge the relative severity of impacts associated with all commercial fishing gears and compared and ranked the overall ecological impact of each gear type. They found that traps (including the kind used in the king crab fishery) generally have a “medium impact” on physical structure and a “low impact” on biological habitat (seafloor organisms).

6.3.1.9. Ecosystem

6.3.1.9.1. Physical oceanography and productivity

The Kamchatka Current flows south out of the Bering Sea and exchanges water with the Sea of Okhotsk through the deep straits between the Kuril Islands. Water from the Sea of Japan (Tsushima Current) also enters the Sea of Okhotsk through Soya Strait in the south (between Sakhalin and Hokkaido). After entering the Sea of Okhotsk, the northern flowing West Kamchatka Current carries water into Shelikhov Gulf. The Yamskoy Upwelling is located at the mouth of Shelikhov Gulf, making this area very productive. A large gyre dominates the western portion of Shelikhov Gulf itself, but water can leave the gulf via the Yamskoe Current (Lapko & Radchenko, 2000). Once out of Shelikhov Gulf, water flows in a counter clockwise direction until eventually leaving the Sea of Okhotsk and flowing back into the Bering Sea around the southern portion of the Kuril Islands (Figure 37) (Lapko & Radchenko, 2000; Talley, 2001).

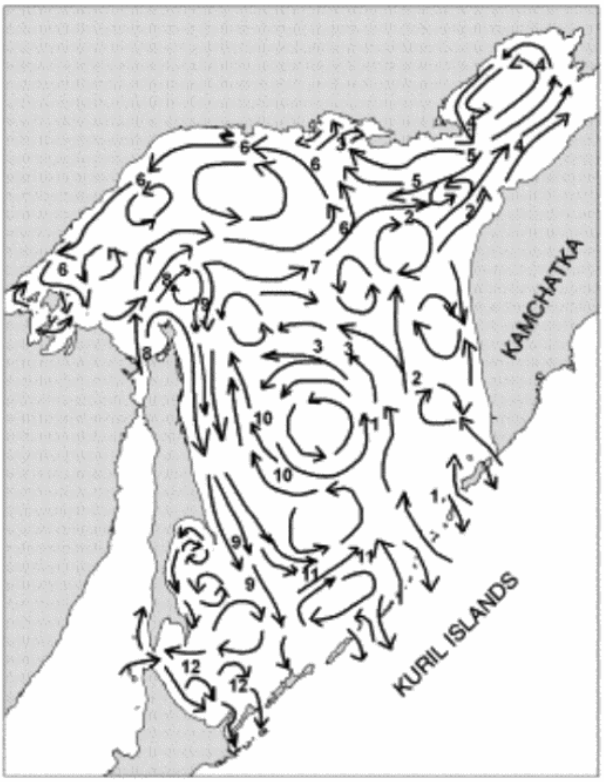


Figure 37 Scheme of general water circulation in active layer in the Sea of Okhotsk in summer.
1: West Kamchatka Current; 2: its Northern Branch; 3: Middle Current; 4: Penzhinskoe Current; 5: Yamskoe Current; 6: Northern Okhotsk Current; 7: Northern Okhotsk Concurrent; 8: Amurskoe Current; 9: East Sakhalin Current; 10: East Sakhalin's Concurrent; 11: North-eastern Current; 12: Soya Current (Lapko & Radchenko, 2000).

This section is based on Shuntov *et al*. (2019) except where otherwise indicated.

The Sea of Okhotsk is in the temperate boreal zone, however, it is 2500 km long (NE-SW) causing significant differences in the climate, hydrological regime and fauna between north and south. The northern and north-western parts of the Sea of Okhotsk are cooled in winter to the extent that lenses of very cold water persist in the near-bottom layers over vast areas even during the summer while surface waters warm, reaching 10–14 °C. The Soya Current warms the surface layers of the southern Sea of Okhotsk to 15–20 °C, and Pacific water also warms the north-eastern and central parts of the sea relative to the northern and north-western parts.

The high levels of productivity in the Sea of Okhotsk derive from this complex oceanography. Due to the relatively limited water exchange with the Pacific Ocean during the summer, and strong stratification, the upper layer is separated from the deep waters, which are rich in nutrients, by a cold intermediate layer. Under these conditions, and with low river runoff, the supply of nutrients to the surface layer only occurs at sites of strong vertical mixing and in upwelling regions: Iony-Kashevarov in the north-west, Yamsky-Taui and Ust-Khairyuzov in the north-east, and off the Kuril Islands. These are easily identified as cold spots in the surface layers (Figure 38). The Shelikhov Gulf, particularly the entrance (Yamsky upwelling) is thought to be one of the most productive marine areas in the world.

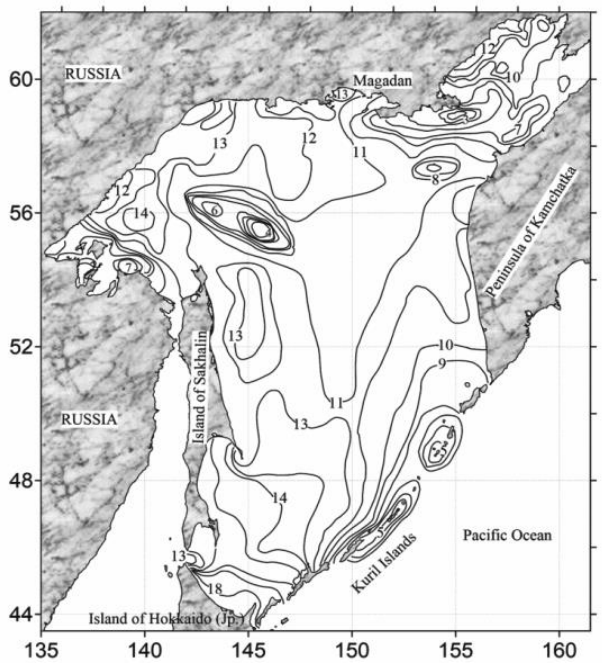


Figure 38 Long-term mean distribution of sea surface temperature in the Sea of Okhotsk LME in August (Shuntov *et al*., 2019).

6.3.1.9.2. Fauna

Zooplankton communities in the Sea of Okhotsk are dominated by copepods, euphausiids, chaetognaths, and amphipods. Except for chaetognaths, this is the key forage resource for nekton. Estimates of the total biomass of zooplankton in the Russian waters of the Far Eastern seas (in the 1980s) were ~1.8 billion (10^9) tons in summer, with annual production of ~10 billion tons. Of this the Sea of Okhotsk accounts for ~one third.

Benthic biomass and productivity is likewise estimated to be high: estimates at various times during the 20th century gave values of 380–400 gm $^{-2}$ for the shelf zone and ~150 gm $^{-2}$ overall, with an annual productivity of 230 gm^{-2} / 360 million t overall. Given that these estimates come from grab samples, they are likely to be underestimates.

The biomass of benthos appears to have increased over the past three decades (Shuntov, 2001; Nadtochy *et al*., 2007). In the Sea of Okhotsk, bottom grab surveys conducted in the 1970s and 1980s were repeated in 2002-2004 using the same grid of sampling stations. The total biomass was slightly lower on the western Kamchatka Shelf, but slightly higher in the Shelikhov Gulf, and on the eastern Sakhalin shelf. The relative proportions of various taxonomic groups and species varied somewhat but the authors suggest that this is a sampling artefact, since benthic species are often very patchily distributed. However, there is evidence of some systemic change; e.g. the common sand dollar (*Echinarachnius parma)* on the Kamchatka Shelf has shifted the northern boundary of its distribution ~120 miles north over the last 10 years, but its density and proportion in the community have significantly decreased (Fedorov and Popov, 1986; Nadtochy *et al*., 2007). The reasons for this are unclear.

Epipelagic fish biomass consists mostly of Walleye pollock (*Gadus chalcogrammus)*, Pacific herring (*Clupea pallasii)*, Capelin (*Mallotus villosus catervarius)*, and Pink salmon (*Oncorhynchus gorbuscha)*. In the mesopelagic zone (>200m) the most abundant fish species are the northern Smoothtongue (*Leuroglossus schmidti)*, Walleye pollock, Garnet lanternfish (*Stenobrachius nannochir)*, and Eared blacksmelt (*Lipolagus ochotensis)* (Shuntov, 2016). Squid accounts for 6% of nekton biomass in the epipelagic zone and 3% in the mesopelagic zone. The density of nekton is estimated at 21.0 t km^{-2}; higher than surrounding waters except adjacent to the Kuril Islands upwelling area (Shuntov, 2016). There is also a high biomass of demersal fishing, including Giant grenadier (*Albatrossia pectoralis*), Greenland halibut (turbot) *Reinhardtius hippoglossoides matsuurae*, Pacific cod (*Gadus macrocephalus*), Yellowfin sole (*Limanda aspera*), and Popeye grenadier (*Coryphaenoides cinereus*). As you would expect, biomass and species composition varies by area, relating to productivity (upwelling) and temperature. Demersal biomass is low in the northern areas where lenses of very cold water remain close to the bottom year round.

6.3.1.9.3. Marine mammals and birds

The abundance of marine mammals in the Sea of Okhotsk and other parts of the Far Eastern Seas has fluctuated due to periods of significant overharvesting (Sobolevskii, 1983; Shuntov, 2016). Due to the lack of large-scale harvesting in the last quarter of the 20th century, numbers of marine mammals in Far Eastern seas has increased: estimates are ~560,000 cetaceans and up to 2 million pinnipeds. According to the latest data, the number of nesting seabirds is estimated at 11.7 million (auks, 75%; petrels, 19%; gulls, 5%). In addition, 34 species of birds are

recorded as nomadic and seasonally migratory, totally a further 4.15 million individuals including ~3 million southern hemisphere shearwaters.

6.3.1.9.4. Ecosystem trophic structure and energy flows

The idea that there was a limited food supply for nekton and nektobenthos in the Far Eastern seas and the North Pacific was generally accepted for many decades (Nikolsky, 1974; Birman, 1985; Klovach, 2003; Karpenko *et al*., 2013), and a range of hypotheses have been put forward as to possible indirect ecosystem effects and trophic cascades resulting from competition for food (e.g. overfishing of flounder → increase in sculpins and other non-commercial species; overfishing of herring and perch → increase in abundance of walleye pollock (Fadeev, 1971); overfishing of whales → reduction of smaller marine mammals due to orca predation (Springer et al., 2003); food competition as driving factor for competition between Pacific salmon species (Birman, 1985; Klovach, 2003; Karpenko *et al*., 2013).

However, more recent research by TINRO-Center suggests that this characterisation of the ecosystem as food limited is unlikely. Based on surveys of zooplankton and nekton, biomass estimates of different functional groups and stomach content analysis across a wide range of species, they have shown that there is a much higher concentration of food in the ecosystem than previously thought, even in winter, and very little evidence of food limitation as a key ecosystem driver (Shuntov, 2001, 2016; Dulepova, 2002; Kuznetsova, 2005; Chuchukalo, 2006; Shuntov and Temnykh, 2008, 2011; Naydenko, 2010).

Following on from this research has been attempts to characterise and quantify energy flows and trophic relationships in the ecosystem (Radchenko, 2015; Gorbatenko, 2018; Figure 40, 41). Extensive information is available on the trophic status of the 118 most abundant animal species using stable isotopes of carbon and nitrogen, allowing researchers to reconstruct the patterns of energy fluxes in pelagic and bottom communities of the Sea of Okhotsk (Gorbatenko *et al*., 2013, 2014; Gorbatenko, 2018). This confirms the earlier more qualitative conclusions about the structure of communities and highlights the flexibility of relationships in trophic networks and the high level of biological capacity, leading to the considerable carrying capacity of the Sea of Okhotsk ecosystem. The complexity of trophic networks makes trophic cascades unlikely or impossible. Although Red, Blue and Golden (Brown) king crabs participate in the flow of energy, their role in this process is not very significant.

6.3.1.9.5. Climate change

There is some research on the impact of climate change in the Sea of Okhotsk ecosystem. In the 1980s, a generally warm period, the Sea of Okhotsk had large stocks of gadoids, especially walleye pollock. In the 1990s the ecosystem cooled and by the mid-1990s to the early 2000s, the total biomass of fish in the Sea of Okhotsk decreased significantly. By the end of that decade, however, there was a renewed warming and a corresponding increase in the abundance of walleye pollock (Kim Sen Tok, 2012). The overall long-term trend appears to be towards warming, with associated reduction in dissolved oxygen and sea ice formation and extent (Oshima *et al*., 2009; Figure).

It is not that surprising that given that cold temperatures are one of the limiting factors for biomass and species abundance in the Sea of Okhotsk (as explained above), some degree of warming is likely to have a generally positive effect on biomass and biodiversity, although the impact on some taxa is likely to be negative (e.g. see https://www.climatehotmap.org/global-warming-locations/sea-of-okhotsk.html).

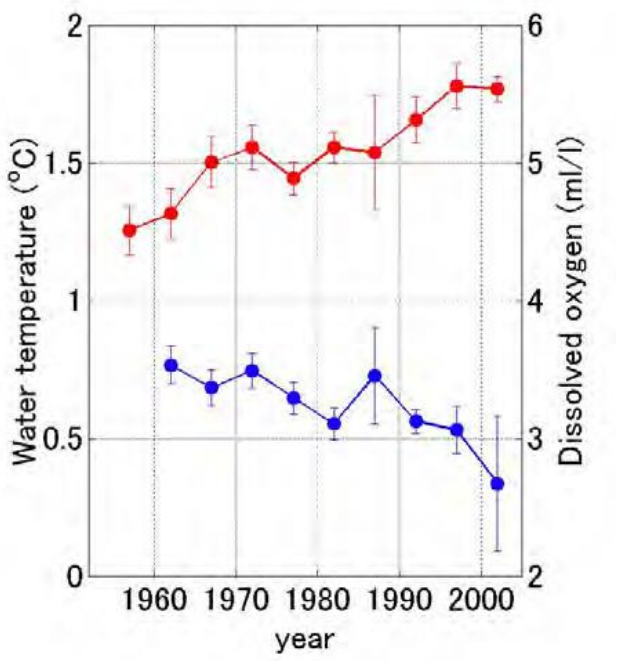


Figure 39 Time series of potential temperature (red line) and dissolved oxygen content (blue line) of the intermediate water at 27.0σθ , averaged over the Sea of Okhotsk, during the past 50 years. Closed circles show a 5-yr average with errors at the 95% confidence interval for the averages. From Oshima *et al*., 2009

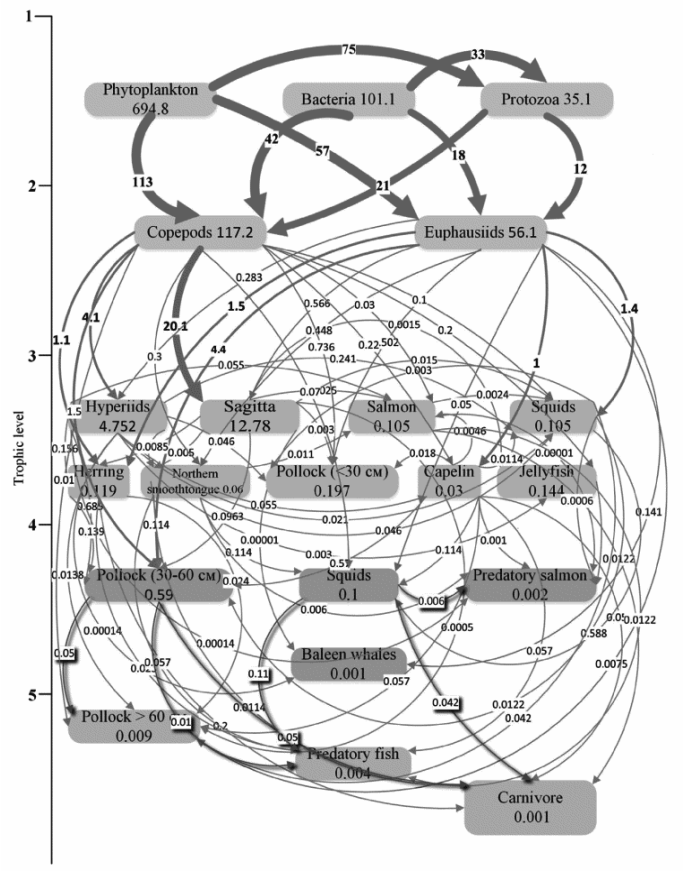


Figure 40 Pattern of energy fluxes in the pelagic zone of the Sea of Okhotsk LME in the 2000s. Values in rectangles are the production, million tC year^{-1}; values on arrow lines are the amount of energy consumed by the following trophic link, million tC year^{-1}. (Gorbatenko, 2018).

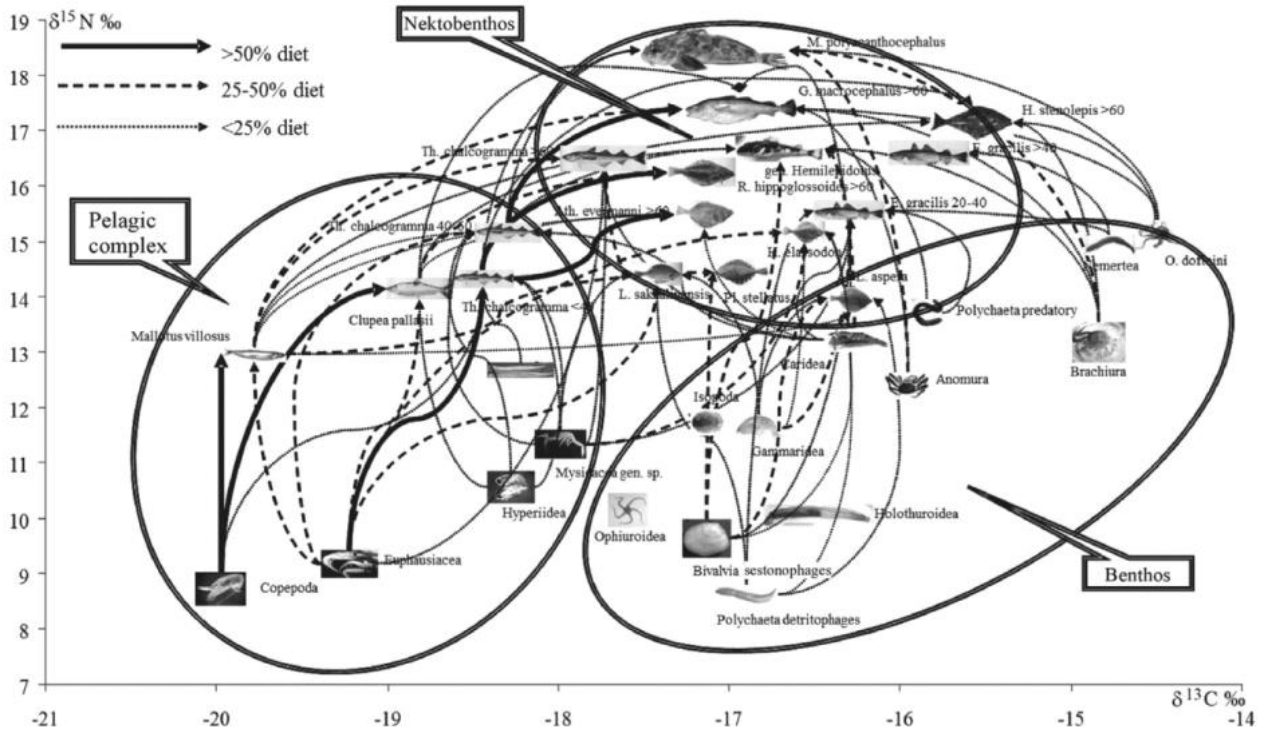


Figure 41 Trophic relationships on the western Kamchatka Shelf, as inferred from stomach contents and values of stable isotopes of carbon δ 13 C and nitrogen δ 15 N (Gorbatenko, 2018).

Table 27 Scoring elements*

Component	Scoring elements	Designation	Data-deficient
P1	Red king crab (*Paralithodes camtschaticus*)	Target	No
P1	Blue king crab (*Paralithodes platypus*)	Target	No
Primary	Golden (Brown) king crab (*Lithodes aequispinus*)	Main	No
Primary	Tanner crab (*Chionoecetes bairdi*)	Main	No
Primary	Pacific herring (*Clupea pallasii*)	Main (bait)	No
Primary	Japanese sardine or pilchard (*Sardinops melanostictus*)	Main (bait)	No
Primary	Commander squid (*Berryteuthis magister*)	Minor (bait)	No
Primary	Snow crab (*Chionoecetes opilio*), Greenland halibut (*Reinhardtius hippoglossoides*), Pacific halibut (*Hippoglossus stenolepis*), Pacific cod (*Gadus macrocephalus*), Pollock (*Gadus chalcogrammus),* Hair crab (*Erimacrus isenbeckii*). Triangle Tanner crab (*Chionoecetes angulatus*)	Minor	No
Secondary	Eelpout (*Lycodes soldatovi*), Verill's crab (*Paralomis verrilli*), *Bathyraja* spp., *Sebastes glaucus, S. borealis, Myoxocephalus polyacanthocephalus, Percis japonica*, *Careproctus rastrinus*, *Liparis ochotensis*, Northern rock sole *Lepidopsetta polyxystra*, Yellowfin sole *Limanda aspera*, Alaska plaice *Pleuronectes quadrituberculatus*, *Sebastolobus macrochir, Hippoglossoides robustus, H. elassodon, Careproctus colletti,* Cottidae spp., *Hemilepidotus* sp., *Hyas coarctatus, Octopus conispadiceus*, sea urchin *Strongylocentrotus pallidus,* gastropods *Buccinum sp.* and *Neptunea sp.*, starfish of genus *Pteraster, Leethasterias and Evasterias*, basket star *Gorgonocephalus caryi*	Minor	not evaluated

ETP	See Table 29 and Table 30	N/A	No
Habitat	Soft bottom	Commonly encountered	No
Habitat	Hard substrata with epifauna	Indicative of VME	Possibly
Ecosystem	Sea of Okhotsk	N/A	No

* Based on data from: Terentyev *et al*., 2013; Moiseev, Moiseeva, 2016, 2017, 2019; KamchatNIRO, 2020c; Khovansky, 2020; Khovansky, 2021.

6.3.2. Principle 2 Performance Indicator scores and rationales

PI 2.1.1 – Primary species outcome

PI 2.1.1		The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI		
Scoring Issue		SG 60	SG 80	SG 100
a	Main primary species stock status			
	Guide post	Main primary species are **likely** to be above the PRI. OR If the species is below the PRI, the UoA has measures in place that are **expected** to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are **highly likely** to be above the PRI. OR If the species is below the PRI, there is either **evidence of recovery** or a demonstrably effective strategy in place **between all MSC UoAs which categorise this species as main**, to ensure that they collectively do not hinder recovery and rebuilding.	There is a **high degree of certainty** that main primary species are above the PRI **and are** fluctuating around a level consistent with MSY.
	Met?	**Yes**	**Yes**	**Yes – blue crab, golden (brown) crab** **No – Tanner crab, Japanese sardine, Pacific herring**

Rationale

Main primary species are as follows:

UoA 1: Blue crab *Paralithodes platypus*, Tanner crab *Chionoecetes bairdi*, Pacific herring *Clupea pallasii*, Japanese sardine *Sardinops melanostictus*

UoA 2: Golden (brown) crab *Lithodes aequispinus*, Pacific herring *Clupea pallasii*, Japanese sardine *Sardinops melanostictus*

Blue crab is evaluated in detail under Principle 1, and this information is not repeated here. The stock is above the PRI with high probability and at a level consistent with MSY (see PI 1.1.1). **SG 60, SG 80 and SG 100 is met for this stock.**

Golden (brown) crab is estimated by MagadanNIRO (2020) to be at a level consistent with Btr (biomass as estimated by a combination of trawl survey and fishery CPUE data) in the range 23-50 kt, Btr 25,721 t. Blim is set at 11,146 t and the biomass is considered to be above this level with high probability. Btr is set at 50%B0 and hence is consistent with Bmsy. **SG 60, SG 80 and SG 100 is met for this stock.**

Tanner crab abundance in 2019 was estimated to be below Nlim, so taking this as a PRI proxy it is not sure that the stock is above the PRI. In 2019-21 therefore, the commercial fishery is closed, with a TAC of 20 t set only for research purposes. All catch of this species must be discarded and vessels must move on from areas of high bycatch (FR, 2019). Some research has been done into discard mortality in king crabs, suggesting that it is relatively low although increases if the crab is caught several times in a short time period (Moiseev, Moiseeva, 2010). Hence there are measures in place to avoid the fishery hindering recovery and rebuilding – SG60 is met. The stock assessment projections suggest that at this level of fishing mortality, the stock should recover, making it

demonstrably effective. There are no other MSC UoAs which categorise this stock as main. **SG 60 and SG 80 are met. SG 100 is not met.**

Pacific herring is not considered to be overfished. The 2020 TAC was 265 kt and the 2020 SB was estimated at 2.3 million t. the highest in the time series (MagadanNIRO, 2021). This fishery used 99 t in 2019, i.e. 0.04% of the TAC. Therefore it is highly unlikely that this fishery would affect stock status of Pacific herring, and since biomass is high the stock should be above the PRI with high probability. **SG 60 and SG 80 are met. SG100 is not met** ('a level consistent with MSY' is difficult to define for this stock).

Japanese sardine is well below historic high levels but biomass is on an increasing trend. The 2020 RC for the Russian fleet was 235 kt, while in 2019 the Japanese fleet took more than 0.5 million t from the stock. The bait uses by this fleet of 99 t in 2019 means that it is highly unlikely that this fishery would affect stock status of Pacific herring. **SG 60 and SG 80 are met**. **SG 100 is not met** ('a level consistent with MSY' is difficult to define for this stock).

b	Minor primary species stock status			
	Guide post			Minor primary species are highly likely to be above the PRI. OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species.
	Met?			**Yes – all UoAs**

Rationale

Minor primary species are as follows:

Bycatch: snow crab (*C. opilio*), triangle Tanner (snow triangle) crab *C. angulatus*, Greenland halibut, walleye pollock, Pacific cod, Pacific halibut, hair crab.

Bait: Commander squid.

All the minor bycatch stocks are healthy relative to defined reference levels, as set out in Table 28, replicated below (**KamchatNIRO, 2020c)**.

Species		Stock	Reference points		SB 2019	Stock status	TAC 2021
			Limit	Target			
Tanner (triangle) crab	*Chionoecetes angulatus*	NSOOS	2700 t	9300 t	27600 t (2018)	FSB_{2018}>TRP	2458 t
Snow crab	*C. opilio*	NSOOS	39,100 t	130,400 t	364,600 t (2017)	FSB_{2017}>TRP	20,400 t
		WKS	3.7 million indivs	22.4 million indivs	6.4 million indivs (2018)	N<Ntr but >Nlim	200 t
Greenland halibut	*Reinhardtius hippoglossoides*	NSOOS, WKS, KKS	We do not have this information		165,000 t (SB)	'consistent with reference points' (MagadanNIRO, pers. comm.)	9,000 t
Walleye pollock	*Gadus chalcogrammus*	NSOOS, WKS, KKS	2.58 million t	5.09 million t	6.7 million t	SB_{2019}>TRP	1.06 million t
Pacific cod	*G. macrocephalus*	WKS, KKS	36930 t	50020 t	62300 t	SB_{2019}>TRP	25700 t
		NSOOS	Not targeted – unprofitable. Catch 2009-18 in range 80-580 t/yr				
Pacific halibut	*Hippoglossus stenolepis*	NSOOS, WKS, KKS	1024 t (min index B)	3829 t (max index B)	1997 (index B 2019)	Within range of index biomass	549 t

Hair crab	*Erimacrus isenbeckii*	WKS, KKS (no catch in NSOOS)	0.754 million individuals	2.478 million indivs	3.359 million indivs	FSN>target	48 t

Triangle Tanner crab: Biomass is estimated to be above the TRP so it is highly likely to be above the PRI. Met.

Snow crab NSOOS: Biomass is estimated to be above the TRP so it is highly likely to be above the PRI. Met.

Snow crab WKS: Biomass is below the TRP but ~73% above Blim (proxy for the PRI). The 2021 TAC is set at a low level (200 t) and there is evidence that the stock is recovering (KamchatNIRO 2020a), the TAC having been set to zero for several years. On this basis, it is likely that the stock is above the PRI; perhaps highly likely but we do not have a quantitative estimate of probability, There is also evidence that the the UoA is not hindering recovery and rebuilding, since the TAC is low and the stock is reportedly recovering. Met.

Walleye pollock: Biomass is estimated to be above the TRP so it is highly likely to be above the PRI. Met.

Pacific cod: Biomass is estimated to be above the TRP so it is highly likely to be above the PRI. Met.

Pacific halibut: Biomass is within management range, so the stock is highly likely to be above the PRI. Met.

Hair crab: FSN is above the target level, so the stock is highly likely to be above the PRI. Met.

Commander squid: Determined to be not overfished (see Section 7.3.1.6.3), so highly likely to be above the PRI. Met.

SG 100 is met for all minor primary species.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a, 2021;
- Moiseev, Moiseeva, 2010, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019.
- Puchnina, 2016;

Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**85**
Condition number (if relevant)	**NA**

Scoring for SIa by scoring elements

Scoring element	**Score**
UoA 1	
Blue crab	100
Tanner crab	80
Pacific herring	80
Japanese sardine	80
Overall score for UoA 1 for the PI	85
UoA 2	
Golden (brown) crab	100
Pacific herring	80
Japanese sardine	80
Overall score for UoA 2 for the PI	85

PI 2.1.2 – Primary species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to be above the PRI.	There is a **partial strategy** in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the PRI.	There is a **strategy** in place for the UoA for managing main and minor primary species.
	Met?	**AlIs UoA – Yes**	**All UoAs – Yes**	**All UoAs – Yes**
Rationale				

Definitions

In the context of this performance indicator (Source: MSC FCR v2.01; Table SA8):

- “Measures” are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.

- A “partial strategy” represents 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.

- A “strategy” represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts.

Crab species: The king crab fishery is managed by the FFA, which issues permits for each vessel that list all the species they are allowed to catch. The requirement for permits, the use of TACs based on reference points, and limitation of gear types are the primary management measures for primary species (KamchatNIRO, 2020). These measures are targeted directly at managing the crab fishery and are adjusted according to the status of each stock (e.g. minimal 20 t research TAC for Tanner crab at present to allow stock recovery, supported by stock status projections; see Figure). Hence for the crab main primary species, **SG 60, SG 80 and SG 100 are met.**

Bait species: These stocks are managed either by Russia directly (herring, squid) or jointly with Japan (sardine). Each stock is managed via a TAC which is set based on a stock assessment. For Pacific herring, fisheries data and surveys plus an aerial survey of spawning are used to obtain a direct estimate of biomass each year; the TAC is currently set at ~16% of biomass. For Japanese sardine, the stock is assessed using cohort analysis with data from both fleets, and a TAC set for both Russia and Japan. For Commander squid, a TAC is likewise set based on an annual stock assessment.

In terms of the UoA, there are measures that limit the impact on bait to a low level, in that the quantity of bait required is minor relative to the biomass and catch from these stocks. Overall, between these two there is a strategy for bait stocks – **SG 60, SG 80 and SG 100 are met.**

Minor bycatch stocks: Greenland halibut and walleye pollock are managed via a TAC, set by stock assessment and reference points, as is Pacific cod, Pacific halibut, hair crab, snow crab and triangle Tanner crab, as set out in Table 28, replicated below (**KamchatNIRO, 2020c)**. This constitutes a strategy for managing these species, since the management measures are responsive to data on the state of the stock. **SG 60, SG 80 and SG 100 are met.**

Species		Stock	Reference points		SB 2019	Stock status	TAC 2021
			Limit	Target			
Tanner (triangle) crab	*Chionoecetes angulatus*	NSOOS	2700 t	9300 t	27600 t (2018)	FSB_{2018}>TRP	2458 t
Snow crab	*C. opilio*	NSOOS	39,100 t	130,400 t	364,600 t (2017)	FSB_{2017}>TRP	20,400 t
		WKS	3.7 million indivs	22.4 million indivs	6.4 million indivs (2018)	N<Ntr but >Nlim	200 t
Greenland halibut	*Reinhardtius hippoglossoides*	NSOOS, WKS, KKS	We do not have this information		165,000 t (SB)	'consistent with reference points' (MagadanNIRO, pers. comm.)	9,000 t
Walleye pollock	*Gadus chalcogrammus*	NSOOS, WKS, KKS	2.58 million t	5.09 million t	6.7 million t	SB_{2019}>TRP	1.06 million t
Pacific cod	*G. macrocephalus*	WKS, KKS	36930 t	50020 t	62300 t	SB_{2019}>TRP	25700 t
		NSOOS	Not targeted – unprofitable. Catch 2009-18 in range 80-580 t/yr				
Pacific halibut	*Hippoglossus stenolepis*	NSOOS, WKS, KKS	1024 t (min index B)	3829 t (max index B)	1997 (index B 2019)	Within range of index biomass	549 t
Hair crab	*Erimacrus isenbeckii*	WKS, KKS (no catch in NSOOS)	0.754 million individuals	2.478 million indivs	3.359 million indivs	FSN>target	48 t

b	Management strategy evaluation			
	Guide post	The measures are considered **likely** to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

Crabs: Management has shown the ability to recovery the stock from low levels in the past. TACs are set at a relatively precautionary level relatively to estimated total biomass, and stock assessments are supported by extensive data including fisheries data, surveys and extensive research into crab biology. For the depleted Tanner crab (*C. bairdii*) and snow crab (WKS), projections suggest that the zero / low commercial TAC will allow the stock to recover (Figure 41). This provides an objective basis for confidence in the strategy – **SG 60 and SG 80 are met.**

Greenland halibut and other minor bycatch fish species: For Greenland halibut, exploitable biomass in 2019 is estimated at 126,000 t and SB 165,000 t, with SB projected to decline to 115,000 t in 2021. The TAC for 2021 was set at 9,000 t (i.e. ~8% of SB) (MagadanNIRO, 2020a). In other words, the TAC is set at a precautionary level

relative to the biomass. In addition, trap design should limit the quantity of fish entering the trap as well as allowing small fish and crabs to exit (large mesh). **SG 60 and SG 80 are met.**

Bait stocks: These stocks are also managed by TACs set based on stock assessments and/or direct biomass estimates. The strategy for Pacific herring is supported by aerial surveys of spawning, in addition to the other sources of information. There is information sharing with Japan to manage the sardine stock, which remains depleted relative to high historic levels but is showing clear signs of recovery, providing an objective basis for confidence that it is working. SG80 is met.

Although there are elements of 'testing' for some of the stocks (e.g. stock assessment projections under zero TAC for Tanner crab), it is not clear that there is systematic 'testing' (in the sense of management strategy evaluation or similar approaches). **SG 100 is not met** for all UoAs**.**

	Management strategy implementation			
c	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its overall objective as set out in scoring issue (a).**
	Met?		**All UoAs – Yes**	**All UoAs – Yes**
Rationale				

The requirement for logbooks, registered landing ports and effective monitoring, control and surveillance (see Principle 3) suggest that the measures are being implemented as required. Scientific observers have evaluated bycatch and shown it to be low (see Section 7.3.1.3: Catch composition). TACs appear to be respected and all stocks except Tanner crab are above the PRI, while for Tanner crab strict measures (zero commercial TAC) are in place. This provides clear evidence that the strategy is being implemented and achieving the outcome of maintaining or recovering the stocks and/or ensuring that the fishery does not impact them significantly. **SG 80 and SG 100 are met.**

	Shark finning			
d	Guide post	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	**NA**	**NA**	**NA**
Rationale				

Not relevant – no sharks.

	Review of alternative measures			
e	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**
Rationale				

Some bycatch of snow and Tanner crabs can take place, but they are released and research shows that their discard mortality is acceptable, especially if they experience only a single capture (MagadanNIRO 2019). There has been review of the potential effectiveness and practicality of alternative measures to minimize UoAs mortality of these crabs, and as a consequence, move-on rules were brought in to minimize mortality (FR 2019; see further details provided in PI 1.2.1). **SG 60 is met**.

These and other alternative measures are potential topics at regular fishery council meetings, where management authorities receive feedback on management practices from the industry and other interested stakeholders. While no written report on these meetings was available to the reviewers, anecdotally, according to federal government stakeholders, these regular fishery council meetings provide evidence that potential measures are kept under review. **SG 80 is met**.

There is no formal review process of this fishery regarding the gear and deployment to minimise UoA-related mortality of unwanted catch of primary species, since, as traps have been traditionally used and are considered low impact. **SG 100 is not met**.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a, 2021;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**90 for all UoAs**
Condition number (if relevant)	**NA**

PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impact on main primary species			
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main primary species with respect to status. **OR** **If RBF is used to score PI 2.1.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is **adequate to assess** the impact of the UoA on the main primary species with respect to status. **OR** **If RBF is used to score PI 2.1.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main primary species.	Quantitative information is available and is **adequate to assess with a high degree of certainty** the impact of the UoA on main primary species with respect to status.
	Met?	**Yes**	**Yes**	**Yes – Pacific herring, Japanese sardine** **No – Tanner crab, blue crab, golden (brown) crab**
Rationale				

Main primary species are as follows:

UoA 1: Blue crab *Paralithodes platypus*, Tanner crab *Chionoecetes bairdi*, Pacific herring *Clupea pallasii*, Japanese sardine *Sardinops melanostictus*

UoA 2: Golden (Brown) crab *Lithodes aequispinus*, Pacific herring *Clupea pallasii*, Japanese sardine *Sardinops melanostictus*

As described above, both fishery-dependent and fishery-independent data are available to assess the stock status and fishery impact on main primary species, and biomass is monitored and compared to reference points. These data provide adequate information to assess the impact of the fishery on main primary species. **SG 60 and SG 80 are met**.

SG100 requires that the fishery impact on primary species is known with a high degree of certainty. For each species, the situation is as follows:

Blue crab – evaluated under PI 1.1.1 to be at a level consistent with MSY. Hence the impact of the UoA can be evaluated as sufficiently low that the stock status can be maintained at the MSC level. Therefore, information is sufficient to evaluate stock status in relation to MSY. However, a high degree of certainty is lacking in relation to the UoA bycatch. **SG 100 is not met**.

Golden (Brown) crab – evaluated as main primary species under PI 2.1.1 to be at a level consistent with MSY. Hence the impact of the UoA can be evaluated as sufficiently low that the stock status can be maintained at the MSC level. Therefore, information is sufficient to evaluate stock status in relation to MSY. However, a high degree of certainty is lacking in relation to quantifying the golden crab catch of the UoA. **SG 100 is not met**.

Tanner crab – Catch of Tanner crab must be discarded and while discard mortality is thought to be low, there is no 'high degree of certainty' about the impact of the fishery on the (depleted) stock. **SG 100 is not met**.

Pacific herring and Japanese sardine (bait) – For sardine, total removals by targeted fisheries were ~750 kt, while for herring the 2020 SB was estimated at 2.3 million t (MagadanNIRO, 2021). This fishery used 99 t of each species in 2019. Therefore data on stock size vs bait quantity are sufficient to state with a high degree of certainty that the UoA has no impact on the status of these stocks. **SG 100 is met**.

Despite the scoring of individual scoring elements, for UoA2 there is limited quantitative data on catch composition, except by extrapolation (see Section 6.3.1.3 for details). **Therefore the score for UoA2 is capped at 80**.

	Information adequacy for assessment of impact on minor primary species			
b	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			**UoA 1, UoA 2 – No**

Rationale

There is an ongoing sea-based scientific data collection programme. Scientific observers are 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. All the minor bycatch species have sufficient data to allow a stock assessment (see SI2.1.1b). However, the list of main bycatch species had to be inferred indirectly from scientific data (see Section 6.3.1.3 and Table 29) and discussion with scientists at the site visit. For these UoAs, **SG 100 is not met**.

	Information adequacy for management strategy			
c	Guide post	Information is adequate to support **measures** to manage **main** primary species.	Information is adequate to support a **partial strategy** to manage **main** primary species.	Information is adequate to support a **strategy** to manage **all** primary species, and evaluate with a **high degree of certainty** whether the strategy is achieving its objective.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

Both fishery-dependent and fishery-independent data are used to support management measures. The partial strategy for management of main primary species includes permit requirements, reference points, and TAC for all primary species as described in detail above. Catch data are collected from the fishery for the target primary species (crabs), to assure that TACs are complied with (see details in PI 1.2.3), and the same is the case for the other primary species for their respective targeted fisheries. Biomass is monitored and assessed relative to reference points. The information provided through catch statistics, biomass surveys, and comparisons with reference points is sufficient to support the strategy to manage main primary species, so **SG 60 and SG 80 are met**.

We do not have sufficient information on information gaps and in particular the levels of uncertainty associated with the stock assessments for these species, nor on bycatch by the UoA directly, to say that information is adequate to evaluate objectives with a high degree of certainty. **SG 100 is not met**.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;

- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a, 2021;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**85 (UoA1)** **80 (UoA2)**
Condition number (if relevant)	**NA**

Scoring for SIa by scoring elements

Scoring element	**Score**
UoA 1	
Blue crab	80
Tanner crab	80
Pacific herring	90
Japanese sardine	90
Overall score for UoA 1 for the PI	85
UoA 2	
Golden (brown) crab	80
Pacific herring	80
Japanese sardine	80
Overall score for UoA 2 for the PI	80

PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit		
Scoring Issue		SG 60	SG 80	SG 100
a	Main secondary species stock status			
	Guide post	Main secondary species are **likely** to be above biologically based limits. OR If below biologically based limits, there are **measures** in place expected to ensure that the UoA does not hinder recovery and rebuilding.	Main secondary species are **highly likely** to be above biologically based limits. OR If below biologically based limits, there is either **evidence of recovery** or a **demonstrably effective partial strategy** in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are **considerable**, there is either **evidence of recovery** or a, **demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species**, to ensure that they collectively do not hinder recovery and rebuilding.	There is a **high degree of certainty** that main secondary species are above biologically based limits.
	Met?	**Yes**	**Yes**	**UoA 1 and UoA 2 – Yes**
Rationale				
No main secondary species (FCR SA3.2.1), so SG100 is met.				
b	Minor secondary species stock status			
	Guide post			Minor secondary species are highly likely to be above biologically based limits. OR If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species

	Met?			**All UoAs – No**

Rationale

The nature of the classification into secondary species indicates that these species are not managed with using of TAC, and in many cases do not have the necessary analytical assessment to determine the biologically based limits. There is little evidence available which shows that these species are highly likely to be above biologically based limits. We have not evaluated all the minor secondary species individually. **SG 100 is not met** for either UoA.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a, 2021;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**UoA 1 and UoA 2 – 90**
Condition number (if relevant)	**NA**

PI 2.2.2 – Secondary species management strategy

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **partial strategy** in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **strategy** in place for the UoA for managing main and minor secondary species.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**

Rationale

Definitions

In the context of this performance indicator (Source: MSC FCR v2.01; Table SA8):

- “Measures” are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.

- A “partial strategy” represents 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.

- A “strategy” represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts.

No main secondary species.

Ostrovnoy-Krab LTD has a Code of Conduct which was put in place as part of a FIP for this fishery in 2020. It includes measures around discards. This distinguishes environmentally responsible discards (non-target species with high survival probability, females with eggs, benthos) vs environmentally irresponsible discards (high-grading, juveniles, dead fish, ETP species) which must be avoided. The Code of Conduct requires vessels to minimise discards, record discards (a bycatch log – not yet in operation), apply technology and other selectivity measures where available to reduce discards further, reduce production waste and ensure access for observers. This constitutes a strategy for managing secondary bycatch species, since it is a series of measures designed to manage the impact on bycatch specifically, with a recording element to allow adjustment. **SG 60, SG 80 and SG 100 are met.**

b	Management strategy evaluation			
	Guide	The measures are considered **likely** to work, based on	There is **some objective basis for confidence** that the	**Testing** supports **high confidence** that the partial

	post	plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

No main secondary species. Observer data shows that bycatch rates are low (see Table 26). **SG 60 and SG 80 are met.** There is nothing that would constitute 'testing' so **SG 100 is not met.**

c	Management strategy implementation			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its objective as set out in scoring issue (a).**
	Met?		**All UoAs – Yes**	**All UoAs – Yes**

Rationale

Catch composition has been evaluated through an on-board scientific observer regime; available observer data show low secondary species bycatch (KamchatNIRO, 2020c; Khovansky, 2021). There is thus clear evidence that the strategy is achieving the objective of minimising bycatch; **SG 80 and SG 100 are met.**

d	Shark finning			
	Guide post	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	**NA**	**NA**	**NA**

Rationale

None of the secondary species identified by observers are sharks susceptible to finning (*Bathyraja* spp. are not finned).

e	Review of alternative measures to minimise mortality of unwanted catch			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of all secondary species, and they are implemented, as appropriate.
	Met?	**All UoAs – Yes**	**Yes**	**All UoAs – No**

Rationale

Alternative measures are to be interpreted as alternative fishing gear and /or practices that have been shown to minimise the rate of incidental mortality. Unwanted catch is interpreted as the part of the catch that a fisher did not intend to catch but could not avoid, and did not want or chose not to use (SA3.1.6). We also consider the possibility of ghost fishing by lost traps here.

UoA 1 and UoA 2 – no main secondary species so **SG 60 and SG 80 are met. SG100 is not met.**

In relation to the possibility of unwanted catch (or mortality) via ghost fishing of lost traps, the captains reported at the site visit that trap loss is rare but does sometimes happen, due to weather or ice. Vessel carry on board equipment to retrieve lost traps and are obliged (provision 17 of the fishing regulations) to try and retrieve lost gear, and to report it. The traps include a biodegradable fastening which should ensure that any ghost fishing by lost traps is time-limited. Therefore we conclude that unwanted mortality from trap loss is likely to be negligible.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a, 2021;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;

  Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**UoA 1 and 2 – ≥80** **UoA 3 – 60-79**
Information gap indicator	

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**UoA 1 and 2 – 90**
Condition number	**NA**

PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and **adequate to assess** the impact of the UoA on main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and **adequate to assess with a high degree of certainty** the impact of the UoA on main secondary species with respect to status.
	Met?	**UoA 1 and 2: Yes**	**UoA 1 and 2: Yes**	**No for all UoAs**
Rationale				

Bycatch information is sufficient to evaluate that there are no main secondary species for either UoA, and hence no impact on main secondary species. **SG 80 is met.** Because we had to make some assumptions in generating the list of main bycatch species from the data (see Section 6.3.1.3 and Table 24) and because we have extrapolated bycatch for UoA 2 from information from UoA 1, there is not a 'high degree of certainty' for either of these UoAs. **SG 100 is not met**.

b	Information adequacy for assessment of impacts on minor secondary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.
	Met?			**All UoAs – No**
Rationale				

There is an ongoing dedicated sea-based scientific data collection programme. Scientific observers are deployed and tasked with specific duties related to retained species and bycatch. This provides for information on mortality of bycatch species by the fishery. However, we have not verified the extent of information at population level (distribution, biology, status) for some of these species which would be required to evaluate overall impact, and direct information on bycatch by weight is lacking. **SG 100 is not met**.

c	Information adequacy for management strategy

	Guide post	Information is adequate to support **measures** to manage **main** secondary species.	Information is adequate to support a **partial strategy** to manage **main** secondary species.	Information is adequate to support a **strategy** to manage **all** secondary species, and **evaluate** with a **high degree of certainty** whether the strategy is **achieving its objective**.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

There are no main secondary species. **SG 60 and SG 80 are met.**

There is no clear evidence for all secondary species that the information is adequate to support a strategy to manage all secondary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective. **SG 100 is not met**.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a, 2021;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**UoA 1 and 2 – 80**
Condition number (if relevant)	**NA**

PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the **effects of the UoA** on the population/ stock are known and **likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, the **combined effects of the MSC UoAs** on the population /stock are known and **highly likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a **high degree of certainty** that the **combined effects of the MSC UoAs** are within these limits.
	Met?	**NA**	**NA**	**NA**

Rationale

The assessment team is not aware of any national and/or international requirements set limits for ETP species which may be encountered by the fishery under assessment. **This SI is therefore not scored**.

b	Direct effects			
	Guide post	Known direct effects of the UoA are likely to not **hinder recovery** of ETP species.	Direct effects of the UoA are **highly likely** to not **hinder recovery** of ETP species.	There is a **high degree of confidence** that there are no **significant detrimental direct effects** of the UoA on ETP species.
	Met?	**All UoAs – Yes**	**All UoAs – No**	**All UoAs – No**

Rationale

The king crabs trap fisheries have no known direct effects on ETP species. The traps are designed in such a way that parts will biodegrade in case of lost traps, so that ghost fishing is not considered an issue. It is a passive gear, where benthic predators are attracted to the trap by the smell of the bait. Considering that no ETP species have been recorded in the catch composition, by observers or scientific research cruises, **SG 60 is met**.

The main concern regarding potential rare and unrecorded ETP species interactions relates to large whales. Although there is no direct evidence of entanglements of large whales in this fishery, the Dungeness crab fishery in the US NW has resulted in relatively significant levels of large whale mortality (humpback, grey and blue). (Noting that this fishery is in a different location, targeting a different species and deploying different traps in a different way).

Table 29 lists the ETP marine mammals present in the Russian Far East. The main risk of entanglement in fishing gear appears to relate to large whales with toothed whales and other mammals at lower risk (Dr Tatiana Shulezhko, pers. comm.). The US fishery identified grey, humpback and blue whales, however according to Filatova *et al*. (2022) these species have not been observed in the same areas as the fishery operates. The fishery overlaps with areas in which bowhead and fin whales have been sighted, so the risk to these species is evaluated, along with right whales because the population is sufficiently reduced that sightings data is likely not reliable, but the whale is known to use feeding areas in the SOO.

Bowhead whale: According to IUCN (Cooke and Reeves, 2018), the N. Pacific bowhead whale population has likely recovered to its pre-whaling level, at ~16,000 animals, and is increasing at ~3% per year. Therefore this fishery is highly unlikely to be hindering its recovery. **SG 80 is met**.

Fin whale: Globally, it is estimated that fin whales have recovered to between 30% and 50% of the population size pre-whaling, but are described by IUCN as 'abundant' in the north Pacific, where they appear to be expanding their ranges as waters warm (Cooke, 2018). Therefore this fishery is highly unlikely to be hindering its recovery. **SG 80 is met.**

Right whale: The N. Pacific right whale stock remains very depleted from commercial whaling days, and the IUCN assessment notes that it is likely that even very low levels of mortality from fishing (or vessel collisions) has the potential to impact the population (less than one event per year). Therefore, although there is no evidence of interactions with this fishery or similar fisheries in the US, the limited data do not allow us to say that it is 'highly likely' that there is no impact. **SG 80 is not me**t.

A similar situation pertains to seabirds, except that there is no evidence from analogous fisheries in the US which raise any concerns about significant levels of bycatch. Data on US trap fisheries do not identify any relevant ETP bird species (Table 35) as at risk of bycatch, and at the site visit scientists and former observers considered that seabird bycatch and impacts were not at all likely in this fishery. Therefore for seabirds **SG 80 is not met**.

The catch composition data cover only a small proportion of fishing trips. Furthermore, although the data covers several years, the observer coverage is not extensive, and thus it is not possible to evaluate with a high degree of confidence that there are no significant detrimental direct effects of the UoAs on ETP species. **SG 100 is not met**.

	Indirect effects			
c	Guide post		Indirect effects have been considered for the UoA and are thought to be **highly likely** to not create unacceptable impacts.	There is a **high degree of confidence** that there are no **significant detrimental indirect effects** of the UoA on ETP species.
	Met?		**All UoA – Yes**	**All UoA – No**

Rationale

Indirect effects would for example include the removal of the target species on the food source of ETP species in the locality, or the aggregation of seabirds during hauling of the traps, looking for possible fish waste (although this may not be counted as detrimental, as the birds would receive additional food). The fisheries operates in deeper waters (>50m) which reduces the likelihood of diving seabird interactions. Whale and dolphin species are abundant in the area due to high zooplankton and fish concentrations in the Sea of Okhotsk; there might be occasional issues of disturbance but IUCN raises this concern much more in relation to commercial shipping – e.g. in the shipping channels in the Kuril and Aleutian islands (which may increase in the NW Pacific as sea ice cover recedes). All vessels are fully MARPOL compliant, with detailed waste and oil pollution risk protocols. Pollution from the vessels in the UoA is therefore not likely to impact on ETP species. In summary, it is highly unlikely that indirect effects create unacceptable impacts. **SG 80 is met**.

There is no a high degree of confidence that there are no significant detrimental indirect effects of the UoAs on ETP species. **SG 100 is not met**.

References

- Atlas.., 1957;
- Filatova *et al*., 2022;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;

- Terentyev *et al*., 2013;
- Cooke, 2018a,b;
- Cooke and Clapham, 2018;
- Cooke and Reeves, 2018;
- Krieger *et al*., 2019.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**70**
Condition number (if relevant)	**1**

PI 2.3.2 – ETP species management strategy

PI 2.3.2	**The UoA has in place precautionary management strategies designed to:** - **meet national and international requirements;** - **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species**		
Scoring Issue	SG 60	SG 80	SG 100
a Management strategy in place (national and international requirements)			
Guide post	There are **measures** in place that minimise the UoA-related mortality of ETP species, and are expected to be **highly likely to achieve** national and international requirements for the protection of ETP species.	There is a **strategy** in place for managing the UoA'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.	There is a **comprehensive strategy** in place for managing the UoA'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.
Met?	**NA**	**NA**	**NA**
Rationale			

This SI is not scored as there are no requirements for protection and rebuilding provided through national/ international ETP legislation of relevant ETPs (relevant to this fishery under assessment). SIb is scored instead.

b	Management strategy in place (alternative)			
	Guide post	There are **measures** in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **strategy** in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **comprehensive strategy** in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.
	Met?	**All UoAs – Yes**	**All UoAs – No**	**All UoAs – No**
Rationale				

There are measures in place that are expected to ensure the UoAs do not hinder the recovery of ETP species. Catch composition is evaluated by observers and scientific research cruises. Trap design, including a biodegradable panel in the trap, reduce the probability of catching ETP species either directly or via ghost fishing. The Code of Conduct includes measures to evaluate and mitigate any interactions with ETP species: including catch recording in the bycatch log, the application of any technologies to reduce interactions / ensure high survival, the requirement to follow scientific advice and provide access for scientific observers (although how the requirement to apply relevant technology operates in practice is unclear).

SG 60 is met.

At SG 80, MSC defines 'strategy' as follows:

A "**strategy**" represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impact.

The measures in place are not designed to manage the impact on ETP species specifically, particularly not in relation to large whales (the main concern identified) since the main issue relates to rope entanglement (since mortality from rope entanglement has not been observed in the fishery). Although observer and other data are available, it is also unclear whether this is sufficient to identify all impacts, particularly given that for some species (right whales) a very small number of events is needed to have a significant population-level impact. Therefore the measures in place (in particular the data collection) are not sufficient to constitute a 'strategy' – **SG 80 is not met**.

c	Management strategy evaluation			
	Guide post	The measures are **considered likely** to work, based on **plausible argument** (e.g., general experience, theory or comparison with similar fisheries/species).	There is an **objective basis for confidence** that the measures/strategy will work, based on **information** directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a **quantitative analysis** supports **high confidence** that the strategy will work.
	Met?	**All UoAs – Yes**	**All UoAs – No**	**All UoAs – No**

Rationale

The degree of confidence in the efficacy of the measures is built by the understanding of the low level of potential impact of the gear on ETP species. There were no records in the observer reports, nor was any evidence of such impact produced by other parties. **SG 60 is met**.

The measures in place give an objective basis for confidence. Research/observer coverage allows the collection of relevant information, based on information directly about the trap fishery (location, depth, gear) as well as potential species involved. However, it is not clear that data are sufficient to be able to identify interactions across all relevant species, and therefore data might not be sufficient for clear confidence that there are no impacts. **SG 80 is not met**.

d	Management strategy implementation			
	Guide post		There is some **evidence** that the measures/strategy is being implemented successfully.	There is **clear evidence** that the strategy/comprehensive strategy is being implemented successfully and **is achieving its objective as set out in scoring issue (a) or (b).**
	Met?		**All UoA – No**	**All UoA – No**

Rationale

There is some evidence that the strategy is being implemented successfully, as the report on catch composition in the fishery indicates that no ETP species have been recorded in this fishery (KamchatNIRO, 2020; MagadanNIRO. 2020). However, we do not have sufficient evidence that the strategy, including Code of Conduct, is implemented in the UoA. **SG 80 is not met**.

e	Review of alternative measures to minimise mortality of ETP species			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species, and they are implemented, as appropriate.
	Met?	**NA**	**NA**	**NA**

Rationale

Despite the concerns noted in PI 2.1.1, it is important to note that there is no direct evidence of ETP bycatch in this fishery (KamchatNIRO, 2020; MagadanNIRO. 2020). There is therefore no reason for the fishery to conduct such reviews at present. This SI is therefore scored as not applicable.

References

- Atlas..., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013;
- Code of Conduct.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**60**
Condition number (if relevant)	**2**

PI 2.3.3 – ETP species information

PI 2.3.3		**Relevant information is collected to support the management of UoA impacts on ETP species, including:** - **Information for the development of the management strategy;** - **Information to assess the effectiveness of the management strategy; and** - **Information to determine the outcome status of ETP species**		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guide post	Qualitative information is **adequate to estimate** the UoA related mortality on ETP species. **OR** **If RBF is used to score PI 2.3.1 for the UoA:** Qualitative information is **adequate to estimate productivity and susceptibility** attributes for ETP species.	Some quantitative information is **adequate to assess** the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. **OR** **If RBF is used to score PI 2.3.1 for the UoA:** Some quantitative information is **adequate to assess productivity and susceptibility attributes** for ETP species.	Quantitative information is available to assess with a high degree of certainty the **magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status** of ETP species.
	Met?	**All UoAs – Yes**	**All UoAs – No**	**All UoAs – No**

Rationale

The available data for evaluating ETP interactions is summarised in Section 6.3.1.2. Observer trips were conducted for both UoAs (see Tables 22 and 23).

Scientific observer data provides some quantitative information on bycatch, in the course of which no evidence of any negative interactions with ETP species were recorded. This is adequate to estimate that UoA-related mortality of ETP species, if it exists, is very low. Since on this basis there is qualitative information to estimate UoA-related mortality of ETP species as negligible. **SG 60 is met**.

The ETP species with the highest potential risk of interactions are bowhead and fin whales (large whales which overlap geographically with the fishery area). There is no direct evidence of any interactions in this fishery, and there is sufficient population-level information (summarised by IUCN) to evaluate that the UoAs are highly unlikely to be a threat to the recovery of this species (see 2.3.1b).

The ETP species with the highest potential risk of impact is the right whale. Although there is no evidence of interactions with right whales in this fishery, or in (semi)analogous US fisheries, and no evidence of population overlap, the population-level data suggests that very low levels of impact (<1 event per year) would be sufficient to hinder recovery. The quantitative data for this fishery at present are not adequate to be completely confident that such rare events are not occuring. **SG 80 and SG 100 are not met**.

b	Information adequacy for management strategy

	Guide post	Information is adequate to support **measures** to manage the impacts on ETP species.	Information is adequate to measure trends and support a **strategy** to manage impacts on ETP species.	Information is adequate to support a **comprehensive strategy** to manage impacts, minimise mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives.
	Met?	**All UoAs – Yes**	**All UoAs – No**	**All UoAs – No**

Rationale

The key information for ETP interactions comes from scientific observers, who undertook trips covering all UoAs (see Tables 22 and 23). The information is adequate to support measures, as it covers a more than a decade of on-board and scientific observations (KamchatNIRO, 2020; MagadanNIRO. 2020). The recording of information is ongoing through the observer programme, according to stakeholder discussions with KamchatNIRO and MagadanNIRO. Considering that there have been no records of ETP species bycaught in this kind of fishery, partly due to the specifics of the UoAs (passive gear of baited traps of particular design, and species targeted), **SG 60 is met**.

Information suggests that additional measures are not needed, but it is not clear that there is sufficient monitoring of interactions or indirect evidence (e.g. loss of traplines and ropes) to identify very rare events and apply additional measures if required. **SG 80 and SG 100 are not met**.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013.
- Cooke, 2018a,b;
- Cooke and Clapham, 2018;
- Cooke and Reeves, 2018.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**60**
Condition number (if relevant)	**3**

PI 2.4.1 – Habitats outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly-encountered habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**
Rationale				

Commonly-encountered habitats are soft sediment habitats (various grain size from mud-silt-sand to gravel and pebble) (Figure ; see extensive references on habitat mapping provided in Section 6.3.1.8.1).

According to research reports (MagadanNIRO 2019, 2020; KamchatNIRO, 2020), in conditions of normal operation there is practically no pulling of traps along the bottom, and they report under these conditions no destructive effect on the bottom or on benthic communities. These habitats are in any case not likely to be vulnerable to any potential impacts. **SG 60 and SG 80 are met**. Lacking direct evidence about trap impacts on different types of habitat, other than surmise from the nature of the gear and habitat, **SG100 is not met.**

b	VME habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	**NA**	**NA**	**NA**
Rationale				

According to the MSC interpretation's log (https://mscportal.force.com/interpret/s/article/identification-of-VMEs-SA3-13-3-1527262008557) for this PI (outcome), only VMEs which are accepted, identified or defined by the management authority should be considered. There is no such designation of VMEs in the Russian Far East management system. Thus this SI is scored as NA.

c	Minor habitat status			
	Guide post			There is **evidence** that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			**All UoA – No**

Rationale

Minor habitats have not been evaluated**. SG 100 is not met**.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**UoA 1 – ≥80** **UoA 2 – ≥80** **UoA 3 – ≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**UoA 1 – 80** **UoA 2 – 80**
Condition number (if relevant)	**NA**

PI 2.4.2 – Habitats management strategy

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a **strategy** in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**
Rationale				

Definitions

In the context of this performance indicator (Source: MSC FCR v2.01; Table SA8):

- “Measures” are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.

- A “partial strategy” represents 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.

- A “strategy” represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts.

Ostrovnoy-Krab LTD has a Code of Conduct (2020) which explicitly includes management of interactions with VMEs. The policy defines VMEs and VME indicator species as per the North Pacific Fisheries Commission (https://www.npfc.int) as all types of corals, plus dense aggregations of sponges, ascidians, ophiuroids, hydroids, barnacles and bryozoans. The requirements under the Code of Conduct are as follows:

- Record VME indicator species in the bycatch log (not yet fully implemented);
- Ensure full access to scientific observers;
- Train crew in identification of bycatch species;
- Map VMEs based on data from vessels and observers and to avoid VME areas, following scientific advice;
- Voluntary move-on rules: bycatch of >50 kg of VMEs (corals) or 400 kg of VME indicators (the other species listed above), or VME bycatch in 2% or more of traps in a trap line requires the vessel to move fishing area (distance not specified);
- Share information on large VME aggregations with scientists and NGOs;
- Record all lost gear.

This Code of Conduct constitutes a strategy in that it includes several measures (e.g. move on rules, mapping and avoidance) which are designed specifically to minimise impacts on VMEs, and also includes monitoring (bycatch log, observers) to evaluate if it is working. It is also worth noting that more generally the fishery is designed to minimise

habitat impacts just by the nature of the gear (i.e. passive gear). **SG 60 and SG 80 are met.** Since the strategy is confined to the UoAs and is not generalised in the fishery, **SG 100 is not met.**

b	Management strategy evaluation			
	Guide post	The measures are **considered likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on **information directly about the UoA and/or habitats** involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on **information directly about the UoA and/or habitats** involved.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

The measures implemented which contribute to the protection of potential vulnerable habitats (e.g., closed areas and seasons; gear restrictions to minimize impacts; and research to improve knowledge) plus the measures in the Code of Conduct, plus the nature of the fishery (passive gear, relatively small footprint), are likely to be working. Closed area/season management of fishing impacts is widely practiced in other parts of the world. **SG 60 is met**.

The fleet-specific move-on rule is likely to work as the incentive is to improve the target catch rather than include quantities of unwanted benthic organisms such as other predatory mobile species. VMS data provides information on the location of fishing with respect to management measures and observer data provides information of the species composition of catches, including benthos bycatch. The bycatch of benthos was shown to be small, which is to be expected, since the trap is a passive gear. The trap footprint can be quantified from trap and trap line size and weight, total trap deployments and trap deployment sites. All these data are available, and come directly from the UoA. This provides an objective basis for confidence that the habitat impact of the fishery is small. **SG 80 is met.**

Since there is nothing that constitutes 'testing', **SG 100 is not met**.

c	Management strategy implementation			
	Guide post		There is **some quantitative evidence** that the measures/partial strategy is being implemented successfully.	There is **clear quantitative evidence** that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		**All UoAs – No**	**All UoAs – No**

Rationale

Habitat maps, in the form of sediment distribution and dominant benthic organisms, of the UoAs fisheries area are available (e.g. Figure , Figure , Figure , Figure , Figure , Figure), and VMS tracks of the vessels show where the fleet operates (Figure 8, Figure 17). However, the Code of Conduct is not yet fully implemented in relation to habitats (e.g. benthos bycatch log not yet operational). **SG 80 and SG 100 are not met**.

d	Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs			
	Guide post	There is **qualitative evidence** that the UoA complies with its management requirements to protect VMEs.	There is **some quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is **clear quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

Compliance levels in the fleet are good and that monitoring of gear, operations of the fleet, at-sea inspections and observer coverage is effective, so the strategy appears to be implemented successfully. **SG 60 is met**. VMS and observer data are quantitative data, and no additional measures have been identified requiring compliance, other than those already mentioned. **SG 80 is met.**

Additional information on potential VME habitat distribution is required to achieve SG 100. **SG 100 is not met**.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;
- Terentyev *et al*., 2013;
- Code of Conduct.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**75 (for all UoAs)**
Condition number (if relevant)	**4**

PI 2.4.3 – Habitats information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat		
Scoring Issue		SG 60	SG 80	SG 100
	Information quality			
a	Guide post	The types and distribution of the main habitats are **broadly understood**. **OR** **If CSA is used to score PI 2.4.1 for the UoA:** Qualitative information is adequate to estimate the types and distribution of the main habitats.	The nature, distribution and **vulnerability** of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. **OR** **If CSA is used to score PI 2.4.1 for the UoA:** Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**
Rationale				

The fisheries operate in the north-east part of the Sea of Okhotsk. This area is one of the most studied in the Far Eastern seas, due to its high biological productivity and commercial importance. The distribution of bottom habitats and forage benthos were initially presented in the "Atlas of Oceanographic Data of the Fishing Regions of the Bering and Okhotsk Seas" (Atlas .., 1957), and the benthic community has been assessed in numerous research studies since that time. TINRO, KamchatNIRO and MagadanNIRO regularly conduct bottom trawl surveys there, and the results of these studies are published in a large number of publications. There is an active benthic research programme for the Sea of Okhotsk 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. These studies provide broad understanding of the types and distributions of main habitats, as well as the nature, distribution, and vulnerability of the main habitats in the UoA area, so the **SG 60 and SG 80 are met**.

The distribution of all habitats is not mapped in full, so **SG 100 is not met** for all UoAs.

	Information adequacy for assessment of impacts			
b	Guide post	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. OR **If CSA is used to score PI**	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR	The physical impacts of the gear on all habitats have been quantified fully.

		2.4.1 for the UoA: Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	**If CSA is used to score PI 2.4.1 for the UoA:** Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

Bycatch data are collected by observers from KamchatNIRO and MagadanNIRO, including data on catches of VME species, which provides some indication of the fishery's impact on the benthos. Information is available on spatial overlap from VMS data and underlying common habitat types. The timing and location of the use of the gear is recorded at each trip, as a matter of course, as part of the everyday management of the fishery. The information is adequate to allow for the identification of the main impacts of the UoAs on the main habitats. **SG 60 and SG 80 are met** for all UoAs.

It is not possible to quantify fully the physical impact of the gear on all habitats; **SG 100 is not met** for all UoAs.

	Monitoring			
c	Guide post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in all habitat distributions over time are measured.
	Met?		**All UoAs – Yes**	**All UoAs – No**

Rationale

Ecosystem research in the SOO is ongoing; the research aims to understand broadly the ecosystem (Shuntov and Dulepova, 1993, 1996; Shuntov *et al*., 2019; Lapko and Radchenko, 2000; Nadtochiy *et al*., 2007). 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 indicators (Radchenko, 2015). Model outputs therefore provide indications of the risk associated with the fishery to the ecosystem as a whole, including habitat. **SG 80 is met** for all UoAs.

Changes in all habitat distributions over time are not measured, so **SG 100 is not met** for all UoAs.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2018, 2020, 2020a, 2020c;
- Karasev and Karpinsky, 2018;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2018, 2020a;
- Moiseev, Moiseeva, 2016, 2017, 2019;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019;
- Puchnina, 2016;

- Terentyev *et al*., 2013.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**80 (for all UoAs)**
Condition number (if relevant)	**NA**

PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA 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	Ecosystem status			
	Guide post	The UoA is **unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Partial**

Rationale

Detailed, referenced information on the Sea of Okhotsk ecosystem has been provided in the background section (Section 6.3.1.9). However, following ASI review of the final report, it was requested that this information, along with references, be repeated here. However, to avoid the rationale being extremely long, it has been summarised somewhat.

In relation to the physical oceanography of the ecosystem, the key elements are (Lapko & Radchenko, 2000; Talley, 2001):

i) The Kamchatka Current which flows south out of the Bering Sea and exchanges water with the Sea of Okhotsk through the Kuril Islands, and then flows north (West Kamchatka Current) into the Shelikhov Gulf.
ii) The Tsushima Current from the Sea of Japan, which enters the Sea of Okhotsk through the Soya Strait (Soya Current).
iii) The Yamskoy Upwelling at the mouth of Shelikhov Gulf makes this area very productive.
iv) A large gyre dominates the western portion of Shelikhov Gulf itself, but water can leave the gulf via the Yamskoe Current. This water flows in a counter-clockwise direction until leaving the Sea of Okhotsk through the southern Kuril Islands.

The northern and north-western parts of the Sea of Okhotsk are cooled in winter to the extent that lenses of very cold water persist in the near-bottom layers over vast areas even during the summer while surface waters warm, reaching 10–14 °C. The Soya Current warms the surface layers of the southern Sea of Okhotsk to 15–20 °C, and Pacific water also warms the north-eastern and central parts of the sea relative to the northern and north-western parts.

The high levels of productivity in the Sea of Okhotsk derive from this complex oceanography. Due to the limited water exchange with the Pacific Ocean during the summer, and strong stratification, the upper layer is separated from the deep waters, which are rich in nutrients, by a cold intermediate layer. Under these conditions, and with low river runoff, the supply of nutrients to the surface layer only occurs at sites of strong vertical mixing and in upwelling regions: Iony-Kashevarov in the north-west, Yamsky-Taui and Ust-Khairyuzov in the north-east, and off the Kuril Islands. The Shelikhov Gulf, particularly the entrance (Yamsky upwelling) is thought to be one of the most productive marine areas in the world (Shuntov *et al*., 2019).

Estimates of the total biomass of zooplankton in the Russian waters of the Far Eastern seas (in the 1980s) were ~1.8 billion (10^9) tons in summer, with annual production of ~10 billion tons. Of this the Sea of Okhotsk accounts for ~one third. Benthic biomass and productivity is likewise estimated to be high: estimates at various times during the 20th century gave values of 380–400 gm $^{-2}$ for the shelf zone and ~150 gm $^{-2}$ overall, with an annual productivity of 230 gm^{-2} / 360 million t overall. Given that these estimates come from grab samples, they are likely to be underestimates. The biomass of benthos appears to have increased over the past three decades (Shuntov, 2001; Nadtochy *et al*., 2007).

Epipelagic fish biomass consists mostly of Walleye pollock (*Gadus chalcogrammus)*, Pacific herring (*Clupea pallasii)*, Capelin (*Mallotus villosus catervarius)*, and Pink salmon (*Oncorhynchus gorbuscha)*. In the mesopelagic zone (> 200 m) the most abundant fish species are the northern Smoothtongue (*Leuroglossus schmidti)*, Walleye pollock, Garnet lanternfish (*Stenobrachius nannochir)*, and Eared blacksmelt (*Lipolagus ochotensis)* (Shuntov,

2016). Squid accounts for 6% of nekton biomass in the epipelagic zone and 3% in the mesopelagic zone. The density of nekton is estimated at 21.0 t km^{-2}; higher than surrounding waters except adjacent to the Kuril Islands upwelling area (Shuntov, 2016). There is also a high biomass of demersal fishing, including Giant grenadier (*Albatrossia pectoralis*), Greenland halibut (turbot) *Reinhardtius hippoglossoides matsuurae*, Pacific cod (*Gadus macrocephalus*), Yellowfin sole (*Limanda aspera*), and Popeye grenadier (*Coryphaenoides cinereus*). As you would expect, biomass and species composition varies by area, relating to productivity (upwelling) and temperature. Demersal biomass is low in the northern areas where lenses of very cold water remain close to the bottom year round.

The abundance of marine mammals in the Sea of Okhotsk and other parts of the Far Eastern Seas has fluctuated due to periods of significant overharvesting (Sobolevskii, 1983; Shuntov, 2016). Due to the lack of large-scale harvesting in the last quarter of the 20th century, numbers of marine mammals in Far Eastern seas has increased: estimates are ~560,000 cetaceans and up to 2 million pinnipeds. According to the latest data, the number of nesting seabirds is estimated at 11.7 million (auks, 75%; petrels, 19%; gulls, 5%). In addition, 34 species of birds are recorded as nomadic and seasonally migratory, totally a further 4.15 million individuals including ~3 million southern hemisphere shearwaters.

The idea that there was a limited food supply for nekton and nektobenthos in the Far Eastern seas and the North Pacific was generally accepted for many decades (Nikolsky, 1974; Birman, 1985; Klovach, 2003; Karpenko *et al*., 2013), and a range of hypotheses have been put forward as to possible indirect ecosystem effects and trophic cascades resulting from competition for food. However, more recent research by TINRO-Center suggests that this characterisation of the ecosystem as food limited is unlikely. Based on surveys of zooplankton and nekton, biomass estimates of different functional groups and stomach content analysis across a wide range of species, they have shown that there is a much higher concentration of food in the ecosystem than previously thought, even in winter, and very little evidence of food limitation as a key ecosystem driver (Shuntov, 2001, 2016; Dulepova, 2002; Kuznetsova, 2005; Chuchukalo, 2006; Shuntov and Temnykh, 2008, 2011; Naydenko, 2010).

Following on from this research has been attempts to characterise and quantify energy flows and trophic relationships in the ecosystem (Radchenko, 2015; Gorbatenko, 2018). Extensive information is available on the trophic status of the 118 most abundant animal species using stable isotopes of carbon and nitrogen, allowing researchers to reconstruct the patterns of energy fluxes in pelagic and bottom communities of the Sea of Okhotsk (Gorbatenko *et al*., 2013, 2014; Gorbatenko, 2018). This confirms the earlier more qualitative conclusions about the structure of communities and highlights the flexibility of relationships in trophic networks and the high level of biological capacity, leading to the considerable carrying capacity of the Sea of Okhotsk ecosystem. The complexity of trophic networks makes trophic cascades unlikely or impossible. Although Red, Blue and Golden (Brown) king crabs participate in the flow of energy, their role in this process is not very significant.

In relation to the SGs, the question relates to the probability of the UoA disrupting ecosystem structure and function. As noted above, the evidence suggests that these crab species do not play a significant role in energy flows in the ecosystem. Benthic biomass is high and demersal trophic networks are complex and hence robust. The proportion of the total crab population taken by the fishery (as a whole, including but not limited to the UoA) is quite low; ~10-20% of adult males (please see details in Principle 1). The fishery does not target females or undersized males which if caught are discarded with reasonable survival (MagadanNIRO, 2019). Therefore, fishery removals only reduce the size of population to a small extent. The fishery removes bycatch species in small quantities relative to the overall population size (removals an order of magnitude lower than removals of crabs) and is not considered likely to have any significant impact on benthos (small footprint) or ETP species. Overall, therefore, we can be confident that the UoA is highly unlikely to disrupt ecosystem structure and function. **SG 60 and SG 80 are met**.

SG 100 requires ‘evidence’, much of which is outlined above. There is evidence to suggest that the ecosystem is robust to disturbance (analysis of ecosystem structure and function, including the role of the crabs in the ecosystem (Radchenko, 2015; Gorbatenko *et al*., 2013, 2014; Gorbatenko, 2018). So in relation to P1 impacts (removal of target species) there is ‘evidence’ and **SG 100 is met**. In relation to P2 impacts, however, we cannot necessarily claim ‘evidence’ for all these aspects – for example the impact of crab traps on potential VME taxa and hence on the benthic ecosystem has largely been inferred from the fishery footprint and benthic habitat mapping, but not considered in, for example, an ecosystem model (as far as we know). Hence **SG 100 is not met** for all elements of UoA impact on the ecosystem. A **partial score of 90 is given**.

References

- Birman, 1985;
- Chuchukalo, 2006;
- Dulepova, 2002;
- Gorbatenko, 2018;

- Gorbatenko *et al*., 2013, 2014;
- Karpenko *et al*., 2013;
- Klovach, 2003;
- Kuznetsova, 2005;
- Lapko & Radchenko 2000;
- MagadanNIRO, 2019;
- Nadtochy *et al*., 2007;
- Naydenko, 2010;
- Nikolsky, 1974;
- Radchenko, 2015;
- Shuntov, 2001, 2016;
- Shuntov and Temnykh, 2008, 2011;
- Shuntov *et al*., 2019;
- Sobolevskii, 1983;
- Talley, 2001.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**90 (for all UoAs)**
Condition number (if relevant)	**NA**

PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary which take into account the **potential impacts** of the UoA on key elements of the ecosystem.	There is a **partial strategy** in place, if necessary, which takes into account **available information and is expected to restrain impacts** of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a **strategy** that consists of a **plan**, in place which contains measures to **address all main impacts of the UoA** on the ecosystem, and at least some of these measures are in place.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**
Rationale				

There are specific measures in place to address management of individual ecosystem elements (see under P1 and P2 scoring above). Measures described under P1 aim to ensure that the fishery is conducted within sustainability limits. There is a range of technical measures and protocols to minimize bycatch of other fish species, which may play an important role in ecosystem structure and function. There are closed areas in place either for all fisheries or for some particular fisheries. No interaction with marine mammals and seabirds has been recorded and the nature of the gear (static) should minimise impacts on benthic habitats. All these measures are applied as required, so **SG 60 is met**, and since they meet the definition of a partial strategy (provided under PI2.2.2a), **SG 80 is met**.

There is no explicit plan outlining the strategy, so **SG100 is not met**.

b	Management strategy evaluation			
	Guide post	The **measures** are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems).	There is **some objective basis for confidence** that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved.	**Testing** supports **high confidence** that the partial strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**
Rationale				

The SOO is defined as one of the world's Large Marine Ecosystems (LMEs). Its seasonal ice cover and high productivity identifies it as a largely unique system but with productivity characteristics similar to many other LMEs. Information from across studies of several LMEs suggest that the measures in place to manage fisheries in the SOO (i.e. setting TACs based on precautionary reference points, gear restrictions, time/area closures etc.) are likely to work. **SG 60 is met**.

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. Data for ecosystem studies is annually collected by specialists of the branches of VNIRO during trawl surveys in the Sea of Okhotsk. The data on the main components of the ecosystem suggest that ecosystem function has not been disrupted by fishing over the past 35-40 years (KamchatNIRO, 2020; MagadanNIRO, 2020; Shuntov *et al*., 2019). This provides some objective basis for confidence that the partial strategy will work. **SG 80 is met**.

Testing would require testable models and scenarios, which were not available for this assessment. **SG 100 is not met**.

	Management strategy implementation			
C	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its objective as set out in scoring issue (a).**
	Met?		**All UoAs – Yes**	**All UoAs – No**

Rationale

The fishery is monitored and there is good compliance; in addition, the ecosystem data available suggest that the ecological function of the system has not been impaired over 35-40 years of fishing during which there has been data collection (KamchatNIRO, 2020; Khovansky, 2020, 2021; Shuntov *et al*., 2019). Therefore, the evidence suggests that fishery ecosystem management is being implemented successfully. **SG 80 is met**.

Lacking 'clear' evidence about the implementation of all aspects of the strategy, **SG 100 is not met**.

References

- Atlas .., 1957;
- Code of Conduct.
- Gorbatenko, 2018;
- KamchatNIRO, 2020;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2020a;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**80 (for all UoAs)**
Condition number (if relevant)	**NA**

PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	Information is adequate to **identify** the key elements of the ecosystem.	Information is adequate to **broadly understand** the key elements of the ecosystem.	
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	
Rationale				

Ecosystem-based research has been ongoing in the Sea of Okhotsk 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, community composition, 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 Sea of Okhotsk ecosystem that is published nationally and internationally where the fishery removals are quantified. **SG 60 is met**.

The information, both historical and ongoing, provided input into modelling of the Sea of Okhotsk ecosystem that is both innovative and complex, and is leading to increasingly better understanding of the system (Shuntov *et al*., 2019). **SG 80 is met**.

b	Investigation of UoA impacts			
	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but **have not been investigated** in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and **some have been investigated in detail**.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and **have been investigated in detail**.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**
Rationale				

Ecosystem monitoring has been carried out by VNIRO in Far Eastern Seas, including the Sea of Okhotsk, for over 25 years. These studies trace changes in the composition and structure of pelagic and benthic communities. However, they only deal with principal groups of animals such as commercial fish. Small fish that are not commercially important are not included in the monitoring. There are no studies specifically investigating the impact of the UoAs on the ecosystem, but quite a bit of information can be inferred from existing data.

There are studies about king crabs fishing in the SOO, but more recent studies are needed to provide updated information on the impacts of the UoAs on key ecosystem elements (KamchatNIRO, 2020; MagadanNIRO, 2020).

Ecosystem research, including recent modelling, has consolidated the available ecosystem information. This includes the key elements of the Sea of Okhotsk ecosystem (plankton, nekton, benthos, seabirds, marine mammals, biological oceanography, predator/prey and trophic relationships, and fishery-specific removals and impacts). Past research and current studies are providing good baseline information used to infer fishery impacts, so **SG 60 is met**.

The main functions of ecosystem components have been described and most have been reported in national and international literature in detail. The key elements have been considered and conclusions drawn on their significance to the Sea of Okhotsk (Shuntov *et al*., 2019). Current trophic modelling infers in detail specific impacts of the fishery on the broader ecosystem of the Sea of Okhotsk. **SG 80 is met**.

Although there is increasing spatial and temporal information on most forms of fishing and captures, it cannot be said that all the main interactions have been investigated in detail. **SG 100 is not met**.

c	Understanding of component functions			
	Guide post		The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are **known**.	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are **understood**.
	Met?		**All UoAs – Yes**	**All UoAs – Yes**

Rationale

The Sea of Okhotsk ecosystem has been the subject of numerous studies, including annual expeditions carried out by TINRO since the early 1980s. These studies have included the collection of quantitative information on the main biological communities – primarily zooplankton, benthos, nekton, and nektobenthos, as well as phytoplankton, protozoa, seabirds and marine mammals. In addition, long term surveys (Shuntov, Dulepova, 1996; Radchenko, 2015; Gorbatenko, 2018; Shuntov *et al*., 2019 and many others) on community composition have been published and TINRO databases on with abundance and biomass density data for zooplankton, nekton, and nektobenthos have been published in a series of tabular directories. Data for ecosystem studies is annually collected by specialists of the Pacific branch of VNIRO during spring trawl surveys in the Sea of Okhotsk, as well as summer bottom trawl surveys on the West Kamchatka shelf, and data have been incorporated into ecosystem modelling studies. The biology and ecology of the Principle 1 species and main bycatch species are well known (see background for Principle 1 and Principle 2) and are researched within the context of the ecosystem as part of the regularly updated stock assessments. The main functions of the relevant primary, secondary, and ETP species caught by the UoA as well as the habitats where fishing is taking place, the interactions and their impacts of the gear on the benthos have been investigated in some detail are known and understood. **SG 80 and SG 100 are met**.

d	Information relevance			
	Guide post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components **and elements** to allow the main consequences for the ecosystem to be inferred.
	Met?		**All UoAs – Yes**	**All UoAs – No**

Rationale

There is a significant database of information on the Sea of Okhotsk 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 in Russia have demonstrated that their experience and innovation in terms of ecosystem modelling is of a high standard, and their work is peer-reviewed. The Sea of Okhotsk ecosystem has been tested over time and the fishery has gone through low periods and poor management, but more recently improved management and control. Existing research and modelling provide adequate information to infer some of the fishery's consequences on the ecosystem, so **SG 80 is met**.

The level of research and understanding continues to grow, and more detail becomes available as mapping and monitoring continues. Although the information on the impacts of the UoAs on the components is adequate, this cannot be said for some of the elements. **SG 100 is not met**.

e	Monitoring			
	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		**All UoAs – Yes**	**All UoAs – Yes**

Rationale

Regular and detailed ecosystem studies are undertaken and have been ongoing for many years. They are done in conjunction with biomass surveys using midwater (pelagic) and bottom trawl (demersal), and the annual surveys are monitored for changes in ecosystem indicators every year (Shuntov *et al*., 2019). **SG 80 is met**.

Although there are inevitably some gaps in our understanding, there is enough information available to support strategies to manage marine ecosystem impacts. **SG 100 is met**.

References

- Atlas.., 1957;
- Gorbatenko, 2018;
- KamchatNIRO, 2020, 2020c;
- Khovansky, 2020, 2021;
- Lapko and Radchenko, 2000;
- MagadanNIRO, 2020a;
- Nadtochiy *et al*., 2007;
- Radchenko, 2015;
- Shuntov and Dulepova, 1993, 1996;
- Shuntov *et al*., 2019.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**90 (for all UoAs)**
Condition number (if relevant)	**NA**

6.4. Principle 3

6.4.1. Principle 3 background

6.4.1.1. Legal and customary framework

Jurisdiction

The fishery under assessment operates entirely within the Russian EEZ. It takes place in the FAO fishing area 61, in three fishery subzones: 61.05.1 – Northern Sea of Okhotsk, 61.05.2 – Western Kamchatka, and 61.05.4 – Kuril-Kamchatka. The target stock is not part of a straddling or a shared stock, and there is no evidence of inter-migration with the stocks of target species outside the area of certification.

International framework

Russia actively collaborates with other countries in the sphere of fisheries in the framework of bilateral or international agreements. The full list of international agreements is available at site of FFA (http://www.fish.gov.ru/opendata/7702679523-perechenmd). The basic requirements of international treaties are integrated into national fishery legislation. Russia participates in many international conventions and treaties:

(i) United Nations Convention on the Law of the Sea (UNCLOS, 1982, establishing the concept of MSY as the basis for fisheries management);

(ii) UN Convention on Biological Diversity (UNCBD 1992, covering the maintenance of biological diversity on the basis of an ecosystem approach);

(iii) Code of Conduct for Responsible Fisheries of the FAO (FAO, 1995), which recommends a precautionary approach to the management of commercial stocks);

(iv) United Nations Fish Stocks Agreement (UNFSA, 1995, prescribing a precautionary management approach to straddling and wide-ranging stocks both outside and within waters under national jurisdiction);

(v) Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (FAO, 2010).

Russia has bilateral fisheries agreements with 21 countries and has concluded intergovernmental agreements aimed at combating and countering IUU fishing with the Republic of Korea, North Korea, Japan, China and the USA. It also has product and catch verification schemes in place with the EU and China. Further, Russia has concluded a Memorandum of Understanding on fisheries cooperation with the Government of Canada with the main objective to enhance mutual actions aimed at preventing and eliminating IUU fishing. Finally, Russia participates actively in 12 international organizations involved in the study of aquatic bioresources and 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).

National management set-up and legislation

Within the Russian Government, fisheries policy falls under the purview of the Ministry of Agriculture (Minselkhoz), see Figure 42. The implementing body for fisheries management under the Ministry is the Federal Fisheries Agency (FFA) (Rosrybolovstvo), which is the successor of the former State Committee for Fisheries (abolished in 2004), and in turn the Soviet Ministry of Fisheries. The Ministry is responsible for the formulation of Russia's fisheries policy, while the FFA oversees the daily management of fisheries, including the determination of specific fishing rules and the implementation of regulations set by the Ministry. Within the Russian Government, the Ministry of Agriculture interacts with other federal ministries, e.g. with the Ministry of Natural Resources and Environment (Minprirody) through its implementing Federal Service for Supervision of Natural Resources or Agency for Monitoring of Natural Resources (Rosprirodnadzor), which carries out environmental impact assessments of fisheries regulations. The Ministry of Agriculture interacts with other federal ministries, e.g. with the Ministry of Natural Resources and Environment (in Russian: Minprirody) through its implementing Agency for Monitoring of Natural Resources (in Russian: Rosprirodnadzor), which carries out environmental impact assessments of fisheries regulations.

The FFA has 18 territorial administrations (in Russian: *upravlenia*), most of which cover several federal subjects. The territorial administrations are responsible for licencing, monitoring of quota uptake, and the administration of closed areas, among other things. The UoA fishery is subject to the control of the North Eastern Territorial Administration (NETA, in Russian SVTU), located in Petropavlovsk-Kamchatskiy and covering the federal subjects of Kamchatskiy krai and Chukotka autonomous okrug. The traditional geographical entities in Soviet/Russian fisheries management are the 'basins'. Currently there are eight basins; one of them is the Far Eastern Fisheries Basin, which includes the Chukchi Sea, the Bering Sea, the Sea of Okhotsk, the Sea of Japan and the Pacific Sea west of Western Kamchatka

and the Kuril Islands. The basin level is no longer a central management level in Russia, but there are still advisory boards at basin level as well as general fishing rules that apply to the entire basin (see below).

In addition to the territorial administrations, which are an integral part of the FFA, the federal agency has a number of subordinate bodies of governance. One group is the *rybvod*s (Russian acronym for fisheries administration), formally 'basin administrations for fisheries and protection of biological aquatic resources'. There is one main office (*Glavrybvod*, literally main fisheries administration) in Moscow and 26 regional offices, including one in Kamchatskiy Krai, located in Petropavlovsk-Kamchatskiy. The *rybvod*s existed in Soviet times and had an important role in fisheries management as the Ministry of Fisheries' main representations at regional level, responsible, among other things, for licencing, quota control and enforcement in port and at sea. During the post-Soviet period, enforcement responsibilities have gradually been transferred to other bodies of governance (see PI 3.2.3 below), but the *rybvod*s still exist and are now primarily involved in aquaculture, reproduction and enhancement of fisheries.

Other groups of organizations subordinate to the FFA are scientific institutes and educational institutions, such as universities and colleges. There is one federal fisheries research institute, VNIRO (the Russian Federal Research Institute for Fisheries and Oceanography). VNIRO has 28 regional branches, the so-called NIROs (Russian abbreviation for the words "Scientific Research Fisheries Oceanography", used in the names of all the fisheries research institutes). These used to be administratively independent but were in 2019 incorporated into VNIRO as the federal institute's regional offices. In the Far Eastern Fishery Basin there are five regional institutes: MagadanNIRO (Magadan in Magadan Oblast), KamchatNIRO (Petropavlovsk-Kamchatskiy in Kamchatka Krai), KhabarovskNIRO (Khabarovsk in Khabarovsk Krai), SakhNIRO (Yuzhno-Sakhalinsk in Sakhalin Oblast) and TINRO (Vladivostok in Primorskiy Krai, "T" stands for Tikhookeanskiy, which means the Pacific Ocean).

Yet another group of institutions subordinate to the FFA are the federal and regional offices of the Center for Systems for Monitoring of Fisheries and Communication (Fisheries Monitoring Centre). These are the technical hubs for all kinds of reporting from vessels, including electronic logbooks, and vessel monitoring systems (VMS). There are seven regional Monitoring Centres, including one in Kamchatskiy krai, located in Petropavlovsk-Kamchatskiy.

All the above are federal management bodies, which have the leading role in Russian fisheries management. There is, however, a limited role also for regional authorities. Kamchatka Krai is one of Russia's 85 federal subjects ("regions"). Just like the federal level of governance, regional authorities in Russia have their own executive, legislative and judicial powers. The executive power is led by a Governor's office with a subordinate "regional administration" or "government" (either designation can be used), which in turn consists of a number of departments (where there is a regional administration) or ministries (where there is a government). The government of Kamchatka Krai has a Ministry of Fisheries.

The basic legal document underpinning fisheries management in the Russian Federation is the 2004 Federal Act on Fisheries and Conservation of Aquatic Biological Resources (Federal Fisheries Act). The Act has been revised several times, last in 2014. Other important legislation at the federal level includes the Federal Act on the Protection of the Environment (10 January 2002), the Federal Act on the Exclusive Economic Zone of the Russian Federation (17 December 1998) and the Federal Act on the Continental Shelf of the Russian Federation (30 November 1995).

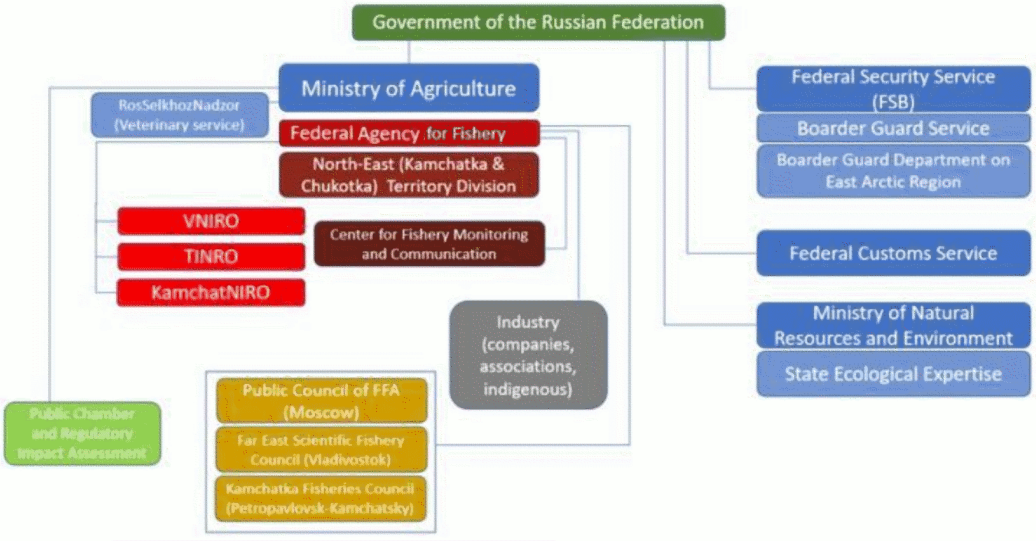


Figure 42 Organizational structure of the Russian fisheries management system (adjusted in relation to marine fisheries in the North West Pacific).

Setting of TAC and quota allocation

The key decision in the fishery management is setting of the Total Available Catch (TAC), or Recommended (or possible) Catch (RC). The procedure is laid out at http://www.fish.gov.ru/files/documents /otraslevaya_deyatelnost/sistema_VBR /Etapy_ustanovleniya_ODU.pdf. Order 104 requires that the stock assessment process in the Russian Federation should proceed under following way (FFA 2018):

1. Annually, local branches of VNIRO prepare materials that substantiate TACs before February 1st of the year preceding to fishing year.
2. VNIRO (head fishery research institute) considers materials prepared by local branches before February 20th, sent comments back to these institutes so that they return revised version of the materials before February 25th.
3. VNIRO establishes inter-institutional working groups for development of coordinated position before February 25th.
4. VNIRO considers coordinated TAC estimations at VNIRO Scientific Council before February 27th.
5. VNIRO considers TAC estimations at enlarged meeting of the Scientific Council before March 5th.
6. VNIRO prepares aggregate materials that substantiate TACs sends them to Industry Council on Commercial Forecasting at the FFA within 10 days.
7. Industry Council considers these materials before March 20th.
8. VNIRO forwards materials substantiating TACs to local branches within 3 days after Industry Council meeting for maintenance of public hearings. Based on the results of public hearings, local branches provide copies of protocols to VNIRO and FFA before May 1st.
9. VNIRO prepares aggregate materials and provide them to FFA before 11th May for presentation to State Ecological Expertise. Also, territorial administrations of FFA before 15th May submit to the State Ecological Expertise materials of public hearings and discussions at the Research Council of the local VNIRO branches.
10. In the case where new data becomes available which requires correction of the TAC, they are discussed at the Research Councils of local VNIRO branches and forwarded (along with the primary data) to VNIRO before 10th June.
11. VNIRO considers these materials and, if necessary, reviews them and, if needed return them to the local VNIRO branches for updating during 7 working days, and, after updating, forwards them to the inter-institutional working groups.
12. Inter-institutional working groups accept decisions on the justification of correction of TAC before 18 July, which are considered by VNIRO before 21st July at the extended meetings of the Research Council.
13. Based on conclusions of the Research Council, VNIRO aggregates all materials justifying correction of TAC, and forwards them to the Bureau of Industry Council for Fishery Forecasting of the FFA. The Industry Council on Fishery Forecasting is formed according to the Policy Directive on the Industry Council on Fishery Forecasting issued by the Ministry of Agriculture, FFA 20th December 2004 N164 (with changes 29th December 2006). It was created specifically for analysis of TACs, and includes experts of FFA, Ministry of Agriculture, Federal Services on veterinary, sanitary and natural resources use control, heads of the local VNIRO branches, and other stakeholders, in particularly, local VNIRO branches. It is headed by the head of FFA. Meetings are carried out at least twice a year, and between the meetings, the functioning is performed by the Bureau. The Bureau then considers the materials before 25th July.
14. VNIRO, during 3 working days forwards materials on correction of TAC to the local VNIRO branches for carrying out public hearings.
15. Protocols of public hearings are submitted to VNIRO not later than 1st September. VNIRO forwards them to State Ecological Expertise before 3 September. Meantime, local VNIRO branches prepare materials on correction of TAC, consider them on their research councils and forward to territorial administrations of FFA for carrying out public hearings and then for forwarding the materials to the State Ecological Expertise by 1st September.
16. Based on all these research, discussions and approvals, FFA issues an order on TACs. Recommended Catch does not require State Ecological Expertise.

The current quota allocation system has operated since 2008, when the fixed quota (constant percentage of TAC) was allocated to a company for 10 years based on historical catches. In 2016, the Federal Law “On Fisheries ...” was amended (Order No. 349-FZ dated 3 July 2016) to introduce a new type of quota – the production (catch) quota of

aquatic bioresources for investment purposes. This quota can be up to 20% of the approved TAC. A production quota was introduced to encourage fisheries infrastructure (in particular, vessels) renewal. Starting in 2018, quotas can be issued to companies for periods of 15 years. There are the following types of quota for fishing in Russia: industrial in seas, coastal, scientific (for research and monitoring), for educational and culturally purposes, for aquaculture, for amateur and sport recreational purposes, for small indigenous peoples of Siberia and Far East, to support international treaties, foreign quotas in the Russian EEZ, industrial in reservoirs, and investment quotas. The quotas are allocated by FFA following the recommendations Far Eastern Industrial Fisheries Council, Far Eastern Scientific and Technical Council, and based on this order, territorial administrations of FFA issue permits to the fisheries allowing them to fish with indication of area, quota, period, fishing gear, target species and a name of the captain.

Objectives

Russian fisheries law defines protection and rational use of aquatic biological resources as the main goal of the country's fisheries management. 'Protection and rational use' was an established concept in Soviet legislation on the protection of the environment and exploitation of natural resources, and has remained so in the Russian Federation. 'Rational use' bears resemblance to the internationally recognized ideal of sustainability, insofar as the emphasis is on long-term and sustained use of the resource, supported by science for socio-economic purposes. The Federal Fisheries Act states that the protection of aquatic biological resources shall be given priority to their rational use. The precautionary approach is not mentioned explicitly, but the requirement to protect aquatic biological resources and take the best scientific knowledge into account equals the requirements of the precautionary approach, as laid out in the FAO Code of Conduct and its technical guidelines. The Russian Federation has signed and ratified a number of international agreements which adopt the precautionary approach, including the 1995 UN Straddling Stocks Agreement. The provisions of international agreements entered into by the Russian Federation stood above those of national law according to the 1993 Russian Constitution, but that was changed when the Constitution was subjected to its first major revision in 2020.

In Russia, the rights of fishery-dependent communities are explicitly stated in the Federal Fisheries Act. The Act states that 'the small indigenous peoples of the North, Siberia and the Far East' (ethnic groups with a 'traditional' lifestyle consisting of less than 50,000 people) shall be given access to fish resources in order to secure their livelihood. It gives 'fisheries to protect the traditional lifestyle of small indigenous peoples of the North Siberia and the Far East' extended rights compared to the other types of fisheries listed in the Act (of which the most important are 'industrial fisheries', 'coastal fisheries' and 'fisheries for scientific and enforcement purposes').

Consultation mechanisms

The Russian (and previously Soviet) system for fisheries management has a long tradition of involving industry and other stakeholders in the management process. In recent years, the traditional arenas for interaction between authorities and stakeholders has been supplemented by new platforms for public engagement with management.

The Federal Fisheries Act requires that any citizen, public organization or association (of legal entities) has the right to provide their input into the decision-making process within Russia's system for fisheries management. A formal arena for interaction between government, industry and other stakeholders are the advisory boards, the so-called fishery councils, set up at federal, basin and regional levels. At the federal level, the Public Fisheries Council was established in 2008 in accordance with the requirement in the Federal Public Chamber Act that all federal bodies of governance (with a few exceptions) shall have a public council that will serve as an arena of interaction between the authorities and the general public. The Council consists of members from various federal bodies of governance, the fishing industry, research institutions and other interested stakeholders, such as non-governmental organizations (WWF). Members are proposed by the public (in practice public organizations), and the FFA appoints up to 50 members for periods of two years.

Basin-level fishery councils have existed since Soviet times, named 'scientific-technical councils'. In line with the general regionalization that took place in Russia during the 1990s, similar bodies were set up at the level of federal subjects, named 'regional fisheries councils'. Both were made mandatory in the 2004 Federal Fisheries Act. Rules of procedures for the 'basin scientific-technical councils' in the Russian Federation were adopted in 2008. They state that the councils shall advice the authorities on a wide range of fishery-related issues, including conduct of fisheries in the relevant basin; control and surveillance; conservation; recovery and harvesting of aquatic biological resources; distribution of quotas and other issues of importance to ensure sustainable management of fisheries. The fishery councils consist of representatives of federal and regional authorities, the fishing industry, research institutions and non-governmental organizations (NGOs), including the indigenous people of the North, Siberia and the Far East. The basin level councils are headed by federal authorities, the councils at federal subject level by regional authorities.

The Far Eastern Basin Scientific-Technical Council consists of representatives from the FFA, the Ministry of Agriculture, the Ministry of Natural Resources, the Federal Security Service (FSB), the Veterinary Agency, the Antimonopoly Agency, scientific institutions, fishing companies and associations and representatives of the indigenous peoples of the Russian Far East and Far North. The Council is headed by a Deputy Director of the FFA, i.e. the federal management authority. As with other public councils at different management levels, the Far Eastern Scientific-Technical Council has an advisory role in all aspects of fisheries management. It has a particularly important role in coordinating stakeholder input to revisions of fisheries legislation and regulations. The Council actively encourages proposals from stakeholders and acts as a coordinating body for further input into the management process. Meetings are held in Vladivostok at least twice a year. The meetings are open to the public.

At a more general level, all new federal regulations in Russia have to go through public hearings; i.e. all draft proposals for new regulations have to be published at the website https://regulation.gov.ru, administered by the Ministry of Economic Development, where the public are given 15–30 days to provide their comments. Further, the FFA has a dedicated “Open Agency” initiative which is comprehensively detailed on their website. In addition to the use of the Public Fisheries Council and consultation bodies at lower level, this includes the use of internet conferences with citizens, reference groups to discuss policy initiatives, and a general objective to increase public access to information. Management bodies also have functions on their websites by which citizens can get in touch with the authorities. E.g., at the website of the FFA, there is detailed information about how citizens can get in touch via telephone and directly from the website. There is even the possibility to book a personal appointment at the Agency.

Enforcement, sanctions and compliance

Enforcement of fisheries regulations in Russia is the joint responsibility of the FFA though its regional offices and the Coast Guard, which is under the Border Service of the Federal Security Service (FSB). The FFA is responsible for control of quota uptake and also takes care of paper control related to licenses, catch logs and VMS data, while the Coast Guard carries out physical inspections at sea. The Coast Guard’s authority is limited to marine waters; the FFA, through its regional offices and those of the *rybvods* (see above), is responsible for the management of freshwater basins. Fish caught in waters under Russian jurisdiction must be landed in Russian ports. The Coast Guard conducts random inspections at sea, including from helicopters. Inspectors control the catch, gear and documents. The Federal Fisheries Monitoring Centre, with its 7 territorial departments including one in Kamchatka, is the technical hub for all electronic reporting from the fishing companies and vessels, including electronic logbooks and other catch reports as well as VMS and AIS data. The FFA territorial departments and the Coast Guard cooperate with the Fisheries Monitoring Centres, as well as with other countries and international fisheries organizations where relevant.

All vessels with an engine power >55 kW and maximum tonnage >80 mt engaged in fishing operations have to be equipped with a functioning vessel monitoring system (VMS) (Figure).

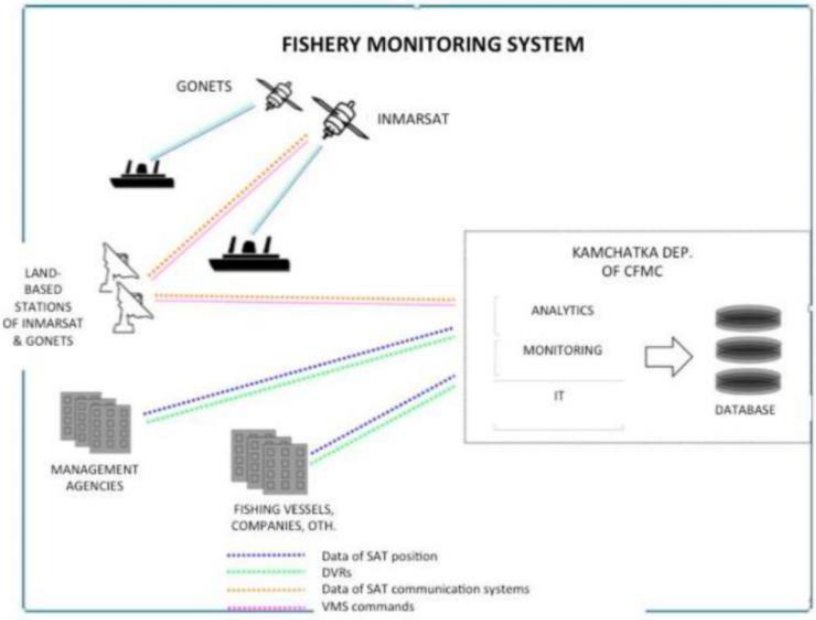


Figure 43 The fishery monitoring system operated by the CFMC (Marine Stewardship Council, 2019).

Russia is currently developing its own comprehensive “Gonets” satellite tracking system, which will soon replace the other systems on all Russian vessels. It will be able to interface with an electronic logbook system that is in advanced stage of development. One of advantages of this system is good coverage in places with latitudes higher

than N 75°. Gonets automatically updates the position of the vessel every 10 minutes. In the rare cases of VMS non-compliance (where VMS fixes are not being streamed regularly), the vessel is immediately requested to rectify the problem by providing regular positional fixes by telephone or fax, but if it cannot bring the system back into operation within 48 hours, the vessel has to return to port. Similarly, an out-of-order VMS is allowed 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 cruise.

Each vessel reports on a daily basis to the CFMC detailed information on its activity, catch by species, number and total time of fishing operations, depth and gear. Also, the vessel reports the amount of each type of production, used bait and various products onboard. Apart from the daily information it collates, the CFMC also provides operational reports (twice a month) by vessel and company from the start of each season and quarterly statistical reports by company.

The Veterinary Service (in Russian: Rosselkhoznadzor) is the only *sluzhba* ([controlling] service; see PI 3.1.1 above) under the Ministry of Agriculture. For several years in the mid- and late 2000s, it was responsible for monitoring and enforcement across all fields of work under the Ministry, including fisheries, but now its remit is limited to more traditional veterinary services, such as supervision of animal health. Hence, it is responsible for sanitary inspections of landed fish.

The Ministry of Agriculture and its subordinate bodies of governance cooperate with other governmental agencies in the enforcement of fisheries regulations. The Federal Customs Service inspects cargoes with fish caught under Russian jurisdiction and intended for export and hence plays an important role in maintaining traceability of fish products. The Federal Tax Service is involved in investigations of economic crime within the fishing industry. The Ministry of Natural Resources through its Agency for Monitoring of Natural Resources (Rosprirodnadzor) assesses the environmental impact of fisheries and is responsible for the protection of habitats and protected, endangered or threatened species.

Sanctions to deal with non-compliance in Russian waters exist in within the system for fisheries management, as well as in the wider legal system. Both make wide use of administrative fines and refer serious cases to the judicial system. The Russian Federal Fisheries Act requires the withdrawal of quota rights if a fishing company has committed two serious violations of the fisheries regulations within one calendar year, among other things. The Code of the Russian Federation on Administrative Infractions specifies the level of fines that can be issued administratively by enforcement bodies, e.g. up to RUR 5,000 for ‘citizens’, 50,000 for ‘executive officers’ and 200,000 for companies. The Criminal Code requires that illegal fishing such as causing ‘large damage’, conducted in spawning areas or migration ways leading to such areas, or in marine protected areas be penalized by either fines up to RUR 300,000 or an amount corresponding to 1-2 years’ income for the violator, compulsory work of no less than 480 hours, corrective work for at least two years or arrest for at least 6 months.

According to the information from the FSB Coast Guard department which is responsible for the fisheries enforcement and control, the Coast Guard conducted 2620 inspections of crab fishing vessels and crab transshipments at-sea in 2018. Coast Guard detected 7 cases of non-compliance with the Fishing Rules and regulations. 3 vessels under convenient flag were restrained. In 2019, enforcement activities remain at the same level – 2642 at-sea inspections. The Coast Guard detected 2 cases of non-compliance by the Russian flagged vessels. No convenient flag vessel was identified (RCCA, 2020). Figure 44 shows that the figures for TAC, reported catch and export of crabs have been very close to each other since 2017.

Review of the management system

There are various mechanisms in place to evaluate key parts of the fishery-specific management system, but at varied levels of ambition and coverage. At the fishery council meetings, found at federal, basin and regional levels, management authorities receive feedback on management practices from the industry and other interested stakeholders. The FFA and the Ministry of Agriculture report annually to the Government, the Presidential Administration and the Federal Assembly (to both the lower chamber, the State Duma, and the upper chamber, the Federation Council) about their work, with emphasis on achievements in the fishing industry. Other federal agencies also review parts of the fisheries management system. For instance, the Auditor General evaluates how allocated funds are spent, and the Anti-Monopoly Service how competition and investment rules are observed. Within FFA, there is regular review of the performance of the Agency’s regional offices. In the establishment of TACs, the scientific advice from VNIRO’s regional branches is peer reviewed by the head office in Moscow, and then forwarded to FFA and the federal natural resources monitoring agency Rosprirodnadzor for comments. It is also presented to the general public for discussion at public hearings, announced in the local press. At the regional level, the Kamchatskiy krai Ministry of Fisheries is under scrutiny by the regional Government, as well as the legislative body at oblast level, the regional Duma.

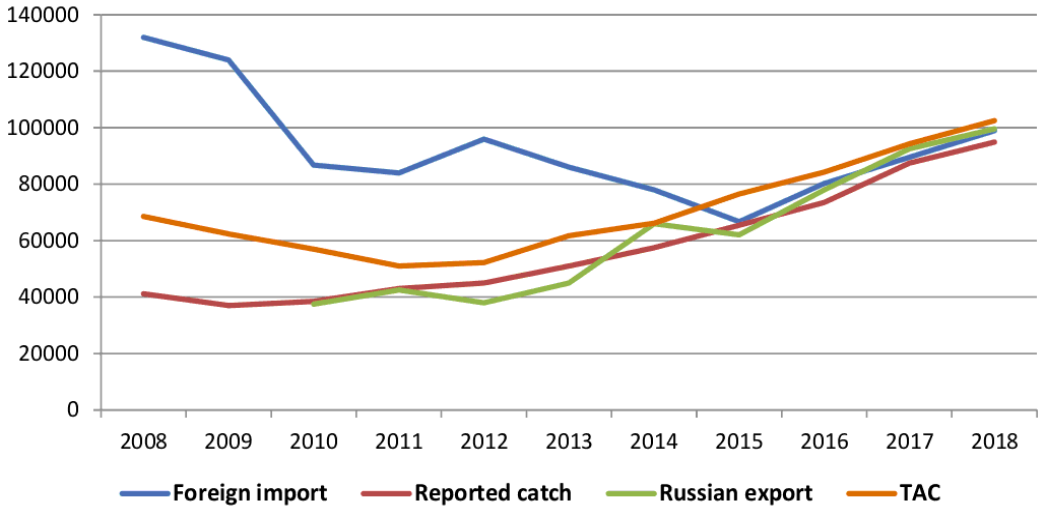


Figure 44 Comparison of reported catch and official export and import trade flows of the Russian Crab X-axis – years, Y-axis – tons (RCCA, 2020).

6.4.2. Principle 3 Performance Indicator scores and rationales

PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: - Is capable of delivering sustainability in the UoA(s); - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework		
Scoring Issue		SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management			
	Guide post	There is an effective national legal system **and a framework for cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and **organised and effective cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and **binding procedures governing cooperation with other parties** which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**
Rationale				

The fishery takes place in Russian exclusive economic zone, internal and territorial waters only and hence falls under exclusive Russian jurisdiction. Within the Russian Government, fisheries policy falls under the purview of the Ministry of Agriculture (Minselkhoz). The implementing body for fisheries management under the Ministry is the Federal Fisheries Agency (FFA) (Rosrybolovstvo), which is the successor of the former State Committee for Fisheries (abolished in 2004), and in turn the Soviet Ministry of Fisheries. The Ministry is responsible for the formulation of Russia's fisheries policy, while the FFA oversees the daily management of fisheries, including the determination of specific fishing rules and the implementation of regulations set by the Ministry. Within the Russian Government, the Ministry of Agriculture interacts with other federal ministries, e.g. with the Ministry of Natural Resources and Environment (Minprirody) through its implementing Agency for Monitoring of Natural Resources (Rosprirodnadzor), which carries out environmental impact assessments of fisheries regulations.

The FFA has 18 territorial administrations, most of which cover several federal subjects. The territorial administrations are responsible for licensing, monitoring of quota uptake, and the administration of closed areas, among other things. UoA fishery is subject to the control of the North-Eastern Territorial Administration of the Federal Fisheries Agency (NETA), which comprises two federal subjects (Kamchatka Krai and Chukotka Autonomous Area) and two fishery-related subzones (61.05.2 – Western Kamchatka and 61.05.4 – Kamchatka-Kuril) and is located in Petropavlovsk-Kamchatsky. The traditional geographical entities in Soviet/Russian fisheries management are the "basins". Currently there are eight basins; one of them is the Far Eastern Fisheries Basin, which includes the Chukchi Sea, the Bering Sea, the Sea of Okhotsk, the Sea of Japan and the Pacific Ocean east of the Kamchatka Peninsula and the Kuril Islands. The basin level is no longer a central management level in Russia, but there are still advisory boards at basin level as well as general fishing rules that apply to the entire basin.

In addition to the territorial administrations, which are an integral part of the FFA, the federal agency has a number of subordinate bodies of governance. One group is the rybvods (Russian acronym for fisheries administration), formally "basin administrations for fisheries and protection of biological aquatic resources". There is one main office (Glavrybvod, literally main fisheries administration) in Moscow and 26 regional offices, including one in Kamchatka Krai (located in Petropavlovsk-Kamchatsky). The rybvods existed in Soviet times and had an important role in fisheries management as the Ministry of Fisheries' main representations at regional level, responsible, among other

things, for licensing, quota control and enforcement in port and at sea. During the post-Soviet period, enforcement responsibilities have gradually been transferred to other bodies of governance, but the rybvods still exist and are now primarily involved in aquaculture, reproduction and enhancement of fisheries.

Other groups of organizations subordinate to the FFA are scientific institutes and educational institutions, such as universities and colleges. There is one federal fisheries research institute, VNIRO (the Russian Federal Research Institute for Fisheries and Oceanography). VNIRO has 28 regional branches, the so-called NIROs (Russian abbreviation for the words “Scientific Research Fisheries Oceanography”, used in the names of all the fisheries research institutes). These used to be administratively independent but were in 2019 incorporated into VNIRO as the federal institute’s regional offices. In the Far Eastern Fishery Basin there are five regional institutes: MagadanNIRO (Magadan in Magadan Oblast), KamchatNIRO (Petropavlovsk-Kamchatsky in Kamchatka Krai), KhabarovskNIRO (Khabarovsk in Khabarovsk Krai), SakhNIRO (Yuzhno-Sakhalinsk in Sakhalin Oblast) and TINRO (Vladivostok in Primorskiy Krai). Institute conduct research on marine and freshwater resources in the respective regions in order to monitor the status of commercial species and prepares annual forecasts and management advice (see below). Further, there are six “technical universities” and nine subordinate colleges, which is under the Far Eastern State Technical Fisheries University, located in Vladivostok. Yet another group of institutions subordinate to the FFA are the federal and regional offices of the Centre for Systems for Monitoring of Fisheries and Communication (Fisheries Monitoring Centre). There are the technical hubs for all kinds of reporting from vessels, including electronic logbooks, and vessel monitoring systems (VMS).

All the above are federal management bodies, which have the leading role in Russian fisheries management. There is, however, a limited role also for regional authorities. Kamchatka Krai is one of Russia’s 85 federal subjects (“regions”). Just like the federal level of governance, regional authorities in Russia have their own executive, legislative and judicial powers. The executive power is led by a Governor’s office with a subordinate “regional administration” or “government” (either designation can be used), which in turn consists of a number of departments (where there is a regional administration) or ministries (where there is a government). The government of Kamchatka Krai has a Ministry of Fisheries.

The basic legal document underpinning fisheries management in the Russian Federation is the 2004 Federal Act on Fisheries and Conservation of Aquatic Biological Resources (Federal Fisheries Act). The Act has been revised several times, last in 2014. Other important legislation at the federal level includes the Federal Act on the Protection of the Environment (10 January 2002), the Federal Act on the Exclusive Economic Zone of the Russian Federation (17 December 1998) and the Federal Act on the Continental Shelf of the Russian Federation (30 November 1995).

Hence, there is an effective national legal system in place to deliver management outcomes consistent with MSC Principles 1 and 2. **SG 60 and SG 80 are met.**

There is a system in place which delivers such outcomes. **SG 100 is met.**

b	Resolution of disputes			
	Guide post	The management system incorporates or is subject by law to a **mechanism** for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is 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**.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

There are effective, transparent dispute resolution mechanisms in place, as fishers can take their case to court if they do not accept the rationale behind an infringement accusation by enforcement authorities or the fees levied against them. Verdicts at the lower court levels can be appealed to higher levels. However, most disputes are solved within the system for fisheries management, not requiring judicial treatment. There are well-established systems of consultation with user groups in place for the fishery (see PI 3.1.2 below), confirmed in federal and regional legislation and transparent for actors within the fishing industry. Therefore, the management system incorporates or is subject by law to a mechanism for the resolution of legal disputes. **SG 60 is met.**

These mechanisms are transparent and considered to be effective in dealing with most issues and are appropriate to the context of the UoAs. **SG 80 is met.**

However, it has not been tested and proven to be effective. **SG 100 is not met.**

	Respect for rights			
c	Guide post	The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**

Rationale

In Russia, the rights of fishery-dependent communities are explicitly stated in the Federal Fisheries Act. The Act states that “the small indigenous peoples of the North, Siberia and the Far East” (ethnic groups with a “traditional” lifestyle consisting of less than 50,000 people) shall be given access to fish resources in order to secure their livelihood. It gives “fisheries to protect the traditional lifestyle of small indigenous peoples of the North Siberia and the Far East” extended rights compared to the other types of fisheries listed in the Act (of which the most important are “industrial fisheries”, “coastal fisheries” and “fisheries for scientific and enforcement purposes”). This is implemented in Kamchatka Krai and Magadan Oblast for the regions’ indigenous peoples Aleuts, Itelmens, Kamchadals, Koryaks, Chukchi people, Evens, Eskimos, and Orochs.

Hence, 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. **SG 60 is met.**

The system has a mechanism to observe such rights, so **SG 80 is also met.**

Since it is founded in law, the mechanism formally commits to these rights, and **SG 100 is met.**

References

- FAO, 1995;
- FFA, 2008, 2015, 2019, 2019a;
- FR, 2019;
- MAR, 2013, 2015, 2017, 2019;
- Melnychuk *et al*., 2017;
- RG, 1999, 2000, 2000a, 2002, 2004, 2005, 2006, 2006a, 2009, 2014, 2019, 2019a;
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- Websites of:

Federal Fisheries Agency – http://fish.gov.ru/

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http://свту.рф/informatsiya-dlya-kmns/prikazy-o-predostavlenii-vbr.html (Local legislation on provision of resources for indigenous peoples).

Okhotsk Territorial Administration of Federal Fisheries Agency – http://magfishcom.ru/

Federal Fisheries Monitoring Center – http://cfmc.ru

- Kamchatka Krai administration – https://www.kamgov.ru/

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**

Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**95**
Condition number (if relevant)	**NA**

PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	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?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**
Rationale				

The functions, roles and responsibilities of the different organizations and individuals involved in the management of the fishery defined in national laws and regulations, as well as in longstanding practice; see SI 3.1.1 a) for an overview of the main bodies of governance at federal and regional levels engaged in the management of the fishery, and SI 3.1.2 b) for an overview of non-governmental organizations involved.

Organizations and individuals involved in the management process have been identified, and their functions, roles and responsibilities are generally understood. **SG 60 is met.**

The functions, roles and responsibilities are explicitly defined in legislation and long-standing practice and well understood for key areas of responsibility and interaction, so **SG 80 is also met.**

Based on interviews with a number of stakeholders at the site visit, including scientists, managers, fishers and an environmental NGO, it can be concluded that the functions, roles and responsibilities are well understood for all areas of responsibility and interaction. **SG 100 is met.**

b	Consultation processes			
	Guide post	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?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**
Rationale				

The Russian (and previously Soviet) system for fisheries management has a long tradition of involving industry and other stakeholders in the management process. In recent years, the traditional arenas for interaction between authorities and stakeholders have been supplemented by new platforms for public engagement with management.

The Federal Fisheries Act (RG, 2004) requires that any citizen, public organization or association (of legal entities) has the right to provide their input into the decision-making process within Russia's system for fisheries management. A formal arena for interaction between government, industry and other stakeholders are the advisory boards, the so-called fishery councils, set up at federal, basin and regional levels. At the federal level, the Public Fisheries Council is established in accordance with the requirements of the Federal Law of July 21, 2014 No. 212-FZ "On the Basics of Public Control in the Russian Federation" (FG, 2014) and Federal Law of April 4, 2005 No. 32-FZ "On the Public Chamber of the Russian Federation" (FG 2005) and other documents.

The Council consists of members from various federal bodies of governance, the fishing industry, research institutions and other interested stakeholders, such as non-governmental organizations (WWF). Members are proposed by the public (in practice public organizations), and the FFA appoints up to 50 members for periods of two years. More information about the Council can be found on the website http://www.fish.gov.ru/otkrytoe-agentstvo/obshchestvennyj-sovet-pri-rosrybolovstve.

Basin-level fishery councils have existed since Soviet times, named "scientific-technical councils". Then, during the 1990s, similar bodies were set up in Russia at the level of federal subjects, named "regional fisheries councils". Both were made mandatory in the Federal Fisheries Act (RG, 2004). Rules of procedures for the "basin scientific-technical councils" in the Russian Federation were adopted in 2008. They state that the councils shall advice the authorities on a wide range of fishery-related issues, including conduct of fisheries in the relevant basin; control and surveillance; conservation; recovery and harvesting of aquatic biological resources; distribution of quotas and other issues of importance to ensure sustainable management of fisheries. The fishery councils consist of representatives of federal and regional authorities, the fishing industry, research institutions and non-governmental organizations (NGOs), including the indigenous people of the North, Siberia and the Far East. The basin level councils are headed by federal authorities, the councils at federal subject level by regional authorities.

The Far Eastern Basin Scientific-Technical Council (DVNPS) consists of representatives from the FFA, the MAR, the MNRER, the FSBR, the Veterinary Agency, the Antimonopoly Agency, scientific institutions, fishing companies and associations and representatives of the indigenous peoples of the Russian Far East and Far North. It is established according to the Federal Fisheries Act (FG, 2004). The Council is headed by a Deputy Director of the FFA, i.e. the federal management authority. As with other public councils at different management levels, the Far Eastern Scientific-Technical Council has an advisory role in all aspects of fisheries management. It has a particularly important role in coordinating stakeholder input to revisions of fisheries legislation and regulations. The Council actively encourages proposals from stakeholders, who are invited to present their case at Council meetings, and acts as a coordinating body for further input into the management process. Meetings are held in different locations of the Far East at least twice a year. Public and media are usually invited for meetings.

At a more general level, all new federal regulations in Russia have to go through public hearings; i.e. all draft proposals for new regulations have to be published at the website https://regulation.gov.ru, administered by the Ministry of Economic Development, where the public are given 15–30 days to provide their comments. Further, the FFA has a dedicated "Open Agency" initiative which is comprehensively detailed on their website http://www.fish.gov.ru/otkrytoe-agentstvo.

In addition to the use of the Public Fisheries Council and consultation bodies at lower level, this includes the use of internet conferences with citizens, reference groups to discuss policy initiatives, and a general objective to increase public access to information. Management bodies also have functions on their websites by which citizens can get in touch with the authorities. E.g., at the website of the FFA, there is detailed information about how citizens can get in touch via telephone and directly from the website. There is even the possibility to book a personal appointment at the Agency.

Hence, the management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system. **SG 60 is met.**

The management system includes consultation processes that regularly seek and accept relevant information. Local knowledge is considered, in particularly, in the framework of public hearings or Public Councils as a way to promote transparency, dialogue and cooperation with scientific and public organizations (including NGOs) and individuals, including representatives of indigenous peoples. In the Far East, the important role in communication, discussion and confirmation of options and decisions is played by the Far Eastern Scientific Fisheries Industrial Council (DVNPS). The management system demonstrates consideration of the information obtained through protocols of meetings (http://fish.gov.ru/otraslevaya-deyatelnost/organizatsiya-rybolovstva/protokoly-komissij-i-nauchno-promyslovykh-sovetov). **SG 80 is met.**

Based on interviews with a number of stakeholders at the site visit, including scientists, managers, fishers and an environmental NGO, it can be concluded that the authorities also explain how their input is used or not used. **SG 100 is met.**

	Participation			
c	Guide post		The consultation process **provides opportunity** for all interested and affected parties to be involved.	The consultation process provides **opportunity and encouragement** for all interested and affected parties to be involved, and **facilitates** their effective engagement.
	Met?		**All UoAs – Yes**	**All UoAs – No**

Rationale

As follows from SI 3.1.2 b) above, the consultation process provides opportunity for all interested and affected parties to be involved at both federal and regional level, which is confirmed by normative documents on fishery management. The guarantee of opportunity for all interested and affected parties to be involved in the consultation process is the Federal Law "On the Procedure for Considering Applications of Citizens of the Russian Federation" (RG, 2006a). The law states, in particular, that the citizen has a right to get a written response from the relevant governmental agency and comply regarding the action (or absence of action) to the court. **SG 80 is met**.

The authorities to some extent encourage stakeholders to be involved and facilitate their effective engagement, e.g. in the public councils described under SI 3.1.2 b), but according to interviews at the site visit there is room for improvement in this respect. **SG 100 is not met.**

References

- FAO, 1995;
- FFA, 2008, 2015, 2019, 2019a;
- FR, 2019;
- MAR, 2013, 2015, 2017, 2019;
- Melnychuk *et al*., 2017;
- RG, 1999, 2000, 2000a, 2002, 2004, 2005, 2006, 2006a, 2009, 2014, 2019, 2019a;
- Zgurovsky *et al*., 2013.
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http://свту.рф/informatsiya-dlya-kmns/prikazy-o-predostavlenii-vbr.html (Local legislation on provision of resources for indigenous peoples).

Okhotsk Territorial Administration of Federal Fisheries Agency – http://magfishcom.ru/

Federal Fisheries Monitoring Center – http://cfmc.ru

Kamchatka Krai administration – https://www.kamgov.ru/

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**95**

Condition number (if relevant)	**NA**

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 Fisheries Standard, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach, are **implicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach are **explicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are **explicit** within **and required by** management policy.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

Russian fisheries law defines protection and rational use of aquatic biological resources as the main goal of the country's fisheries management. "Protection and rational use" was an established concept in Soviet legislation on the protection of the environment and exploitation of natural resources, and has remained so in the Russian Federation. "Rational use" bears resemblance to the internationally recognized ideal of sustainability, insofar as the emphasis is on long-term and sustained use of the resource, supported by science for socioeconomic purposes. The Federal Fisheries Act (RG, 2004) states that the protection of aquatic biological resources shall be given priority to their rational use. The precautionary approach is not mentioned explicitly, but the requirement to protect aquatic biological resources and take the best scientific knowledge into account equals the requirements of the precautionary approach, as laid out in the FAO Code of Conduct and its technical guidelines. The Russian Federation has signed and ratified a number of international agreements which adopt the precautionary approach, including the 1995 UN Straddling Stocks Agreement. **SG 60 is met.**

Clear long-term objectives to guide decision-making, consistent with MSC Principles and Criteria, including the precautionary approach, are explicit within and required by management policy. Although the precautionary approach as such is not incorporated in Russian fisheries legislation anywhere, practical stock assessment, harvest control rules set for the UoA and other Russian fisheries do incorporate a clear precautionary element, in particular, following the highly-cited book by Babayan (2000). Russian management system also takes into consideration the FAO Code of Conduct for Responsible Fisheries (FAO, 1995), and analyses show that it is widely used in practical management (Zgurovsky et al., 2013). Long-term objectives within management policy are addressed in several federal laws. They are described in more details in the National framework section. These documents define policy objectives for the Russian fisheries and for the Far East fishing industry in particular and provide a broad context for managing the fishery under the assessment. These documents include objectives to maintain sustainable stocks and protect the environment while meeting social and economic goals. **SG 80 is met.**

However, such objectives are not made mandatory for lower-level regulations and policy implementation at national level. **SG 100 is not met.**

References

- FAO, 1995;
- FFA, 2008, 2015, 2019, 2019a;
- FR, 2019;
- MAR, 2013, 2015, 2017, 2019;
- Melnychuk *et al*., 2017;
- RG, 1999, 2000, 2000a, 2002, 2004, 2005, 2006, 2006a, 2009, 2014, 2019, 2019a;
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http://свту.рф/informatsiya-dlya-kmns/prikazy-o-predostavlenii-vbr.html (Local legislation on provision of resources for indigenous peoples).

Okhotsk Territorial Administration of Federal Fisheries Agency – http://magfishcom.ru/

Federal Fisheries Monitoring Center – http://cfmc.ru

Kamchatka Krai administration – https://www.kamgov.ru/

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**80**
Condition number (if relevant)	**NA**

PI 3.2.1 – Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	**Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery-specific management system.	**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-specific management system.	**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-specific management system.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Partial**

Rationale

Objectives broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2 are explicit in the Russian regulations of crab fisheries, including to maintain the stocks at sustainable levels (both target stocks and other retained species) and protect other parts of the ecosystem, such as habitats. **SG 60 is met.**

These objectives are long-term, but also more short-term objectives exist in the fishery, both in the regulatory system and in Ostrovnoy Crab LLC's Code of Conduct. These include, for P1 and P2 stocks, to stocks within defined limit and precautionary reference points and avoiding juvenile catch; for ETP species to mitigate interactionand ensure high survival; and for habitats to avoid interaction with VMEs. The objectives are explicit in the fishery regulations for the (Russian) Far Eastern Basin and in Ostrovnoy Crab LLC's Code of Conduct. **SG 80 is met.**

The P1 objectives mentioned above are well defined and measurable in the sense that performance against them can be measured through scientific research and the enforcement bodies' recording and inspection routines (see SI 3.2.3 a) below). However, P2 objectives are less well defined and measurable, warranting a **partial score at SG 100.**

References

- FAO, 1995;
- FFA, 2008, 2015, 2019, 2019a;
- FR, 2019;
- MAR, 2013, 2015, 2017, 2019;
- Melnychuk *et al*., 2017;
- RG, 1999, 2000, 2000a, 2002, 2004, 2005, 2006, 2006a, 2009, 2014, 2019, 2019a;
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Kamchatka Krai administration – https://www.kamgov.ru/

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**90**
Condition number (if relevant)	**NA**

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		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	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?	**All UoAs – Yes**	**All UoAs – Yes**	

Rationale

There is a formal decision-making process resulting in measures and strategies to achieve the fishery-specific objectives. The FFA is a central actor in the decision-making process. It works based on recommendations from VNIRO, KamchatNIRO and MagadanNIRO and is responsible for the distribution of quota based on TACs and recommended catch users. The system is based on fully documented (databases, scientific literature and websites) 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 questions necessary to achieve the objective of making the fishery sustainable and preserving ecosystem health and function. The evaluation is weighted towards the target crabs species, but appropriate and relevant environmental and ecosystem questions and issues are also addressed; the questions posed show good understanding of the system in which the crab fishery is conducted.

SG 60 and SG 80 are met.

b	Responsiveness of decision-making processes			
	Guide post	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?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**

Rationale

The well-established decision-making procedures at federal and regional level in Russia respond to issues identified in research, monitoring, evaluation or by groups with an interest in the fishery through the arenas for regular consultations between governmental agencies and the public. This happens in the fishery councils at basin and regional level and through special consultation with the industry and other stakeholders (see PI 3.1.2 above). In addition, there is close contact between authorities and scientific research institutions, primarily between the FFA and VNIRO at the federal level and their subordinate bodies at regional level. **SG 60 is met.**

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. The generalised scheme of setting up TAC, which is a key element of the management of the crab stocks is provided at the FFA website (http://www.fish.gov.ru/files/documents/otraslevaya_deyatelnost/sistema_VBR/

Etapy_ustanovleniya_ODU.pdf) and described in more details at section on Total Available Catch and Recommended Catch based on report from FFA (FFA, 2015). In terms of the formal assessment of fish stocks involved in the fishery, 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 surveys, modelling to internationally acceptable standard and other relevant research information. Projects “Open Agency” and “Open Government” launched by the FFA include information on public hearings, Public Councils, websites, media releases. **SG 80 is met.**

It is not clear that all issues are responded to. For instance, WWF informed the assessment team during the site visit that they have raised the issue of overcapacity with the authorities without having any response to this. **SG 100 is not met.**

c	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		**All UoAs – Yes**	

Rationale

Decision-making processes use the precautionary approach in most cases and are based on best available information obtained from the fisheries research institutions at all management levels. Explicit in the assessment methodology is the precautionary principle, as explained in Babayan (2000) and laid out in the FAO Code of Conduct and its technical guidelines. **SG 80 is met.**

d	Accountability and transparency of management system and decision-making process			
	Guide post	Some information on the fishery’s performance and management action is generally available on request to stakeholders.	**Information on the fishery’s 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 the fishery’s performance and management actions** and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – No**

Rationale

Information is available on the fishery’s performance and management action on the websites of the FFA and its regional offices, here NETA, as well as those of regional authorities, here the Ministry of Fisheries of Kamchatka Krai. **SG 60 is met.**

Explanations are provided for actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity, to some extent on the mentioned websites but in particular at the public meetings and hearings presented under SI 3.1.2 b) above. **SG 80 is also met.**

In order to reach SG 100, reporting must be formal and information comprehensive. The timely online posting of all protocols counts, in the opinion of the assessment team, as formal reporting as much as distribution via mail or email. Protocols from meetings in the public councils are available on the FFA, NETA and OTA websites, but no recent updates. The assessment team has not been provided with protocols from meetings in the decision-making bodies, e.g. the technical-scientific councils. **SG 100 is not met.**

e	Approach to disputes			
	Guide post	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?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**

Rationale

The Russian system for fisheries management is not subject to continuing court challenges or indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery. **SG 60 is met.** If taken to court by fishing companies, the management authority will comply with the judicial decision in a timely manner. **SG 80 is met.**

The management authority works proactively to avoid legal disputes. This is done primarily through the tight cooperation with user groups at the regulatory level (see PI 3.1.2 above), ensuring as high legitimacy as possible for regulations and other management decisions. Regulatory and enforcement authorities offer advice to the fleet on how to avoid infringements, keeping them updated on changes in the regulations. They also have the authority to issue administrative penalties for minor infringements (serious enough to be met by a reaction above a written warning), thus referring only the more serious cases to prosecution by the police and possible transfer to the court system. Since the management system acts proactively to avoid legal disputes and rapidly implements judicial decisions, **SG 100 is met.**

References

- Babayan, 2000;
- FAO, 1995;
- FFA, 2008, 2015, 2019, 2019a;
- FR, 2019;
- MAR, 2013, 2015, 2017, 2019;
- Melnychuk *et al*., 2017;
- RG, 1999, 2000, 2000a, 2002, 2004, 2005, 2006, 2006a, 2009, 2014, 2019, 2019a;
- Zgurovsky *et al*., 2013.
- Websites of:

Federal Fisheries Agency – http://fish.gov.ru/

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Federal Fisheries Monitoring Center – http://cfmc.ru

Kamchatka Krai administration – https://www.kamgov.ru/

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**85**
Condition number (if relevant)	**NA**

PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance **mechanisms** exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance **system** has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A **comprehensive** monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**

Rationale

Enforcement of fisheries regulations in Russia is the joint responsibility of the FFA though its regional offices (in the UoA fisheriesfisheries – NETA) and the Coast Guard, which is under the Border Service of the Federal Security Service (FSB). The FFA is responsible for control of quota uptake and also takes care of paper control related to licenses, catch logs and VMS data, while the Coast Guard carries out physical inspections at sea. The Coast Guard's authority is limited to marine waters; the FFA, through its regional offices and those of the rybvods (see SI 3.1.1 a)), is responsible for the management of freshwater basins. Fish caught in waters under Russian jurisdiction must be landed in Russian ports. The Coast Guard conducts random inspections at sea, including from helicopters. Inspectors control the catch, gear and documents. The Federal Fisheries Monitoring Center, with its 7 territorial departments including one in Kamchatka, is the technical hub for all electronic reporting from the fishing companies and vessels, including electronic logbooks and other catch reports as well as VMS data. The FFA territorial departments and the Coast Guard cooperate tightly with the Fisheries Monitoring Centers, as well as with other countries and international fisheries organizations.

All vessels with an engine power >55 kW and maximum tonnage >80 mt engaged in fishing operations have to be equipped with a functioning vessel monitoring system (VMS). Russia is currently developing its own comprehensive "Gonets" satellite tracking system, which will soon replace the other systems on all Russian vessels. It will be able to interface with an electronic logbook system that is in advanced stage of development. One of advantages of this system is good coverage in places with latitudes higher than N 75°. Gonets automatically updates the position of the vessel every 10 minutes. In the rare cases of VMS non-compliance (where VMS fixes are not being streamed regularly), the vessel is immediately requested to rectify the problem by providing regular positional fixes by telephone or fax, but if it cannot bring the system back into operation within 48 hours, the vessel has to return to port. Similarly, an out-of-order VMS is allowed 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 cruise.

Each vessel reports on a daily basis to the CFMC detailed information on its activity, catch by species, number and total time of fishing operations, depth and gear. Also, the vessel reports the amount of each type of production, used bait and various products onboard. Apart from the daily information it collates, the CFMC also provides operational reports (twice a month) by vessel and company from the start of each season and quarterly statistical reports by company.

The Veterinary Service (in Russian: Rosselkhoznadzor) is the only controlling service (see PI 3.1.1 above) under the Ministry of Agriculture. For several years in the mid- and late 2000s, it was responsible for monitoring and enforcement across all fields of work under the Ministry, including fisheries, but now its role is limited to more traditional veterinary services, such as supervision of animal health. Hence, it is responsible for sanitary inspections of landed fish.

The Ministry of Agriculture and its subordinate bodies of governance cooperate with other governmental agencies in the enforcement of fisheries regulations. The Federal Customs Service inspects cargoes with fish caught under Russian jurisdiction and intended for export and hence plays an important role in maintaining traceability of fish

products. The Federal Tax Service is involved in investigations of economic crime within the fishing industry. The Ministry of Natural Resources through its Agency for Monitoring of Natural Resources (Rosprirodnadzor) assesses the environmental impact of fisheries and is responsible for the protection of habitats and protected, endangered or threatened species.

Hence, monitoring, control and surveillance mechanisms exist and are implemented in the fishery, and there is a reasonable expectation that they are effective. **SG 60 is met.**

These measures qualify as a system and have demonstrated an ability to enforce relevant management measures, strategies and rules; see SI 3.2.3 c) below on compliance. **SG 80 is met.**

Based on inspection and infringement statistics from the enforcement agency (see SI 3.2.3 c) below), it can be concluded that the system has demonstrated a consistent ability to enforce relevant management measures, strategies and rules. **SG 100 is met.**

	Sanctions			
b	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, **are consistently applied** and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and **demonstrably** provide effective deterrence.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – Yes**

Rationale

Sanctions to deal with non-compliance in Russian waters exist within the system for fisheries management, as well as in the wider legal system. Both make wide use of administrative fines and refer serious cases to the judicial system. The Russian Federal Fisheries Act (RG, 2004) requires the withdrawal of quota rights if a fishing company has committed two serious violations of the fisheries regulations within one calendar year, among other things. The Code of the Russian Federation on Administrative Infractions specifies the level of fines that can be issued administratively by enforcement bodies.

The Criminal Code requires that illegal fishing causing “large damage”, conducted in spawning areas or migration ways leading to such areas, or in marine protected areas, be penalized by either fines up to RUR 300,000 or an amount corresponding to 1-2 years’ income for the violator, compulsory work of no less than 480 hours, corrective work for at least two years or arrest for at least 6 months.

Therefore, sanctions for non-compliance at sea fishing are rather strong and applied by the Coastguard. The Coastguard also ensures compliance with international fishery agreements and regulations. **SG 60 is met.**

Assessment reports of other marine fisheries in the Kamchatka region on Pacific cod and Pacific halibut (Marine Certification, 2019) provide evidence that sanctions are consistently applied and thought to provide effective deterrence. **SG 80 is met.**

Based on inspection and infringement statistics from the enforcement agency (see SI 3.2.3 c) below), it can be concluded that sanctions demonstrably provide effective deterrence. **SG 100 is met.**

	Compliance			
c	Guide post	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?	**All UoA – Yes**	**All UoA – Yes**	**All UoA – Yes**

Rationale

According to information from the client, “Ostrovnoy-crab” complies with the management system, including providing information important to the effective management of the fishery. It also follows from other MSC assessment reports in the area that fishers are generally thought to comply. **SG 60 is met.**

The CFMC integrates all fishery information in a complex and transparent system. This allows for centralized collection, storage and processing of data on the quantity of aquatic biological resources harvested, processed, transhipped, transported and landed by individual fishing vessels. Reporting of data and information to the CFMC is at least daily, using Vessel Monitoring System (VMS). The satellite tracking system is automatically reporting the position of the vessel each 10 minute. In 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. If it cannot bring the system back into operation within 48 h, the vessel has to return to port. On a daily basis, each vessel reports to the CFMC, providing detailed information on its activity, catch by species, number and total time of fishing operations, depth and gear. Also, the vessel reports the amount of each type of product, used bait and various products onboard. Hence, there is some information that fishers comply. **SG 80 is also met.**

According to information from the FSB, the Coast Guard conducted 2620 inspections of crab fishing vessels and crab transshipments at-sea in 2018. Seven cases of non-compliance with the fishing regulations were detected, and three vessels under flag of convenience were detained. In 2019, enforcement activities remained at the same level, with 2642 at-sea inspections. Two cases of non-compliance were detected, and no vessels under flag of convenience were identified. This is indicative of a high level of compliance in the fishery, which was also confirmed by the enforcement authorities at the site visit.

With official inspection and infringement data from the enforcement agency available, it can be concluded that there is a high degree of confidence that fishers comply. **SG 100 is met.**

d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		**All UoA – Yes**	

Rationale

No evidence has been provided to the assessment team indicating systematic noncompliance in the fishery.**SG 80 is met.**

References

- Acoura Marine, 2018;
- FAO, 1995;
- FFA, 2008, 2015, 2019, 2019a;
- FR, 2019;
- MAR, 2013, 2015, 2017, 2019;
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RCCA, 2020.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**100**
Condition number (if relevant)	**NA**

PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific 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	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate **some** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **key** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **all** parts of the fishery-specific management system.
	Met?	**All UoAs – Yes**	**All UoAs – Yes**	**All UoAs – No**
Rationale				

There are various mechanisms in place to evaluate key parts of the fishery-specific management system, but at varied levels of ambition and coverage. At the fishery council meetings, found at federal, basin and regional levels (see SI 3.1.2b above), management authorities receive feedback on management practices from the industry and other interested stakeholders. The FFA and the Ministry of Agriculture report annually to the Government, the Presidential Administration and the Federal Assembly (to both the lower chamber, the State Duma, and the upper chamber, the Federation Council) about their work, with emphasis on achievements in the fishing industry. Other federal agencies also review parts of the fisheries management system. For instance, the Auditor General evaluates how allocated funds are spent, and the Anti-Monopoly Service how competition and investment rules are observed. Within FFA, there is regular review of the performance of the Agency's regional offices. In the establishment of TACs, the scientific advice from VNIRO's regional branches is peer reviewed by the head office in Moscow, and then forwarded to FFA and the federal natural resources monitoring agency Rosprirodnadzor for comments. It is also presented to the general public for discussion at public hearings, announced in the local press. At the regional level, the Kamchatskiy Krai Ministry of Fisheries is under scrutiny by the regional Government, as well as the legislative bodies at oblast level, the regional Duma.

Hence, the fishery has in place mechanisms to evaluate key parts of the fishery and associated enhancement program management system. **SG 60 and SG 80 are met.**

It is a principal challenge to claim that 'all' parts of a fisheries management system are subject to review, but it seems reasonable to expect some sort of a holistic evaluation of the fishery-specific system as such, which does not seem to take place in the UoA fishery. **SG 100 is not met.**

b	Internal and/or external review			
	Guide post	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?	**All UoAs – Yes**	**All UoAs – No**	**All UoAs – No**
Rationale				

Regular internal review of the fishery-specific management system is performed through FFA continuous evaluation of the performance of regional management in the Far Eastern Fishery Basin and other forms of review listed under SI 3.2.4 a) above. **SG 60 is met.**

As regards external review, the MSC Fisheries Standard states that external here means "external to the fishery", but not necessarily international. The Guidance (GSA 4.10.1) specifies that "external" review might be conducted by another department within an agency, or another agency or organization within the country. It is a matter of definition

where the division line goes between internal and external reviews, and to what extent external review of elements of the management system constitutes review of the management as such; e.g. review of scientific information is not a review of the management system itself. The assessment team has not been provided documentation that the management system for crab fisheries in Russia is subject to external reviews. **SG 80 is not met.**

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- FAO, 1995;
- FFA, 2008, 2015, 2019, 2019a;
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- Melnychuk *et al*., 2017;
- RG, 1999, 2000, 2000a, 2002, 2004, 2005, 2006, 2006a, 2009, 2014, 2019, 2019a;
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Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**60-79**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	**70**
Condition number (if relevant)	7

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8. Appendices

8.1. Assessment information

8.1.1. Small-scale fisheries

The Ostrovnoy-Krab LTD Sea of Okhotsk crab trap is not a small-scale fishery.

Table 28 – Small-scale fisheries

Unit of Assessment (UoA)	Percentage of vessels with length <15m	Percentage of fishing activity completed within 12 nautical miles of shore
All UoAs	None	None

8.2. Evaluation processes and techniques

8.2.1. Site visits

The assessment was announced on the MSC website, and stakeholders that were identified by the client and also by UCSL, were contacted directly.

A Variation Request was accepted by the MSC to conduct the initial site visit for the full assessment remotely. The site visit took place 14-18 June 2021. P1 expert Petr Vasilets was physically present at the site visit, while P2 expert Jo Gascoine and TL and P3 expert Geir Hønneland participated remotely.

The following people were interviewed during the site visit:

WWF marine programme:

- Sergey Rafanov (Petropavlovsk-Kamchatsky)
- Konstantin Zgurovsky (Svetlogorsk)
- Alexander Moiseev (Moscow)
- John Simeone, client consultant (external expert of WWF US.

KamchatNIRO (Kamchatka branch of VNIRO):

- Alexander Varkentin, PhD, Deputy Director; specialist in stock assessment and by-catch species
- Pavel Ivanov, PhD, Head of Lab of vertebrate
- Oleg Ilyin, PhD, Leading specialist and developer of the Synthesis stock assessment model
- Sergey Kornev, PhD, Head of Lab, marine of mammals
- Ekaterina Lepskaya, PhD, Head of Lab, benthos specialist from KamchatNIRO

MagadanNIRO (Magadan branch of VNIRO) - crab's scientist:

- Evgeny Metelyov, Deputy Director; specialist in stock assessment of crabs in North part of the Sea of Okhotsk

Kamchatka branch of Pacific Institute of Geography of Far East branch of Russian Academy of Science – seabirds specialist:

- Yury Artukhin, PhD, Head of Lab

North-Eastern Territorial Administration of Federal Fisheries Agency of Russian Federation:

- Dmitry Kim, Head of Department

CFMC (Centre of Fishery Monitoring and Communications):

- Demjan Chekunov, Deputy Director

In addition, two repersentatives of the CAB were present at the meetings, as observers:

- Andrey Vinnikov, PhD, Director of Marine Programme, UCSL
- Alexey Khoruzhiy, Certification Manager, UCSL

The fishery client was presented by the following people during the meetings:

- Tatiana Schulezhko, Consultant of Ostrovnoy-Krab LTD, PhD, Senior Scientist, Kamchatka Branch of the Pacific Institute of Geography, Russian Academy of Science, Project Manager for certification and improvement of the fisheries, Longline Fishery Association
- Sergei Sukhanov, Representative of Ostrovnoy-Krab LTD, Sakhalin Region, Yuzhno-Kurilskiy District, Malokurilskoye village

8.2.2. Stakeholder participation

Organizations and individuals having relevant interest in the assessment were identified and notified, via e-mail, of the surveillance process. This highlighted the potential process for engagement in the assessment, if desired. In addition, the interest of others not appearing on this list was solicited through the postings on the MSC website.

A list of people interviewed during the site visit is provided in Section 9.2.1 above.

8.2.3. Evaluation techniques

1. Public Announcements

UCSL publicly announced the full assessment and the assessment site visit dates and location, as well as the assessment team. This was done according to the process requirements in MSC's Fisheries Certification Process v2.2, and in the MSC Fisheries Standard 2.01. These media presented the announcement to a wide audience representing industry, agencies, and other stakeholders. Meetings calls held during the site visit will constitute the main tool in guaranteeing the participation of relevant stakeholders.

2. Information gathering

The assessment team reviewed documents sent by the client ahead of the site visit. The team supplemented the information provided with publicly available scientific and grey literature. At the site visit discussions with the clients and management agencies focused on the content within the provided documentation and information gaps identified in the ACDR. In cases where relevant documentation could not be provided in advance of the meeting, it was requested by the assessment team and subsequently supplied during, or shortly after the meeting. The MSC allows only 30 days from the last day of the site visit for information to be provided, so any information not publicly available on or before this date cannot be used to justify scoring changes in the assessment.

3. Scoring

Scoring at the PCDR stage is performed according to the procedure established in MSC FCP v2.2 7.17. In the Fisheries Standard v2.01 default assessment tree used for this assessment, the MSC has 28 PIs, six in Principle 1, 15 in Principle 2, and seven in Principle 3. The PIs are grouped in each principle by 'component.' Principle 1 has two components, Principle 2 has five, and Principle 3 has two. Each PI consists of one or more 'scoring issues;' a scoring issue is a specific topic for evaluation. 'Scoring Guideposts' define the requirements for meeting each scoring issue at the 60 (conditional pass), 80 (full pass), and 100 (state of the art) levels.

Note that some scoring issue may not have a scoring guidepost at each of the 60, 80, and 100 levels; in the case of the example above, scoring issue (b) does not have a scoring issue at the SG 60 level. The scoring issues and scoring guideposts are cumulative; this means that a PI is scored first at the SG 60 levels. If not all of the SG scoring issues meet the 60 requirements, the fishery fails, and no further scoring occurs. If all of the SG 60 scoring issues are met, the fishery meets the 60 level, and the scoring moves to SG 80 scoring issues. If no scoring issues meet the requirements at the SG 80 level, the fishery receives a score of 60. As the fishery meets increasing numbers of SG 80 scoring issues, the score increases above 60 in proportion to the number of scoring issues met; PI scoring occurs at 5-point intervals. If the fishery meets half the scoring issues at the 80 level, the PI would score 70; if it meets a quarter, then it would score 65; and it would score 75 by meeting three-quarters of the scoring issues. If the fishery meets all of the SG 80 scoring issues, the scoring moves to the SG 100 level. Scoring at the SG 100 level follows the same pattern as for SG 80. Principle scores result from averaging the scores within each component, and then from averaging the component scores within each Principle. If a Principle averages less than 80, the fishery fails. Scoring for this fishery will follow a consensus process in which the assessment team discussed the information available for evaluating PIs to develop a broad opinion of performance of the fishery against each PI.

Team members are responsible for completely their relevant scoring tables and providing a provisional score. The necessary harmonisation procedure is already described in a relevant section.

5. Use of the RBF

At the ACDR stage, the Risk-Based Framework is triggered for Secondary species outcome (PI 2.2.1), and reasons are following:

PI 2.2.1 Secondary species outcome:

"The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit".

PI 2.2.1 a) - Main secondary species stock status

According to catch composition tables facilitated by the Ostrovnoy-Krab LTD (client) there are no main secondary species to consider in the UoAs 1 and 2. The only two secondary species in the UoA 3 for considering are Soldatov's eelpout *Lycodes soldatovi* and Verrill's crab *Paralomis verrilli* which considered as a main secondary species. The species has been evaluated using the RBF because no reference points are available to inform stock status. The species has been scored using the RBF approach. During a full assessment process an RBF workshop has to be conducted with different stakeholders in order to agree with the scoring of the susceptibility attributes of the RBF procedure (Productivity Susceptibility Analysis (PSA)).

In "Rationale" for this **PI 2.2.1 a)** noted:

"UoA 1 (Red king crab *Paralithodes camtschaticus*) and UoA 2 (Blue king crab *P. platypus*) have no **main secondary species.**

For UoA 3 (Golden (Brown) king crab *Lithodes aequispinus*), **main secondary species** were Soldatov's eelpout *Lycodes soldatovi* and Verrill's crab *Paralomis verrilli.*

These were previously evaluated using the RBF (PSA in Appendix Section 8.8.1 in two Tables, CA to be conducted at the site visit). The preliminary scores were >80 for both species."

In Appendix Section 8.8.1 assessment team showed Productivity Susceptibility Analysis (PSA) for both species.

The use of the RBF was previously announced followed the MSC's procedure outlined in the FCP v2.2, Annex PF, Section PF2.1.

Important Note: UoA 3 was determined to have failed the final scoring therefore removed, so the PSA information has been removed as well from this version of the report.

8.3. Peer Review reports

▪ PR A: General Comments

Peer Reviewer (A/B/C)	Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
PR A	Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	No	There are several SIs throughout P1 and P2 evaluation tables for which rationales do not adequately summarize the available evidence to convincingly justify the scoring. There are also a number of instances of only a portion of SG wording being addressed as well as some rationale that seems to have little or no relevance. Details are included in PI comments.	We thank the peer reviewer for the very useful comments provided. Corrections have been made in accordance with the recommendations.
PR A	Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.2, 7.18.1 and sub-clauses]	Yes	Tables 39-44 in section 8.5 should identify the SI and include SG80 wording in the PI row. Milestones clearly indicate what is needed and timeframes for closing conditions are reasonable. However, condition 2 (Table 39) should be revisited as per comment for PI 2.2.2, SIe.	SIs have been included. SG80 wording is in the PI line.
PR A	Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]		Note: Include this row for assessments completed against FCR v1.3 and v2.0, but not for FCP v2.1/v2.2 (in which the client action plan is only prepared at the same time as the peer review). Delete this text from the cell for FCR v1.3/v2.0 reviews or delete the whole row if FCP v2.1/v2.2.	NA
PR A	Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?			

PR A	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	There are quite a few shortcomings in P1, and to a lesser extent in P2, background sections requiring editorial attention. On p. 32, reference is made to a huge difference between reported and actual catches. On p. 80, in 1st paragraph under 6.3.1.2 (of P2 background), it is stated that catch data were inaccurate up to ~2015 due to underreporting but now appear to be robust. And, on p. 155 (of P3 background) Fig. 54 appears showing a time series of catch data (of all crab species combined???) illustrating the extent of underreporting. This issue is critically important to P1, where it should have been thoroughly sorted out for the catch data used in the assessment of each of the 3 fisheries. The UoA descriptions in Table 2 identify quite a few companies, in addition to the client, that participate in each of the 3 fisheries. Table 25 shows the client's share of each TAC (identified as UoC share, wheras the full TAC is identified as UoA share - this contradicts the definition of UoA in Table 2. FCP 2.2 (Summary of Changes) states: The UoA includes the certified fleet, the ecosystem, the target stock and every other vessel that fishes the same stock. The UoA definitions need to be reconciled with this MSC definition.	The number of vessels has been corrected; Figure 43 has been commented and the issue of underreporting discussed (see also response to PR C on this issue). It is only the client group which is covered by the certificate, i.e. UoC. The other companies are listed in the UoA table as extra information. It is explicitly stated that there are no other eligible fishers in the fishery. Regarding P2, the main problem that we could see was the broken cross-references, which have now been corrected, along with one or two table and figure headings.

PR A	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	Presumably, the client's shares of TACs are from the production quotas mentioned on p. 152 (1st line). This should be described in section 4.1.1 along with an explanation of why none of the other companies will share the certificate - are they all MSC certified? On p. 34, explain what happens to the 0.2% sublegals/females and what happens when bycatch in other fisheries exceeds 2%. On p. 35, explain ind./catch/day (1st line) and males per a day per trap (Table 10 caption). Define Prerecruits I and II in Table 10. There appear to be different definitions of prerecruits/recruits, etc in Figs 10 and 13. On p. 36 (1st paragraph below Fig. 11 and following paragraph) catch rate should be exploitation or removal rate. On p. 39 (end of 1st paragraph under Nutrition), the parts per thousand symbol needs fixing. Table 11 caption needs some explanation. On p. 47 (2nd paragraph), re needing snow crab quota to fish GKC, what happens when quota for one or the other is caught? In Fig. 23 caption, is Buccinidae a crab species? On p. 53 (2nd paragraph under RKC), explain that Bloss, being the upper CI (Table 19), is a more conservative Blim. On p. 56 (paragraph under Fig. 34), reference to where all these rules are described for each fishery and to where the MCS system is described should be included here.	We thank the peer reviewer for the very useful comments provided. Corrections have been made in accordance with your recommendations. Please not that it is not within the remit of the assessment team to discuss why fishery clients are not willing to share their certificate.

PR A	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	On p. 61 (2nd paragraph under For all UoAs in general), this needs to be tied in with the 1st general comment above. Last paragraph of this section, define IUU and explain how it is taken into account. Caption for Table 24 should clearly indicate that these UoAs represent the whole fishery. Explain what this table presents, as per above comments on total catch. On p. 62, mention is made of CPUE from trap surveys that are used in the assessment for each fishery, but these very important data series are not illustrated. Where reference is made to assessment models, surveys, etc through sections 6.2.1.1/6.2.1.2/6.2.1.3 and 6.2.2, reference should be made to where details can be found in later sections. Consideration should be given to reorganizing P1 background to improve overall readability. For eack stock, the presentation of data sources/series, assessment models, time series of results, current status should be done in a sequential fashion. On pp. 80-81, some approximation of what the observer coverage represents as % of the total fishery should be provided. On p. 82 (1st paragraph under 6.3.1.3), presumably the escape vent in traps contributes to lower bycatch as well. Is there any info re the effectiveness of these escape vents in terms of releasing sublegals and females of eack target species? Throughout P2 background sections and in the evaluation tables there are many "Error! Reference source not found." messages that really should have been eliminated before this CPRDR stage. On p. 83 (paragraph following Table 28), there is reference to this report as ACDR.	We don't have an estimate of observer coverage in terms of %age (and in any case, it depends how you measure it). Reportedly, the objective is to have one trip per target species per year. The fishery as a whole includes 20-30 vessels. We have no information on the impact of escape vents on bycatch; in any case, the effectiveness in terms of each target species is a question to be covered under P1. Cross references have been corrected.

PR A	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	On p. 88 (section 6.3.1.3), minor secondary species are dismissed without consideration. There should be a brief summary of those most frequently encountered in each fishery. On p. 88 (2nd paragraph under Bait), the estimate of bait used by the client's fleet should be bumped up to the entire fishery (UoA) which is what's actually being evaluated in P2. On p. 91, reference to Table 29 should be included in 3rd paragraph. On pp.101/102, there is no conclusion re VMEs for GKC as for RKC and BKC. On p. 105, the very brief consideration of climate change should be expanded to include current ecosystem status, in particular with respect to ocean warming, given the extent to which recruitment has been negatively impacted in Bering Sea stocks of RKC and BKC. On p.149 (end of section International framework), the 3 acronyms should be spelled out. There are numerous instances of places throughout P1 and P2 background sections where very minor editorial fixes are required, e.g. consistent spacing between numbers and letters in sub-section headings, between table/figure numbers and captions, use of commas between hundreds and thousands in multi-diget TAC/catch numbers, etc.	The information that we have is provided in Section 6.3.1.3. Regarding bait, the relevant calculation is the use of bait by species as a percentage of the total catch. This could be the UoA or the entire fishery, as long as the figures are consistent (and as long as the UoA operates in the same way as the rest of the fishery). In this case, both the numerator (bait) and denominator (total catch) come from the UoA, so the proportion by species should be correct. There is no reason to evaluate all the elements of P2 in the same way, given that the data sources are different, as clearly explained at the start of the P2 background section. What do you mean 'current ecosystem status'? In what sense? Good/bad? Warm/cold? It seems a bit simplistic. Recruitment is discussed under Principle 1.

▪ PR A: PI Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code

Fishery	Assess-ment Start Year	Insert extra rows for P1 PIs if separate scores given for different UoA stocks	Insert extra rows for P2 PIs if separate scores given for different UoA gear types	Peer Revie-wer (A/B/C)	Perfor-mance Indica-tor (PI)	Has all available relevant information been used to score this PI?	Does the information and/or rationale used to score this PI support the given score?	Will the condition(s) raised improve the fishery's performance to the SG80 level?	Peer reviewers (PRs) should provide support for their answers in the left three columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Additional rows should be inserted for any PIs where two or more discrete comments are raised, e.g. for different scoring issues, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return key combination. Detailed justifications are only required where answers given are one of the 'No' options. In other (Yes) cases, either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (without any implications for the scores).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to each of the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.1.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa - The common name for each species should be included in each UoA heading and used consistently in rationales for each. The 1st sentence of UoA 1 rationale applies generally to all 3 UoAs - sort of info that should be elaborated on in background section and referred to here. Rationales for each UoA should include a little more detail re determination of reference points, with reference to background section included, and use same units for Blim and current biomass values The key metric for SG100 being met is whether the lower CI for estimate of current biomass is above Blim.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.1.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIb - A little more detail re Bmsy determination and include values of current biomass estimates.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, additional evidence presented)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.1.2	NA (PI not scored)	NA (PI not scored)	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa - 1st paragraph should mention male-only fisheries as well as removal rates that TACs are based on. Reference should be included as to where details of the MCS system can be found. Re SG100 - explain the additional info needed to achieve the "designed" part of SG wording.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIb - This rationale is extremely brief. A little info for each UoA should be included and explain what sign of recruitment overfishing means. It's objectives reflected in PI 1.1.1 SG80 being addressed here and in SIa.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIc - Should elaborate a little on this monitoring, that it applies to all UoAs and provide reference to where details can be found.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SId - Even though SG100 may not be met, any info related to the SG wording should be included.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIf - Refer to background section for details of unwanted catch. Some info on measures and their effectiveness for each species is needed. There is no info on how well the escape vents mentioned on p. 20 work for each species. Are there handling protocols in place for live release, etc? Does the evidence for "acceptable" mortality apply to each species? What is acceptable mortality? In SG80, the "intent" of regular review means at least once every 5 years. Presumably, there is no evidence that review is done every 2 years, as per SG100. Should also make clear that all this applies to each of the 3 species.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.2	No (change to rationale expected, not to scoring)	No (scoring implications unknown)	NA	SIa - It should be made clear in rationale that the HCR applies to all 3 fisheries. Re SG100 - There is some general info regarding the ecological role of these stocks - in the Biology section for each in background it is pointed out that it isn't a LTL species. The other component of the wording "most of the time" isn't considered.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIb - This rationale is extremely brief. The main HCR uncertainties should be identified and how they are accounted for described. On p. 32, 5th paragraph, mention is made of reported catches being much lower than the real ones - was this a problem in all 3 fisheries at the time? On p. 80 (P2) this underreporting issue is mentioned, that it prevailed until ~2015, but now appears to have been fixed. This	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)

									needs to be addressed in greater detail in P1 background, where it is much more relevant, and mentioned here as well. On p. 61, mention is made of IUU fishing and that it is taken into account in assessments but there is no info provided on its magnitude or how it is accounted for. Re SG100 - There is no consideration of what info is needed in the context of the SG wording.		
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIc - Re SG100 - same comment as for SIb.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	Yes	SIb - The stock abundance part of SG60 wording is not mentioned. The SG80 rationale should state that the stock assessments provide the basis for TAC determination and hence, applying the HCR. SG100 rationale simply repeats all of the SG	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)

									wording without any mention of what's lacking.		
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	Yes	SIc - The UoA1/2 rationale needs to mention which other fisheries catch RKC and BKC, the level of observer coverage, quantities caught, etc. Re GKC - is info available for other fisheries?	Thank you for comment. Background text and the rational was changed to suit your recommendation. For GKC, we additionally mentioned the bottom net fishery in the NSOOS in 2002.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	1.2.4	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.1.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa - The two Met? rows is a bit confusing. Suggest combining, i.e. All species/UoAs for SGs60 and 80: SG100 is a No for all 3 UoAs. The identification of UoAs in rationale should include the species names. There should be a heading before the series of scoring element rationales. Conclusions for each SE should say whether "highly likely" (≥ 80%) is achieved. Similarly	The 'by UoA' row has been deleted because it is covered in table at the end of the PI. Probability statement added where needed. I'm afraid I have no information about escape gaps in relation to Tanner crabs. Discard mortality is relevant because there is zero commercial quota at present (because the stock is depleted) hence catch must be discarded. The move-on rule is specific to Tanner crab	Accepted (no score change, change to rationale)

									for "high degree of certainty" (≥ 90%) for SG100 - this is a fairly high bar. The "OR" part of SG80 is considered for Tanner crab - explain relevance of discard mortality info on RKC to Tanner crab. What about the effectiveness of escape vents in traps re non-target species? What is the move-on rule and does it apply to other crab species in each UoA? Note, Japanese sardine is referred to as Japanese pilchard on p. 88.	(for the same reason). All this is explained in the background section on Tanner crab. Corrected to sardine throughout.	
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.1.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIb - The rationale is extremely brief. Should state that each SE is a minor species for all 3 UoAs. Each SE should be evaluated separately, as in SIa, and whether "highly Likely" is achieved should be stated for each.	In my opinion, brevity per se is not a fault in a rationale. Nevertheless, the information in Table 28 has been restated here, as requested.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.1.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIe - Refer to comment PI 1.2.1, SIf. The rationale provided for SG100 has no relevance to the SG wording.	Rationale for SG100 reworded. As noted earlier, I'm afraid I do not have any information about the operation of	Accepted (no score change, change to rationale)

										escape gaps for non-target species.	
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.1.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa - The primary focus of wording for all 3 SGs for this info PI is the adequacy of quantitative info on amount of bycatch of primary species in each of the UoA fisheries, the actual stock status of the primary species is secondary. Both should be addressed for each species.	I do not agree that the rationale focuses on stock status for any of these species. However, the level at which information is adequate to evaluate UoA impacts is different according to the likely UoA impact on the stock - so for example the threshold for 'adequate information' would be higher for Tanner crab (depleted stock, commercial crab species vulnerable to the gear) than for the bait species (very large small pelagic stocks of which the UoA is purchases trivial quantities relative to the total catch). So in that sense, this information is relevant here.	Not accepted (no change)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.1.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIb - The rationale is extremely brief. SIa comment applies here as well. As in PI 2.1.1, SIb, each minor SE should be evaluated separately as in SIa for main.	Brief is not necessarily bad. However, the rationale has been extended to discuss information adequacy for stock assessment and point the reader at the information provided in 2.1.1b on these stocks.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.1.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIc - SGs 60 and 80 refer to main primary species, SG100 refers to all i.e. main + minor. The SG100 rationale really doesn't address the SG wording. It has nothing to do with uncertainty in the stock assessments for these species. It has to do with the strategy to manage them and with evaluating whether the strategy is achieving its objectives, not with evaluation the objectives.	Yes, but the stock assessment forms the basis of the strategy for these stocks (i.e. defines the management by categorising the stocks as above or below the target level) and is also the means of assessing whether the strategy is meeting its objective (i.e. is the stock at or above the target level or not?).	Not accepted (no change)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa - The reference to appendix # is incorrect, it should be 8.8.1. Re UoAs 1 and 2, cite FCR SA3.2.1 for scoring SG100. Given that the scores from PSAs are 84 for eelpout	Corrected. Added. The reviewer is correct - the score should be 80. Corrected.	Accepted (non-material score reduction)

									and 81 for Verril's crab, the overall score of 85 for UoA 3 needs explanation.		
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIb - Minor secondary species are being dismissed, both here and in background section (p. 88), without any consideration of even a few of those most frequently encountered - see general comment. The 1st sentence of rationale is not relevant - it's a basis for being identified as a secondary species. Last sentence suggests some have been evaluated, but that appears not to be the case. The rationale really doesn't evaluate whether or not SG100 is met. For this PI, highly likely = 70% probability, so even a very qualitative evaluation would suffice. What about the OR part of the SG?	We do not have sufficient information to identify all the minor secondary species, never mind evaluate them. Even if we evaluated individually all the species we have (see Section 6.3.1.3) we would not be sure that the list was complete and therefore the score would still be the same.	Not accepted (no change)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	Yes	SIb - Explain, as in SIa, that there are no main secondary species for UoAs 1 and 2. The rationale should include something a bit more substantiative about what low bycatch rates mean in the UoA 3 fishery.	Added. This is presented in Table 31. Added to the rationale.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	Yes	SIe - The No at SG80 for UoA 3 needs explanation given that it received a Yes for this SG in 2.1.2 - why does it meet SG80 for main primary but not main secondary? The relevance of the last paragraph in this rationale is unclear. Is the condition needed?	Species of commercial importance vs species not of commercial importance. The last paragraph is there because a stakeholder was concerned about trap loss in the fishery, but it was unclear how to include it in P2 given that we do not know what P2 species are involved, if any - the analysis was included here lacking anywhere else suitable. The condition is needed because SG80 is not met. If you are asking whether the condition will help make the fishery more sustainable, that's another question.	Not accepted (no change)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.2.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa - Refer to FCR SA3.3.1, SG100 is not automatically met for this info PI. This SI has to be scored, i.e. rationale provided.	Corrected.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.2.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIb - Refer to comment for SIb in PI 2.2.1.	See response above	Not accepted (no change)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.2.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIc - See comment for SIa.	Corrected.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.3.1	Yes	Yes	Yes			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.3.2	Yes	Yes	Yes			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.3.3	Yes	Yes	Yes			NA (No response needed)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.4.1	Yes	Yes	Yes	SIb - Re reference to "small footprint" in rationale for UoAs 2 and 3, the usual measure of footprint is % of total area fished that is actually impacted by the gear in a season. A crude estimate of which could be generated from total trap hauls x bottom area of a trap, if some approximation of the area over which the fishery operates is available.	Please note that the scoring of SIb has been changed following other PR comments, so this comment is no longer applicable.	NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.4.2	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.4.3	Yes	Yes	NA	SG100 is essentially dismissed for each SI by additional info being needed without consideration of SG wording or what info is needed.	The wording has been changed to reflect the wording of SG100. In my opinion, for most fisheries the SG100s are all impossible. Certainly SG100b is impossible except in very exceptional circumstances.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.5.1	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.5.2	Yes	Yes	NA			NA (No response needed)

Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	2.5.3	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	3.1.1	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	3.1.2	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	3.1.3	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	3.2.1	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	3.2.2	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	3.2.3	Yes	Yes	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3	Traps	PR A	3.2.4	Yes	Yes	Yes			NA (No response needed)

▪ PR A: RBF comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report -	CAB Res-ponse Code

									PCDR)	
Fishery	Assess-ment Start Year	UoA stock (if separate scores in P1, add extra rows if needed)	UoA gear type (if separate scores in P2, add extra rows if needed)	Peer Revie-wer (A/B/C)	Perfor-mance Indica-tor (PI)	Does the report clearly explain how the process(es) applied to determine risk using the RBF has led to the stated outcome?	Are the RBF risk scores well-referenced?	Peer reviewers (PRs) should provide support for their answers in the left three columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Insert additional rows for any PIs where discrete comments are raised e.g. for different scoring issues (allowing CABs to give a different answer in each case). Paragraph breaks may also be made within cells using the Alt-return key combination. Note: Detailed justifications are only required where answers given are one of the 'No' options. In other cases, please either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (without any implications for the scores).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options
Sea of Okhotsk crab trap	2021	UoAs 1, 2 and 3.	Trap	PR A	2.2.1 (RBF)	No (change to rationale expected, not to scoring)	Yes	To clearly explain how the processes are applied (as per the column H question), including the productivity and susceptability attribute tables from the FCP would be helpful.	Added	Accepted (no score change, change to rationale)

PR B: General Comments

Fishery	Assess-ment Start Year	Peer Reviewer (A/B/C)	Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Sea of Okhotsk crab trap	2021	PR B	Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	The scoring is generally consistent with the MSC standard and based on the evidence presented in the assessment report. There may be some areas where the scoring or rationale needs reviewing.	We thank the peer reviewer for the very useful comments provided. Corrections have been made in accordance with your recommendations.
Sea of Okhotsk crab trap	2021	PR B	Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.2, 7.18.1 and sub-clauses]	Yes	Page 23. Should Condition 2 refer to 'main' secondary species as specified in page 194? Page 195: Condition 4 here refers to 'recovery of ETP species' but should it refer to 'right whales' as in Page 24.	Corrected in both cases.
Sea of Okhotsk crab trap	2021	PR B	Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]	NA	Note: Include this row for assessments completed against FCR v1.3 and v2.0, but not for FCP v2.1/v2.2 (in which the client action plan is only prepared at the same time as the peer review). Delete this text from the cell for FCR v1.3/v2.0 reviews or delete the whole row if FCP v2.1/v2.2.	NA
Sea of Okhotsk crab trap	2021	PR B	Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	NA	Note: Include this row for assessments completed against FCR v1.3 and v2.0, but not for FCP v2.1/v2.2 (in which the client action plan is only prepared at the same time as the peer review). Delete this text from the cell for FCR v1.3/v2.0 reviews or del	NA

Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	The background information is generally appropriate. Please check some comments below for consideration:	We thank the peer reviewer for the very useful comments provided. Corrections have been made in accordance with your recommendations.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	Page 13: the comment 'no external review of the stock assessment or the fishery-specific management system' is repeated	Corrected.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	Page 14. it woud be useful to specify species being assessed and information on 7 conditions in the Exec Summary.	According to the MSC template, a summary of the conditions is provided in Section 4.3.3, while the full conditions are listed in Section 8.5.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 18: The geographical area for GKC is specified as 61.05.1 but in Figure 1 it is also appears to have a presence in 61.05.2?	That is correct. GKC is presence in 61.05.1 and 61.05.2 subzones. The only 61.05.1 subzone is included in the UoA 3.

Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	Page 20: The Ostrovnoy-Krab LTD currently has 4 crab fishing vessels and there are 7 vessels listed in Table 4. It would be useful to know the total number of vessels operating in the fishery and the share of the catch that Ostrovnoy-Krab LTD takes.	Thank you. We've fixed a bug. The company now has 7 vessels.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	Page 33: The statement refers to the commercial fishery of P. camtschaticus in the western Kamchatka waters having a catch in 2013 of 6785 t. but this catch is not apparent in Figure 7b. Given the mention of reported catches and acual catches in page 32, it should be specified whether the catches in Figure 7b are 'reported catches'. Page 62 specifies that 'the catch in 2017-2019 was taken equal to the official one' but some discussion is warranted about how there is confidence that the catches reported now represent the actual catches.	Thank you for the comment. Catch in Figure 7b is shown in million crabs. An average weight of a RKC commercial male is 2.14 kg. Corrections in text have been made in accordance with your recommendations.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	Page 34: The concept of 'minimum daily volumes of crab catch per one vessel' is an unusual one and some further discussion would be useful. Is it just to determine the number of days allowed for fishing the TAC or does it serve another purpose? What are the consequences of not achieving the minimum daily volume?	Thank you for the comment. That is correct. The minimum daily volume is used to determine the number of days allowed for the fish catch quota.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	Page 35. Definition of the sizes for Pre-recruits 1 and 2 would be useful.	We thank you for the comment. Corrections in text have been made in accordance with your recommendations. Pre-recruits I – carapace width 140–149 mm; Pre-recruits II – carapace width 130–139 mm. We have added this information to the note in table 10.

Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 36. Should the statement 'catch rate was 30% of the stock' be referring to harvest rate rather than catch rate?	We thank you for the comment. Corrections in text have been made in accordance with your recommendations.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 45: Are the estimates in Figure 20 'survey estimates' or are they model estimates as referred to on page 43?	We thank you for the comment. This is model estimated data. Explanatory text has been added to figure captions.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 50. The TAC in Fig. 27 appears to be over 3000 t but the statement says 'In 2009-2018, the TAC of Golden (Brown) king crab in NSOOS ranged from 2,000 to 2,876 tons'.	We thank you for the comment. Actually in 2009-2018, the TAC of Golden (Brown) king crab in NSOOS ranged from 1,800 to 3,100 tonnes. Corrections were made to the text.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 61: How is 'IUU fishing is taken into account when assessing stock abundance'?	We thank you for the comment. KamchatNIRO's forecast (2020b) says that they use data on the actual catch of crabs, obtained according to the method of Ivanov (2016), to make a TAC forecast. Since 2017, they have been using official fishery statistics data from VMS. Corrections in text have been made in accordance with your recommendations.

Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 62. What sizes are 'prerecruits and recruits' mentioned here and how does it compare to pre-recruits 1 and 2 discussed previously?	We thank you for the comment. Pre-recruits - crab males with carapace width (CW) < Minimum Legal Size (MLS), recruits - crab males with CW = MSL. For RKC in KKS and WKS MSL = 150 mm. All pre-recruits 1 and 2 discussed previously is < than MLS (150 mm).
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 80+: Figures and tables in Principel 2 show 'Error! Reference source not found'.	Corrected throughout.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 145. The Rationale for SG100 in SIb is not written in the appropriate place.	Corrected.
Sea of Okhotsk crab trap	2021	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	P. 154. Figure 43 on the 'comparison of reported catch and official export and import trade flows of the Russian Crab' is listed but it not discussed or referred to in the document.	A comment has been added.

▪ PR B: PI Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer	CAB Response to Peer Reviewer's comments (as	CAB Res-ponse Code

									Review stage)	**included in the Public Comment Draft Report - PCDR)**	
Fishery	Assess-ment Start Year	Insert extra rows for P1 PIs if separate scores given for different UoA stocks	Insert extra rows for P2 PIs if separate scores given for different UoA gear types	Peer Revie-wer (A/B/C)	Perfor-mance Indica-tor (PI)	Has all available relevant information been used to score this PI?	Does the information and/or rationale used to score this PI support the given score?	Will the condition(s) raised improve the fishery's performance to the SG80 level?	Peer reviewers (PRs) should provide support for their answers in the left three columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Additional rows should be inserted for any PIs where two or more discrete comments are raised, e.g. for different scoring issues, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return key combination. Detailed justifications are only required where answers given are one of the 'No' options. In other (Yes) cases, either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (without any implications for the scores).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to each of the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.1.1	No (score increase expected)	No (score increase expected)	NA	SIb UoA 2: The blue king crab stock has been above Btr since 2012 (Fig. 21) so SG100 appears to be met.	Thank you for comment. Text of the rational was changed. Based on the precautionary approach, the score has not been changed.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.1.2	NA (PI not scored)	NA (PI not scored)	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa: The rationale states that 'Fishermen must also submit statistical reports to the controlling organizations twice a month', however some statement on the reliability of these data must be discussed given that there have been issues to past reliability of reported data. Some comment on the type of 'additional information required to achieve SG 100' would be useful. This applies to some other Rationales as well.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, additional evidence presented)

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.2.2	No (score increase expected)	No (score increase expected)	NA	SIa: The rationale states 'there is no information as to the ecological role of the stock which is a component of the HCR. SG 100 is not met.' However do both aspects of SG100 need to be satisfied for a score of 100 if there is no evidence of an 'ecological role'. If the 'HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY' then they should be scored at 100. UoA 2 in particular should be reviewed.	Thank you for comment. Text of the rational was changed. Based on the precautionary approach, the score has not been changed.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.2.3	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	Yes	SIb: Probably need to add 'no evidence of' in front of 'a good understanding of inherent uncertainties in the information and the robustness of assessment and management to this uncertainty'. Also 'SG not 100' should read 'SG 100 is not met'.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.2.4	Yes	Yes	NA	Scoring agreed	Thank you.	NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.1.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa: The Greenland halibut rationale 'stock status and fishing mortality are consistent with reference points' supports SG100 but the statement says 'SG100 is not met'. The score on page 110 lists the score at 100. Overall Performance Indicator score states 95 (UoA1, UoA3) 90 (UoA2) but the score in the table on page 110 shows 95 (UoA2, UoA3) 90 (UoA1)	All corrected	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.1.2	Yes	Yes	NA	Scoring agreed		NA (No response needed)

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.1.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIa: Appendix should refer to 8.8.1 rather than 9.8.2. Some justification for UoA 3 of 85 is required in Rationale as RBF scores for 2 species is 81 and 84.	The PR is correct - the score should be 80. Corrected.	Accepted (non-material score reduction)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.2.2	Yes	Yes	Yes	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.2.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.3.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	Yes	SIB: The Rationale for the argument on the Right whale is difficult to evaluate given there is 'no evidence of interactions' over the years but noting that less than one event per year has the potential to impact population. The Rationale needs to be strengthened to at least indicate that this species does occur in the SOO as stated in Table 29, 'In summer, this whale stays in its feeding areas in the Sea of Okhotsk, off Kuril and Commander Islands'.	It is difficult to know what to do in this situation, but we bore in mind that where there is uncertainty we should be precautionary. The rationale has been amended as suggested.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.3.2	Yes	Yes	Yes	Condition 4 on Page 195 refers to 'recovery of ETP species' but should it refer to 'right whales' as in Page 24.	Corrected	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.3.3	Yes	Yes	Yes	SIb: The Rationale 'it is not clear that there is sufficient monitoring to identify very rare events and apply additional measures if required. SG 80 is not met'. However even 100% monitoring is not conclusive proof of no interaction as interactions (rope entanglement) could occur without being observed. Information on loss of traps and ropes, if available, could provide some evidence of entanglements and strengthen the Rationale.	Good point. Added.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.4.1	Yes	Yes	Yes	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king	Traps	PR B	2.4.2	Yes	Yes	NA	Scoring agreed		NA (No response needed)

		crab									
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.4.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.5.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.5.2	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.5.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	3.1.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	3.1.2	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	3.1.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	3.2.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	3.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	SIe: The Rationale states that 'If taken to court by fishing companies, the management authority complies with the judicial decision in a timely manner.' Is there any evidence to support this statement?	The guidepost requires that the management system 'is attempting to comply in a timely fashion with judicial decisions'. Russia has a generally well-functioning judicial system, and according to interviews at the site visit the management system is attempting to comply with judicial decisions. The rationale has been slightly rephrased.	Accepted (no score change, additional evidence presented)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	3.2.3	No (scoring implications unknown)	No (scoring implications unknown)	NA	The reported catches are reported to be less than actual catches in page 32 and page 62 specifies that 'the catch in 2017-2019 was taken equal to the official one' (see also Figure 43). Some discussion is warranted in the Rationale about how there is confidence that the catches reported now represent the actual catches to assess the level of compliance.	The background information on p. 32 shows that there have been several periods with overfishing but that the authorities have then halted the fishery. According to the enforcement authorities, compliance in the fishery has been high in recent years. The management system cannot be penalized for problems in the past. If anything, the data show that the enforcement system has managed to detect overfishing.	Not accepted (no change)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden	Traps	PR B	3.2.4	Yes	Yes	Yes	Scoring agreed		NA (No response needed)

		(Brown) king crab									

▪ PR B: RBF comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Res-ponse Code
Fishery	Assess-ment Start Year	UoA stock (if separate scores in P1, add extra rows if needed)	UoA gear type (if separate scores in P2, add extra rows if needed)	Peer Revie-wer (A/B/C)	Perfor-mance Indica-tor (PI)	Does the report clearly explain how the process(es) applied to determine risk using the RBF has led to the stated outcome?	Are the RBF risk scores well-referenced?	Peer reviewers (PRs) should provide support for their answers in the left three columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Insert additional rows for any PIs where discrete comments are raised e.g. for different scoring issues (allowing CABs to give a different answer in each case). Paragraph breaks may also be made within cells using the Alt-return key combination. Note: Detailed justifications are only required where answers given are one of the 'No' options. In other cases, please either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (without any implications for the scores).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.1.1 (RBF)					
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.1.1 (RBF)					
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.2.1 (RBF)	Yes	Yes	Scoring agreed. Page 202 The Rationale under Post-capture mortality states 'Extensive studies have been done on post-release mortality in other lithodid crabs in this fishery, which show that it is relatively low unless the crab is subjected to multiple trap lifts in succession (ref).' Ref needs to be added.	I read this in my preliminary review of the material but never managed to relocate the reference! which is incredibly annoying. However, since we have assumed medium risk, it does not impact the score.	Not accepted (no change)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.3.1 (RBF)					
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.4.1 (RBF)					
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.5.1 (RBF)					

PR B: RBF comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
Fishery	Assess-ment Start Year	UoA stock (if separate scores in P1, add extra rows if needed)	UoA gear type (if separate scores in P2, add extra rows if needed)	Peer Revie-wer (A/B/C)	Perfor-mance Indica-tor (PI)	Does the report clearly explain how the process(es) applied to determine risk using the RBF has led to the stated outcome?	Are the RBF risk scores well-referenced?	Peer reviewers (PRs) should provide support for their answers in the left three columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Insert additional rows for any PIs where discrete comments are raised e.g. for different scoring issues (allowing CABs to give a different answer in each case). Paragraph breaks may also be made within cells using the Alt-return key combination. Note: Detailed justifications are only required where answers given are one of the 'No' options. In other cases, please either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (without any implications for the scores).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	1.1.1 (RBF)					

Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.1.1 (RBF)					
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.2.1 (RBF)	Yes	Yes	Scoring agreed. Page 202 The Rationale under Post-capture mortality states 'Extensive studies have been done on post-release mortality in other lithodid crabs in this fishery, which show that it is relatively low unless the crab is subjected to multiple trap lifts in succession (ref).' Ref needs to be added.	I read this in my preliminary review of the material but never managed to relocate the reference! which is incredibly annoying. However, since we have assumed medium risk, it does not impact the score.	Not accepted (no change)
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.3.1 (RBF)					
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.4.1 (RBF)					
Sea of Okhotsk crab trap	2021	Red king crab blue king crab Golden (Brown) king crab	Traps	PR B	2.5.1 (RBF)					

PR C: General comments

Fishery	Assess-ment Start Year	Peer Reviewer (A/B/C)	Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Sea of Okhotsk crab trap	2021	PR C	Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	This is a well presented report, providing extensive detail to enable the scoring of the fishery with clear justifications. The individual components and issues are well researched. Scoring has been precautionary and is consistent with the MSC standard.	Thanks to the peer reviewer for these encouraging words.
Sea of Okhotsk crab trap	2021	PR C	Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.2, 7.18.1 and sub-clauses]	Yes	With one exception, please note my comment regarding PI2.4.1	Thanks & noted.
Sea of Okhotsk crab trap	2021	PR C	Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]		Note: Include this row for assessments completed against FCR v1.3 and v2.0, but not for FCP v2.1/v2.2 (in which the client action plan is only prepared at the same time as the peer review). Delete this text from the cell for FCR v1.3/v2.0 reviews or delete the whole row if FCP v2.1/v2.2.	NA
Sea of Okhotsk crab trap	2021	PR C	Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?			

Sea of Okhotsk crab trap	2021	PR C	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA		
Sea of Okhotsk crab trap	2021	PR C	General comment		Above Figure 1: "The Units of Certification consist of one company – Ostrovnoy-Krab LTD." Is that what was meant? Or was it "There are three Units of Assessment all fished by the same company - Ostrovnoy-Krab LTD"	We thank you for the comment. Corrections in text have been made in accordance with your recommendations.
Sea of Okhotsk crab trap	2021	PR C	General comment		Section 4.2.1/2. It says that the company currently has 4 crab fishing vessels, and is building a further 2. Table 4 lists 7 vessels. Are these 3 extra vessels on lease, for example? This detail matters from a Traceability point of view.	Thank you. We've fixed a bug. The company now has 7 vessels.
Sea of Okhotsk crab trap	2021	PR C	General comment		Section 7 - Traceability. It is stated that ownership changes when the catch is transferred onto a transshipment vessel. From the description in Table 7 it seems that the transshipment vessel can hold catches that are from vessels which are not part of the fishery under assessment. Is that correct? Does the transshipment vessel hold Chain of Custody certification? Indeed it clearly states at the end of the first para in Section 5.3 "Downstream certification of the product requires the appropriate chain of custody certification" - so maybe add, as well as in Table 7, that this includes the transshipment vessels.	Ownership changes at the point of landing. Some catch is landed direct by the fishing vessels while some is transhipped to transport vessels. The products are separated and marked before, during and after transhipment, and there is a strict control regime in connection with both transhipment and landings. The client ensures that MSC catch is separated on board the fishing vessels and products properly marked. All paperwork is also marked with MSC on the line item of documents like bills of lading and invoices. Segregation is maintained during transhipment and offloading. The carrying of packed labelled product on the reefers is low risk, and the practice is used by all MSC certified vessels in both the Northeast Atlantic and the Far East.

Sea of Okhotsk crab trap	2021	PR C	General comment		Section 6.2.4 on information mentions a scientific on board observer programme in addition to the annual surveys. Could you please provide a bit more detail on this observer programme? Who runs the programme? How are the vessels chosen for an observer to be on (eg random allocation)? Have vessels of the fishery under assessment hosted such observers? What kind of data does the observer collect; the paragraph mentions "to collect information on the composition of the catches and the biological parameters of the species caught" - what is this specifically in terms of non-target species bycatch?	Thank you for the comment. VNIRO runs this observers programme, and it chose the vessels for programme. Vessels of the fishery under assessment will host such observers. Observers collect information on the composition of the catches (including non-target species bycatch) and the biological parameters of target species. VNIRO has a special training program for observers.
Sea of Okhotsk crab trap	2021	PR C	General comment		Somewhere in the general description of the fishery (maybe Section 4.2?) it would be helpful to see the following information: what kind of crab processing happens on the vessels? Is there a live crabs market - for example is the smallest vessel used for this live crab market? (this happens in the Barents Sea, the small vessels don't go that far offshore, and have special holding tanks on board). Where in the world is the market for these crabs? Japan? China? US? Are there designated landing ports? Providing such information helps with forming a better picture of the fishery operation.	Thank you for the comment. A large number of products are produced from crab, including canned and frozen products. According to Ivanov (2020), in the last 3 years, the major part of annual catch of RKC is transported alive to ports of China and South Korea. All marine living resources caught in the Russian EEZ or on the Russian continental shelf have to be taken to Russian port before being exported.
Sea of Okhotsk crab trap	2021	PR C	General comment to P1		Under the heading "Fishing rules and Limitations" in Principle 1, Clause 40, regarding ABR bycatch. This para seems to relate primarily to trawl gear - whereby there is a move on rule. Although it does not state catch thresholds which would trigger the move on rule. Is there a similar 'move on rule' for traps - besides for	Thank you for the comment. Clause 40 of Fishibg rules (2019) relates to all fishing gears. There is no mention of catch thresholds which would trigger the move on rule. Bycatch threshold is, for example, in clause 38.1. "In a specialized fishing for other species and in other areas, bycatch of juveniles is set up not more than 8 % in terms of

					accidentally catching too many females or juveniles? Is there an ABR bycatch threshold, or relevant to paticular ABR species?	quantity per one operation from the catch of target species"
Sea of Okhotsk crab trap	2021	PR C	General comment to P1		The last sentence in Section 6.2.5 of the P1 background is "The organizational steps of the TAC determination procedure are detailed in section 7.4.1.2 Fisheries management". There is no such section in this version of the report, the numbering must have gone askew. Would you be referring to the section described in the background material of P3 "Setting of TAC and quota allocation"	We thank you for the comment. Corrections in text have been made.
Sea of Okhotsk crab trap	2021	PR C	General comments to P2		The cross referencing of Tables within the text has gone, giving error messages.	Fixed.
Sea of Okhotsk crab trap	2021	PR C	General comments to P2		Section 6.3.1.2. Table 26 - what does 'operations' mean in the column header? Number of crab catching trips by that vessel in that year? Table 27: Could you please provide the translation for the two target species listed?	Number of traplines hauled. Table 27 - Added.

Sea of Okhotsk crab trap	2021	PR C	General comments to P2		Section 6.3.1.2: could you please provide more detail on the observer programme? What percentage of the crab fishing fleet is covered by observers annually? What do the observers record specifically and how? The non-commercial bycatch is recorded as presence/absence or in quantities? It is not clear from the background text whether there are two types of recording - would it be correct to say that commercial bycatch is recorded by the vessels, as part of their regular on board operations recording (ie, the text states "The fishing vessels do not record non-commercial bycatch, which is discarded immediately" which implies that commercial bycatch is recorded - as part of permit requirements presumably); and special scientific observers record both target and non-target bycatch?	Regarding observer coverage, we do not have an estimate in % (which in any case varies according to how you measure it) but reportedly the objective is one trip per target species per year, with a total fleet size of 20-30 vessels. I'm afraid we do not have details on the observer protocols, but non-commecial bycatch is not recorded in any detail (if at all) because it is discarded immediately. This is why we do not have details on minor secondary species, and also why this part of P2 is evaluated mainly based on scientific research cruise data and site visit discussion with scientists. The sources of data used to evaluate the different components of P2 is explained at the start of the P2 background section.
Sea of Okhotsk crab trap	2021	PR C	General comments to P2		Section 6.3.1.3.2 Golden (Brown) Kc: as an aside it is mentioned in the first paragraph that Opilio is also a target species in this mixed crab fishery - could you please just clarify in the bracketed aside that it is not being assessed for certification here. As this is a mixed crab fishery, whereby some of the species are being certified and some not, it might be helpful to state up front which crabs are regarded as commercial and thus retained. It helps with building up a picture of the fishery overall (this could just be one sentence at the top of the bycatch section which would say this)	Clarification added. It's stated clearly in Section 6.3.1.3 (Catch composition) - see bullet points dividing catch composition into commercial crabs vs. fish vs. other invertebrates (including non-commercial crabs). I think it's clear.

Sea of Okhotsk crab trap	2021	PR C	General comments to P2		Table 28 lists Tanner crab as a main bycatch - is this also retained as part of a mixed crab fishery ? (I note that the justification for SI2.1.3 states that tanner crab must be discarded - yet in other areas, eg Bering Sea there is a commercial fishery for this species - so could you please confirm in background text which crab species are retained as part of a mixed crab fishery but not part of the certificate)	Please see above. Tanner crab is a commercial species but the stock is depleted and thus there is currently no quota. The situation is thus a little more complex that just commercial / retained vs non-commercial / discarded.
Sea of Okhotsk crab trap	2021	PR C	General comments to P2		Section 6.3.1.3.3: GL halibut is listed a main bycatch in the Golden (Brown) crab fishery. In other crab fisheries in Russia - Barents Sea, some such species have to be recorded by the vessel as per regulations, as part of general stock assessment. Is this the case in the Okhotsk area too? In which case the records of halibut would come from the vessel catch records, rather than the ad-hoc scientific observer?	Please see Section 6.3.1.2 which explains the source of information for each type of bycatch. It states there clearly (paragraph 2) that anything that is not retained (i.e. anything other than a commercial crab species with quota) is discarded straightaway and is not required to be recorded. This would be the case for Greenland halibut.
Sea of Okhotsk crab trap	2021	PR C	General comments to P2		Scoring: In several of the P2 justifications where SG60 was met, this was not actually mentioned in the justification text, and by stating that SG80 or SG100 is met, it is implicit of course that SG is met. Alas, the requirements are to state the obvious and to say so explicitly. So for example in PI2.2.2a at the end state that SG60, SG80 and SG100 are met. Same with PI2.2.2b, where SG60 and SG80 are met. etc - there are several of these throughout the scoring tables	Added.

Sea of Okhotsk crab trap	2021	PR C	General comments to P3		I was impressed by the number of at sea inspections in both 2018 and 2019, 2620 in 2018 for eg, which means around 7 inspections a day all year round. Just for the crab fishery. This seems high to me, considering the practicalities and logistics involved - Is this considered a high risk fishery/ risky for other things not to do with fishing? Illegal fishing? Just wondering, as in other parts of the world such numbers of inspections for one type of fishery are only dreamed about.	Yes, it is a high number, and it seems to be a prioritized fishery, perhaps due to periods of overfishing in the early 2000s.
Sea of Okhotsk crab trap	2021	PR C	General comments to P3		Figure 43 at the end of P3 background seems to have snucked in there, out of context. It is an interesting graph though, and would be most informative in the fishery background section 4.2 It neatly indicates the demand for crab	A comment to the figure has been added.
Sea of Okhotsk crab trap	2021	PR C	General comments to P3		The paragraph on the number of at sea inspections right above Figure 43 is a repeat from the previous section on Enforcement, Sanctions and Compliance.	Thanks for noticing this. The paragraph has been removed.

▪ PR C: PI Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code

Fishery	Asses ss-ment Start Year	Insert extra rows for P1 PIs if separat e scores given for different UoA stocks	Insert extra rows for P2 PIs if separa te scores given for differe nt UoA gear types	Peer Revie-wer (A/B/C)	Perfo r-manc e Indic a-tor (PI)	Has all available relevant information been used to score this PI?	Does the information and/or rationale used to score this PI support the given score?	Will the condition(s) raised improve the fishery's performan ce to the SG80 level?	Peer reviewers (PRs) should provide support for their answers in the left three columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Additional rows should be inserted for any PIs where two or more discrete comments are raised, e.g. for different scoring issues, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return key combination. Detailed justifications are only required where answers given are one of the 'No' options. In other (Yes) cases, either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (without any implications for the scores).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to each of the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options
Sea of Okhot sk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.1.1	Yes	Yes	NA	Scoring agreed		NA (No respons e needed)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.1.2	NA (PI not scored)	NA (PI not scored)	NA			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.1	Yes	No (change to rationale expected, not to scoring)	NA	This applies to several SI's - a), d) and f) In the justification for SG100 it is stated that further information is required before scoring this. I presume this is a left over from the ACDR. Could you please specifically state in each SI justification why SG100 was not met.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.1	Yes	No (scoring implications unknown)	NA	SI b) At SG 100 it is stated that there is 'no evidence that the performance of the harvest strategy has been fully evaluated'. It may be more accurate to state that the 'assessment team has not been provided with any evidence that the harvest strategy has been fully evaluated' (and maybe give an example of what kind of evidence would be required); in particular as the second part of the SG100 seems to have been met (achieving its objectives including being clearly able to maintain stocks at target levels) as at SG80 it is stated that "the harvest strategy worked well and achieved the stock management objectives"	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.2	Yes	No (change to rationale expected, not to scoring)	NA	This applies to both SI b) and c): The justification given at SG100 appears to be a left over from the ACDR. Please specifically state for each SI as to why SG100 was not met. For example, for SI c) SG80 is met because there is evidence available to show 'that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs'. SG 100 wants that little bit more clarity - which would for example suggest that there is a time series of applying the HCR successfully.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.3	Yes	Yes	Yes	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.4	No (scoring implications unknown)	No (scoring implications unknown)	NA	SI a): Please provide additional justification as to why SG100 is not met, such as what are the major features relevant to the biology of the species and the biology of the UoA - what is missing to not meet SG100?	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.4	No (scoring implications unknown)	No (scoring implications unknown)	NA	SI c) at SG100, the justification provided does not appear to tally with the work described in Section 6.2.5 in the P1 background.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.4	Yes	Yes	NA	SI d) and e) at SG100: may I suggest to rephrase the justification to indicate that 'no relevant evidence was provided to the assessment team….'. This might seem a bit pedantic of me, but it may well be that the evidence is there in the depths of the various research offices, but we assessors have not been able to ask questions clear enough to tease it out. This is especially an issue where English is not the working language of the client fishery.	Thank you for comment. Text of the rational was changed to suit your recommendation.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.2.4	No (scoring implications unknown)	No (scoring implications unknown)	NA	SI e) At SG80 it is stated that the TAC recommendations are forwarded to VNIRO in Moscow, where presumably another review takes place? In other Russian crab fisheries the final TAC recommendations are further reviewed by the independent Ecological Council of the Ministry of Nature comprised of independent scientists representing Academy of Science and universities. The VNIRO and the Ministry of Nature Councils' peer review are therefore external. Is this not the case in this fishery under assessment also?	Thank you for comment. This is the case in the fishery under assessment. Score increased. Text of the rational was changed to suit your recommendation.	Accepted (score increased)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.1.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.1.2	Yes	Yes	NA	Scoring agreed		NA (No response needed)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.1.3	Yes	Yes	NA	Scoring agreed			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.2.1	Yes	Yes	NA	Scoring agreed			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.2.2	Yes	Yes	Yes	Scoring agreed			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.2.3	Yes	Yes	NA	Scoring agreed			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.3.1	Yes	Yes	Yes	Scoring agreed			NA (No response needed)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.3.2	No (scoring implications unknown)	Yes	Yes	Gear loss is considered in SI2.2.2e. It is also of relevance here, whereby lost traps and associated buoys and ropes can lead to entanglement. Has the team asked the client whether the trap lines are marked in some way with radio tags? This is now being done by Russian trap fisheries in the Barents Sea, whereby buoys have identifiers as well as tags for locating them. Considering the concerns about the Right Whale population, such a management measure would be of help to reduce potential interactions	We asked the client, and reportedly the trap lines are indeed radio tagged.	NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.3.3	No (scoring implications unknown)	No (scoring implications unknown)	Yes	SI b) the justification does not follow the SGs text. The text provided for SG60 seems to meet SG80 (ie the trends aspect); are you saying that SG60 is met but SG80 is only partly met (yes for trends but no for sufficient monitoring to identify rare events) ? And SG100 is not met as per scoring guidance text.	Yes, that was what I was saying. I have revised the rationale slightly to clarify that SG60 is met. I take the reviewer's point on stating the obvious, but as I understand it, if it is clearly stated that SG80 is not met, SG100 does not need to be mentioned.	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.4.1	No (score increase expected)	No (score increase expected)	No	Re the MSC interpretations on identifying VMEs, please see: https://mscportal.force.com/interpret/s/article/identification-of-VMEs-SA3-13-3-1527262008557 from this it can be seen that "within the outcome PI, only accepted, defined or identified VMEs should be considered" Also: "It should be noted that within the management PI, the UoA is expected to be precautionary and recognise potential VMEs" Therefore, as there are no clearly defined, accepted or identified VMEs within the managed area , SG80 would be met. The issue is further addressed under the management PI, where consideration to indicator species may be given and to score precautionary - and this issue seems well addressed by the fishery under assessment by its Code of Conduct (2020) which explicitly includes management of interactions with VMEs/ VME indicator species. It would be very difficult for the client fishery to close out a condition which is based on something they have little influence over - ie they are not the management authority to define/ identify/ accept VMEs and put protection measures in place. The comment by an observer that there may be corals in the area needs to be backed up with documented evidence. Having soft coral on the trap is not enough. This issue is better addressed under the information PI, where the client can actually practically contribute data towards habitat mapping exercises by recording when they bring up benthos organisms. With this in mind a condition under outcome is not appropriate, in my opinion - but as habitat is considered an issue, it would be more appropriate to address this under either management (as suggested by Interpretations) or information, which in turn would be clearly auditable.	The reviewer's point is valid. According to the interpretation, potential VMEs (based on indicator species) should not be considered under 2.4.1b unless they are accepted by the management authority, which is not the case here. Hence the scoring of this SI has been changed to NA. PIs 2.4.2 and 2.4.3 were already scored taking into account the indicator species, and SG80 was met throughout all the SIs in both. There is no reason to review this scoring, since the interpretation was correct for	Accepted (score increased)

										these two PIs (indicator species should be considered on a precautionary basis). Therefore there is no condition on VMEs any more.	
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.4.2	No (change to rationale expected, not to scoring)	Yes	NA	SI 2.4.2c and d) at SG100 - is this statement a leftover from the ACDR? The SG100 justification should be updated to reflect whether the SG100 guidepost is met /not met	I suppose so; sometimes it's tempting to vary the wording a bit but it's probably not a good idea.	Accepted (no score change, change to rationale)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.4.2	No (change to rationale expected, not to scoring)	Yes	NA	SI2.4.2b mentions closed areas to protect habitat. Could you please give a reference to such areas in the Sea of Okhotsk relevant to this fishery? There does not appear to be such mention in the background section. P1 discusses closed areas to protect spawning and early development sites, as well as part of adult stock.	Sorry, my wording was bad - it does imply that habitat protection is their direct purpose. I have changed the wording to clarify.	Accepted (no score change, change to rationale)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.4.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.5.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.5.2	No (change to rationale expected, not to scoring)	Yes	NA	SI 2.5.2a - could you please give a reference or map to the closed areas mentioned in the justification if these closed areas relate to habitat management; there are closed areas as part of managing the stock of course - closed areas to protect spawning and early development sites, as well as part of adult stock.	See comment under 2.4.2 above.	Not accepted (no change)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/	Trap	PR C	2.5.3	Yes	Yes	NA	SI2.5.3b - the justification text for SG100 has somehow slipped into the column of the next SI.	Oops! Corrected.	Accepted (no score change, change

		Golden (Brown) Kc									to rationale)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	3.1.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	3.1.2	Yes	Yes	NA	Scoring agreed		NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	3.1.3	Yes	Yes	NA	Clear longterm objectives would also include such issues as the creation of marine protected areas, whereby the goal is to have a percentage of marine area protected for eg the feeding / breeding range of particular species (are there whale breeding/ feeding grounds for example which may be seasonally closed to vessel traffic?), or the protection of a range of benthic features by permanently closing areas to demersal gears - is there such a long term objective in Russia? For example, https://www.thegef.org/news/long-cold-shore-strengthening-management-effectiveness-marine-protected-areas-russia . There is a long list of biosphere reserves, but none seem to be exclusively marine: https://en.unesco.org/biosphere/eu-na#russia	Russia has a long tradition for and a well-developed network of protected areas. This PI is about the higher-level stated objectives in Russian fisheries legislation, not fishery-specific (as in PI 3.2.1) or policy-oriented.	Not accepted (no change)

Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	3.2.1	Yes	Yes	NA	Scoring agreed			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	3.2.2	Yes	Yes	NA	Scoring agreed			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	3.2.3	Yes	Yes	NA	Scoring agreed			NA (No response needed)
Sea of Okhotsk crab trap	2021	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	3.2.4	Yes	Yes	Yes	Scoring agreed			NA (No response needed)

▪ PR C: RBF comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment	CAB Res-ponse Code

									Draft Report - PCDR)	
Fishery	Assess-ment Start Year	UoA stock (if separate scores in P1, add extra rows if needed)	UoA gear type (if separate scores in P2, add extra rows if needed)	Peer Revie-wer (A/B/C)	Perfor-mance Indica-tor (PI)	Does the report clearly explain how the process(es) applied to determine risk using the RBF has led to the stated outcome?	Are the RBF risk scores well-referenced?	Peer reviewers (PRs) should provide support for their answers in the left three columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Insert additional rows for any PIs where discrete comments are raised e.g. for different scoring issues (allowing CABs to give a different answer in each case). Paragraph breaks may also be made within cells using the Alt-return key combination. Note: Detailed justifications are only required where answers given are one of the 'No' options. In other cases, please either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (without any implications for the scores).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options
Fishery	Assess-ment Start Year	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	1.1.1 (RBF)					
Fishery	Assess-ment Start Year	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.1.1 (RBF)					

Fishery	Assess-ment Start Year	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.2.1 (RBF)	Yes	Yes	Scoring agreed		
Fishery	Assess-ment Start Year	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.3.1 (RBF)					
Fishery	Assess-ment Start Year	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.4.1 (RBF)					
Fishery	Assess-ment Start Year	Red King crab/ Blue Kc/ Golden (Brown) Kc	Trap	PR C	2.5.1 (RBF)					

PR A: General Comments. Second follow-up comments to CAB responses to first comments

Question	Peer Reviewer comments at Public Comment Draft Report stage Insert additional rows for each clearly distinct issue raised.	CAB response to Peer Reviewer's Public Comment Draft Report stage comments (as included in Final Draft Report)
List here any issues not covered in the Performance Indicators or Conditions table (following sheet) that you feel have not been adequately addressed in the CAB response and would make a material difference to the scoring of the fishery.	The point of the comment at the PRDR stage re UoA/UoC definitions did not get addressed. In Tables 2 (p. 19) and 3 (p. 20), UoAs and UoCs are defined the same, i.e. the client's share of the overall fishery for each of the three species. In Table 25 (p. 69), however, UoA means the overall fishery (i.e. the full TAC) and UoC means the client's share of the fishery. It's these two definitions of UoA that need reconcilation with the MSC definition of a UoA.	Thanks for your comment. We have made clarifying notes for both tables 2 and 3, and adjusted the table 25 on p. 69 to reflect that the UoC and the UoA are the same in this fishery.

See above	What was meant by "current ecosystem status" at the PRDR stage should have been obvious with the Bering Sea context that was included but the point of the comment was ignored. Section 6.3.1.9.5 Climate change (p. 111) provides a very brief (7 line, one 2012 reference) consideration of a very important component of ongoing ecosystem changes. It describes past warm/cold periods (1980s to 2000s) and impacts on fish stocks, but no mention of impacts on crab stocks. It is well established that ocean warming is generally good for fish but bad for crab. The point of the comment is: What way has ocean climate been trending over the past 10 years, are conditions presently warm or cold, have any aspects of the ecosystem been affected that may have impacted recruitment in crab stocks????? Contrary to what was suggested in the response, this aspect of crab recruitment is not considered under P1.	1. General trends are towards warming (increased temperature, reducing DO and reducing extent of sea ice), although we have no information since a publication in 2016 (added to the background section). But presumably, relative to the long term mean conditions currently are warm. 2. Regarding how this impacts recruitment of crab stocks, for the target species, this is as I said a question to be addressed under Principle 1. If the reviewer is unhappy about how it has been dealt with under Principle 1, s/he needs to address their comments at that section. 3. Regarding the crab bycatch stocks (some overlap with P1 stocks, admittedly), I'm afraid that we have no information on the impact of climate change trends on recruitment. I should imagine it is difficult to unpick the drivers of any particular trends in recruitment although inferences might be drawn (but if they have been, we do not have this information).

See above	In 6.3.1.5 (p. 94) minor secondary species are given no consideration at all, as per the general comment provided at the PRDR stage. The point of the comment for 2.2.1, SIb is that the background section at least should include a summary of amounts caught or incidence in catches for the top few species in each UoA (as per info in Tables 30 and 31) along with a subjective evaluation of the likely UoA impact based on their general distribution in relation to UoA fisheries and on how common they are in general terms. This would make 6.3.1.5 much more relevant and meaningful and could be referenced in evaluation tables to more adequately address SIb SG100 wording for PIs 2.2.1 and 2.2.3.	This information would no doubt be of general interest, but as previously stated, there is a large number of these species, and it would be a great deal of effort to present it for each one. This expendature of time (and therefore money) would be of no benefit to the assessment, since at the end of it we would still not have sufficient evidence to score the SIs relating to the minor secondary species as met. It is permissable to set minor primary and secondary species aside, as long as the relevant SGs/SIs are scored as 'not met', and in this case, the outcome of doing this, in terms of scoring, is exactly the same as if we had done what the reviewer suggests. Therefore it makes no sense to do it, however interesting it might be.

PR A: Specific PI Comments. Second follow-up comments to CAB responses to first comments

UoA stock	UoA gear	PI	PR Comment Code	Peer Reviewer Justification (as given at Public Comment Draft Report (PCDR) stage)	CAB response to Peer Reviewer's comments (as included in the Final Draft Report)	CAB Response Code
UoAs 1, 2 and 3	Traps	2.1.2	No (change to rationale expected, not to scoring)	SIa - The rationale needs reconsideration in light of follow-up comments below for 2.1.3, SIs a and c. This SI is all about a strategy in place in each of the three UoA crab fisheries to manage impacts on their respective bycatch species. It has nothing to do with management of the directed fisheries for those species that are bycatch in the UoA fisheries.	Please note that this rationale has been extensively revised to respond to MSC TO. However, as noted also below, my logic in addressing this PI and 2.1.3 is a little different from the reviewer's. Please see comments below.	Not accepted (no change)

UoAs 1, 2 and 3	Traps	2.1.3	No (change to rationale expected, not to scoring)	SIa - The primary focus of wording for all 3 SGs for this info PI is the adequacy of quantitative info on amount of bycatch of primary species in each of the UoA fisheries, the actual stock status of the primary species is secondary. Both should be addressed for each species. Above is this PR's comment at the PRDR stage. Contrary to the team's response, the rationale is very heavily focused on the stock status of the primary species (which is the subject of PI 2.1.1) and on the information collected to do those assessments. This is being used as a basis to say that adequate information is being collected on amount of these species taken as bycatch in the three UoA fisheries - two completely different things. While the SG wording might not spell it out, it's clear that information about bycatch in the UoA fisheries is what's intended here. The SG100 conclusion for Greenland halibut addresses the question qualitatively but it is only for the two bait species that it is addressed quantitatively (although reference to where the estimates are provided, PI 2.2.1 SIa, should be included).	My logic in addressing this SI is a little different from the reviewers, which in my opinion is a bit flawed. If we know the stock status of the species, then we can infer the impact of all fisheries (directed and bycatch), including, logically, the UoA. So my reading of the SI is that our first port of call is to search for a stock assessment. If the stock status is good, then we need no further information to evaluate that the impact of the UoA on the stock is no detrimental. If, conversely, the stock status is evaluated as poor, or there is no stock assessment, then at that point we need to consider information directly from the UoA, in order to see if we can assess the impact of the UoA directly. Note that the rationale has been somewhat revised in response to MSC TO. Contrary to what the reviewer suggests, cross-references to other rationales and background sections have mainly been removed because MSC TO did not like them.	Not accepted (no change)

UoAs 1, 2 and 3	Traps	2.1.3	No (change to rationale expected, not to scoring)	SIc - SGs 60 and 80 refer to main primary species, SG100 refers to all i.e. main + minor. The SG100 rationale really doesn't address the SG wording. It has nothing to do with uncertainty in the stock assessments for these species. It has to do with the strategy to manage them and with evaluating whether the strategy is achieving its objectives, not with evaluation the objectives. Above is this PR's comment at the PRDR stage. The team response indicates we are looking at PI 2.1.3 in two completely different ways. The SG wording doesn't spell it out nor does the comment express it explicitly but, in this PR's view, it should be obvious that SIc is all about managing the three crab fisheries under assessment in terms of minimizing bycatch of the primary species. It really has nothing to do with managing the directed fisheries on the primary species.	A comment has been added to the rationale about information coming directly from the UoA in relation to SG100, although it remains not met. I agree that we have a slightly different perspective on this PI, and with all due respect I think the reviewer is a little quick (here and above) to state what is 'obvious' and 'clear' despite (as s/he admits) this not being apparent from the wording of SGs themselves.	Accepted (no score change, change to rationale)
UoAs 1, 2 and 3	Traps	2.2.1	No (change to rationale expected, not to scoring)	SIb - Minor secondary species are being dismissed, both here and in background section (p. 88), without any consideration of even a few of those most frequently encountered - see general comment. Above is part of this PR's comment at the PRDR stage. While something of a moot point given SG100 is not met, the rationale says nothing at all about amounts of these species taken as bycatch in the three UoA crab fisheries which would provide some basis for evaluating their likely impacts. The rationale is focused entirely on stock assessments (i.e. analytical assessments), which are not done for secondary species, and management (i.e. TACs). See general comment.	See response to general comment. We have conducted an analysis to evaluate which species should be considered main vs minor. The MSC standard makes no distinction between 'frequently encountered' minor species and other minor species. Please see response to general comment and also response above in relation to primary species.	Not accepted (no change)

UoAs 1, 2 and 3	Traps	2.2.2	No (change to rationale expected, not to scoring)	SIe - The No at SG80 for UoA 3 needs explanation given that it received a Yes for this SG in 2.1.2 - why does it meet SG80 for main primary but not main secondary? The relevance of the last paragraph in this rationale is unclear. Is the condition needed? Above is this PR's comment at the PRDR stage. The response really doesn't address why the review process that achieves SG80 for UoA 3 in PI 2.1.2, SIe doesn't achieve it here. Why does the SG80 rationale for UoA 3 in PI 2.1.2, SIe, i.e. "evidence that potential measures are kept under review" not apply to all bycatch species? Why would measures implemented as per regular review to reduce bycatch of main primary (i.e species of commercial importance) in this crab fishery not also work to reduce bycatch of main secondary species? The lost traps/ghost fishing issue is covered in PI 1.2.1, SIf of this report, where it is usually considered. Nevertheless, any measures aimed at reducing trap loss or encouraging retrieval of lost traps has implications for bycatch species as well.	Regarding SIe. SG80 only relates to main species, and for 2.1.2e (primary species) the only main primary species for which unwanted catch is relevant is snow and Tanner crabs, where there is a regular discussion process (covering all the commercial crab species but not other species) which aims to minimise bycatch. Hence SG80 is met. For 2.2.2e, conversely, UoAs 1 and 2 have no main secondary species (hence 80 is met by default), but UoA 3 has two, for which SG80 requirements are not met because the team could not find any evidence of a regular review process. Hence the scoring difference. Hopefully this answers the question? Regarding the lost traps issue, the reviewer doesn't seem to be asking for any change??	Not accepted (no change)
UoAs 1, 2 and 3	Traps	2.2.3	No (change to rationale expected, not to scoring)	SIb - See comment above for 2.2.1, SIb and general comment.	See response above.	Not accepted (no change)

8.4. Stakeholder input

The Client provided numerous scientific reports to the assessment team for provide information for the ACDR and supplement the site visit. The CAB received no written comments from stakeholders regarding the ACDR. The assessment team received no verbal comments during the site visit likely to cause a material difference to the outcome of the assessment.

UCSL received and addressed MSC comments to the PCDR as part of a technical oversight review. These comments and relevant responses are given in the table below.

SubID	PageReference	Grade	RequirementVersion	OversightDescription	Pi	CABComment
31112	Throughout PCDR	Guidance	FCP-7.17.9.1 v2.2	Cross-referencing errors throughout the Public Comment Draft Report make it difficult to follow the rationales and logic used by the team.		Corrected
31113	128	Minor	FCP-7.17.9.1 v2.2	PI 2.2.2.e (UoA3): It is unclear from the rationale how the score is justified. There is no mention of a review of the potential effectiveness and practicality of alternative measures to minimise UoA related mortality of unwanted catch of main secondary species, only a reference to the general measures already in place within the fishery.	2.2.2,	The Code of COnduct was put in place in 2020, and reviews bycatch issues and requires vessels to use appropriate measures to avoid unwanted catch. The team considered that this is sufficient to meet the requirements of SG60 ('a review') but not SG80 because we do not have evidence of an ongoing process in the UoA (it might be in place since this is what the Code of COnduct intends but we were not able to verify that it was).
31114	128	Minor	SA-3.8.2 v2.01	PI 2.2.2.d: It is not clear why shark finning hasn't been scored when specific reference to elasmobranchs is made.	2.2.2,	It is a species of elasmobranch that is not of any commercial interest for finning. It would not be finned.
31116	115	Minor	FCP-7.17.9.1 v2.2	PI 2.1.1.b: A clear rationale should be provided for each minor primary	2.1.1,	Expanded

				species.		
31117	122; 143; 152	Guidance	FCP-7.17.9.1 v2.2	PIs 2.1.3.a; 2.4.2.d; 2.5.3.e: To ensure clarity for stakeholders, the team should present a rationale to support the team's conclusion in each table rather than cross referencing to evidence or rationales in other background sections or performance indicators/scoring issues.	2.1.3, 2.4.2, 2.5.3,	The cross references were not essential to the rationales; they were just provided to point to related information and avoid duplication, which tends to lead to errors during the reviewing process (items corrected in one place but not another). The cross-references have been deleted in most places as requested, although in my opinion this conflicts with the comments further down relating to improved referencing of information.
31118	118	Minor	FCP-7.17.9.1 v2.2	PI 2.1.2.a: Bait species: The rationale does not justify the score. It is unclear what measures are in place to consitute a strategy that limits the impact of all UoAs on bait species.	2.1.2,	A strategy is achieved by the combination of i) the low use of bait by the UoAs compared to total removals from the stock and ii) the direct management of these stocks either by Russia or jointly by Russia and Japan. This is explained in the rationale. A bit more detail has been added.

31119	118	Minor	FCP-7.17.9.1 v2.2	PI 2.1.2.a: Greenland halibut & minor bycatch stocks: The rationale does not justify the score. Insufficient evidence is presented to support the conclusion that a strategy is in place for Greenland halibut and minor bycatch stocks, the measures in place that consitute the strategy should be described in more detail.	2.1.2,	More detail added.
31121	119	Minor	FCP-7.17.9.1 v2.2	PI 2.1.2.b: Crabs: The rationale does not justify the score. Insufficient information is presented as to what management and projections information are used to provide an objective basis for confidence that the measures/partial strategy will work based on information directly about the fishery and/or species involved.	2.1.2,	A reference has been added to point the reader at the projections, which are included in the background section. I ask myself what the background section is for, if all the information provided there has to be re-pasted into the rationales.
31128	115; 119-120; 122-123; 131; 136; 139; 140; 143; 14	Major	FCP-7.17.9.1 v2.2	PIs 2.1.1.b; 2.1.2.b; 2.1.2.e; 2.1.3.a; 2.1.3.c; 2.2.3.c (UoA3); 2.3.2.d; 2.3.3.b; 2.4.1.a; 2.4.2.c; 2.5.1.a: The rationales do not adequately justify the scores. Insufficient evidence is presented for what information is available to justify these scores. For example where the terms "according to studies", "research shows, "the information shows", "projections show" or	2.1.2, 2.1.3, 2.2.3, 2.3.2, 2.3.3, 2.4.1, 2.4.2, 2.5.1,	2.1.1b - There is no such phrase in this rationale. 2.1.2b - Projections referenced (provided in background section). More details have been provided for the other stocks (also previously provided in the background section). 2.1.2e - References added

				"there is some evidence" are used, the information in question should be detailed or referenced, including its coverage, its source and why it is relevant to justify the score. The team should also apply FCP 7.20.4 throughout to reference any information used to inform scoring.		2.1.3a - The cross-references to Principle 1 pointed clearly to the information and references but this TO has required me to remove them. I have added the information back in here directly, although I feel that this method of multiple duplication of the same information is both inefficient and prone to error. 2.1.3c - All the information summarised in this rationale has been clearly set out and referenced in the preceding rationales for Principle 2. I have added some cross-references to make this clearer. 2.2.3c - references added 2.3.2d - The information is referenced. The phrases in question are not used. Plese be more specific about the problem with this rationale. 2.3.3b - references added 2.4.1a - references added 2.4.2c - These figures are all provided in the

						background section. Cross-references added, since I presume it is not desirable to re-paste 9 figures into the rationale. 2.5.1a - Detailed and referenced information is provided in the background section, and is summarised in the rationale - a cross-reference to the background section has been added, rather than duplicating large quantities of information. Elsewhere some references added. Some of the information, however, remains unreferenced because it is information that can be considered common knowledge for a marine biologist - i.e. that crabs are generalist feeders and that many species of demersal fish feed on crustaceans.
31130	195	Guidance	FCP-7.7.3 v2.2	Section 5 within 8.2.3 (evaluation techniques): The justification for why RBF has been triggered is not clear, using Table 3 in Annex PF, 'because data-deficient is attending for its stock status' does not speak to the requirements for triggering RBF.		Apologies for the typo. Not all participants in the MSC process are native English speakers, so this can happen.

31132	70	Guidance	FCP-7.17.9.2 v2.2	PI 1.1.1.a (UoA1): The text says “SG 80 and SG 80 are met”.	1.1.1,	We thank you for the comment. Corrections in text have been made in accordance with your recommendations.
31133	70	Minor	FCP-7.17.9.1 v2.2	PI 1.1.1.a (UoA1): There is not enough evidence in the rationale to support SG 100 is met. In particular, there is no reference to the model calculations that show that the risk of commercial size stock falling below Blim in 2020 and 2021 is nil.	1.1.1,	We thank you for the comment. Corrections in text have been made in accordance with your recommendations.
31134	70	Guidance	FCP-7.17.9.1 v2.2	PI 1.1.1.a (UoA2): The text should refer to Table 20, not Table 19 (which is for UoA1). Also, the sentence “From 2011 to the present, biomass of legal-size males (commercial stock) has ranged from 17,900 to 26,800 tonnes, i.e. was higher than Blim” references Figure 21; however, this figure does not represent Blim or biomass of the stock.	1.1.1,	We thank you for the comment. In our opinion, Figure 21 also represent Blim and biomass of the commercial BKC stock.
31135	71	Major	FCP-7.17.9.1 v2.2	PI 1.1.1.a (UoA3): There is not enough evidence in the rationale or in the background information section to support that there is a high degree of certainty (i.e. 95%) that the stock is above PRI.	1.1.1,	We thank you for the comment. All three MSC experts in their reviews wrote that there is sufficient evidence to assess SI 1.1.1a = 100.

31136	71	Guidance	FCP-7.17.9.1 v2.2	PI 1.1.1.b (UoA2): Figure 21 does not clearly represent the information given in the rationale; Figure 22 does, but it's not referenced here.	1.1.1,	We thank you for the comment. Corrections in text have been made in accordance with your recommendations.
31137	74-75	Minor	FCP-7.17.9.1 v2.2	PI 1.2.1.b: The rationale does not contain enough evidence that prove that when measures to reduce fishing mortality were introduced during a downturn in stock abundance the stock responded positively. The three figures (Figs. 13, 20 and 31) referenced here do not clearly show how the harvest strategies for these stocks are working.	1.2.1,	We thank you for the comment. Corrections in text have been made in accordance with your recommendations.
31138	79	Minor	FCP-7.17.9.1 v2.2	PI 1.2.2.c: Although it seems reasonable to think that the HCRs are working based on the status of the stocks, the rationale does not clearly show evidence that a reduction in TAC had the desired effect on the stock levels.	1.2.2,	We thank you for the comment. Corrections in text have been made in accordance with your recommendations.
31140	127-131	Major	FCP-PF4.3.2.4 v2.2	PIs 2.2.2; 2.2.3: For multiple attributes against multiple species within the PSA tables (e.g. Eelpout, Lycodes soldatovi Max. age and length at maturity, Verill's crab (Paralomis verrilli) density dependence & post capture mortality) the justification includes reference to limited or no information without a precautionary score	2.2.2, 2.2.3,	eelpout max age - from congenerics we surmise an max age of ~14 years, but a score of 2 allows a max age of up to 25 years, which is outside the range recorded for the genus, therefore it is a precautionary score eelpout length at maturity - more information added

				being awarded. It is therefore unclear how in the rationales for PI 2.2.2 and PI 2.2.3 the scores from the PSA indicate a low risk.		density dependence - please note that the SGs for density depends are as follows: medium risk - no depensatory or compensatory dynamics demonstrated or likely; high risk - Allee effects demonstrated or likely. In this case, Allee effects are neither demonstrated nor is there any evidence of any particular likely driver of Allee effects. In fact, as you may know, there are very few species where Allee effects are demonstrated. The P2 assessor has a PhD on this subject. Some more discussion of the 'likely' part of the SG has been added. post-capture mortality - missing reference added, apologies for that

31142	127-131	Major	FCP-PF4.4.2.2 v2.2	PIs 2.2.2; 2.2.3: For multiple attributes against multiple species within the PSA tables (e.g. Eelpout, Lycodes soldatovi Max. age and length at maturity, Verill's crab (Paralomis verrilli) density dependence & post capture mortality) the justification includes reference to limited or no information without a precautionary score being awarded. It is therefore unclear how in the rationales for PI 2.2.2 and PI 2.2.3 the scores from the PSA indicate a low risk.	2.2.2, 2.2.3,	(duplicate of the comment above)
31143	277	Guidance		Table 49 is empty. It is unclear if this was deliberately left empty (in which case a justification is required) or accidentally, in which case needs completing.		Sorry, I thought that fact that there are no species grouped by similar taxonomies would be sufficient explanation as to why the table was not filled in. A comment has been added to this effect.
31144	N/A	Major	FCP-PF2.3.1 v2.2	It is not clear how the assessment team consulted stakeholders in order to gather information to be able to use the PSA. There are a number of justifications for the PSA scores which indicate there is no data available for the species and it is unclear what attempts were made to fill those gaps.		These species were discussed with MagadanNIRO and KamchatNIRO at the site visit, after which a summary of additional Russian information was provided, which was used to verify the rationales, but is not directly cited because it is in a format which is difficult to cite. It is available on

						request to the CAB.
31145	276	Major	FCP-PF2.3.4 v2.2	Section 8.8.1: There is no evidence of stakeholder information being incorporated into the final PSA results. This is particularly evident as we note the PSA information and scores provided in the announcement for using the RBF is identical to that in the PCDR, indicating no further information or views were sought and/or incorporated.		Please see explanation above. Some pers. comm. citations have been added. Please ask if you would like to see a copy of the information provided.
31146	127	Major	FCP-7.17.9.1 v2.2	PI 2.2.2.a: The rationale does not support the scoring guidepost for SG80. It is not clear how the PSA outcome is equivalent to a partial strategy and therefore constitutes a rationale for meeting SG 80 (noting the definition of partial strategy in Table GSA3 in FSR 2.01 and SA3.8.1 'The team shall score this PI even if the UoA has no impact on this component.'). More information on the Code of Conduct is also needed to determine that it is a strategy that would justify a score of SG100.	2.2.2,	An explanation of the 'partial strategy' has been added, and the definition of measures, ps and strategy pasted in at the top of the rationale as an aide memoire. Some information has been added as to the Code of Conduct.

31148	N/A	Minor	FCP-PF2.3.2 v2.2	It is not clear if the CAB followed this requirement and therefore if they clearly communicated the use and purpose of the risk-based framework in the announcement.		In fact, the RBF statement was included in the fishery announcement template as well as the RBF announcement was published on the MSC website. Moreover, all potential stakeholders were informed about using the RBF procedure two months prior the site visit, and during which relevant communication between them and experts was carried out as well.
31149	161-162	Minor	FCP-7.17.9.2 v2.2	PI 3.1.1.a: It is unclear from the rationale that the procedures governing cooperation with other parties are binding. In addition, it is unclear from the rationale that the legal system and procedures deliver management outcomes consistent with MSC Principles 1 and 2.	3.1.1,	This clause on binding procedures refers to situations which are subject to international cooperation, which is not the case here. That management outcomes are delivered consistent with MSC Principles 1 and 2 is discussed under the sections on Principles 1 and 2 in the assessment report. While the assessment team deams this to be rather obvious, a reference to the discussion under Principles 1 and 2 has been added.
31150	162-163	Minor	FCP-7.17.9.2 v2.2	PI 3.1.1.b: It is unclear from the rationale how the dispute resolution mechanism is transparent or	3.1.1,	This has been clarified in the text.

				effective.		
31151	165-166	Minor	FCP-7.17.9.2 v2.2	PI 3.1.2.b: It is unclear from the rationale how regularly information is sought and accepted by the Public Fisheries Council (at the federal level).	3.1.2,	This has been clarified in the text.
31152	168	Minor	FCP-7.17.9.2 v2.2	PI 3.1.3.a: It is unclear from the rationale that clear long-term objectives, consistent with the MSC Fisheries Standard and the precautionary approach, are explicit within management policy.	3.1.3,	The requirement to protect aquatic biological resources and take the best scientific knowledge into account equals the requirements of the precautionary approach, as laid out in the FAO Code of Conduct and its technical guidelines.
31153	170	Minor	FCP-7.17.9.2 v2.2	PI 3.2.1.a: It is unclear from the rationale what the short and long-term objectives are, or whether they are explicit.	3.2.1,	Objectives are to maintain the stocks at sustainable levels (both target stocks and other retained species) and protect other parts of the ecosystem, such as habitats. These are explicit in the management system.
31154	172-173	Guidance	FCP-7.17.9.2 v2.2	PI 3.2.2.b: The FFA website link included in the rationale and background section appears to be broken.	3.2.2,	The reference has been updated.

31155	173	Minor	FCP-7.17.9.2 v2.2	PI 3.2.2.c: It is unclear from the rationale how the decision-making process uses the precautionary approach. The rationale states that decision-making is based on the precautionary approach but does not explain how the precautionary approach is used.	3.2.2,	The precautionary approach, as defined by the FAO Code of Conduct and its technical guidelines, is used in setting reference points and TAC, amongh other things.

8.5. Conditions

Table 33 – Condition 1 – Applies to all UoAs in relation to ETP species right whales (*Eubalaena japonica*)

Performance Indicator	2.3.1 (SIb)
Score	70
Justification	Right whale: The N. Pacific right whale stock remains very depleted from commercial whaling days, and the IUCN assessment notes that it is likely that even very low levels of mortality from fishing (or vessel collisions) has the potential to impact the population (less than one event per year). Therefore, although there is no evidence of interactions with this fishery or similar fisheries in the US, the limited data do not allow us to say that it is 'highly likely' that there is no impact.
Condition	The fishery must demonstrate that direct effects of the UoA are **highly likely** to not **hinder recovery** of the North Pacific right whale
Condition deadline	4th annual surveillance
Exceptional circumstances	NA
Milestones	By the first annual surveillance, the fishery must be monitoring interactions with right whales. By the second annual surveillance, there must be an evaluation whether the direct effects of the UoA are **highly likely** to not **hinder recovery** of right whale By the third annual surveillance, there must be a strategy in place to reduce impacts on right whales to an acceptable level. By the fourth annual surveillance, the fishery must demonstrate that direct effects of the UoA are **highly likely** to not **hinder recovery** of the North Pacific right whale.
Verification with other entities	Not required

Table 34 – Condition 2 – Applies to all UoAs in relation to ETP species right whales (*Eubalaena japonica*)

Performance Indicator	2.3.2 (SIb, SIc, SId)
Score	65
Justification	The measures in place are not designed to manage the impact on ETP species specifically, particularly not in relation to large whales (the main concern identified) since the main issue relates to rope entanglement (since mortality from rope entanglement has not been observed in the fishery). Although observer and other data are available, it is also unclear whether this is sufficient to identify all impacts, particularly given that for some species (right whales) a very small number of events is needed to have a significant population-level impact. Therefore the measures in place (in particular the data collection) are not sufficient to constitute a 'strategy'. The measures in place give an objective basis for confidence. Research/observer coverage allows the collection of relevant information, based on information directly about the trap fishery (location, depth, gear) as well as potential species involved. However, it is not clear that data are sufficient to be able to identify interactions across all

	relevant species, and therefore data might not be sufficient for clear confidence that there are no impacts. There is some evidence that the strategy is being implemented successfully, as the report on catch composition in the fishery indicates that no ETP species have been recorded in this fishery. However, we do not have sufficient evidence that the strategy, including Code of Conduct, is implemented in the UoA.
Condition	The fishery must put in place a **strategy** that is expected to ensure the UoA does not hinder the recovery of right whales. The fishery must demonstrate an **objective basis for confidence** that the measures/strategy will work, based on **information** directly about the fishery and/or the species involved. Evidence should be presented that the strategy is being implemented in the UoAs.
Condition deadline	4th annual surveillance
Exceptional circumstances	NA
Milestones	By the first annual surveillance, the fishery must be monitoring interactions with right whales. By the second annual surveillance, there must be an evaluation whether the direct effects of the UoA are **highly likely** to not **hinder recovery** of right whale By the third annual surveillance, there must be a strategy in place to reduce impacts on right whales to an acceptable level. By the fourth annual surveillance, the fishery must be able to show that the strategy is being implemented, and there is an objective basis for confidence that the strategy will work, based on information from the fishery and/or from monitoring of right whales in the fishing area.
Verification with other entities	Not required

Table 35 – Condition 3 – Applies to all UoAs in relation to ETP species right whales (*Eubalaena japonica*)

Performance Indicator	2.3.3 (SIa, SIb)
Score	60
Justification	The ETP species with the highest potential risk of impact is the right whale. Although there is no evidence of interactions with right whales in this fishery, or in (semi)analogous US fisheries, and no evidence of population overlap, the population-level data suggests that very low levels of impact (<1 event per year) would be sufficient to hinder recovery. The data for this fishery at present are not adequate to be completely confident that such rare events are not occuring.
Condition	The fishery must provide some quantitative information on interactions with right whales, **adequate to assess** the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of right whales. Information should be adequate to measure trends and support a **strategy** to manage impacts on ETP species
Condition deadline	3rd annual surveillance
Exceptional circumstances	NA

Milestones	By the first annual surveillance, the fishery must be monitoring interactions with right whales. By the second annual surveillance, there must be an evaluation whether the direct effects of the UoA are **highly likely** to not **hinder recovery** of right whale By the third annual surveillance, the fishery must be able to show that information is adequate to determine whether the fishery is a threat to protection and recovery, to measure trends and support a strategy.
Verification with other entities	Not required

Table 36 – Condition 4 – Applies to all UoAs

Performance Indicator	2.4.2 (SIc)
Score	75
Justification	Habitat maps, in the form of sediment distribution and dominant benthic organisms, of the UoAs fisheries area are available (e.g. Figure , Figure , Figure , Figure , Figure , Figure), and VMS tracks of the vessels show where the fleet operates (Figure 8, Figure 17). However, the Code of Conduct is not yet fully implemented in relation to habitats (e.g. benthos bycatch log not yet operational). SG80 is not met.
Condition	The fishery must provide some quantitative evidence that the measures / partial strategy for protecting vulnerable habitats are being implemented specifically. Specifically, no evidence was provided that the Code of Conduct is being implemented in relation to vulnerable habitats.
Condition deadline	2nd annual surveillance
Exceptional circumstances	NA
Milestones	By the first annual surveillance, the fishery must demonstrate that the partial strategy (Code of Conduct or some other appropriate measure) is being implemented. By the second annual surveillance, the fishery most provide some quantitative evidence of implementation.
Verification with other entities	Not required

Table 37 – Condition 5 – Applies to all UoAs

Performance Indicator	3.2.4 (SIb)
Score	70
Justification	The assessment team has not been provided documentation that the management system for crab fisheries in Russia is subject to external reviews.
Condition	The fishery-specific management system is subject to regular internal and occasional external review.
Condition deadline	3rd annual surveillance

Exceptional circumstances	NA
Milestones	By the first surveillance audit, the client must provide a written update on the status of the external review, including terms of reference for the review. By the second surveillance audit, the client must provide evidence that the external review has been commissioned. By the third surveillance audit, the client must provide the written external review.
Verification with other entities	Not required

8.6. Client Action Plan

The following tables present the Client Action Plan (CAP) for the **five Conditions** set against the Sea of Okhotsk crab trap fishery.

Table 38 Client action plan for conditions of certification

Client Action Plan, Condition 1.	Year 1 For the first annual surveillance audit, Ostrovnoy-Crab will develop and implement a field-guide for the crews of the fishery vessels in case of any interactions with right whales. Year 2 By the second annual audit, Ostrovnoy-Crab based on the reports from the ships will prepare a review on the evaluation whether the direct effects of the UoA are highly likely to not hinder recovery of the North Pacific right whale. Year 3 In case the previous year showed any evidence of direct effects of the UoA on the right whale population in the area, Ostrovnoy-Crab will present a strategy in place to reduce such impacts on right whales to an acceptable level. Year 4 By the fourth annual audit, Ostrovnoy-Crab will use all the obtained during previous years data to demonstrate that direct effects of the UoA are highly likely to not hinder recovery of the North Pacific right whale.
Client Action Plan, Condition 2.	Year 1 For the first annual surveillance audit, Ostrovnoy-Crab will develop and implement a field-guide for the crews of the fishery vessels in case of any interactions with right whales. Ostrovnoy-Crab will also contact scientists and specialists from Russian Academy of Science institutes, who have researched large whales for getting additional information on the species. Year 2 By the second annual audit, Ostrovnoy-Crab based on the reports from the ships will prepare a review on the evaluation whether any direct effects of the UoA are highly likely to not hinder recovery of right whale. The data obtained from the whale specialists will also be used for the review. Year 3 In case the previous year showed any evidence of direct effects of the UoA on the right whale population in the area, Ostrovnoy-Crab will present a strategy in place to reduce such impacts on right whales to an acceptable level, developed in cooperation with whale specialists. Year 4 By the fourth annual audit, Ostrovnoy-Crab will use all the obtained during previous years data to show an objective basis for confidence that the strategy will work, based on information from the fishery and/or from monitoring of right whales in the fishing area. Letters of support for the Client Action Plan will be provided by Kamchatka Branch of the Pacific Institute of Geography, Russian Academy of Science.
Client Action Plan, Condition 3.	Year 1 For the first annual surveillance audit, Ostrovnoy-Crab will develop and implement a field-guide for the crews of the fishery vessels in case of any interactions with right whales. Ostrovnoy-Crab will also contact scientists and specialists from Russian Academy of Science institutes, who have researched large whales for getting additional information on the species. Year 2

	By the second annual audit, Ostrovnoy-Crab based on the reports from the ships will prepare a review on the evaluation whether the direct effects of the UoA are highly likely to not hinder recovery of right whale. The data obtained from the whale specialists will also be used for the review. Year 3 By the third annual audit, Ostrovnoy-Crab will use all the obtained during previous years data to measure trends and determine whether the fishery is a threat to protection and recovery. In case of positive decision, Ostrovnoy-Crab will present a strategy in place to reduce such impacts on right whales to an acceptable level, developed in cooperation with whale specialists. Letters of support for the Client Action Plan will be provided by Kamchatka Branch of the Pacific Institute of Geography, Russian Academy of Science.
Client Action Plan, Condition 4.	Year 1 By the first annual surveillance audit, Ostrovnoy-Crab will develop specific benthos bycatch logbooks for implementation on fishery vessels. Terms of use of the logbooks will be defined in the Code of Conduct, part devoted to vulnerable habitats. Year 2 By the second annual surveillance audit, Ostrovnoy-Crab will provide a report with quantitative data on benthos bycatch obtained from the logbooks.
Client Action Plan, Condition 5.	Year 1 For the first annual surveillance audit, Ostrovnoy-Crab will provide a written update on the status of the external review, including terms of reference for the review. Year 2 By the second annual audit, Ostrovnoy-Crab will provide evidence that the external review has been commissioned. Year 3 By the third annual audit, Ostrovnoy-Crab will provide the written external review.

- **Letters of support**

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ТИХООКЕАНСКОГО ИНСТИТУТА ГЕОГРАФИИ
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Письмо в поддержку Плана действий клиента

Уважаемый Михаил Алексеевич!

Камчатский филиал Тихоокеанского института географии ДВО РАН (КФ ТИГ) ознакомился в Планом действий клиента (Client Action Plan), предложенным ООО «Островной-Краб» (ОК) в рамках работы над условиями MSC-сертификации российского ловушечного промысла краба в Охотском море (северо-охотоморская подзона - краб равношипый; западно-камчатская подзона - краб камчатский, краб синий; камчатско-курильская подзона - краб камчатский). По мнению КФ ТИГ, предложенный план действий свидетельствует об ответственном отношении Клиента к ведению промысла и желании повышать его уровень в соответствии с международными критериями устойчивого рыболовства.

В нашем институте работают специалисты, занимающиеся вопросами распространения и современной численности крупных китообразных в дальневосточных морях. Крабовый промысел известен как вид рыболовства, представляющий наименьшую угрозу для морских млекопитающих, однако, в наших водах данный вопрос остается неизученным. Сотрудничество с ОК позволило бы получить важные данные о возможном влиянии данного промысла на популяции редких видов китообразных.

КФ ТИГ выражает готовность сотрудничать с ОК в рамках работы над условиями 3,4 и 5 Плана действий клиента, а также иных вопросов, касающихся влияния промысла на ETP-виды.

Приложение: перевод текста письма на английский язык на 1 стр. в 1 экз.

Врио директора КФ ТИГ ДВО РАН, д.б.н. Коростелев С.Г.

English translation is below:

Dear Mr. Zaitsev,

Kamchatka Branch of the Pacific Geographical Institute, Russian Academy of Science (KB PGI), got acquainted with the Client Action Plan proposed by Ostrovnoy-Crab LLC as part of the work on the terms of MSC certification of the Russian trap crab fishery in the Sea of Okhotsk (North Okhotsk subzone – Golden king crab; West Kamchatka subzone - Red king crab, Blue king crab; Kamchatka-Kuril subzone - Red king crab). In the opinion of KB PGI, the proposed plan demonstrates the Client's responsible attitude to fishing and the desire to increase its level in accordance with the criteria for sustainable fishery.

Our institute employs specialists working on the distribution and current abundance of large cetacean species in the Far Eastern seas. Crab trap fishery is known to be the least threatening type of fishery for marine mammals, however, in Russian waters this issue remains unexplored. Cooperation of our institute with Ostrovnoy-Crab could provide important data on the possible impact of this fishery on populations of cetaceans.

KB PGI expresses its readiness to collaborate with Ostrovnoy-Crab in terms of work on conditions 3, 4 and 5 of the Client Action Plan, as well as any other issues related to possible impact of fishery on ETP species.

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копия:
Директору
United Certification Systems Limited (UCSL)
О.А. Шуваловой
e-mail: o.shuvalova@ucsl.eu

Исх. № 02-10
«21» октября 2021г.

Письмо поддержки

Уважаемый Михаил Алексеевич,

Камчатское отделение Всемирного фонда природы WWF России рассмотрело представленный План действий клиента (Client Action Plan), разработанный ООО «Островной-краб» в целях выполнения условий по повышению экологической устойчивости промысла крабов, осуществляемого компанией в Охотском море. Положения Плана учитывают рекомендации и предложения, предложенные в процессе обсуждения условий сертификации промысла и, при условии их выполнения, будут свидетельствовать об ответственном подходе компании к промыслу краба.

Положения Плана предполагают реализацию комплекса мер, направленных на повышение устойчивости и экологической ответственности промысла. В частности, особого внимания заслуживают меры, направленные на изучение вопроса воздействия промысла на морских млекопитающих и уязвимые морские экосистемы, а также меры по снижению прилова нецелевых видов. На сегодняшний день снижение воздействия морских промыслов на морские экосистемы является одной из ключевых задач для сохранения биологического разнообразия морей.

Данные меры потребуют тщательного планирования и привлечения профильных экспертов при их реализации. WWF России надеется на ответственное отношение компании к исполнению возложенных на себя обязательств.

С уважением,

Директор
Камчатского-Берингийского
экорегионального отделения
Всемирного фонда природы (WWF России)
Рафанов Сергей Владимирович

English translation is below:

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To Director General
«Ostrovnoy-crab» LLC
M.A. Zaycev
e-mail: crab@ostrovnoy.ru

Copy to:
Director
United Certification Systems Limited (UCSL)
O.A. Shuvalova
e-mail: o.shuvalova@ucsl.eu

№ 02-10
«21» October 2021г.

Letter of support

Dear Mikhail Alekseevich,

Kamchatka branch of WWF Russia reviewed the submitted Client Action Plan developed by Ostrovnoy-Krab LLC in order to fulfill the conditions for improving the environmental sustainability of the crab fishery carried out by the company in the Sea of Okhotsk. The provisions of the Plan take into account the recommendations and concerns proposed in the process of discussing the conditions for the certification of the fishery and, provided they are implemented, will testify to the company's responsible approach to the crab fishery.

The provisions of the Plan imply the implementation of a set of measures aimed at increasing the sustainability and environmental responsibility of the fishery. In particular, measures to address the impact of fishing on marine mammals and vulnerable marine ecosystems, as well as measures to reduce the by-catch of non-target species, are of special attention. Today, reducing the impact of marine fisheries on marine ecosystems is one of the key tasks for the conservation of biological diversity of the seas.

These measures will require solid planning and the involvement of specialized experts in their implementation. WWF Russia hopes for a responsible attitude of the company towards fulfilling its obligations.

Sencerely,

Director
Kamchatka-Bering sea
Ecoregional office
WWF России
Rafanov Sergey

Федеральное агентство по рыболовству
Камчатский филиал Федерального государственного бюджетного научного учреждения
«ВСЕРОССИЙСКИЙ НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ ИНСТИТУТ РЫБНОГО ХОЗЯЙСТВА И ОКЕАНОГРАФИИ»
Камчатский филиал ФГБНУ «ВНИРО»
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14 ОКТ 2021 № 01-03/3058
102021-1 от 13.10.2021

Генеральному директору
ООО «Островной-Краб»
М.А. Зайцеву
e-mail: crab@ostrovnoy.ru

Директору United Certification Systems Limited (USCL)
О.А. Шуваловой
e-mail: o.shuvalova@ucsl.eu

Письмо поддержки.

Уважаемый Михаил Алексеевич!

Камчатский филиал ФГБНУ «ВНИРО» («КамчатНИРО») ознакомился в Планом действий клиента (Client Action Plan), предложенным ООО «Островной-Краб» (ОК) в рамках работы над условиями MSC-сертификации российского ловушечного промысла краба в Охотском море (Северо-Охотоморская подзона — краб равношипый; Западно-Камчатская подзона — краб камчатский, краб синий; Камчатско-Курильская подзона — краб камчатский). По мнению «КамчатНИРО», положения предложенного плана действий выдвигают требования к ведению промысла краба Клиентом, соответствующие международным критериям устойчивого рыболовства.

Наш филиал сотрудничает с ОК с 2020 г. В последние годы промысел краба требует особого внимания в части изучения приловов нецелевых видов, оценки влияния промысла на донные экосистемы, а также повышения эффективности мер по регулированию промысла.

«КамчатНИРО» ежегодно выполняет целевые исследования состояния запасов крабов в зонах ответственности филиала. Увеличение количества научных наблюдателей на борту промысловых судов, в том числе принадлежащих ОК, позволило бы собрать дополнительные данные о состоянии запасов крабов, приловах нецелевых видов и влиянии промысла на донные экосистемы. Следует отметить, что отдельные формулировки Плана действий клиента требуют также участия других заинтересованных сторон, в компетенции которых находятся биоресурсы Охотского моря.

«КамчатНИРО» подтверждает свою готовность сотрудничать с ОК в сфере разработки и реализации мер по изучению и рациональной эксплуатации запасов крабов в Охотском море, изучения приловов нецелевых видов и влияния этого промысла на экосистему.

Приложение: перевод текста письма на английский язык на 1 стр. в 1 экз.

Врио руководителя филиала  А.И. Варкентин

Варкентин Александр Иванович
заместитель руководителя
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English translation is below:

Приложение
к письму Камчатского филиала
ФГБНУ «ВНИРО» («КамчатНИРО»)
14 ОКТ 2021 № 01-03/3058

Dear Mr. Zaitsev,

Kamchatka branch of VNIRO (KamchatNIRO) got acquainted with the Client Action Plan proposed by Ostrovnoy-Crab LLC as part of work on the conditions for MSC certification of the Russian trap fishery for crab in the Sea of Okhotsk (North-Okhotsk subzone – Golden king crab; West-Kamchatka subzone - Red king crab, Blue king crab; Kamchatka-Kuril subzone - Red king crab). In the opinion of KamchatNIRO, the provisions of the proposed plan put forward requirements for the Client to carry out fishing in accordance with international standards of the sustainable fishery.

Our branch has been cooperating with the Ostrovnoy-Crab since 2020. In recent years, crab fishery attracts special attention in terms of studying the by-catch of non-target species, assessing the impact of fishing on bottom ecosystems, as well as increasing the effectiveness of measures to regulate the fishery.

KamchatNIRO annually carries out case studies of the state of crab stocks in the areas of responsibility of the branch. An increase in the number of scientific observers on board fishing vessels, including those owned by the Ostrovnoy-Crab, would provide additional data on the status of crab stocks, by-catch of non-target species and the impact of fishing on benthic ecosystems. It should be noted that certain formulations of the Client Action Plan require the participation of other interested parties in the competence of which are the biological resources of the Sea of Okhotsk.

KamchatNIRO confirms its readiness to cooperate with the Ostrovnoy-Crab in the development and implementation of measures for the study and rational exploitation of the stock of crabs in the Sea of Okhotsk, the study of by-catch of non-target species and the impact of this fishery on the ecosystem.

8.7. Surveillance

Table 39 – Fishery surveillance program				
Surveillance level	Year 1	Year 2	Year 3	Year 4
e.g. Level 5	e.g. On-site surveillance audit	e.g. On-site surveillance audit	e.g. On-site surveillance audit	e.g. On-site surveillance audit & re-certification site visit
Level 6 (default)	**On-site surveillance audit**	**On-site surveillance audit**	**On-site surveillance audit**	**On-site surveillance audit & re-certification site visit**

Table 29 – Timing of surveillance audit			
Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
e.g. 1	e.g. May 2018	e.g. July 2018	e.g. Scientific advice to be released in June 2018, proposal to postpone audit to include findings of scientific advice
TBD	TBD	TBD	TBD

Table 30 – Surveillance level justification			
Year	Surveillance activity	Number of auditors	Rationale
e.g.3	e.g.On-site audit	e.g. 1 auditor on-site with remote support from 1 auditor	e.g. From client action plan it can be deduced that information needed to verify progress towards conditions 1.2.1, 2.2.3 and 3.2.3 can be provided remotely in year 3. Considering that milestones indicate that most conditions will be closed out in year 3, the CAB proposes to have an on-site audit with 1 auditor on-site with remote support – this is to ensure that all information is collected and because the information can be provided remotely.
1	On-site audit	1 auditor on-site with remote support from 2 auditors off-site	The fishery is certified with seven conditions covering all three MSC principles, so the default surveillance schedule is required.
2	On-site audit	1 auditor on-site with remote support from 2 auditors off-site	The fishery is certified with seven conditions covering all three MSC principles, so the default surveillance schedule is required.

3	On-site audit	1 auditor on-site with remote support from 2 auditors off-site	The fishery is certified with seven conditions covering all three MSC principles, so the default surveillance schedule is required.
4	On-site audit	1 auditor on-site with remote support from 2 auditors off-site	The fishery is certified with seven conditions covering all three MSC principles, so the default surveillance schedule is required.

8.8. Risk-Based Framework outputs

8.8.1. Productivity Susceptibility Analysis (PSA)

Removed because only applied to UoA 3 which is no longer included.

8.9. Harmonised fishery assessments

How explain in FSP v2.2, GPB1.1 "Harmonisation is not necessary in assessments of fisheries that use similar gears or management approaches but operate in clearly different geographic areas".

Currently, there are no MSC certified fisheries of the Red, Blue or Golden (Brown) king crab in the Sea of Okhotsk or in the nearby Far East seas. But there is Red king crab and Snow crab fisheries in the Barents Sea (Table). Because of they are "in clearly different geographic areas", harmonisation is not necessary for P1 and P2 in the assessments of "Ostrovnoy-Krab LTD Sea of Okhotsk crab trap". However, since the overarching management framework for crab fisheries in Russia apply to all three fisheries, harmonisation is carried out for Component 3.1.

Table 42 – Overlapping fisheries

Fishery name	Certification status and date	Performance Indicators to harmonise
Russia Barents Sea red king crab (https://fisheries.msc.org/en/fisheries/russia-barents-sea-red-king-crab/@@assessments)	Certified 15 February 2018)	PIs 3.1.1-3.1.3
Antey Sever Barents Sea crab (https://fisheries.msc.org/en/fisheries/antey-sever-barents-sea-crab/@@assessments)	In assessment (FDR 6 August 2021)	PIs 3.1.1-3.1.3

Supporting information	
- Describe any background or supporting information relevant to the harmonisation activities, processes and outcomes.	
See above.	
Was either FCP v2.2 Annex PB1.3.3.4 or PB1.3.4.5 applied when harmonising?	**No**
Date of harmonisation meeting	**NA**
If applicable, describe the meeting outcome	
- e.g. Agreement found among teams or lowest score adopted.	

Table 43 Scoring differences (used only for information not for harmonisation' purpose).

Prin-ciple	Performance Indicator (PI)		Russia Barents Sea red king crab	Antey Sever, Barents Sea crab (red king crab UoA)	Sea of Okhotsk (current assessment)
3	3.1.1	Legal &/or customary framework	95	95	95
	3.1.2	Consultation, roles & responsibilities	100	95	95
	3.1.3	Long term objectives	100	80	80

Table 44 – Rationale for scoring differences

If applicable, explain and justifyany difference in scoringand rationale for the relevant Performance Indicators (FCP v2.2 Annex PB1.3.6).
No harmonisation is required for P1, P2 or Component 3.2 (see above). Scoring differences for Component 3.1 are within the 80-100 range.
If exceptional circumstances apply, outline the situation and whether there is agreement between or among teams on this determination.
NA

8.10. Objection Procedure

To be added at Public Certification Report stage

The CAB shall include in the report all written decisions arising from the Objection Procedure.

Reference(s):MSC Disputes Process v1.0, FCP v2.2Annex PD Objection Procedure

9. Template information and copyright

This document was drafted using the 'MSC Reporting Template v1.2'.

Template version control

Version	Date of publication	Description of amendment
1.0	17 December 2018	Date of first release
1.1	29 March 2019	Minor document changes for usability
1.2	25 March 2020	Release alongside Fisheries Certification Process v2.2

A controlled document list of MSC program documents is available on the MSC website (msc.org).

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