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Russia Barents Sea Opilio Trap Fishery

Final Draft Report

Conformity Assessment Body (CAB)	**Lloyd's Register**
Assessment team	Geir Hønneland, Gudrun Gaudian, Julian Addison
Fishery client	**Association of Crab Catchers of the North**
Assessment Type	Initial Assessment

Assessment Data Sheet

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2 Glossary

BBTA	Barents Sea and White Sea Territorial Administration (Russia)
CBD	Convention of Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CW	Carapace width
EEZ	Exclusive economic zone
ETP	Endangered, threatened or protected species
FFA	Federal Fisheries Agency (Russia)
FPZ	(Svalbard) Fishery Protection Zone
FSB	Federal Security Service (Russia)
GLM	Generalised Linear Model
HACCP	Hazard Analysis (and) Critical Control Point
HCR	Harvest control rule
ICES	International Council for the Exploration of the Sea
IMR	Institute of Marine Research (Norway)
IUCN	International Union for the Conservation of Nature
JNRFC	Joint Norwegian–Russian Fisheries Commission
LTL	Low trophic level
MLS	Minimum legal landing size
MSY	Maximum sustainable yield
NAFO	Northwest Atlantic Fisheries Organization
NAMMCO	North Atlantic Marine Mammal Commission
NEAFC	North-East Atlantic Fisheries Commission
PINRO	Knipovich Polar Research Institute for Marine Fisheries and Oceanography (Russia)
REZ	Russian Economic Zone
RFMO	Regional fisheries management organisation
SDM	Species distribution modeling
TAC	Total allowable catch
TNASS	Trans-north Atlantic Sightings Survey
VME	Vulnerable marine ecosystem
VMS	Vessel monitoring system
VNIRO	All-Russian Research Institute of Fisheries and Oceanography

3 Executive summary

» This report is the Final Draft Report which provides details of the MSC assessment process for the Russia Barents Sea Opilio Trap fishery for The Association of Crab Catchers of the North. The process began with publication of the ACDR on 6th March and was concluded (to be determined at a later date).

» A review of information presented by the client has been scored by the assessment team and through the publication of the ACDR and the site visit that followed, week commencing the 6th May in Tromsø, Norway. The ACDR scores have been reviewed by the assessment team and amended as appropriate.

» Following this, this report has been through peer and client review. The assessment team have reviewed all comments and revised scores appropriately.

» The PCDR gave stakeholders a further chance to review the report and scoring. This Final Draft Report is the final presentation of our certification decision and scores.

» Stakeholders may submit an objection to our Certification Decision held in this Final Draft Report by following Annex PD in FCP 2.1.

» The **Target Eligibility Date** for this assessment is the date of certification.

» The assessment team for this fishery assessment is comprised of Geir Hønneland who acted as team leader and primary Principle 3 specialist; Gudrun Gaudian who was primarily responsible for evaluation of Principle 2 and Julian Addison who was primarily responsible for evaluation of Principle 1. Paul Macintyre and/or Ken Bruce who were the traceability expert advisors.

Client strengths

1. The North-West Fishing Company-Murmansk is a well-established fishery actor in the Barents Sea. It is well integrated in the management process in Russia and already has another crab fishery MSC certified.
2. Russia has a well-developed legal framework for crab fisheries.
3. The stock appears to be in good shape.
4. There are biological reference points and associated harvest control rules.
5. There is little bycatch of non-target species. The client is in the process of rolling out a detailed bycatch-recording system across the fleet, in cooperation with PINRO and WWF.
6. There is good cooperation with PINRO and WWF to improve habitat management, with habitat mapping work in progress to eventually establish voluntary closed areas

Client weaknesses

1. Levels of bycatch of snow crabs in trawl fisheries are not known.
2. Information on catches of ETP species needs to be improved.
3. There is no external review of the stock assessment or the fishery-specific management system.

Determination

Following stakeholder input of initial scoring in the ACDR, site visit, client, peer and MSC review and PCDR consultation the assessment team determine that this fishery has passed its assessment and should be certified. The determination will be presented to LR's decision making entity that this fishery has passed its assessment and should be certified.

Rationale

There are a number of areas which reflect positively on the fishery; see overview of client strengths above.

Conditions & Recommendations

1. However, a number of criteria which contribute to the overall assessment score scored less than the unconditional pass mark, and therefore trigger a binding condition to be placed on the fishery, which must be addressed in a specified timeframe (within the 5-year lifespan of the certificate). Full explanation of these conditions is provided in Section 5.2.3 of the report and Appendix 8.5, but in brief, the areas covered by these conditions are:

    a) the lack of data on bycatches of snow crab in the trawl fisheries in the Barents Sea

    b) the lack of peer review of stock assessments

c) improving on quantitative recording of bycatch information, including ETP interactions when relevant, detailed enough (i.e. to species level per fishing season) to allow the measuring of possible trends over a number of years

d) the lack of external evaluation of the fishery-specific management system

2. In addition, the assessment team made several recommendations. As these are not the result of a failure to meet the unconditional pass mark, they are non-binding; however, in the opinion of the assessment team, they would make a positive contribution to ongoing efforts to ensure the long-term sustainability of the fishery. Details of these recommendations are provided in Section 5.2.4 of this report.

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

Lloyd's Register confirm that this fishery is within scope.

4 Report details

4.1 Authorship and peer review details

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

Assessment team leader: Dr Geir Hønneland

Primarily responsible for assessment under Principle 3

Geir Hønneland holds a PhD in political science from the University of Oslo (2000) and has studied international fisheries management (with main emphasis on enforcement and compliance issues), international environmental politics and international politics in Polar regions. He was affiliated with the Fridtjof Nansen Institute in Oslo for more than 20 years, as PhD student and research fellow (1996-2006), research director (2006-2014) and director (2015-2019). Among his fisheries-related books are 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 40 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, North Pacific and Southern Ocean, as well as inland and bivalve 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, Russia, Iceland, Faroe Islands, Greenland, Scotland and Germany, as well as the EU level. He is qualified as an MSC Team Leader (Fisheries Standard v2.0, Fisheries Certification Process v2.1) and Chain of Custody Auditor (v2.0) and has also passed the ISO 19011-2018 course as Lead Auditor – Management Systems Auditing. Since 2019, he has been affiliated with Lloyd's Register as Senior Project Manager for Northern Europe, Scandinavia and Russia.

Geir has passed the MSC traceability training. Geir has no Conflict of Interest in relation to this fishery. Full CV available on request.

Expert team member: Dr Julian Addison

Primarily responsible for assessment under Principle 1

Julian Addison is an independent fisheries consultant with over 30 years' experience of stock assessment and provision of management advice on shellfish fisheries, and a background of scientific research on shellfish biology and population dynamics and inshore fisheries. Until December 2010 he worked at the Centre for Environment, Fisheries and Aquaculture Science (Cefas) in Lowestoft, England where he was Senior Shellfish Advisor to Government policy makers, which involved working closely with marine managers, legislators and stakeholders, Government Statutory Nature Conservation Organisations and environmental NGOs. He has also worked as a visiting scientist at DFO in Halifax, Nova Scotia and at NMFS in Woods Hole, Massachusetts where he experienced shellfish management approaches in North America. For four years he was a member of the Scientific Committee and the UK delegation to the International Whaling Commission providing scientific advice to the UK Commissioner. He has worked extensively with ICES and most recently was Chair of the Working Group on the Biology and Life History of Crabs, a member of the Working Group on Crangon Fisheries and Life History and a member of the Steering Group on Ecosystems Function. He has extensive experience of the MSC certification process primarily as a P1 team member but also as a P2 team member and team leader. He has undertaken nearly 30 MSC full assessments of crustacean and mollusc fisheries worldwide which use a wide range of stock assessment methodologies and fishing gears. He has also undertaken MSC pre-assessments in Europe, North America and Australia and over 50 annual surveillance audits and technical reviews. He is a member of the MSC Peer Review College and has carried out peer reviews of MSC assessments worldwide of a wide range of fish and shellfish fisheries. Other recent work includes a review of the stock assessment model for blue crabs in Chesapeake Bay, USA, and an assessment of three Alaskan crab fisheries under the FAO-based Responsible Fisheries Management scheme. Julian has passed all relevant MSC and ISO training and has no Conflict of Interest in relation to this fishery. Full CV available on request.

Expert team member: Dr Gudrun Gaudian

Primarily responsible for assessment under Principle 2

Gudrun Gaudian is an experienced marine ecologist and taxonomist, including coastal and marine surveys, EIA's for development and tourism, and research projects in tropical and temperate seas. Work experience also includes coastal and marine management issues, such as identifying sustainable coastal development projects, as well as addressing conservation issues, including selection and planning of marine parks and reserves, sustainable utilisation of natural resources and community-based management programmes. Projects have been undertaken in temperate, polar and tropical marine regions. Since 2010 Dr Gaudian has been working on fisheries certification applying the Marine

Stewardship Council 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. Gudrun has passed all relevant MSC and ISO training and has no Conflict of Interest in relation to this fishery. Full CV available on request

4.2 Peer Reviewers

Peer reviewers used for this report were Daria Safronova and John Tremblay. A summary CV for each is available in the **Assessment downloads** section of the fishery's entry on the MSC website.

Daria Safronova

Ms Daria Safronova has a background in ichthyology, hydrobiology and aquatic ecology, and is currently Assistant professor at the Saint-Petersburg State University, Russia. She has worked with MSC fisheries since 2010, particularly actively since 2016. She has supported assessment teams working on the following MSC assessments: sockeye salmon (Oncorhynchus nerka) in the Sea of Okhotsk, Western coast of Kamchatka peninsula and in Ozernaya River, Ust-Bolsheretsk district; Barents and Norwegian Seas cod (Gadus morhua) and haddock (Melanogrammus aeglefinus), red king crab (Paralithodes camtschaticus), blue king crab (Paralithodes platypus), bairdi tanner crab (Chionoecetes bairdi) in the West Kamchatka fishing subzone and the Kamchatka-Kuril fishing subzone of the Sea of Okhotsk; scallop (Chlamys islandica) in the Barents and White Seas; common perch (Perca fluviatilis) and pikeperch (Sander lucioperca) in Russian Lake Chany and Lake Peipus; sockeye salmon (Oncorhynchus nerka), chum salmon (Oncorhynchus keta), coho salmon (Oncorhynchus kisutch), quinnat salmon (Oncorhynchus tschawytscha), and pink salmon (Oncorhynchus gorbuscha) in Eastern Kamchatka, Kamchatskiy Bay and Kamchatka Kray, Olyutorskiy Bay; Russia Northwest Pacific demersal fish, including Pacific cod (Gadus macrocephalus), Greenland halibut (Reinhardtius hippoglossoides), Pacific halibut (Hippoglossus stenolepis), Grenadier (Albatrossia pectoralis, Coryphaenoides acrolepis), Skate (Bathyraja violacea), Sea of Okhotsk and Sea of Japan Japonicus snow crab (Chionoecetes japonicus), Angulatus snow crab (Chionoecetes angulatus), and Brown king crab (Lithodes aequispinus).

John Tremblay

Dr Michael John Tremblay is an expert in marine fisheries ecology and in the stock assessment of marine invertebrates. After obtaining an M.Sc. from the University of Guelph, in 1983 he joined the Science Branch of Fisheries and Oceans Canada (DFO) in Halifax, Nova Scotia. He earned a Ph.D. in Marine Biology from Dalhousie University in 1991. His main areas of expertise are the population ecology of invertebrates, especially the biology and stock assessment of decapod crustacea (lobsters, crabs and shrimp), and the ecology of bivalve larvae. He has authored 35 peer-reviewed publications and over 50 technical publications. The topics of these publications include invertebrate stock assessments, methods for estimating the abundance of lobsters, and the ecology of sea scallop larvae. Dr Tremblay has extensive experience in providing internal and external peer reviews of invertebrate stock assessments, and of papers submitted for publication in primary journals. For over 25 years he met regularly with stakeholders to discuss fisheries science application and results. As head of the Maritimes Region Lobster Unit at the Bedford Institute of Oceanography for 10 years, he was responsible for regular assessments of the most valuable commercial fishery in Canada.

Since leaving DFO in 2015, Dr Tremblay has acted as a P1 expert for MSC assessments, developed a 50-hour module on Marine Biology for a college course on Fisheries and Aquaculture, and contributed to publications on lobster ecology and benthic communities.

4.3 RBF Training

Principle 1 expert Julian Addison has been fully trained in the use of the MSC's Risk Based Framework (RBF).

RBF was not used for this fishery assessment. See section 8.2.3.

4.4 Version details

Table 1: Fisheries program documents versions.

Document	Version number
MSC Fisheries Certification Process	**Version 2.1**
MSC Fisheries Standard	**Version 2.01**

MSC General Certification Requirements	**Version 2.3**
MSC Reporting Template	**Version 1.0**

5 Unit(s) of Assessment and Certification and results overview

5.1 Unit(s) of Assessment and Unit(s) of Certification

5.1.1 Unit(s) of Assessment

Table 2: Unit(s) of Assessment (UoA)

UoA 1	Description
Species	Snow Crab / Opilio Crab (*Chionoecetes opilio*)
Stock	Opilio Snow Crab (FAO Area 27, ICES Ia, Ib)
Geographical area	Continental shelf of the Russian Federation in the Barents Sea
Harvest method / gear	Traps (Pots)
Client group	Association of Crab Catchers of the North, Non-profit Organization
Other eligible fishers	None

5.1.2 Unit(s) of Certification

Table 3: Unit(s) of Certification (UoC) (draft)

UoC 1	Description
Species	Snow Crab / Opilio Crab (*Chionoecetes opilio*)
Stock	Opilio Snow Crab (FAO Area 27, ICES Ia, Ib)
Geographical area	Continental shelf of the Russian Federation in the Barents Sea
Harvest method / gear	Traps (Pots)
Client group	Association of Crab Catchers of the North, Non-profit Organization
Other eligible fishers	None

5.1.3 Scope of assessment in relation to introduced fisheries

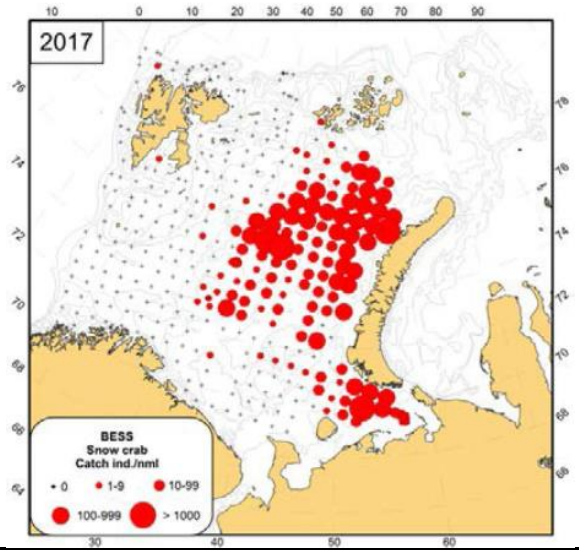
The MSC definition of an Introduced Species Based Fishery (ISBF) is:

“Any fishery which prosecutes a target fin or shellfish species that was intentionally or accidentally transported and released by human activity into an aquatic environment beyond its natural distribution range.” (MSC Vocabulary v1.1, dated 20 February 2015)

MSC Fisheries Certification Process v2.1, paragraph 7.4.7 states that “a CAB shall only accept an application for certification from a fishery targeting an introduced species if it meets the scope criteria contained in Table 2.”

The assessment team have therefore considered whether the fishery for the snow crab, *Chionocoetes opilio*, which was accidentally introduced into the Barents Sea meets the scope criteria as an Introduced Species Based Fishery (ISBF) as described below.

Table 4: MSC Scope critea for Introduced Species Based Fishery (ISBF) (Taken from Table 2 MSC FCP v2.1 7.4.7)

A	Irreversibility of the introduction in the new location	
i	The introduced species has a large population size (comparable to or larger than the population sizes of other native species occupying similar ecological niches in the new location).	Snow crab, *Chionoecetes opilio,* was first observed in the Barents Sea in 1996 (Kuzmin, S.A., Akhtarin, S.M. and Menis, D.T. 1998), and the index of snow crab abundance estimated from research surveys conducted by PINRO since 2005 show that the population increased slowly during the 2000s, but then increased significantly from 2011 onwards, such that it now supports a major fishery in the Barents Sea. The median estimate of legal-sized stock across Russian, Norwegian and international waters was 450,000 tonnes in 2016 (Bakanev, 2016). Variations in size composition of snow crab catches during the surveys indicate that abundant year-classes appear frequently. The IMR/PINRO ecosystem report for 2017 stated that snow crab biomass was now at the highest value recorded for the whole period of ecosystem surveys.
ii	The species has spread to a range beyond that of its initial introduction in the new location.	Since its accidental introduction in the Barents Sea, the snow crab has spread westwards and is now common in the eastern and northeastern Barents Sea primarily in the Russian EEZ but also in the international waters managed by NEAFC (see figure below). Consequently fisheries have been developed in Russia and Norway (Sundet, 2014). The IMR/PINRO ecosystem report for 2017 stated that snow crab biomass was now at the highest value recorded for the whole period of ecosystem surveys. 
iii	There is evidence to demonstrate that the species cannot be eradicated from the location by known mechanisms without serious ecological, economic and/or social consequences.	Size composition data from the annual research surveys show that there are regular pulses of recruitment demonstrating that eradication of snow crab would be almost impossible. More than 20 years since its introduction, the population is therefore self-sustaining and snow crab have been found in the stomachs of a wide range of demersal fish species and eradication would have significant ecological consequences. The fishery is now considered to be of high economic significance for populations along the coast of the Barents Sea, and so

		eradication would have economic and social consequences.
B	**History of the introduction**	
i	The species was introduced to the new location prior to 1993; this being the year that the Convention on Biological Diversity (CBD), which includes provisions on introduced species was ratified.	The first observation of significant numbers of *Chionoecetes opilio* in the Barents Sea occurred in 1996 (Kuzmin, S.A., Akhtarin, S.M. and Menis, D.T. 1998) i.e. after the year in which the Convention on Biological Diversity was ratified, and therefore this criterion is not met.
ii	If the introduction occurred after the CBD was ratified such fisheries shall only potentially be in scope if the introduction was non-deliberate and occurred at least 20 years prior to the date the application is made for assessment against the MSC standard.	The introduction of *Chionoecetes opilio* in the Barents Sea occurred in 1996 after the CBD was ratified. The introduction was non-deliberate and occurred more than 20 years prior to the date (2018) that the application was made for assessment against the MSC standard. The fishery is therefore considered to be in scope.
C	**No further introductions**	
i	There is no continuing introduction of the introduced species being considered for certification to the location (i.e., the species is now entirely self-sustaining in its new location).	There is no deliberate continuing introduction of *Chionoecetes opilio* to the Barents Sea. It is of course feasible that a further accidental introduction could occur through, for example, ballast water, but as the species is now entirely self-sustaining in the Barents Sea, such an accidental introduction would have a negligible impact on the current widely distributed population.

In conclusion, the snow crab, *Chionoecetes opilio*, has been accidentally transported and released by human activity into the Barents Sea which is outside its natural distribution range. The most likely method of transport and release was through ballast water (Sundet and Bakanev, 2014) The assessment team therefore concluded that the fishery for *Chionoecetes opilio* in the Barents Sea met the criteria on (a) irreversibility of the introduction in the new location, and (b) history of the introduction as set out in Table 2 of the MSC FCR v2.1 and can therefore be considered as in scope for an Introduced Species Based Fishery (ISBF).

5.1.4 Fishery Background

Brief description (history) of the client group:

The Association of Crab Catchers of the North (the Association) was established as a non-profit organization in 1992, as the result of a consolidation of several fishing companies in the North-West Region of Russia into one professional organization. Now the Association has one of the biggest fleets in the region, consisting of crab-catching vessels. Besides crab harvesting the Consortium includes special departments dealing with fleet exploitation and supplies, as well as vessels repair in accordance with available permissions and licenses as required.

The office of the Management Company of the Consortium is located in St Petersburg, while the office of the fleet operating company is located in Murmansk. The Consortium has representative offices in Moscow, Petrozavodsk and Arkhangelsk. About 800 people are working for the Consortium companies, including administration and shipboard personnel.

The companies joined by the Consortium are able to provide the full set of required processing operations: harvesting of ground fish species and red king crab, processing of raw material on board the vessels and in shore factories, transportation of finished products, repair and supply of vessels, and the distribution and sales of products both in domestic and international markets. In addition, considerable scientific activity and efforts are performed by the Consortium companies.

The Association carries out activities aimed at further development of the fishing industry and creating new jobs in the sector, and it also supports the coordination and interaction of all economic entities involved. It currently possesses 11 crab-catching vessels, used to carry Opilio Snow Crab from the fishing ground in the Russian Economic Zone (REZ) to Murmansk. The UoA vessels are all registered in Murmansk, Russia.

Opilio Snow Crab is fished in the FAO Area 27 (ICES Ia, Ib) and landed in Murmansk (mostly by leased transport vessels, but occasionally by the crab-catching vessels themselves). A large share of it is subsequently exported to Europe and the US.

5.1.5 Vessel Details

The following eleven vessels are involved in this fishery and part of the UoA (Source: Client information May 2019)

1. North-West Fishing company - Murmansk Ltd. (3 vessels)

Vessel	M-0139 "Retinskoe"	M-0389 "Nikolskiy"	M-0393 Salacgriva"	
Vessel's type	Crab-catching vessel	Crab-catching vessel	Crab-catching vessel	
№ of permit for harvesting	512018010193ПМ	512018010194ПМ	512018010195ПМ	
Quota volume	754,982 t	874,99 t	657,775 t	
Period of quota catch	17.03.18 – 06.07.18	10.03.18 – 09.07.18	08.03.18 – 29.05.18	
Quantity of trips in 2018	One trip	One trip	One trip	
Quantity of days in each trip	111 days	122 days	83 days	
Quantity of discharging operations from the vessel in 2018	9 discharging operations	8 discharging operations	6 discharging operations	
Total catch of crab opilio, tons in 2018: as per quota in by-catch	754,981 t	874,989 t	657,774 t	

2. North-West Crab Catching Company Ltd. (1 vessel)

Vessel	M-0388 "Aleksandr Mashakov"			
Vessel's type	Crab-catching vessel			
№ of permit for harvesting	512018010198ПМ			
Quota volume	654,502 t			
Period of quota catch	18.03.18 – 05.07.18			
Quantity of trips in 2018	One trip			
Quantity of days in each trip	110 days			
Quantity of discharging operations from the vessel in 2018	7 discharging operations			
Total catch of crab opilio, tons in 2018: as per quota in by-catch	654,501 t			

3. JSC Arcticservice (4 vessels)

Vessel	M-0252 "Glacier Enterprise"	M-0223 "Polyarny Issledovatel"	M-0259 "Diomedes"	M-0263 "Atka Enterprise"
Vessel's type	Crab-catching vessel	Crab-catching vessel	Crab-catching vessel	Crab-catching vessel
№ of permit for harvesting	512018010200ПМ 512018010269ПМ	512018010199ПМ	512018010202ПМ 512018010271ПМ	512018010201ПМ 512018010270ПМ
Quota volume	1200,369 t	1129,974 t	1288,116 t	1201,658 t
Period of quota catch	07.03.18 – 08.07.18	09.03.18 – 07.07.18	09.03.18 – 08.07.18	10.03.18 – 09.07.18
Quantity of trips in 2018	One trip	One trip	One trip	One trip
Quantity of days in each trip	124 days	121 days	122 days	122 days
Quantity of discharging operations from the vessel in 2018	11 discharging operations	11 discharging operations	12 discharging operations	11 discharging operations
Total catch of crab opilio, tons in 2018: as per quota in by-catch	1200,367 t -	1129,972 t -	1288,114 t -	1201,657 t -

4. Zigrand Ltd. (1 vessel)

Vessel	MK-0580 “Polar Enterprise”			
Vessel’s type	Crab-catching vessel			
№ of permit for harvesting	512018010302ПМ 512018010301ПМ			
Quota volume	56,895 t			
Period of quota catch	27.08.18 – 08.09.18			
Quantity of trips in 2018	One trip			
Quantity of days in each trip	13 days			
Quantity of discharging operations from the vessel in 2018	1 discharging			
Total catch of crab opilio, tons in 2018: as per quota in by-catch	56,871 t -			

5. JSC Severomorskij Aljans (2 vessels)

Vessel	M-0251 "Northern Enterprise"	M-0344 "Morskoy Briz"		
Vessel’s type	Crab-catching vessel	Crab-catching vessel		
№ of permit for harvesting	512018010197ПМ	512018010196ПМ		
Quota volume	1172,217 t	735,858 t		
Period of quota catch	21.03.18 – 08.07.18	22.03.18 – 12.07.18		
Quantity of trips in 2018	One trip	One trip		
Quantity of days in each trip	110 days	113 days		
Quantity of discharging operations from the vessel in 2018	12 discharging operations	8 discharging operations		
Total catch of crab opilio, tons in 2018: as per quota in by-catch	1172,216 t -	735,856 t -		

The vessels are equipped with all units needed for production of finished products in the high sea during fishing. Freshly caught fish is 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 transshipment onboard transport vessel or before unloading in a port.

These crab-catching vessels also passed an assessment of HACCP compliance (System of food products quality control based on HACCP principles; Hazard Analysis (and) Critical Control Point) and have an appropriate certificate.

The client is currently building a new crab catcher and another three vessels are being upgraded and transformed into crab catchers (Client interview, May 2019)

5.1.6 Gear Description

The crab pot is designed as follows:

Conical (Figure 1) – 1.5m diameter at the base, 2.5mm 3-strand net.

Figure 1: Conical crab pot

A dedicated crab fishing vessel can hold up to 6000 pots. There are 150 pots involved along each line. The majority of traps employed in the snow crab fishery, regardless of their designs, are deployed at depths beyond 300m (Client information site visit 2019; PINRO 2017).

Section 7.3.1c provides more details on the gear and deployment, with particular relevance to ecosystem issues (habitat impact, ecosystem issues).

5.2 Assessment results overview

5.2.1 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 determine that this fishery has passed its assessment and should be certified. The determination will be presented to LR's decision making entity that this fishery has passed its assessment and should be certified.

5.2.2 Principle level scores

Table 5: Principle level scores

Principle	UoA 1
Principle 1 – Target species	81.7
Principle 2 – Ecosystem impacts	85.3
Principle 3 – Management system	85.2

5.2.3 Summary of conditions

Table 6: Summary of conditions

Condition number	Condition	Performance Indicator (PI)	Related to previous condition?
1	There should be an estimate of bycatches of snow crab from the trawl fisheries in the Barents Sea so that total fishery removals from the snow crab stock can be estimated.	1.2.3	**NA**
2	The assessment of stock status should be subject to peer review.	1.2.4	**NA**

3	The recording of bycatch information in this fishery will need to be quantitative and detailed enough to allow the measuring of possible trends over a number of years. This would include collecting information at a similar time of year, and over a similar timeframe. The records would also need to include marine mammal and seabird interaction, if any. (Where there are no such interactions, this would need to be specifically recorded)	2.3.3	**NA**
4	The fishery-specific management system has to be subject to regular internal and occasional external review.	3.2.4	**NA**

5.2.4 Recommendations

Recommendations are included to highlight how the management or operation of the fishery could be enhanced and contribute to ongoing efforts to ensure the long-term sustainability of the fishery. Recommendations do not impose a mandatory requirement nor are they auditable, however, they do act as a marker for future audits and assessments and may highlight actions that will ensure information or evidence of good management remain current and continue to meet MSC requirements.

1. **Recommendation for PI 1.2.3**

The assessment team recommends that research is undertaken on molt cycles in snow crab to ensure that mortality of recently-molted snow crabs is minimised.

2. **Recommendation for PI 1.2.4**

There are uncertainties underlying the method of estimating stock biomass from the ecosystem surveys, and the assessment team recommends that alternative methods of estimating stock biomass are investigated in conjunction with Russian and Norwegian scientists.

3. **Recommendation for PI 2.1.2 and PI 2.2.2**

Although the current low bycatch does not warrant a review of alternative measures it may well be that with this expanding fishery, bycatch could increase. There are currently no guidelines as to what level of bycatch should trigger a review of alternative measures. The fishery may need to address this in the fishery management plan

4. **Recommendation for PI 2.1.3**

A Recommendation is raised, to suggest that all bycatch is recorded regularly for each line where applicable, and the analysis of bycatch includes number/ amount for each species per season, so it is possible to calculate the proportion from the total each season. In other words, a more detailed catch profile each fishing year

5. **Recommendation for PI 2.2.3**

A Recommendation is made, similar to PI2.1.3, as it concerns the collection and collation of bycatch data. The Recommendation suggests that bycatch is recorded regularly, and the analysis of bycatch includes number/ amount for each species per season, so it is possible to calculate the proportion from the total each season. In other words, a more detailed catch profile each fishing year. It is further recommended to provide detail on the squid (bait), where caught and what species.

6. **Recommendation PI 2.3.3**

The fishery is encouraged to record sightings and observations of marine mammals, giving species, location number of individuals, of sighting, in collaboration with PINRO scientists. PINRO, with IMP, is actively involved in such surveys (e.g. Trans-north Atlantic Sightings Survey - TNASS), and the observations by the fishery would be a valuable contribution to ongoing marine mammal distribution studies. Observations and sightings could also be extended to seabirds where appropriate

7. **Recommendation for PI 2.4.2**

1. The bycatch information currently available consists of presence/ absence data. It is highly recommended to improve on the detail of benthos bycatch data by recording numbers of individuals and /or weight per species/genus and to analyse this data for each season. Thus, it will be possible to build a picture of the type of benthos encountered in the fishing area. This information should be shared with ongoing habitat mapping programmes, for example as outlined by Jørgensen et al 2015 (which is a joint project between IMR and PINRO). The software for recoding bycatch is currently

being rolled out across participating fisheries and will provide quantitative detail. Future audits will monitor the implementation of this programme.

2. A Recommendation is raised as a pointer for future audits to observe and note the progress on these voluntary closed areas based on benthos habitat protection. The successful implementation of such voluntary closed areas may well improve the score for this PI.

8. Recommendation for PI 2.4.3

With the expansion of the distribution of snow crab further into the Barents Sea basin (northwest -wards for example), the fishery will follow the snow crab. This will potentially mean that new areas will be exploited, hitherto not fished. Jørgensen et al (2015). These areas will likely contain undisturbed benthic communities, with associated larger individuals (see observations in studies by Jørgensen et al 2015/16/19). Before fishing in new areas, it is highly recommended to conduct research (with PINRO/IMR) to establish what benthos is there, and if possible actually close areas to fishing. The rationale being, that these closed areas will provide seed areas of benthic organisms, as fishing areas expand northwards, following changing fish community distribution patterns (not just for trap fishery but also trawl fishery).

9. Recommendation for PI 2.5.2

It is recommended that annual records are kept, per fishing season, of traps lost (even though traps are disabled through biodegradable panels).

6 Eligibility and Traceability

6.1 Eligibility date

The **Target Eligibility Date** for this fishery will be the date of certification. This means that any fish caught by the certified fleet following that date will be eligible to enter the chain of custody as a certified product, if and when certification is granted.

The measures taken by the client to account for risks within the traceability of the fishery are detailed in the rest of this section.

6.2 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 Monitoring Centre at BBTA. If any vessel from outside enters the crab catching region, the State Monitoring Centre informs Border Control authorities and the vessel's owner will have to explain their activity in the region. 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. Since 100 % of the Russian snow crab is a part of the UoA there will be no risk of substitution between crab from the UoA and crab from outside this unit. 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: 4. If this may occur on the same trip, on the same vessels, or during the same season; 5. 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:	*No, all vessels being the part of Association of Crab Catchers of the North will conduct fishery within the UoC geographic area only.*

6. If this may occur on the same trip; 7. How any risks are mitigated.	
Potential for vessels outside of the UoC or client group fishing the same stock	*The demersal Barents Sea fishery is a large-scale fishery with hundreds of vessels taking part. All Norwegian and third country vessels in the Barents Sea, as well as the majority of the Russian vessels, are MSC certified. 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 offloading.*
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. 8. Transport 9. Storage 10. Processing 11. Landing 12. Auction If Yes, please describe how any risks are mitigated.	*At the present moment vessels being the part of Association of Crab Catchers of the North perform two types of fishery:* *1. Russia Barents Sea Red King Crab fishery, which is MSC certified* *2. Russia Barents Sea Opilio Snow Crab fishery, which is under assessment.* *But these two types of fishery are not overlapping, and harvesting is performed within different seasons. Therefore, there no risks connected with mixing of certified and non-certified products during Transport, Storage, Processing and Landing.*
Does transhipment occur within the fishery? If Yes, please describe: 13. If transhipment takes place at-sea, in port, or both; 14. If the transhipment vessel may handle product from outside the UoC; 15. 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 transshipment 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.* *Transshipment onboard a fishing vessel for subsequent transportation to the port of discharge. - Rarely, it is used only for transshipment of products of own production. The transshipment procedures are the same as for transshipping 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 coldstore 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?	*No.*

If Yes, please describe how any risks are mitigated.	

6.3 Eligibility to enter further chains of custody

The scope of this certification ends at the first point of landing. Based on the information below, it is considered that traceability management systems operated by the vessels, the client group and the enforcement bodies are sufficiently robust to meet the MSC fisheries traceability requirements up to the first point of landing. In order for subsequent links in the distribution chain to be able to use the MSC logo, separate Chain of Custody certificates must be obtained. On clarification from the client at site visit the proposed eligible points of landing are Norway: Tromso, Kirkenes, Hamerfest. The Netherlands: Velsen, Eemshaven. Russia: Murmansk, Arkhangelsk, St. Petersburg.

A catching vessel may tranship products to a transport vessel at sea, then the transport vessel will land the products into a Russian and/or foreign port (but in any event this transport vessel will deliver cargo via Russian port). Also, the catching vessel may land products in Russian port by itself. The catching vessel has only products caught and processed by itself on board (that is catching vessels do not deliver cargoes of third parties.) Change of ownership (that is the point from which subsequent Chain of Custody should start) is landing in port. Some catch is landed direct by the fishing vessels in Norway and Russia, while some is transshipped to transport vessels for landing in the Netherlands. The products are separated and marked before, during and after transshipment, and there is a strict control regime in connection with both transshipment and landings. The traceability system for the fishery under assessment is as follows:

• accurate reporting – logbooks and sales notes (regularly inspected and cross-checked);

• verified landings data (including data on other retained species) are used for official monitoring of quota up-take and national statistics;

• a good system of at-sea monitoring, control and surveillance, including routine boarding and inspection, spotter planes, reporting to checkpoints when crossing international boundaries, reporting pre and post transhipment, VMS;

• close cooperation between Norwegian and Russian regulatory and enforcement authorities and no immunity from prosecution in other jurisdictions, and increasingly close cooperation with EU regulatory and enforcement authorities at the point of transhipment landing;

• inspection of landings prior to unloading

• The European Union IUU regulation (EC no 1224/2009) which came into force on the 1st January 2010 and which is designed to ensure full traceability of all marine fishery products traded with the European Community and illuminate the prospect of IUU fish entering the European market. This is achieved by means of a catch certification scheme in cooperation with third countries (such as Russia). Fishery products can now only be imported into the European Community when accompanied by a catch certificate, issued by the competent authorities of the flag State (in this instance BBTA in Russia) certifying that the catches concerned have been made in accordance with applicable laws, regulations and international conservation and management measures. This applies to both directly landed and transhipped product.

The above is considered sufficient to ensure fish and fish products invoiced as such by the fishery originate from within the evaluated fishery and no specific risk factors have been identified.

7 Scoring

7.1 Summary of Performance Indicator level scores

Table 8: Summary of Performance Indicator level scores

Principle	Component	Performance Indicator (PI)		Score Range
One	Outcome	1.1.1	Stock Status	90
		1.1.2	Stock Rebuilding	N/A
	Management	1.2.1	Harvest Strategy	80
		1.2.2	Harvest Control rules & tools	80
		1.2.3	Information & monitoring	75
		1.2.4	Assessment of stock status	75
Two	Primary Species	2.1.1	Outcome	100
		2.1.2	Management strategy	90
		2.1.3	Information / Monitoring	85
	Secondary Species	2.2.1	Outcome	80
		2.2.2	Management strategy	90
		2.2.3	Information / Monitoring	90
	ETP Species	2.3.1	Outcome	90
		2.3.2	Management strategy	85
		2.3.3	Information strategy	70
	Habitats	2.4.1	Outcome	85
		2.4.2	Management strategy	80
		2.4.3	Information strategy	80
	Ecosystems	2.5.1	Outcome	90
		2.5.2	Management strategy	80
		2.5.3	Information	85
Three	Governance and policy	3.1.1	Legal &/or customary framework	95
		3.1.2	Consultation, roles & responsibilities	85
		3.1.3	Long term objectives	80
	Fishery specific management system	3.2.1	Fishery specific objectives	90
		3.2.2	Decision making processes	95
		3.2.3	Compliance & enforcement	80
		3.2.4	Monitoring & management performance	70

7.2 Principle 1

7.2.1 Principle 1 background

a. Taxonomy and distribution

The snow crab, *Chionoecetes opilio* (Fabricius, 1788) is a sub-arctic crab species of the family Oregoniidae (Ng *et al*., 2008). It is distributed in the Northwest Atlantic from the Gulf of Maine to the coast of Labrador including the Gulf of St Lawrence and the St. Lawrence estuary (Squires, 1990), along the west coast of Greenland, and is also found in the North Pacific and Beaufort Sea. In all these areas important commercial fisheries for snow crab have developed. Snow crabs have also been introduced into the Barents Sea (Kuzmin *et al*., 1998) possibly in ballast water. Genetics studies show that the snow crabs in the Barents Sea did not originate from Canada or Greenland and it is most likely that they were introduced from the Bering Strait. Since introduction in the Barents Sea, the snow crab has spread westwards and consequently new fisheries have been developed recently in Russia and Norway (Sundet, 2014; Sundet and Bakanev, 2014). The long planktonic larvae stage and high fecundity observed for *C. opilio* would suggest high connectivity between exploitable populations, and although significant genetic differences between snow crabs from Atlantic Canada and Greenland have been observed, there is an absence of genetic structure within Atlantic Canada from southern Labrador to Nova Scotia (Puebla *et al*., 2008). Similar, low levels of genetic diversity have been observed in populations of *C. opilio* in Alaskan waters (Merkouris *et al*., 1998). In view of the genetic evidence in other geographical areas, and as the snow crab has only recently been introduced to the Barents Sea, it can be assumed that there is a single stock in the Barents Sea.

b. Biology and life history of snow crab

Large male snow crabs are found generally on mud or mud/sand, although smaller individuals may be found on harder ground, and in the Northwest Atlantic snow crabs have been observed to undertake an ontogenetic migration from shallow cold areas with hard substrates to warmer deeper areas with soft substrates (DFO, 2012). Snow crabs generally inhabit regions of very cold water (-1° to 5° C) (Sainte-Marie *et al.*, 1996) and temperature has a profound effect on production, early survival, and subsequent recruitment to fisheries in snow crab in the Northwest Atlantic (Foyle *et al.* 1989; Marcello *et al*. 2012). Productivity has diminished in the northwest Atlantic coincident with warming over the past decade (Mullowney *et al*. 2014). Snow crab in the Barents Sea are distributed over an extensive area from its south-eastern and eastern part (coastal waters of the Novaya Zemlya archipelago) to the Svalbard archipelago in the west. Snow crab are caught in a wide depth range from 40 m to 300 m with legal males showing preference for waters deeper than 150 m with temperatures close to 0°C and below. As the snow crab is a cold-water species, it has not spread to the relatively warmer waters of the southwestern Barents Sea where there are high concentrations of red king crab (*Paralithodes camtschaticus*).

Following hatching in the spring, the planktonic larvae phase lasts between 3 to 5 months dependent on temperature. During this phase individuals go through a number of stages before settling on the bottom and taking on a benthic lifestyle. As with other crustacean species, growth occurs through moulting and once settled on the seabed the immature snow crabs subsequently moult through to juveniles, adolescents and adults. Unlike most crustaceans, snow crabs do not continue to moult and grow throughout their lives and instead exhibit a terminal moult. The size at which females reach terminal moult is much smaller than that for males giving rise to the characteristic sexually dimorphic appearance. The terminal moult in females occurs when the female reaches sexual maturity and the abdomen widens substantially in order to carry the egg mass. Male crabs reach terminal moult when the claws grow allometrically and become instrumental in mating behaviour, although males may reach maturity before the claws enlarge. As the terminal moult occurs at a smaller size in females than males, many snow crab fisheries are essentially male-only fisheries. In the Barents Sea, the fishery is a male-only fishery with a requirement to return all females to the sea. The size at which both males and females reach terminal moult is thought to be both temperature and density dependent. Following the moult, it may be many months before the shell fully hardens during which time there is a low meat content and so the crabs are not commercially exploited. In addition, these soft-shelled crabs are extremely vulnerable to handling during the fishing process and so significant pre-recruit mortality may occur.

Mating occurs when the male crab holds the female until it moults and is available for mating. This aggressive mating behaviour provides an advantage to the larger males. Female crabs' mate for the first time after terminal moult, although these primiparous females produce fewer eggs than multiparous females which are repeat spawners. On spawning, the eggs are carried in the abdomen of the females for up to two years before release of larvae into the water column in spring. Although females are protected from capture in the Barents Sea fishery, there is potential for the male-only fishery to impact on reproductive capacity with the potential for sperm limitation in snow crabs where there are insufficient males to fertilise the available females (Sainte-Marie, 1993; Rondeau & Saint-Marie, 2001).

In a major study on the prey of snow crabs including cannibalism by larger conspecifics in the Northwest Atlantic (Squires & Dawe, 2003), stomach analysis showed that snow crab prey upon a broad range of benthic and demersal species including sabellid polychaetes, a wide range of crustacean species, infaunal clams, *Pandalus borealis* and other shrimps, and capelin and other fish. Snow crabs have also been observed to eat garbage (E. Dawe, DFO, St. John's, Newfoundland pers. comm.; J.H. Sundet, IMR, Tromso, pers. comm.). Although cannibalism was most frequently exhibited by intermediate-size males, it was more widely practised by females than males, and the high level of cannibalism observed by Squires & Dawe (2003) in comparison with previous studies suggests that it may be an important density-dependent mechanism influencing recruitment patterns. Large fish, such as cod, are potentially important predators of snow crab. Although there are thought to be few predators of hard-shelled snow crabs, they are more vulnerable to predators when they are soft-shelled following moulting, but generally the natural mortality rate of snow crabs is low. Top-down control of snow crab populations by predators is therefore considered unlikely. A more likely source of major mortality in snow crabs is infection by the dinoflagellate parasite, *Hematodinium sp*., which is the causative agent of bitter crab disease (Shields *et al*., 1995). Little is known about the transmission of the parasite, but infection rates are highest in new-shelled or recently-moulted crabs and sporulation of the parasite occurs at the same time as moulting in crab, so the most likely transmission point is during the moulting process (Eaton *et al*., 1990).

Marcello *et al*. (2012) compared snow crab recruitment dynamics across both the Pacific and Northwest Atlantic and concluded that whilst there was good evidence that cold conditions during early life history stages positively influences subsequent snow crab recruitment, there was little evidence that spawning stock or predator biomasses had a significant effect on recruitment in either the Pacific or Northwest Atlantic.

Snow crab, *Chionoecetes opilio*, is not considered to be a key low trophic level (LTL) species as it does not meet the criteria for a key LTL as defined by paragraphs SA2.2.8-SA2.2.10 of the MSC Fisheries Standard v2.01 (MSC, 2018). Specifically snow crab is not considered to play a key role in the ecosystem as there is no evidence that there is significant predator dependency on snow crabs or that a large volume of energy passing between lower and higher trophic levels passes through the snow crab stock or that the ecosystem is wasp-waisted (SA2.2.9a.iii). In addition, snow crab does not meet all the life history characteristics listed in SA2.2.9b.i.

c. Harvest Strategy

The overarching regulation underpinning the harvest strategy for the snow crab fishery in Russian waters is the 2004 Russian Federal Act (law No.166-FZ) entitled 'About fishing and keeping of aquatic biological resources.

The key elements of the Russian fisheries regulations are:

1. establishing total allowable catch (TAC);
2. establishing a mechanism of distributing TAC relating to the kinds of catch shares of aquatic bioresources and the order of fixing catch shares to the users of aquatic bioresources;
3. laying down fishery regulations;
4. establishing measures on keeping the functions of aquatic biological resources and ecosystem functions;
5. establishing order of regulating legal disputes.

The snow crab stock is distributed across both the Norwegian and Russian EEZs, and whilst the fishery is managed through cooperation with Norway within the general framework of the Joint Norwegian Russian Fishery Commission (JNRFC), Norway and Russia manage the fishery separately on their respective continental shelves. Although snow crabs are also distributed within the international waters known as 'The Loophole' managed by the North East Atlantic Fisheries Commission (NEAFC). Russia's sovereign rights to fish for snow crab are recognized within The Loophole because the snow crab is designated as a sedentary species found on the continental shelf and national jurisdiction extends out to 350nm on the continental shelf. The biological objective is to prevent overfishing, but there is no formal management plan agreed between Norway and Russia, although regulations such as catch period and gear restrictions are agreed within JNRFC. However, JNRFC does not set TACs for snow crab, and in consequence Norway and Russia set them unilaterally for their respective EEZs.

d. Regulations

The document "Harvest control rules for priority species of crabs" (Editor V.A.Bizikov, FSBSI "VNIRO") and approved by the Council of Directors of Fisheries Research Institutes (Protocol No. 8 of 30 June 2016) states that the management target for the Barents Sea snow crab stock is that a TAC should be gradually increased until the time when enough fisheries data are accumulated to fully apply the precautionary approach. The total allowable catch (TAC) for the Russian Federation's Barents Sea snow crab (*C. opilio*) fishery was set at 7870 tonnes in 2017 for which the UoA's allocation was 7840 tonnes. The TAC for 2018 was set at 9840 tonnes. Since then limit and target biomass reference points have

been implemented, and along with a maximum exploitation level, new harvest control rules (HCRs) have been developed through which scientists advise on TACs based upon annual estimates of stock biomass in relation to the target and limit reference points. The reference points and HCRs are set out more fully in section n below. In addition to an overall quota for the fishery, each of the 11 vessels in the fleet has an individual quota.

All vessels must hold a fishing permission or license, thereby ensuring controlled entry to the fishery. Each vessel fishes between 6,000 and 6,300 conical traps fished in strings of approximately 150 traps, and whilst vessels are required to mark each string of traps with the vessel's registration number and its fishery permission, there is no formal limit on the number of traps that can be fished. There is no formal limit on the length of season.

The fishery is also regulated through a series of technical conservation measures. There is a minimum legal landing size (MLS) of 10 cm carapace width (CW). The landing of females is also prohibited, and any females and juveniles caught must be returned immediately to the sea on hauling of traps. The snow crab fishery is therefore a male-only fishery. There is also a 'move-on' rule in place where vessels must move at least 2nm if juveniles make up more than 25% of the catch of snow crabs. In addition, there is also a move-on rule if bycatch rates exceed prescribed levels.

Fishing must be using only traps according to Fisheries Regulations for the Northern Fisheries Basin covering the size of traps and the mesh size (50mm) of traps such that handling of juveniles and females returned to the sea is minimized. In addition, there is a requirement that the distance between the lowest part of the slipway for unwanted crab and the waterline must not be more than 1.5 meters, which provides further protection from damage of unwanted crab returned to the sea. Traps are baited with herring, squid and cod heads, and must be fitted with a biodegradable panel to avoid 'ghost fishing'.

There are some areas permanently closed to fishing in the northern basin of which all fishers are fully aware. Other areas may be closed on a temporary basis for the purpose of conservation of the aquatic bioresources in the Barents Sea and both vessels and fishing companies will be informed of such temporary closures.

There are no official seasonal closures of the fishery, but the main fishing season is from March until July which is influenced primarily by the high meat content of the catch at that time of year and the high catch rates (Client, pers. comm.). It is thought that the fishing season ends in late June or early July as this coincides with the start of the molting season, but there is little data on molt cycles of snow crab in the Barents Sea.

All vessels must be fitted with a Vessel Monitoring System (VMS) and the completion of catch and effort data in logbooks is mandatory.

e. Monitoring

The stock status of snow crab and the habitat in which snow crab is observed have been monitored annually through joint Norwegian-Russian ecosystem surveys from 2005 to 2018. The surveys are undertaken in summer/autumn by 4 or 5 research vessels using a Campelen bottom trawl with a horizontal opening of 25 metres and a vertical opening of 5 metres and an insertion in the codend made of a 22 mm mesh netting.

Fishing activity is monitored through VMS, logbooks and landings declarations. There is an observer program in place which records size and sex composition of the catch in addition to catch numbers.

There is a strong enforcement of all management measures in the snow crab fishery, with detailed records available of the regular boarding of vessels by the Border Guard Service of the Russian Federation's FSB in the Western Arctic District throughout the fishing season.

f. Review of harvest strategy

At national level in Russia, the Federal Fisheries Act was adopted by the Federal Assembly (the Russian Parliament) in 2004 and has subsequently been revised several times, first and foremost through a major revision in 2007. TACs are set annually by the Federal Fisheries Agency (FFA) and all other regulations are considered on an annual basis. A significant change to the harvest strategy in 2018/19 was the development of target and limit biomass reference points and harvest control rules (HCRs) which are used to provide scientific advice on TACs based upon annual estimates of stock abundance in relation to the reference points.

g. Data and Information

All vessels are currently equipped with an automatic vessel monitoring system (VMS) which provides records of fishing position on all fishing trips. All vessels are required to complete logbooks describing their fishing activity in terms of catch and fishing effort. At present paper logbooks are required, but electronic logbooks are currently being trialed. Each vessel hauls between 500 and 1500 traps per day with catches varying between 5 and 10 tonnes per day. Catches are recorded for each string of approximately 150 traps fished. The total catch for all traps (undersized and commercial-

sized crabs) are recorded. Catches of all bycatch species including Vulnerable Marine Ecosystem (VME) species must be recorded on the logbooks.

The catch is recorded on a daily basis in the fishing log. At the end of each day the ship reports the date, soak time, fishing position, quantity of catch in each string, total daily catch, quantity of finished products produced per day and total quantity of finished products on board the vessel and these data are submitted to the supervisory bodies (Centre of Fishery Monitoring and Communications, the Barentsevo-Belomorskoe Territorial Department, State port control and the Shipowner).

There is an observer program which records size and sex composition of the catch in addition to catch numbers. This is particularly important as this is a male-only fishery and therefore all females are returned to the sea immediately on capture and therefore may not be reliably recorded on logbooks. The target for observer coverage is 20% of fishing trips.

As processing of snow crab occurs on board the vessels, the assessment team understands that there is no sampling of catches at the landing points to obtain information on size distributions of landings.

At landing sites control of compliance with size distribution of the finished products is carried out by the Inspectors of the Russian Border Guard of the Federal Security Service for the protection of Aquatic Biological Resources and state control in this area.

Landings declarations are required for the snow crab fishery. Landing of finished products on transport vessels is controlled by an inspector of the Russian Border Guard of the Federal Security Service (BBTA), following which the Bill of Landing is issued. The inspector checks the compliance of the discharging data with the logbook entries of fishing and the Bill of Landing is signed by the shipper, carrier and the inspector of the Russian Border Guard of the Federal Security Service.

BBTA undertakes cross-checks of logbook records, trans-shipment volumes and landings declarations. The threshold level of discrepancies between these figures is 5%. One infringement was recorded in 2017, but in general there is good compliance with the regulations requiring monitoring of catches and landings.

As noted above, fishery-independent surveys of the snow crab stock are undertaken annually through the joint Norwegian-Russian ecosystem surveys.

h. Stock Assessment and Status

The abundance and geographical distribution of the snow crab stock in the Barents Sea has continued to increase in recent years, and consequently a number of approaches have been taken to make preliminary estimates of snow crab stock distribution, abundance and legal-size stock. These approaches include estimates of abundance based upon the fishery-independent joint Norway-Russia ecosystem survey including estimates of snow crab catchability in the trawls, Leslie depletion modeling to estimate catchability, Species Distribution Modelling (SDM) approaches to evaluate likely expansion of the distribution of the snow crab population, and the fitting of a Bayesian surplus production model to biomass estimates from the ecosystem survey and catch data to define target and limit reference points.

i. Ecosystem Surveys

Snow crab distribution and abundance can be estimated from the annual joint Norway-Russia ecosystem surveys. The snow crab is common in the eastern and northeastern Barents Sea primarily in the Russian EEZ but also in the international waters managed by NEAFC (S. Bakanev, PINRO and J.H. Sundet, IMR, Norway, pers. comm.).

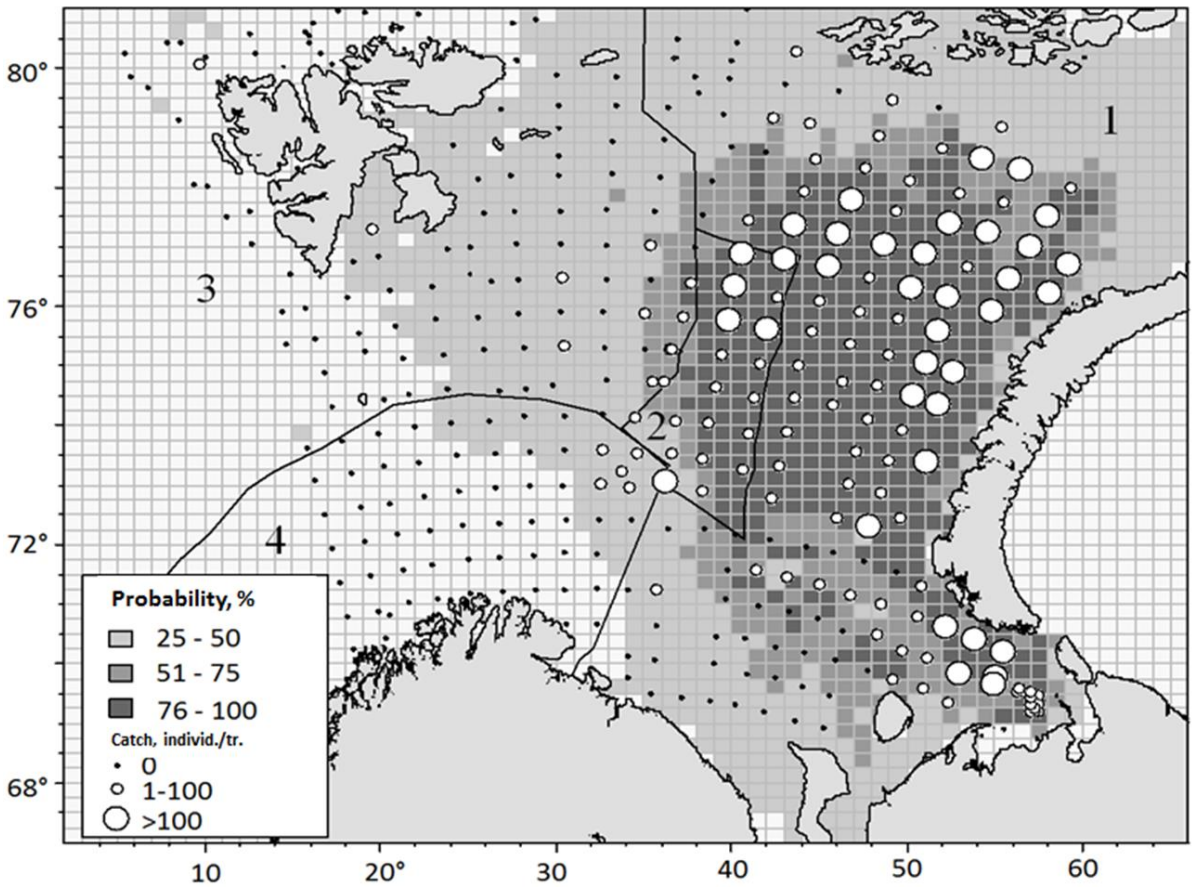


Figure 2: The annual ecosystem surveys cover a wide geographical area, and therefore sampling stations are at a relatively low intensity over the current known distribution of snow crab. A summary of the number of stations sampled, snow crabs caught, and biological samples taken each year can be found in Table 9. The ecosystem survey in 2018 was not as extensive as in previous years due to poor weather conditions during the survey.

The ecosystem survey has the advantage that it uses a small-meshed trawl so that small snow crabs are caught in the sampling gear, but the surveys suffer from problems with variable catchability of snow crabs as the surveys are multi-purpose and not designed specifically to quantitatively estimate snow crab abundance (S. Bakanev, PINRO and J.H. Sundet, IMR, Norway, pers. comm.)

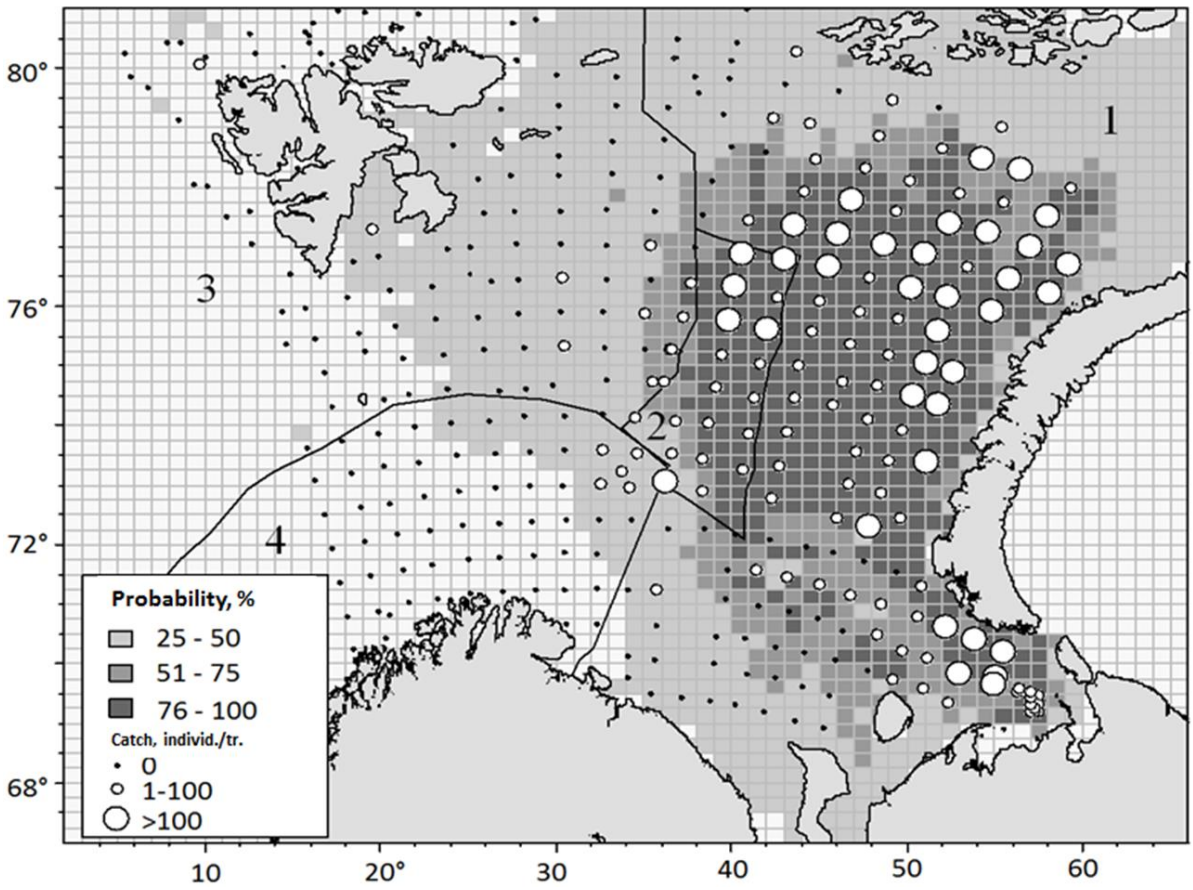


Figure 3: Mean catches and likelihood of occurrence of snow crabs from bottom-trawl catches in ecosystem surveys 2010-18 in the Barents Sea: 1- Russian EEZ. 2- International waters manages by NEAFC. 3- Svalbard Fishery Protection Zone (FPZ). 4- Norwegian Economic Zone (Source: PINRO)

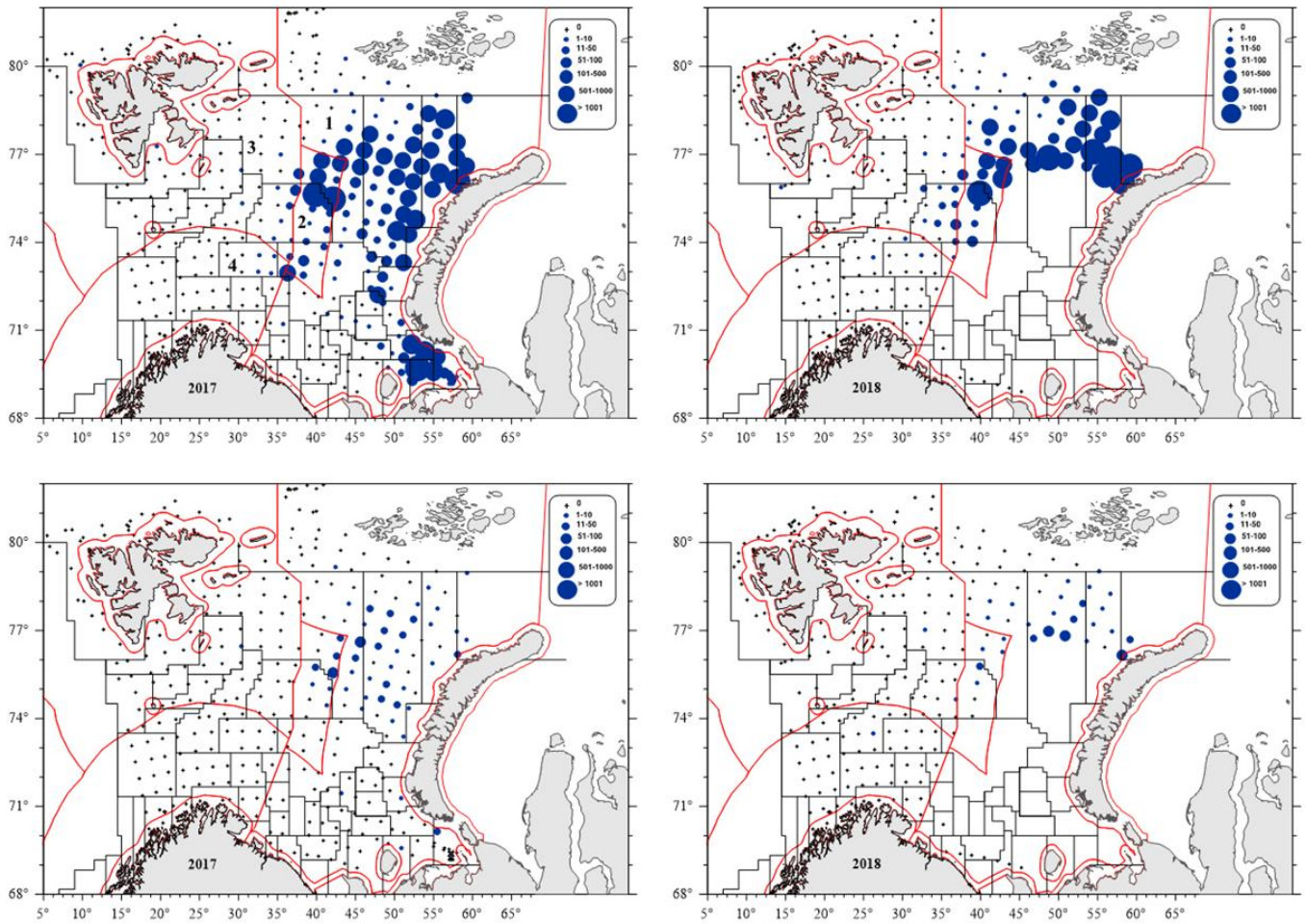
Table 9: Joint-Norwegian-Russian Ecosystem survey in the Barents Sea. Summary of number of stations sampled (hauls), hauls in which snow crab were captured, number of snow crabs caught, and number of biological samples taken from 2008-18 (Source: PINRO, 2018)

Russian-Norwegian Ecosystem survey in the Barents Sea (last decade)

Year	Number of			
	hauls	hauls with captured snow crabs	crabs, ind..	biological samples
2008	452	77	670	581
2009	387	66	284	284
2010	331	58	400	386
2011	401	84	6657	1182
2012	455	121	37737	1970
2013	493	132	19020	2756
2014	304	87	12871	2814
2015	335	89	3125	1867
2016	311	84	2107	1372
2017	350	131	20757	4009
2018	235	62	20484	1981

Survey results for 2017 show that there were high densities of snow crabs in 2017 in both the Russian EEZ and within the Loophole area managed by NEAFC (Figure 3). There was a similar distribution of snow crabs in 2018 in the northern and western areas of the stock, but the restricted survey in 2018 did not cover areas off the southwest coast of Novaya

Zemlya where high densities of snow crabs were observed in 2017. Recent surveys show that there were high levels of berried (egg-bearing) female crabs in 2017, although there were low levels of pre-recruits in 2015 and 2016. Variations in size composition of snow crab catches during the surveys indicate that strong year-classes appear frequently (but



not in every year), and those year-classes can have an impact on the dynamics of the snow crab population (Figure 5).

Figure 4: Catch distribution of snow crab in the Barents Sea during ecosystem surveys in 2017 (left column) and 2018 (right column). Top panel denotes catches of all snow crabs, and bottom panel denotes legal-sized male snow crabs. (Source: PINRO)

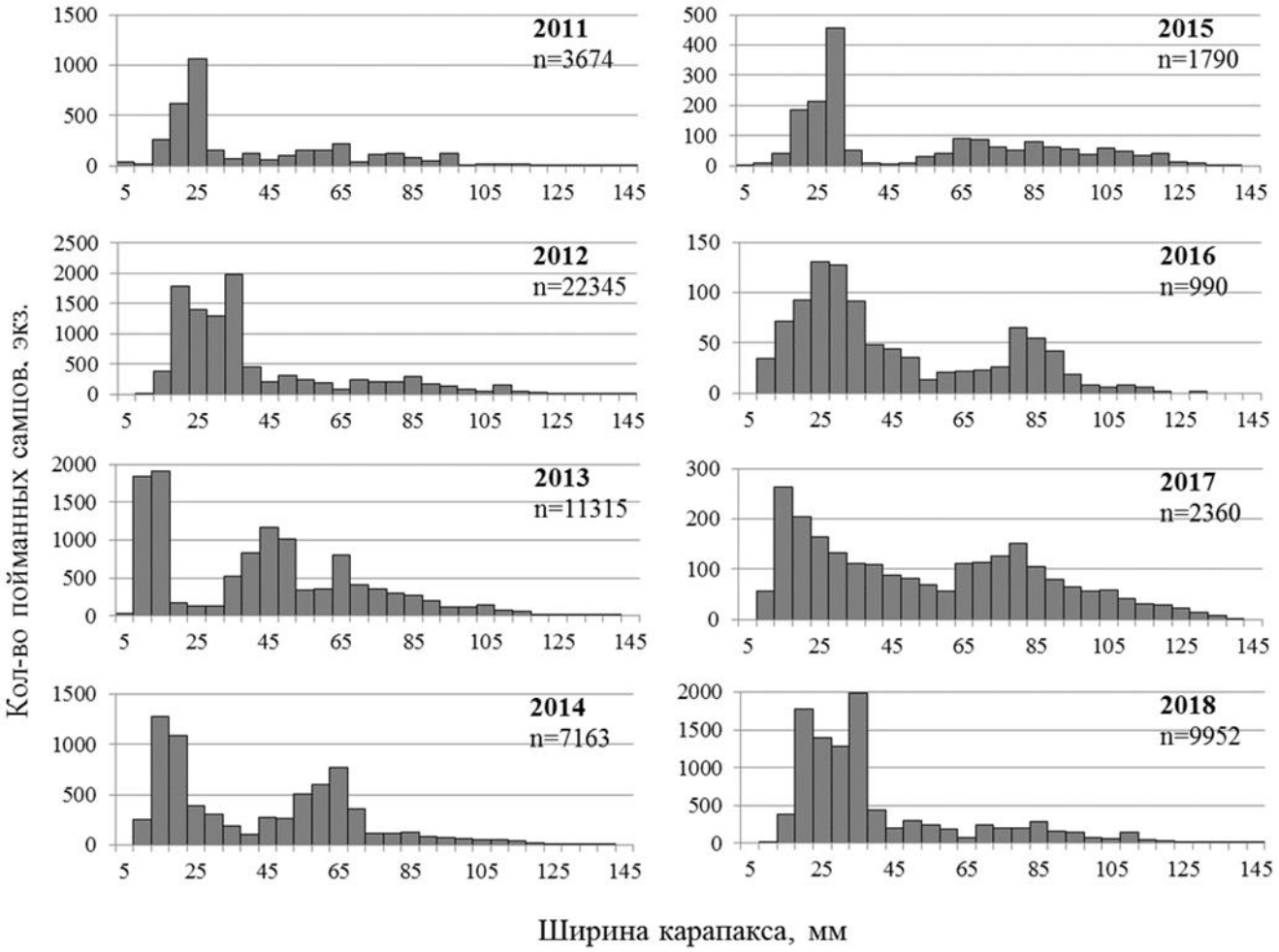


Figure 5: Size composition of snow crab catches taken with bottom trawls in the Barents Sea according to results from ecosystem surveys in 2011-18. X-axis is 'carapace width (mm)', Y-axis is 'number of males caught'. (Source: PINRO)

j. Geographical Distribution of Snow Crab

Tagging experiments show that adult snow crabs moved 2 to 80 km generally (S. Bakanev, PINRO, pers. comm.) but the highest distance moved was 252 km demonstrating that snow crabs have the ability to extend their distribution relatively quickly. As the geographical distribution of the snow crab has increased since its introduction in the Barents Sea, PINRO have carried out modelling studies to predict how the geographical distribution of snow crabs may change in future years. SDM within the 'biomod2' package in 'R' was used to evaluate occurrence of snow crabs in the Barents Sea and to perform an analysis of environmental factors contributing to their successful adaptation (Bakanev *et al*., 2018). In addition to temperature, the modelling studies considered depth, sediment grain size, current direction and speed, salinity, nitrate, phosphate and oxygen concentration and benthos distribution. The probability distribution of snow crab occurrence was computed under various scenarios relating to sea water temperatures to assess a potential distribution area for snow crabs in the Barents Sea. In the last few years there has been no significant expansion of the distribution, but the modelling demonstrates that there are no environmental factors limiting further expansion of the species. The results showed that snow crab distribution is likely to widen in the future if there is no change in water temperature and will continue to expand in their distribution even if water temperatures increase by 1° C in future years (Bakanev *et al*., 2018; Figure 6).

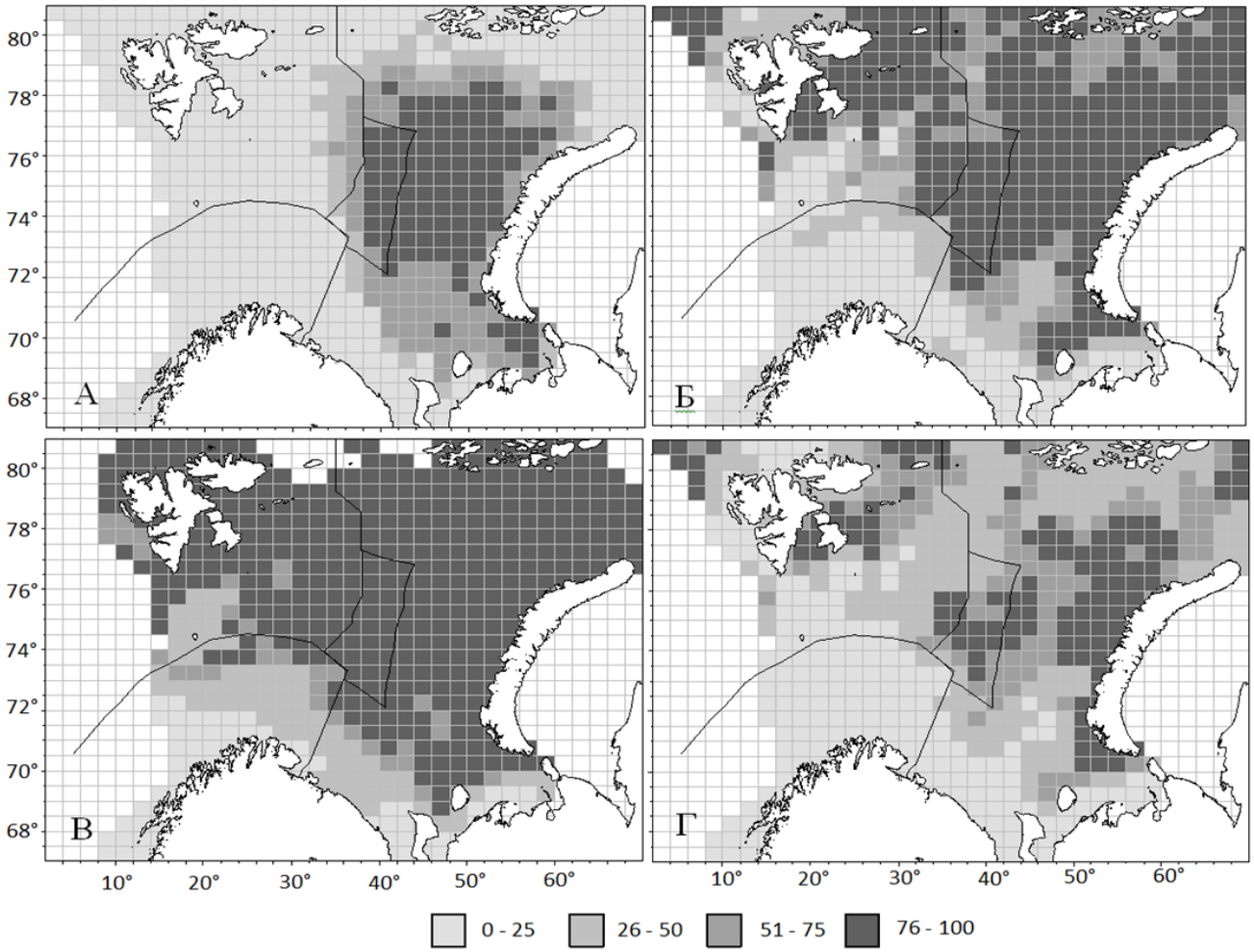


Figure 6: Forecast distribution of snow crab in the Barents Sea. The probability of occurrence (%) of snow crab in the Barents Sea as observed currently in 2010-16 (А, top left), the forecast distributions at (Б, top right) current annual average temperature, (В, bottom left) if 1ºC lower than current average annual temperature and (Г, bottom right) 1oC above current average annual temperature. (Source: PINRO; Bakanev *et al.*, 2018)

k. Initial Estimates of Snow Crab Abundance (from ecosystem surveys)

The abundance index for snow crabs was calculated as the arithmetic mean catch (individuals per mile of trawling) within the ecosystem research survey area in the Russian EEZ in 2005-2016, but the low and highly variable catchability of snow crab in bottom trawls created uncertainties in relation to investigating interannual variations in snow crab abundance. To eliminate the influence of variation in trawl catchability on the snow crab abundance index, the arithmetic mean catches of snow crab (*C*, individuals per mile of trawling) was compared with the by-catches of abundant benthic species. The averaged dynamics of the relevant catchability coefficient for abundant benthic species (*q*) in 2005-2016 was estimated and along with mean catches of snow crabs (C_t), a snow crab abundance index (*I*) in the year *t* was calculated as follows:

$$I_t = C_t/q_t$$

Mean catch rates of snow crabs in the surveys suggest that there was very rapid growth of the population in 2012-2013, but a significant decline in 2015-2016 (Table 10, Column 2). However, low catchability of all benthic organisms in the most recent years suggests that this recent decline in catch rates is due to low catchability of snow crabs in the last two years (Table 10, Column 5). The snow crab population therefore appears to have been characterised by three phases of growth - low abundance in 2005-2008, strong growth in 2009-2010 and high abundance in 2011-2016.

In summary, the annual ecosystem surveys show that the stock appears to be in a good state following a period of rapid growth and that recruitment pulses are regular. However, PINRO scientists warn that stock estimates from the trawl survey have inherent uncertainties, and that these data can provide only a general description of likely long-term population trends.

Table 10: Indicators of assessment of relative abundance of snow crab and benthos on results from ecosystem surveys in the Barents Sea in 2015-16. (Source: PINRO)

Year	Mean distribution density (ind./haul)		Coefficient of relevant catchability of benthos (q)	Index of snow crab abundance $I_t = C_t/q_t$, ind./haul
	of crab according to survey, C	of benthos according to survey		
2005	0,17	62	0,04	4,43
2006	1,42	1006	1,10	1,29
2007	1,62	633	0,38	4,32
2008	7,21	1437	1,05	6,88
2009	2,78	130	0,21	13,19
2010	7,51	358	0,31	24,17
2011	53,60	701	0,52	103,88
2012	410,25	10442	5,60	73,20
2013	168,64	1990	1,48	113,75
2014	128,18	1737	0,96	133,93
2015	24,14	311	0,23	106,15
2016	12,53	203	0,13	96,25

I. Fisheries-dependent Data

The commercial Russian fishery for snow crabs commenced in 2013 in the northeastern area of the international waters managed by NEAFC and has since expanded to cover parts of the Russian EEZ (Figure 7). However, since 2016 fishing in the international waters has been prohibited and all catches are currently from the Russian EEZ (Figure 8). The Russian fishery for snow crab in the Barents Sea is a newly developed fishery, and in 2014-2016, there was not a sufficiently long time series of fisheries data for which standard analytical stock assessments could be undertaken for the snow crab stock. Using an alternative approach, the fisheries data from the Russian fishery in the international waters managed by NEAFC were used to provide a time series of catches throughout a fishing season, and a Leslie depletion model was used to model the decline in catches over the season and hence assess the stock within the fishing area (Bakanev, S.V. 2015;Table 11). Estimates of biomass from the Leslie model were over 30,000 tonnes in 2014, with a density of 774 tonnes per km^2, but the estimate of stock biomass had declined significantly by 2016 (Table 11).

The estimates in Table 11 were used to extrapolate to the whole area of the international waters providing an estimate of legal size stock within the international waters of 73,000 tonnes in 2014 and 34,000 tonnes in 2016. The density of snow crabs in the international waters at the start of the fishery in 2014 was then used with an estimate of the area of the stock in the Russian EEZ, the international waters and the Svalbard area to produce estimates of the legal size stock in all three fishing areas (Table 12). A number of assumptions underlie both the Leslie depletion model approach and the extrapolation to the wider fishery areas, and therefore there must be some uncertainty underlying these stock estimates.

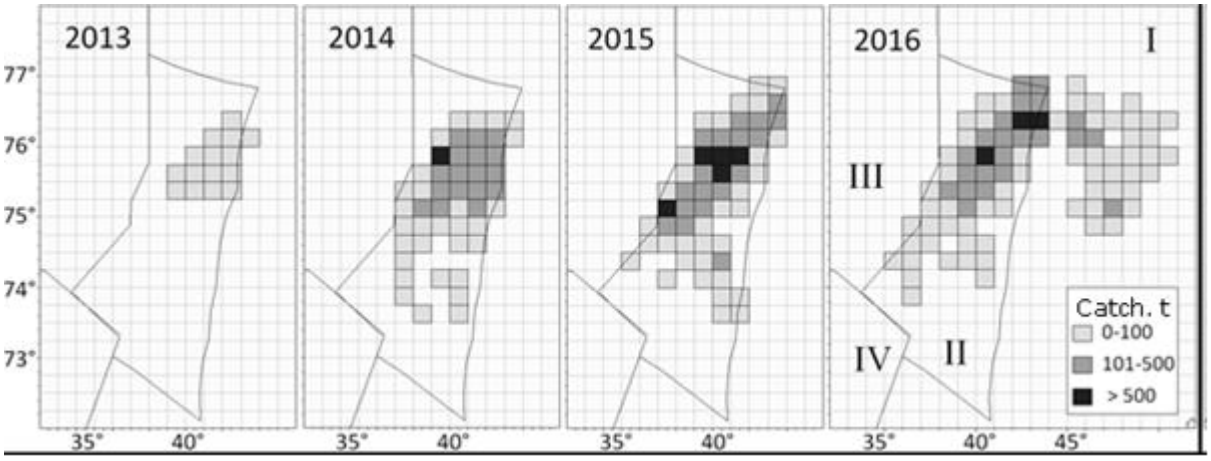


Figure 7: Distribution of snow crab catches taken by Russian vessels in 2013-16 in the Barents Sea: I- Russian EEZ. II- International waters managed by NEAFC. III- Svalbard. IV- Norwegian EEZ. (Source: PINRO)

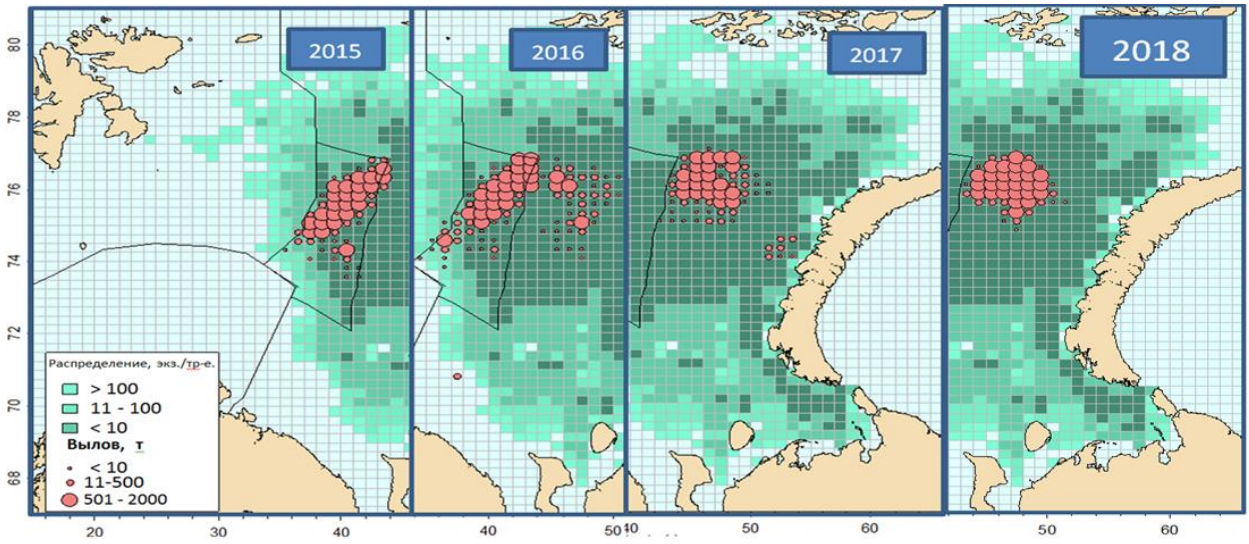


Figure 8: Distribution of snow crab catches taken by Russian vessels in 2015-18 in the Barents Sea. (Source: PINRO)

Table 11: Median values of initial biomass B0 and 95% confidence interval limits in 2014-2016 derived by Leslie method of snow crab in the area of Russian Snow crab fishing activities in international waters of the Barents Sea. (Source: PINRO)

Year	Density of legal stock, t/thou.square km	B_0, t	95% confidence interval limit for B_0, t	
			lower limit	upper limit
2014	774	30196	15006	45385
2015	576	22482	11173	33791
2016	464	16614	8257	24972

Table 12: Density, median and 95% confidence interval limits for the snow crab legal stock in the three Barents Sea areas estimated by the end of 2016. (Source: PINRO)

Area	Study area size, thou.square km	Density of legal stock, t/ thou.square km	Fishable stock, thou. t		
			Median	95% confidence interval limit	
				Lower limit	Upper limit
Russian EEZ	471	774	405	201	608
International waters of the Barents Sea	73	426	31	15	47
Svalbard	14	774	11	5	16
Total	558	-	447	221	671

m. Updated Stock Assessment in 2018 (including catch profiles)

An updated stock assessment was undertaken by PINRO in 2018. The assessment included collation of catch per unit effort (CPUE) data from the fishery, a time series of stock biomass estimated from the ecosystem surveys and a Bayesian stock production model fitted to ecosystem survey data and recent catch data.

CPUE data are available from logbooks and the data are standardised using a Generalised Linear Modelling (GLM) approach to account for vessel and seasonal influences. As noted above, the Russian fishery has shifted from the NEAFC-managed international area known as The Loophole to the Russian EEZ, which precludes detailed evaluation of trends in CPUE. CPUE had declined in the Loophole from 2014 to 2016, and CPUE is much higher in the Russian EEZ from 2016 to 2018 (Table 13).

The updated stock assessment developed a time series of stock biomass estimates with confidence intervals calculated from estimates of snow crab abundance from the annual ecosystem surveys and using an estimate of catchability of 0.17 derived from the depletion experiments previously undertaken in the Loophole area. For 2018 the stock biomass estimate was 600,000 tonnes with the 95% lower limit of 300,000 tonnes (Figure 9).

Table 13: Russian fishery Statistics for the snow crab fishery from 2013 to 2018 for the Loophole, International Waters (Anclave) and the Russian EEZ. (Source: PINRO)

Russian fishery statistics in 2013-2018

Year	Number of			CPUE kg per traps	CPUE, Tons per day	Catch, tons
	vessels	catch days	traps			
			Anclave			
2013	2	22	2,4*	-	2,82	62,0
2014	12	1153	788,7	4,80	3,53	4104,2
2015	20	3119	2894,7	3,07	2,77	8894,6
2016	18	2338	2489,8	2,49	2,58	6199,4
			REZ			
2016	5	178	91,7	12,49	7,53	1499,9
2017	10	889	410,8	15,64	9,57	7839,8
2018	11	971	582,4	16,70	9,19	9727,5

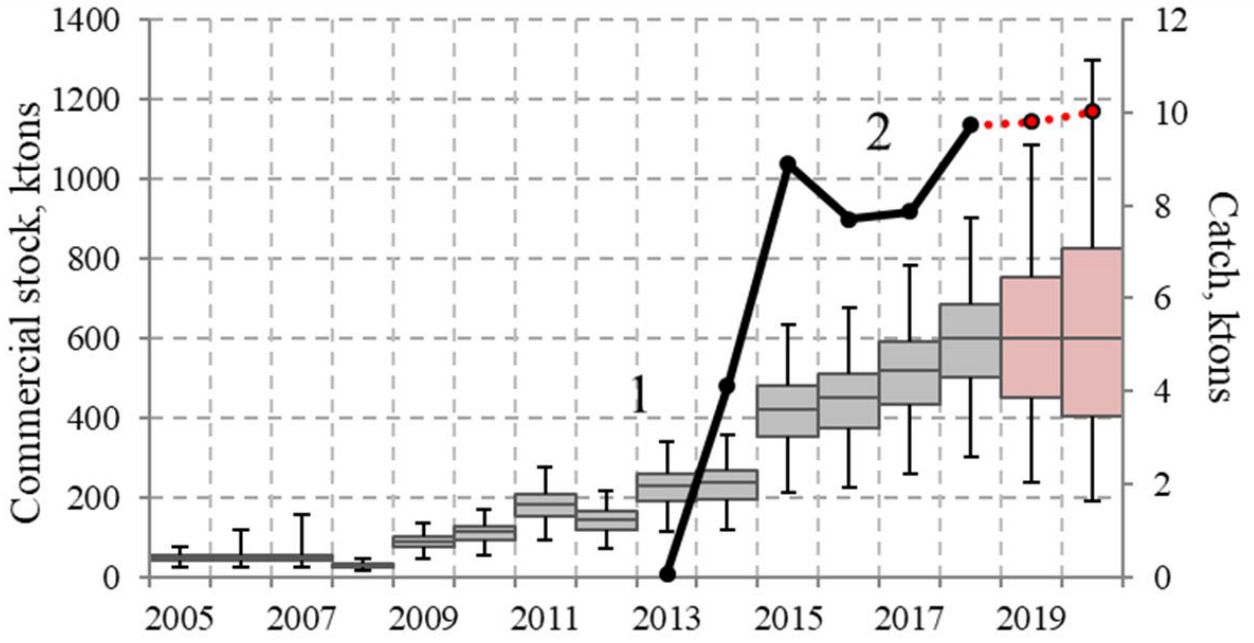


Figure 9: Barents Sea snow crab stock and catches. Estimate of legal-sized stock with 95% confidence intervals (1) from 2005 to 2018 with projections to 2019 and 2020 and observed catches (2) from 2013 to 2018. (Source: PINRO)

A Bayesian surplus production model developed for the shrimp (*Pandalus borealis*) fishery in the Barents Sea (Hvingel, 2016) was fitted to Russian snow crab fishery data (Bakanev, 2019). The model is formulated in a state-space framework and Bayesian methods are used to derive posterior likelihood distributions of the parameters (Hvingel and Kingsley, 2006). The model synthesises information from input priors including the initial population biomass, the carrying capacity (K) and Maximum Sustainable Yield (MSY), and is fitted to a series of snow crab catches and biomass estimates from the ecosystem survey calculated as a 3-year moving average of annual fishable biomass with catchability coefficient equal to 0.17 as calculated previously using the depletion model described above (

Table 14). The model used an input prior of the 2005 stock estimate as the initial population biomass with a normal distribution with mean of 0.01 and sigma 0.26. The prior for carrying capacity (K) was a median of 640,000 tonnes with 95% confidence intervals of 380,000 and 1,000,000 tonnes.

The model fit gave a median estimate of K of 711,400 tonnes from which an estimate of B_{MSY} was derived as 0.5 x K equivalent to 356,000 tonnes. In addition, a B_{LIM} of 0.3 x B_{MSY} of 107,000 tonnes was derived. These biomass values of 356,000 and 107,000 tonnes have therefore been implemented as the target (B_{tr}) and limit (B_{lim}) reference points.

Table 14: Input data – biomass index from the ecosystem survey and Russian catch data – for the Bayesian stock production model for the Barents Sea Snow crab fishery. (Source: PINRO).

YEAR	Survey index, ktons	Russian catch, ktons
2005	49	0.0000
2006	49	0.0000
2007	49	0.0000
2008	29	0.0000
2009	89	0.0000
2010	112	0.0000
2011	182	0.0000
2012	144	0.0000
2013	227	0.0620
2014	236	4.1042
2015	423	8.8946
2016	449	7.6993
2017	503	7.8700

Table 15: Results of the fit of the Bayesian stock production model to the Russian Snow crab catch data and estimates of stock biomass. MSY = Maximum Sustainable Yield, B = Stock Biomass, F = Fishing mortality, K = carrying capacity, q = catchability. (Source: PINRO)

	Mean	SD	25 %	Median	75 %
MSY	54.15	28.03	34.98	52.34	71.47
B_{msy}	365.6	81.35	307.4	355.7	412.1
K	731.1	162.7	614.8	711.4	824.2
q	1.006	0.09738	0.941	1.008	1.071
F_{msy}	0.151	0.07651	0.09945	0.1477	0.1967
B_{lim}	109.7	24.4	92.23	106.7	123.6
B_{pa}	182.8	40.67	153.7	177.9	206

n. Harvest Control Rules (HCRs)

The estimation of target and limit biomass reference points from the fitting of the Bayesian surplus production model described above allows an annual assessment of stock status in relation to these biological reference points. Scientific

advice on the TAC for the forthcoming year is then based upon the status of the stock in relation to the target and limit biomass reference points and a maximum exploitation rate of 15%.

The harvest control rule for setting the annual TAC is as follows:

- If the legal-sized stock is within the healthy zone, i.e. above the target reference point (B_{tr} = 356,000 tonnes), then the exploitation level (proportion harvested, E_t) is set at no higher than the target exploitation level (E_{tr} = 0.15);

  If the legal-sized stock is in the cautious zone, i.e. above the biomass limit reference point (B_{lim}=107,000 tonnes), but below the target reference point, the exploitation level (E_t) is estimated as $E_t = E_{tr} \times (B_t - B_{lim})/(B_{tr} - B_{lim})$;

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

- Year-to-year TAC variation can be no more than ± 42 % of the previous year's TAC provided that the legal stock is above the limit reference point.

o. Peer Review of Stock Assessment

Whilst the snow crab stock assessments are generally peer-reviewed internally within PINRO, and within a specialist crab fishery group within the Russian scientific institutes, the application of the Bayesian stock production model to this stock is a newly-developed approach for the snow crab stock and was developed in the time between the publication of the ACDR and the site visit. There has not yet been sufficient time for a formal internal or external peer review of this latest stock assessment approach.

7.2.2 Total Allowable Catch (TAC) and catch data

a. Setting of TACS

Setting appropriate TACs for the Barents Sea snow crab fishery have been complicated because snow crab is an introduced invasive species whose distribution has expanded in recent years, and a sufficiently long time series of fisheries data was not available from which to estimate MSY and consequent MSY-based TACs. The initial harvest strategy was that the TAC should be gradually increased until the time when enough fisheries data were accumulated to fully apply the precautionary approach. On that basis, the TAC for the Russian fishery was set at 7870 tonnes in 2017 for which the UoA's allocation was 7840 tonnes. The TAC for 2018 was set at 9840 tonnes.

A new harvest control rule was implemented in 2019 for use in setting TACs. In native Russian snow crab stocks, an exploitation rate of 10-20% of the legal-size stock is considered sustainable given regular recruitment events, and therefore the harvest control rule set a maximum exploitation rate of 15% if the stock is in the healthy zone. The estimate of snow crab stock biomass in 2018 from the ecosystem surveys was 600,000 tonnes with a lower 95% confidence interval of 300,000 tonnes (Figure 9). PINRO scientists therefore advised that a highly precautionary TAC would be 15% of this lower limit, i.e. 0.15 x 300,000 = 45,000 tonnes for 2019. In the light of the various uncertainties underlying the assessment methodology used to estimate stock biomass, and the relatively short time series of fisheries data, the management authorities decided to maintain an even more precautionary TAC by rolling over the 2018 TAC of 9840 tonnes for 2019.

Evidence from snow crab fisheries in the northwest Atlantic and modelling of populations in relation to environmental indices (Figure 6), suggest that the snow crab population in the Barents Sea has potential for further expansion. Management will need to be adaptive in the future to take into account changes in population abundance and distribution and will be informed by scientific research on life history parameters.

Table 16: Total Allowable Catch (TAC) and catch data

TAC	**Year**	**2019**	Amount	**9840.00 tonnes**
UoA share of TAC	Year	**2019**	Amount	**9777.95 tonnes**
UoA share of total TAC	Year	**2019**	Amount	**9777.95 tonnes**
Total green weight catch by UoC	Year (most recent)	**2018**	Amount	**9727.30 tonnes**

Total green weight catch by UoC	Year (second most recent)	**2017**	Amount	**7839.78 tonnes**

7.2.3 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?	**Yes**	**Yes**	**Yes**

Rationale

A Bayesian surplus production model fitted to Russian snow crab fishery data from 2005 to 2017 estimated a biomass limit reference point (B_{LIM}) of 107,000 tonnes based on the assumption that B_{LIM} is equivalent to 0.3 x B_{MSY}. Given the likely expanding geographical distribution of the introduced snow crab population and increasing stock biomass, this estimate of B_{LIM} is very likely to be above the point of recruitment impairment (PRI). The stock biomass of snow crabs within Russian waters estimated from the Joint Norwegian-Russian ecosystem survey was 600,000 tonnes in 2018. Whilst there is some uncertainty underlying the methodology for assessing stock biomass as there are significant variations in catchability of snow crabs in the ecosystem survey, the lower 95% confidence interval of the biomass estimate is 300,000 tonnes, which is well above the estimate of B_{LIM}. The ecosystem survey uses a small-meshed net and is therefore able to monitor annual variations in abundance of small pre-recruit snow crabs. The annual surveys show that recruitment pulses are regular in the snow crab population in the Barents Sea, and there is no evidence from the ecosystem surveys or commercial fisheries data that recruitment has been impaired. In addition the harvest strategy includes a prohibition on the retention of females and a move-on rule if catches of juveniles exceed certain thresholds, and survival rate of both females and undersized crabs returned to the sea is assumed to be high. The harvest strategy is therefore designed to mitigate against recruitment failure. It can be concluded that there is a high degree of certainty that the stock is above the PRI and therefore the SG60, SG80 and SG100 are 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?		**Yes**	**No**

Rationale

A Bayesian surplus production model fitted to Russian snow crab fishery data from 2005 to 2017 estimated a target limit reference point (B_{TR}) of 356,000 tonnes based on the assumption that B_{TR} = 0.5 x K (carrying capacity) and is therefore equivalent to B_{MSY}. The stock biomass of snow crabs within Russian waters estimated from the Joint Norwegian-Russian ecosystem survey was 600,000 tonnes in 2018, which is well above the target reference point, and therefore it can be concluded that the stock is at or fluctuating around a level consistent with MSY. The SG80 is met.

There are some uncertainties underlying the estimate of stock biomass from the ecosystem surveys, and the derivation of the target reference point equivalent to B_{MSY} is based upon an initial fitting of the stock assessment model to a relatively short time series of fisheries data. The lower 95% confidence interval of the biomass estimate is 300,000 tonnes, which is just below B_{MSY} and therefore, there is not a high degree of certainty that the stock is fluctuating around or above a level consistent with MSY. The SG100 is not met therefore.

References

Results of the annual joint Norwegian-Russian ecosystem survey in the Barents Sea.

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MSC. 2018a. MSC Fisheries Standard Version 2.01. 31 August 2018.

MSC. 2018b. MSC Fisheries Certification Process. Version 2.1. 31 August 2018.

Stock status relative to reference points			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Reference point used in scoring stock relative to PRI (SIa)	Limit reference point (B_{LIM}) equivalent to 0.3 x B_{MSY}	107,000 tonnes	Stock biomass estimate in 2018 = 600,000 tonnes, i.e. 5.6 x B_{LIM}
Reference point used in scoring stock relative to MSY (SIb)	Target reference point (B_{TR}) equivalent to B_{MSY} estimated as 0.5 x K	356,000 tonnes	Stock biomass estimate in 2018 = 600,000 tonnes, i.e. 1.69 x B_{TR} or B_{MSY}
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				
The snow crab stock is not depleted and so there is no requirement to score this Performance Indicator.				
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				
See comment above for scoring issue a.				
References				
MSC. 2018a. MSC Fisheries Standard Version 2.01. 31 August 2018.				

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

PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guide post	The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG80.	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 SG80.	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 SG80.
	Met?	**Yes**	**Yes**	**No**

Rationale

The objective of the harvest strategy is to avoid overfishing and the strategy consists of limited entry licensing, setting a precautionary annual TAC, a minimum landing size, a prohibition on the landing of female snow crabs, restrictions on trap design including minimum mesh size and the incorporation of biodegradable panels and move-on rules to minimise mortality of juvenile snow crabs, and implementation of closed areas. The harvest strategy is therefore expected to achieve stock management objectives and the SG60 is met.

Limit and target reference points have been implemented and the harvest control rule within the Russian fishery sets the annual TAC based upon estimates of stock biomass in relation to those reference points. The harvest strategy is therefore responsive to the state of the stock. There is a detailed monitoring programme, all vessels must have a Vessel Monitoring System (VMS) on board and logbook completion is mandatory, and there is robust enforcement of fishery management regulations through boarding of vessels at sea. Whilst it is difficult to assess whether a harvest strategy is appropriate for such a fishery where the species has been introduced only recently, and stock dynamics are uncertain, 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. The SG80 is met.

Whilst both Norway and Russia set TACs unilaterally, and there is discussion of common management regulations within the Joint Norwegian Russian Fishery Commission (JNRFC), the lack of a formal management plan for the fishery as a whole either through JNRFC or NEAFC means that the SG100 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?	**Yes**	**Yes**	**No**

Rationale

A harvest strategy based upon limited entry licensing, highly precautionary TACs and measures to minimise juvenile mortality is likely to work based on similar harvest strategies in other snow crab fisheries. The SG60 is met.

There has not been any formal testing of the harvest strategy but estimates of stock biomass, identification of regular recruitment events and information on the distribution of the snow crab stock all provide evidence that the key element of the harvest strategy to ensure that overfishing does not occur is working. SG80 is met.

The performance of the harvest strategy has not been fully evaluated through, for example, a Management Strategy Evaluation (MSE), so SG100 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?	**Yes**		

Rationale

Fishing activity is monitored through a vessel monitoring system (VMS), logbooks and landings declarations. There is an observer programme in place which records size and sex composition of the catch in addition to catch numbers. The annual joint Russian-Norwegian ecosystem survey provides information on stock abundance, stock structure and distribution. Regular boarding of vessels by the Border Guard Service of the Russian Federation's FSB in the Western Arctic District throughout the fishing season monitors for compliance with fishery management regulations. Cross-checks of records from logbooks, transhipment volumes and landings data provide evidence that generally there is good compliance with data-recording regulations. The SG60 is met.

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

Rationale

At national level in Russia, the Federal Fisheries Act was adopted by the Federal Assembly (the Russian Parliament) in 2004 and has subsequently been revised several times, first and foremost through a major revision in 2007. TACs are set annually by the Federal Fisheries Agency (FFA) and all other regulations are considered on an annual basis. The harvest strategy has been improved significantly in 2018/19 through the derivation of limit and target reference points and the implementation of a harvest control rule to set annual TACs. However, without a formal management plan agreed by the JNRFC for all areas of the fishery, it cannot be concluded that the overall harvest strategy for the fishery is regularly reviewed and improved. The SG100 is not met. SG 80 is awarded by default.

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?	**Yes**	**Yes**	**No**

Rationale

Measures for minimising the mortality of unwanted catch of snow crabs appear to have been reviewed regularly. Since the start of the fishery in 2013, there have been changes to the mesh size of traps, a prohibition of fishing using any method other than traps has been introduced, the landing of females is prohibited, and any females caught must be returned immediately to the sea on hauling of traps. In addition, there is a requirement that the distance between the lowest part of the slipway for unwanted crab and the waterline must not be more than 1.5 metres, which provides further protection from damage of unwanted snow crab returned to the sea, and there is a move-on rule if juveniles make up more than 25% of the catch of snow crabs. Traps must be fitted with a biodegradable panel to avoid 'ghost fishing'. There is therefore a regular review of the potential effectiveness of alternative measures to minimise unwanted mortality of snow crabs, and so SG60 and SG80 are met.

Recently molted soft-shelled snow crabs are extremely vulnerable to handling during the fishing process and so significant pre-recruit mortality may occur. Whilst the current fishing season ends in late June or early July which is thought to avoid the main molting season thereby reducing the likelihood of mortality of recently-molted snow crabs, both Russian and Norwegian scientists note that there is little data on molt cycles of snow crab in the Barents Sea. **The assessment team recommends therefore that research is undertaken on molt cycles in snow crab to ensure that mortality of recently-molted snow crabs is minimised.**

The assessment team found no evidence that a formal biennial review of alternative measures is undertaken. SG100 is not met.

References

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Russian Federal Act 2004 (law No.166-FZ)

Fisheries Regulations for the Northern Fisheries Basin.

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

PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	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?	**Yes**	**Yes**	**No**

Rationale

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

- If the legal-sized stock is within the healthy zone, i.e. above the target reference point (B_{tr}= 356,000 tonnes), then the exploitation level (proportion harvested, E_t) is set at no higher than the target exploitation level (E_{tr} = 0.15);
- If the legal-sized stock is in the cautious zone, i.e. above the biomass limit reference point (B_{lim}=107,000 tonnes), but below the target reference point, the exploitation level (E_t) is estimated as $E_t = E_{tr} \times (B_t - B_{lim})/(B_{tr} - B_{lim})$;
- If the legal stock is in the critical zone, i.e. below the limit reference point, the exploitation level is set to zero (E_t = 0). The fishery is therefore closed and only fishing for science is permitted;
- Year-to-year TAC variation can be no more than ± 42 % of the previous year's TAC provided that the legal stock is above the limit reference point.

Whilst the exploitation rate will be maintained at 15% in the healthy zone, when the estimate of stock biomass drops below the target reference point and approaches the limit reference point, i.e. the point at which recruitment is impaired, then the exploitation rate is reduced. The SG60 is met.

There is an additional HCR in that when the percentage of juveniles in a vessel's catch exceeds a threshold of 25%, the vessel must move on to an area where the abundance of juveniles is lower. The current harvest control rules are well-defined, exploitation rate is reduced as the PRI is approached, and are precautionary enough to ensure that the stock will fluctuate around or above the target reference point which is equivalent to B_{MSY}. The SG80 is met.

The formal HCRs require that the exploitation rate is set at 15% of the stock, but in effect, the TAC is calculated as 15% of the lower 95% confidence limit of the estimated stock biomass, and with the expanding geographical distribution of the snow crab population and consequent increase in stock biomass, the HCRs are expected to keep the stock fluctuating at or above a level consistent with MSY. However, the HCRs do not take into account the ecological role of the stock. The SG100 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?		**Yes**	**No**

Rationale
The key HCR is revision of the annual TAC in response to changes in the estimates of stock biomass. There are significant uncertainties inherent in the estimation of stock biomass based upon the annual joint Norwegian-Russian ecosystem survey because of variations in catchability of snow crabs as the surveys are not designed to provide quantitative estimates of snow crab biomass. However, the estimates of stock biomass are calculated using estimates of catchability from depletion experiments which should increase the robustness of the estimates. Scientific advice on setting of the TACs uses the lower 95% confidence limit of the estimates of stock biomass to produce a highly precautionary TAC. The SG80 is met. The setting of the TACs does not take into account a wide range of uncertainties, and the ecological role of the snow crab stock is not fully known as it is a recently introduced species in the Barents Sea. The SG100 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?	**Yes**	**Yes**	**No**

Rationale
There is some evidence that the management tools in place in the Russian fishery are effective in controlling exploitation rate and so the SG60 is met. There is clearly considerable scope for the snow crab population to expand geographically and for significant increases in stock biomass, and the current tools of limiting fishing effort, and setting highly-precautionary TACs (the TAC for 2019 of 9840 tonnes represents an exploitation rate of only 1.6% of the estimated stock biomass) are effective in achieving the maximum exploitation level of 15% required under the HCR. SG80 is met. The HCRs are newly-implemented and scientists are only beginning to understand snow crab stock dynamics in the Barents Sea and so it is too early in the development of the snow crab stock to conclude that there is clear evidence that the tools are effective in achieving the exploitation levels required under the HCRs. SG100 is not met.

References
Bakanev, S.V. 2015. Stock assessment of the red king crab in the Russian EEZ of the Barents Sea by using depletion models. Voprosy rybolovstva, vol. 16, *No.* 4: 465–476 (in Russian). Bakanev, S.V. 2019. Evaluation of biological reference points and HCR for snow crab stock in the Russian EEZ of the Barents Sea, unpublished. Bizikov, V. A. editor. Harvest control rules for priority species of crabs. FSBSI “VNIRO” Russian Federal Act 2004 (law No.166-FZ)

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

PI 1.2.3 – Information and monitoring

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Range of information			
	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?	**Yes**	**Yes**	**No**

Rationale

There is good information available from the annual Joint Russian-Norwegian ecosystem surveys on stock structure, stock productivity and distribution of the stock. There are 11 vessels in the Russian snow crab fishery and fleet composition is well understood. The SG60 is therefore met.

All vessels are currently equipped with an automatic vessel monitoring system (VMS) which provides records of fishing position on all fishing trips, and vessels are required to complete log books describing their fishing activity in terms of catch and fishing effort which requires recording of both undersized and commercial crabs, and landings declarations are required. There is an observer program (with a target coverage of 20%) which records size and sex composition of the catch in addition to catch numbers. The snow crab population within the Barents Sea is considered to be a single stock. There is enough information available from both fishery-dependent and fishery-independent sources to meet the SG80.

Whilst there is additional environmental and community information available from the annual ecosystem surveys, and modelling work has provided predictions on likely snow crab stock abundance and distribution in future years, there are uncertainties in sampling variability in the ecosystem surveys relating to snow crab catchability and stock structure which provide some uncertainties surrounding estimates of stock abundance, so it cannot be concluded that the information for this fishery is comprehensive. The SG100 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?	**Yes**	**Yes**	**No**

Rationale

Stock abundance is monitored through the ecosystem surveys and UoA removals are rigorously monitored across all fishing areas and so the SG60 is met.

Whilst UoA removals are rigorously monitored, there are some uncertainties surrounding the estimates of stock abundance which are used to assess the status of the stock in relation to the biomass reference points. However, by using the lower 95% confidence limit of the estimated stock biomass within the HCR to calculate the TAC, it can be concluded that the stock biomass estimates are monitored at a level of accuracy that is sufficient to support the HCR. In 2019, the management authorities also set the TAC at a significantly lower level than that required under the HCR. The SG80 is met.

There is not a high degree of certainty around the information available, and there is not a good understanding of the inherent uncertainties in the information or the robustness of the assessment and management to those uncertainties. SG100 is not met.

c	Comprehensiveness of information			
	Guide post		There is good information on all other fishery removals from the stock.	
	Met?		**No**	

Rationale

There are 11 registered snow crab fishing vessels in the UoA for which there is very good information on all catches of commercial-sized and undersized snow crab, and there are no other crab catching vessels in the Barents Sea.

As the entire fishery is conducted outside the 12nm limit, there is no recreational fishing.

There are some bycatches of snow crab in the trawl fisheries for haddock, cod and halibut in the Barents Sea, but these bycaught snow crabs are generally damaged by the trawl and therefore not landed. Any such damaged and discarded snow crabs caught in the trawls will be recorded by observers, but there is currently no formal estimate of these other fishery removals. The SG80 is not met therefore and a condition is raised.

References

Bakanev, S.V. 2015. Stock assessment of the red king crab in the Russian EEZ of the Barents Sea by using depletion models. Voprosy rybolovstva, vol. 16, *No.* 4: 465–476 (in Russian).

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Bakanev, S., Sokolov, K. and Pavlov, V. 2018. Prospects for a Russian snow crab (*Chionoecetes opilio*) fishery in the Barents Sea. Submission to 18th Russian-Norwegian Symposium, 24pp.

Results of the annual joint Norwegian-Russian ecosystem survey in the Barents Sea.

Overall Performance Indicator score	**75**
Condition number (if relevant)	**1**

1. **Recommendation for PI 1.2.3**

The assessment team recommends that research is undertaken on molt cycles in snow crab to ensure that mortality of recently-molted snow crabs is minimised.

PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	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?		**Yes**	**No**

Rationale

The assessment of the snow crab stock is based on both fishery-dependent and fishery-independent information. Conventional catch per unit effort (CPUE) data from logbooks are standardised for season, area and vessel using a GLM, but as yet there is not a sufficient time trend of CPUE data to draw conclusions on stock status. Stock biomass estimates are produced from the fishery-independent annual joint Norwegian-Russian ecosystem survey and are calibrated using snow crab catchability estimates derived from Leslie depletion analysis applied to commercial fishing data collected in previous years in the snow crab fishery. The assessment provides annual estimates of stock biomass which are compared with both limit and target reference points defined using a Bayesian stock production model fitted to estimates of stock biomass from ecosystem surveys and a time trend of snow crab landings data. TACs are then set based on exploitation rates determined within the HCRs and whether the stock status is within the healthy, cautious or critical zones. The assessment method is therefore appropriate to the stock and for the HCR. The SG80 is met.

Whilst the assessment takes into account the major features of the biology of snow crab, the key characteristic of the UoA is that this is an introduced species in the Barents Sea, and whilst the assessment includes some environmental modelling which predicts the future geographical distribution and abundance of the snow crab population, the nature of the UoA is such that there is sufficient uncertainty in snow crab dynamics in the Barents Sea to conclude that the assessment takes into all the major features of the UoA. There are uncertainties underlying the method of estimating stock biomass from the ecosystem surveys, and **the assessment team recommends that alternative methods of estimating stock biomass are investigated in conjunction with Russian and Norwegian scientists.** The SG100 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?	**Yes**	**Yes**	

Rationale

The assessment estimates stock status relative to limit and target biomass reference points. The SG60 is met.

The assessment estimates snow crab stock biomass from the results of the annual ecosystem survey using an estimate of catchability derived from depletion experiments. The estimate of stock biomass is compared with a limit reference point of 107,000 tonnes estimated as 0.3 x B_{MSY} and a target reference point of 356,000 tonnes equivalent to B_{MSY} and calculated as 0.5 x carrying capacity (K). These reference points were estimated from fitting a Bayesian stock production model to stock biomass estimates from the ecosystem survey and a time trend in landings. The SG80 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?	**Yes**	**Yes**	**No**

Rationale

The stock assessment has identified the major sources of uncertainty – estimates of stock biomass from the ecosystem survey need calibrating for snow crab catchability and snow crab distribution is expanding. The SG60 is met.

In addition to taking into account uncertainties in the assessment through the setting of highly precautionary TACs which are much lower than those required under the HCRs, a Bayesian stock production model which inherently takes into account uncertainty in the initial stock size, carry capacity and the estimate of MSY, has been fit to stock biomass estimates from the ecosystem surveys and a time trend of snow crab landings. The SG80 is met.

Whilst the Bayesian stock production model could provide an evaluation of stock status relative to reference points in a probabilistic way, the approach has not yet been undertaken, and the SG100 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?			**No**

Rationale

The stock assessment approach using an estimate of stock biomass from the ecosystem survey has not been fully tested and has yet to be shown to be robust. Various stock assessment methodologies have been trialled for this newly developed fishery based on a recently introduced species, but it cannot be concluded that the methodologies have been rigorously explored. The SG100 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?		**No**	**No**

Rationale

The Client advised that stock assessments are generally reviewed internally within PINRO and by a wider specialist group within the Russian Institutes, and this process has been followed for previous assessments of the Barents Sea snow crab stock. However, the application of the Bayesian stock production model to this stock is a newly developed approach for the snow crab stock and was developed in the time between the publication of the ACDR and the site visit. There has not yet been sufficient time for a formal internal or external peer review of this latest stock assessment approach, and so the SG80 is not met and a condition is raised.

References

Bakanev, S.V. 2015. Stock assessment of the red king crab in the Russian EEZ of the Barents Sea by using depletion models. Voprosy rybolovstva, vol. 16, *No.* 4: 465–476 (in Russian).
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Bakanev, S., Sokolov, K. and Pavlov, V. 2018. Prospects for a Russian snow crab (*Chionoecetes opilio*) fishery in the Barents Sea. Submission to 18th Russian-Norwegian Symposium, 24pp.

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MSC. 2018. MSC Fisheries Standard Version 2.01. 31 August 2018.
Results of the annual joint Norwegian-Russian ecosystem survey in the Barents Sea.

Overall Performance Indicator score	**75**
Condition number (if relevant)	**2**

2. Recommendation for PI 1.2.4

There are uncertainties underlying the method of estimating stock biomass from the ecosystem surveys, and the assessment team recommends that alternative methods of estimating stock biomass are investigated in conjunction with Russian and Norwegian scientists.

7.2.4 Principle 1 References

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7.3 Principle 2

7.3.1 Principle 2 background

The following sections provide the necessary background in order to score the fishery with respect to ecosystem impacts.

a. The Barents Sea Ecosystem

The ecosystem of the Barents Sea has been described in a number of recent MSC full assessments of fisheries located in that area (for example Gaudian et al 2016 (MSC certification report of the Arkhangelsk Trawl fleet Norwegian Barents Sea cod haddock saithe fishery). There is ongoing detailed research into the Barents Sea ecosystem conducted by Russian and Norwegian scientists, as part of the joint research and marine surveys conducted by these countries (Prozorkevich et al 2018). The research is updated on-line as results become available (barentsportal.com). ICES Ecosystem overviews produce regular updates of the Barents Sea (most recent update 2016). The Working Group on Arctic Fisheries regularly updates fisheries species related information on the Barents Sea with reference to the ecosystem (ICES AFWG 2019).

Key features of the Barents Sea ecosystem may be summarized as follows (McBride et al 2016), the region is continuously monitored, with live updates on the barentsportal.com website for the various ecosystem components.

1. High productivity and biodiversity associated with polar front, sea ice edge, and continental slope;
2. Relatively low pollution, although this is monitored regularly in both seabirds and mammals (see individual studies updated on barentsportal.com1;
3. Large inter-annual variations in productivity related to variations in the inflow of Atlantic water and/or other oceanographic changes;
4. Average water temperature in Barents Sea during 2012 was considerably higher than in 2011, and higher than the long-term average (see IMR/ PINRO Joint Report Series 2016 and 2018 – Prozorkevich et al 2018, McBride et al 2016); Cooling favours capelin; warming favours cod and herring;
5. More than 2,500 benthic invertebrate species recorded, with decreasing biodiversity from West to East;
6. Benthos composition highly variable dependent on overlying (Arctic or Atlantic) water;
7. Knowledge of distribution of benthic animals improving through regular joint Russian – Norwegian surveys (Jakobsen & Ozhigin, 2011; Dolan et al 2015).
8. Sea bottom dominated by sponges in certain areas;
9. Deep water coral reefs along the Norwegian coast including the Røst Reef, the world's largest coldwater coral reef, located off Loføten;
10. Relatively short and simple food chains, but complex relationships/feedback between major fish species (cod, haddock, herring, capelin and polar cod) with predator-prey relationships shifting according to opportunity and life cycle stage;
11. Capelin is a key species serving as major predator of zooplankton and major prey species of other fish, birds and mammals. It has suffered three major collapses in the last 25 years, though the causes are poorly understood;
12. Important nursery areas for Norwegian spring spawning herring;
13. Presence of several alien species, including Red king crab (deliberately introduced in the 1960's) and Snow crab (first found on Goose Bank in 1996, suggested to have come into the Barents Sea in ballast water (Sundet and Bakanev, 2014);
14. Highly concentrated fishing pressure based on known movement and aggregation of cod and haddock;

1 https://www.barentsportal.com/barentsportal/index.php/en/maps/101-pollution/pollution-contaminants-in-seabirds

15. Summer population of around 20-25 million seabirds (more than 40 species) that harvest approximately 1.2 million tonnes of biomass annually. Main concentrations of breeding seabirds (more than 80%) are located on the Norwegian mainland, Novaya Zemlya and Svalbard. However, there has been a decline in seabird numbers over the last decade.

16. Seabirds play a significant role in transferring nutrients from sea to land and from North to South

17. Significant marine mammal populations (minke, humpback and fin whale (which breed further south and forage in the sea) beluga and narwhal (which breed in the area), harp, common, grey, bearded, hooded and ringed seals;

18. Minke whale, and some seal species are hunted and subject to a quota;

19. Gas and oil activities are increasing with drop in extent of sea ice.

The IMR/PINRO 2018 ecosystem survey report (Prozorkevich, et al 2018) stated that the snow crab distribution was expanding (Figure 10), which is relevant in the context of the ecosystem, as the fishery follows the snow crab, and with it associated fishery-related impacts.

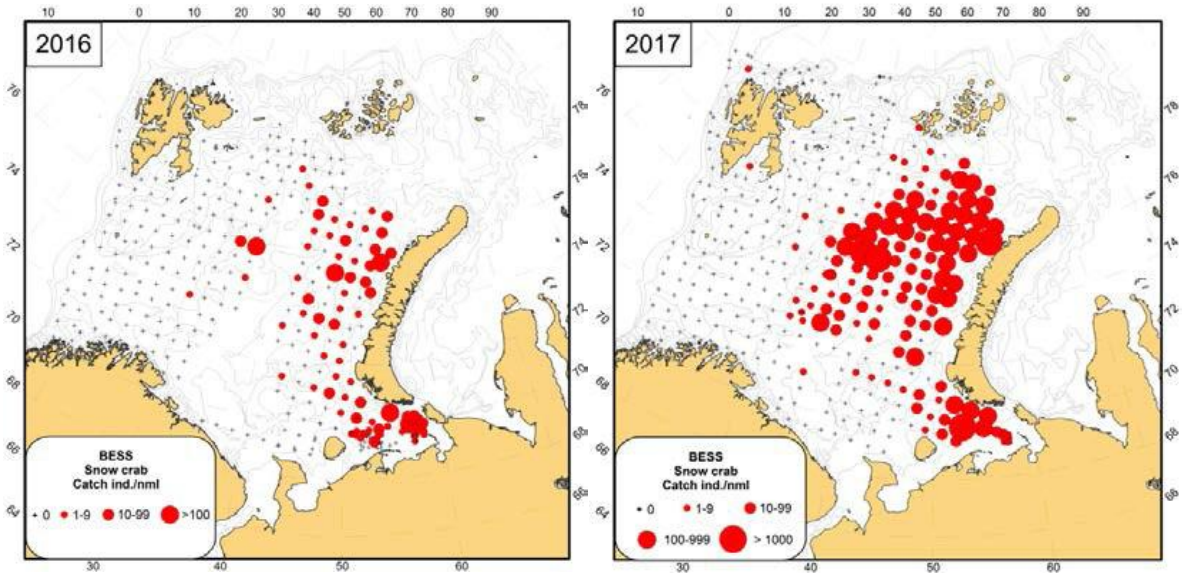


Figure 10: Distribution of Snow Crab (*Chionecetes opilio)* in the Barents Sea, August-October 2016 and 2017. (Source: IMO/PINRO 2018 Ecosystem report)

Recent studies explored large scale patterns in community structure of benthos and fish in the Barents Sea in relation to environmental gradients (Johannesen et al 2017), whereby seawater temperature (Figure 11) was shown to be a major factor. As the Barents Sea continues to warm, the large-scale patterns detected in this study, the interactions between fish and benthos as well as the food web structure are expected to change.

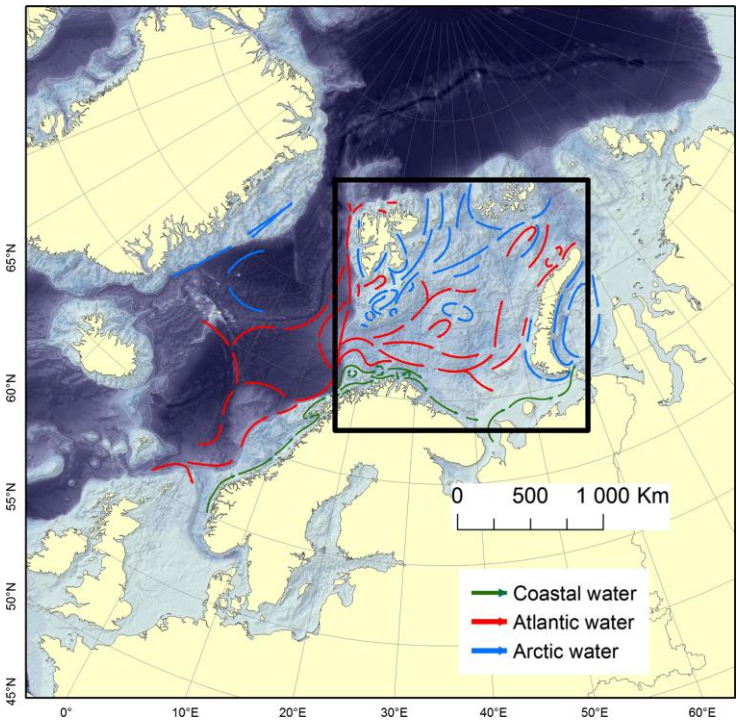


Figure 11: Water temperature pattern in the Barents Sea. (Source: Johannesen *et el.*, 2017)

The Arctic Barents Sea is experiencing a record temperature increase, a poleward shift in the distributions of commercial fish stocks, and invasion by the snow crab, a new predator. Jørgensen et al (2019) evaluated benthic community vulnerability when exposed to seawater warming, bottom trawling, and predation from a new predator – the snow crab. The study showed a recent significant increase in community mean temperature ranks, indicating an increased importance of species with affinity for warmer waters and a reduced importance of coldwater species. Commercial fish stocks and snow crabs are expanding into the western part of the Barents Sea, thereby simultaneously increasing the exposure of large immobile species (currently untouched as there is no fishing in those areas yet) to trawling and of small prey species to crab predation. The study encouraged the identification of vulnerable areas that warrant special measures, including protection from trawling and reduction of the snow crab stock.

b. Habitats

i. Benthic Habitats

Mapping of the benthic habitats in the Barents Sea has been undertaken over many years and is on-going under several national and international programmes (The “Mareano programme2”; The Joint Russian/Norwegian Ecosystem Assessment via Barents Portal3). There are several detailed publications on the Barents Sea ecosystem (Spiridinov et al 2011, Larsen et al 2003, Prokhorova et al 2013).

There is an increasing body of information available, of good enough resolution, to allow better decision-making regarding where to fish and where to protect vulnerable habitats. Areas of high biodiversity value/vulnerability continue to be identified. Available information on habitat types in the Barents Sea shows that there are aggregations of large, non-mobile, long-living habitat-forming species, in particular large deep sea sponges (*Geodia* spp & *Stelletta* spp, *Tethya citrina*, *Thenea muricata*), mussel beds (Modiolus *modiolus*) and some reef species such as Zooanthidae and *Drifa glomerata*. Such deep-sea communities serve as breeding, spawning and nursery areas for many fish species, and provide vital habitat for a variety of species.

The richest communities of hard-bottom benthic species are found along the Norwegian coast and the coast of Svalbard. Reefs of *Lophelia* petusa are found closer inshore in Norwegian territorial waters and are therefore not thought to be in areas fished by the fishery under assessment.

The crab fishery operates at around 300m depth (Figure 12). Vessel tracks provided by the client (Figure 13) for snow crab fishing operations between 1st March to 1st July 2017, can be overlaid with habitat maps in order to give an

2 https://www.mareano.no/en
3 http://barentsportal.com

indication of risk of the trap fishery to underlying benthic habitat. The Russian snow crab fishery in the Barents Sea takes place exclusively in the REZ, i.e. beyond 12nm from shore (Client information, March 2018).

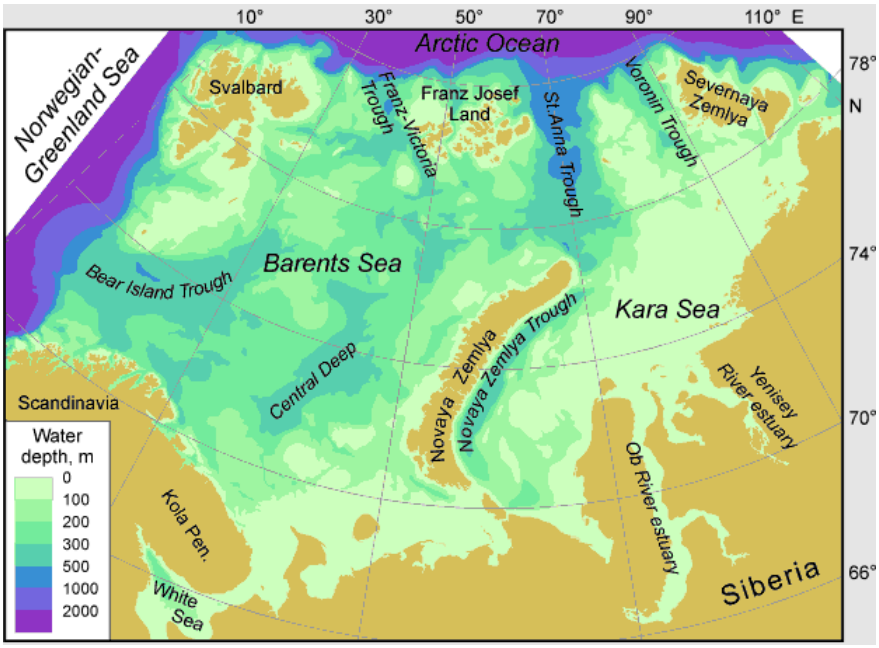


Figure 12: Depth contours of Barents Sea, in relations to where the fishery operates. (Source: http://research.bpcrc.osu.edu/foram/maps.htm**)**

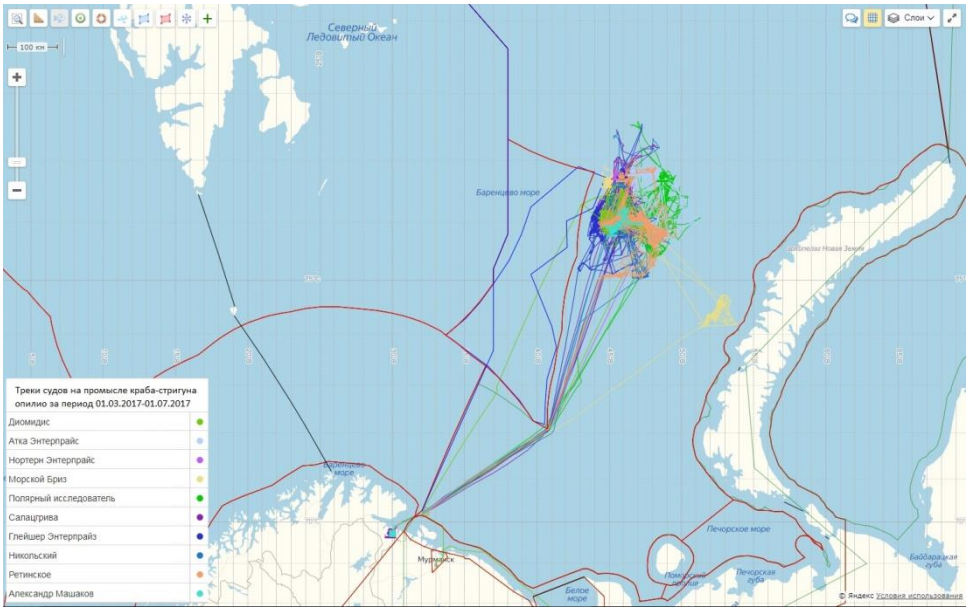


Figure 13: Vessel tracks of all snow crab vessels between 1.03 to 1.07, 2017, showing the predominant location of the snow crab fishing operations. (Source: Client March 2018)

The underlying sediment map (Figure 14) shows that the common habitat type is sedimentary, mud and sandy mud, gravel, gravelly sand, and boulders in some places. The mapping programme also showed that there are no sensitive habitat types, such as hard or soft bottom sponge communities, coralline communities etc in the area where the snow crab fishery takes place, although several community types have been identified in the area (Figure 15; Figure 16).

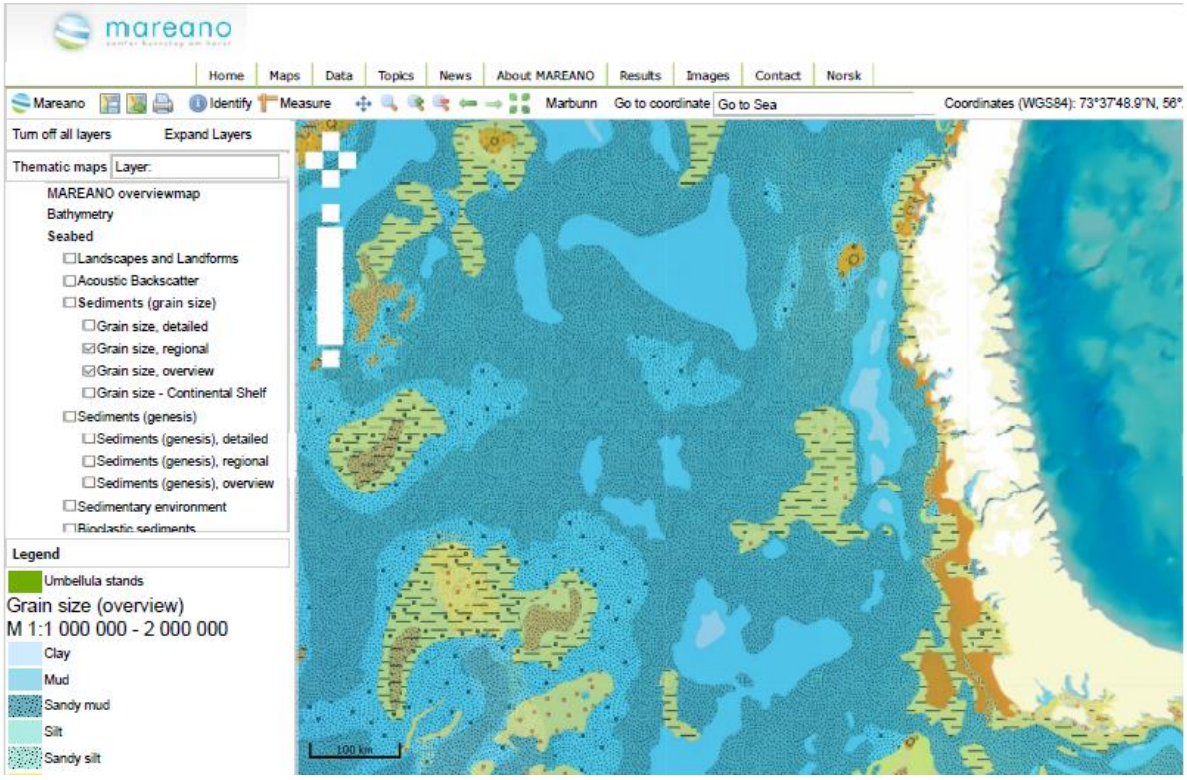
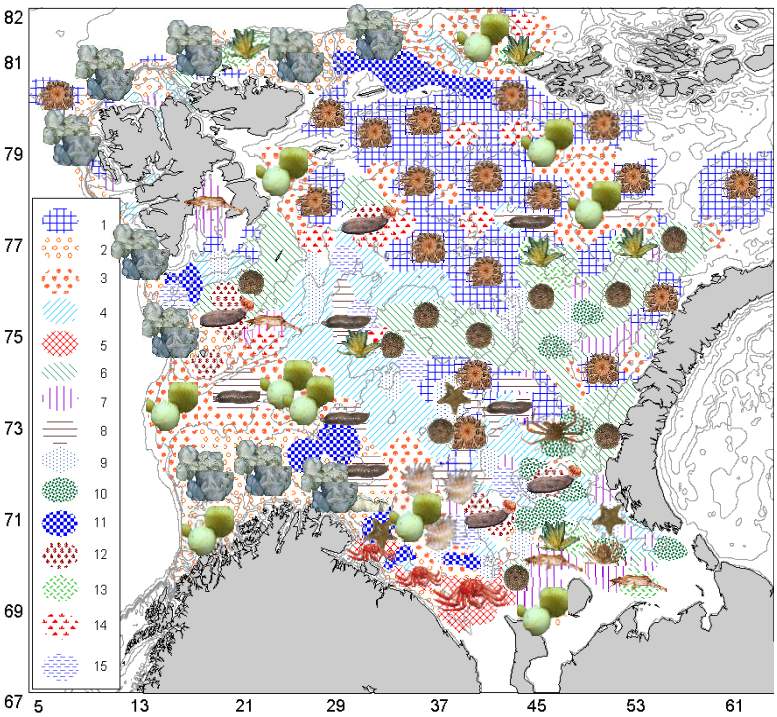


Figure 14: Sediment map of the area of the Barents Sea where the snow crab fishery operates. (Source: http://www.mareano.no/kart/mareano_en.html?language=en#maps/3541 generated May 2019**)**



Legend: 1 - *Gorgonocephalus spp., 2 - Geodia spp., 3 - Spongia g. Spp., 4 - Ctenodiscus crispatus, 5 - Paralithodes camtschaticus, 6 - Strongylocentrotus spp., 7 - Sabinea septemcarinata, 8 -Molpadia spp., 9 - Urasterias linckii, 10 - Chionoecetes opilio, 11 - Hippasteria phrygiana, 12 - Cucumaria frondosa, 13 - Sclerocrangon spp., 14 - Crinoidea g. spp., 15 -Icasteriaspanopla*

Figure 15: Areas with various dominant representatives of megazoobenthos in the Barents Sea in 2006-2011. (Source: Anisimova *et al.*, 2010)

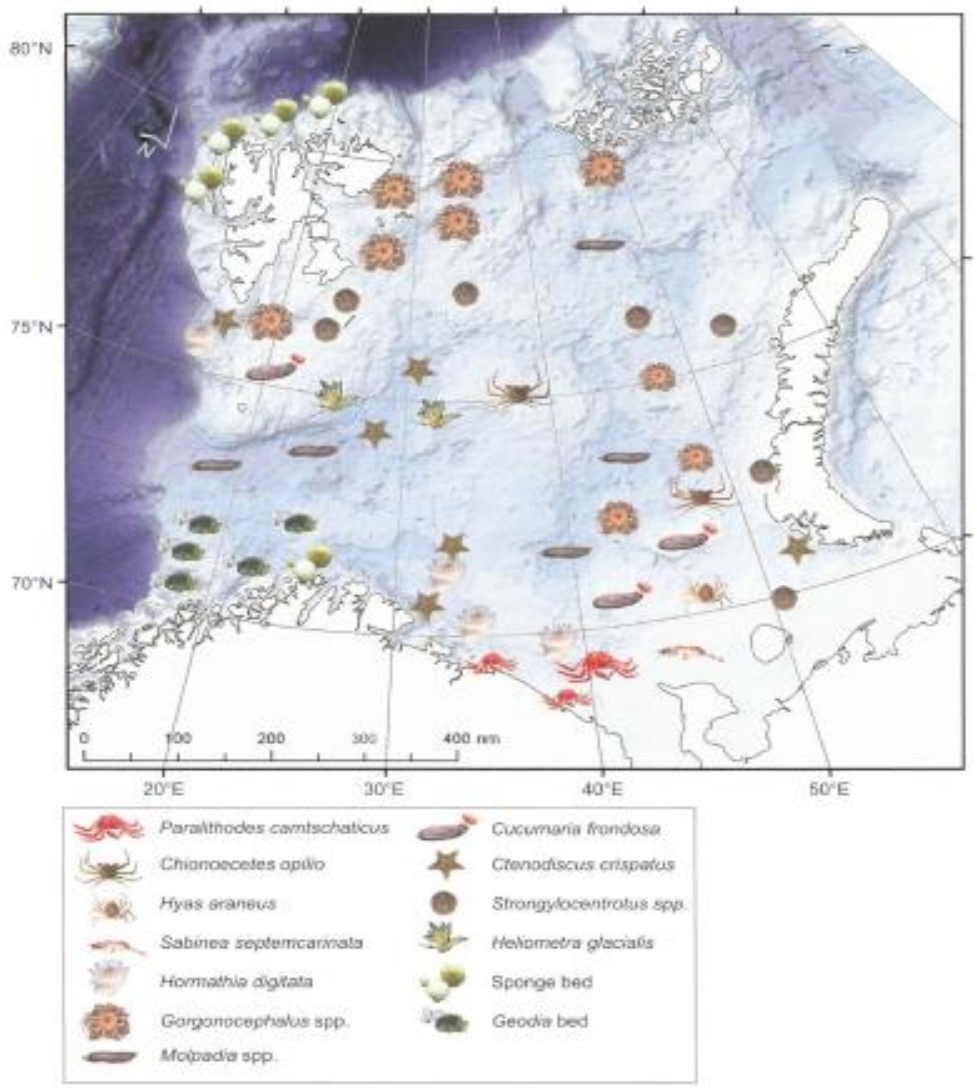


Figure 4.1.13. Communities defined by statistical analyses and illustrated by dominant species. Detritus feeder communities dominated by: *Molpadia* spp., *Ctenodiscus crispatus*, *Strongylocentrotus* spp.; suspension feeder communities dominated by: *Gorgonocephalus* spp., *Heliometra glacialis*, sponges, *Cucumaria frondosa*; carnivorous communities dominated by: *Chionoecetes opilio*, *Paralithodes camtschaticus*, *Hyas araneus*, *Hormathia digitata*, *Sabinea septemcarinata*.

Figure 16: Benthic communities in the Barents Sea. (Source: Jakobsen & Ozhigin, 2001)

Benthic communities that may be encountered by the opilio fishery vessels, as derived primarily from Jakobsen and Ozhigen 2011, Denisenko and Zgurovsky 2013, and various publications related to the joint PINRO/IMR ecosystem surveys, appear to be soft bottom species (Echinoid including crinoid communities, and sponges for example).

The distribution of large benthos groups shows that Porifera (mainly the *Geodia* group) dominate biomass in the west, while Echinodermata (mainly brittle stars) dominate in the east. In the Northeast, Cnidaria (soft corals, such as the sea pen *Umbellula encrinus*, and sea anemones) dominates along with Echinodermata, while Crustacea dominates along with the Echinodermata in the Southeast (Figure 17).

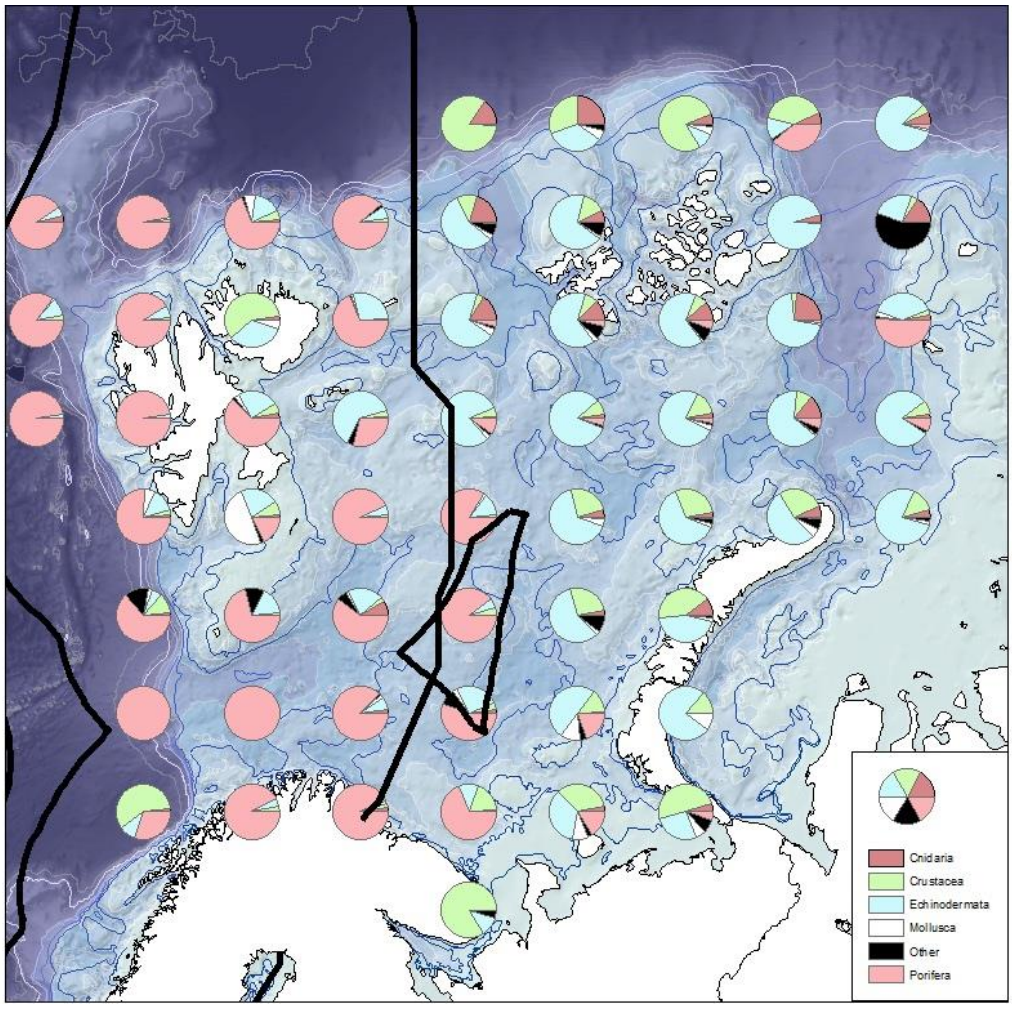


Figure 17: The main benthos group distribution (in biomass). The data are the integrated mean for the period 2009-2014. (Source: Jørgensen *et al.*, 2019) [4]

A study by Jørgensen et al (2015) on the distribution of benthos revealed four main megafaunal regions: southwestern (SW), banks/slopes in southeast and west (SEW), north-western (NW), and north-eastern (NE). The distribution of this region-specific benthos was significantly related to depth, temperature, salinity, and number of ice-days. The SW region was dominated by filter-feeders (sponges) in the inflow area of warm Atlantic water while the deeper trenches had a detritivorous fauna (echinoderms). In the SEW region, predators (starfish, anemones and snow crabs) prevailed together with filtrating species (sea cucumber and bivalves) within a mosaic of banks and slopes. Plankton-feeding brittle stars were common in the NW and NE region, but with increasing snow crab population in NE. The study concluded that climate change, potentially expanding trawling activity, and increasing snow and king crab populations might all have an impact on the benthos. It suggested that benthos should therefore be a part of an integrated assessment of a changing sea, and national agencies might consider adding benthic taxonomic expertise on-board scientific research vessels to identify the invertebrate “bycatch” as part of routine trawl surveys. Indeed, this is an integral part of MSC certified fisheries.

Dependent on their sex and size, the diet of snow crabs consists of polychaetes, shrimps, crabs, smaller crustaceans, clams, brittle stars, gastropods, and sea urchins (Squires & Dawe 2003), which live in and on based on sedimentary habitat types. These prey species were common in the southeast, central, and north-western part of the Barents Sea (Jørgensen et al 2019), which is of relevance regarding the expansion NW-wards of snow crab. It can be summarised that for this fishery the commonly encountered habitat type is sedimentary, mud and sandy mud, gravel, gravelly sand, and boulders in some places. The main community types that may be encountered by the snow crab fishery vessels, as derived primarily from Jakobsen & Ozhigen (2011) and Denisenko & Zgurovsky (2013), and various publications related to the joint PINRO/IMR ecosystem surveys, appears to be *Echinoid* communities, including *Strongylocentrotus* spp and *Gorgonocephalus* spp, *Crinoidea* spp. Considering where the snow crab fishery is located, and the dietary needs of the species, the fishery is unlikely to encounter hard bottom and reef communities. This is confirmed by the

[4] Jørgensen at al 2019 – live website accessed at 27th Feb 2019; http://www.barentsportal.com/barentsportal/index.php/en/biotic-components/182-benthos-and-shellfish-2017/772-benthos-and-shellfish

bycatch information available from scientific records 2013-2016 (Table 19 in Section 7.3.1d; PINRO – Client information 2018).

ii. VMEs and Protected Areas

International guidance and vulnerable marine ecosystems (VMEs)

Following on from guidance produced by FAO (2009), there has been increasing activity on the parts of governments and Regional Fisheries Management Organisations RFMOs to define and manage "vulnerable marine ecosystems". These are typically interpreted as significant aggregations of benthic organisms that create benthic habitats of importance in their own right and as habitat for other organisms. These areas may show high structural diversity, biodiversity and productivity and may in turn be important for the long-term health of commercial fish and shellfish stocks. In its advice to NEAFC and NAFO, ICES list seven VME habitat types for the Northeast Atlantic and the taxa and species that are most likely to be found in these habitats (ICES special request Advice 2013). Criteria for a VME indicator are based on traits related to functional significance, fragility, and the life-history traits of component species that show slow recovery to disturbance. For each group, it is the dense aggregations (beds/ fields) that are considered to be VME in order to establish functional significance. Indicators include for example various species of crinoids, erect bryozoans, large sea squirts, sponges and corals.

NEAFC VME habitat types include:

1 - Cold water coral reef:

Lophelia pertusa reef

Solenosmilia variabilis reef

2 - Coral garden:

a) Hard-bottom coral garden

- Hard-bottom gorgonian and black coral gardens
- Colonial scleractinians on rocky outcrops (incl. *L.pertusa*)
- Non-reefal scleractinian aggregations

b) Soft bottom coral gardens

3 - Deep sea sponge aggregations

4 - Seapen fields

5 - Tube dwelling anemone patches

6 - Mud and sand emergent fauna

7 - Bryozoan patches

FAO also offers guidance as to the meaning of "significant adverse effects" on VMEs (FAO 2009): They are those that compromise ecosystem integrity (i.e. ecosystem structure or function) in a manner that:

- impairs the ability of affected populations to replace themselves,
- degrades the long-term natural productivity of habitats, or
- causes, on more than a temporary basis, significant loss of species richness, habitat or community types

OSPAR (to which Norway is party, but not (as yet) Russia) also lists threatened and/or declining species and habitats (OSPAR 2010; OSPAR agreement 2008-6: list of declining species/habitats in the NE Atlantic) in sub-areas I&II and of relevance to these fisheries, including for example Coral gardens, Deep sea sponge aggregations, *Lophelia pertusa* reefs *Modiolus* beds, Seapen and burrowing megafauna communities.

There are no known hard coral and coral garden colonies North of the Varanger peninsula or within the Russian EEZ. The client fishery does not fish in this area. No detailed surveys, MAREANO-style, have been conducted further north, to the SW of Svalbaard. The information was provided here in order to demonstrate that mapping surveys have located sensitive habitats along the Norwegian coast, and along certain depth contours, and it may be extrapolated that such habitats are likely to occur along the Southwestern coast of Svalbard.

Hardbottom coral garden: These aggregations (mainly sea fans) occur on hard substrates exposed to strong currents. Their distribution has been mapped in the Norwegian EEZ (excluding Svalbaard) as part of MAREANO. They occur at the upper edge of the continental slope to the West of Tromsø and the Lofoten Islands. The fishery under assessment

does not fish in the area mapped by MAREANO, but these species may well occur around Svalbaard, where the fishery operates.

Softbottom coral gardens: "Soft coral" species belonging to the Alcyonacea are relatively common on silty and mixed bottom substrates throughout the Barents Sea, including *Gersemia fruticosa, G. rubiformis, Drifa glomerata and Duva florida*. While most of these species need hard bottom or rock on which to attach, *Gersemia* is able to anchor itself in relatively soft sediments and establish significant colonies. These species are relatively common and widely dispersed, but dense aggregations appear to be unusual. However, an extensive area of softbottom coral garden has been mapped on the upper part of the continental slope to the northwest of Finmark (roughly 70º00' to 70º30'N; 14º45 to 16º17E). The MAREANO project mapped areas in the SW Barents Sea and Norwegian Sea. Mapping has not yet been conducted further North, towards Svalbaard, and based on the sediment maps, it is likely that such species occur there.

Seapen fields: Aggregations of *Umbellula* are relatively common throughout both Barents and Norwegian Seas, occurring in the central and lower parts of the continental slope. *Umbellula incrinis* is found in dense aggregations on soft muddy substrates in the north-eastern part of the Barents Sea near the St. Anna Trough. The long stalks (up to 1m) mean that these organisms are vulnerable to trawling and are regularly found as bycatch in this area. The MAREANO project mapped areas in the SW Barents Sea and Norwegian Sea.

Ostur sponge aggregations: Aggregations of sponges, mainly *Geodia, Thenea, Tetilla, Phakellia, Rhadiella, and Polymastia* are characteristic of substantial areas of the Barents Sea shelf as determined in surveys early in the 20th century. These sponges form mass settlements in areas with active sea bottom hydrodynamics, notably on deepwater banks and slopes. The richest communities of sponges are found along the edge of the Barents Sea shelf and at the upper parts of the continental slope. Larger settlements of *Geodia* sponges are found in the most south-western parts of the shelf and the Tromsø Bank (Tromsøflaket) where the Norwegian current encounters the Barents Sea shelf. A rich fauna of hydroids and bryozoans is usually found in association with these sponges.

It is notable that ICES (Special advice 2013) has developed a list of sponge species which are habitat-forming and can be considered indicators of sponge VMEs in the North Atlantic. These are species that form the sponge grounds and host a variety of associated smaller sponge species that contribute to the biodiversity of the habitat. 41 sponge species and 9 species of colonial Anthozoan polyps, which are classified as VME indicator species according to NAFO and NEAFC, occur in the Barents Sea (Zakharov et al., 2016). The majority of Anthozoan polyp species from the NAFO and NEAFC lists of VME indicator species were sporadically found within the Barents Sea shelf in small quantities. The exception is sea pens *Umbellula incrinus* that develop dense settlements in the northeastern Barents Sea on the western slope of the St. Anna's Channel. They were not found in crab trap catches. None of these were recorded in the observer report – (PINRO, 2017, in client information pack – please see Section 7.3.1d)

VMEs in the Barents and Norwegian Sea relevant to this assessment

Russia has been party to the process of developing VME advice and the NEAFC recommendation (ICES Advice 2008), but application of the rules and protocols has not yet been formalized in Russian regulations, although there is work ongoing as part of wider fisheries management in the Barents Sea (see Coordination Council for Development of Sustainable Fishery in the North Atlantic in Gaudian et al 2016).

Russia has signed several international agreements and conventions on species protection and management of relevance to the Barents Sea Fisheries:

» the Convention on Biological Diversity (CBD),

» the Convention on Trade in Endangered Species of Wild Animals (CITES)

» the Convention on the Conservation of Migratory Species of Wild Animals (CMS),

» the Agreement on North Atlantic Marine Mammal Commission (NAMMCO)

In Russian waters closed areas - both seasonal and permanent - are a regularly applied fisheries management tool. The focus for the majority of these closures is to protect spawning and nursery areas of certain commercial species (e.g. red king crab). Protected areas in Svalbard, Norwegian Arctic (Figure 18), were originally established under the 1925 Svalbard Act. When the Svalbard Environmental Protection Act entered into force in 2002, all national parks and nature reserves in Svalbard was protected under the new act. In all, 65 per cent of the area of the islands is protected, together with about 75 per cent of the territorial waters out to the 12-nautical-mile territorial limit. The newest national park, Indre Wijdefjorden, was established in 2005.

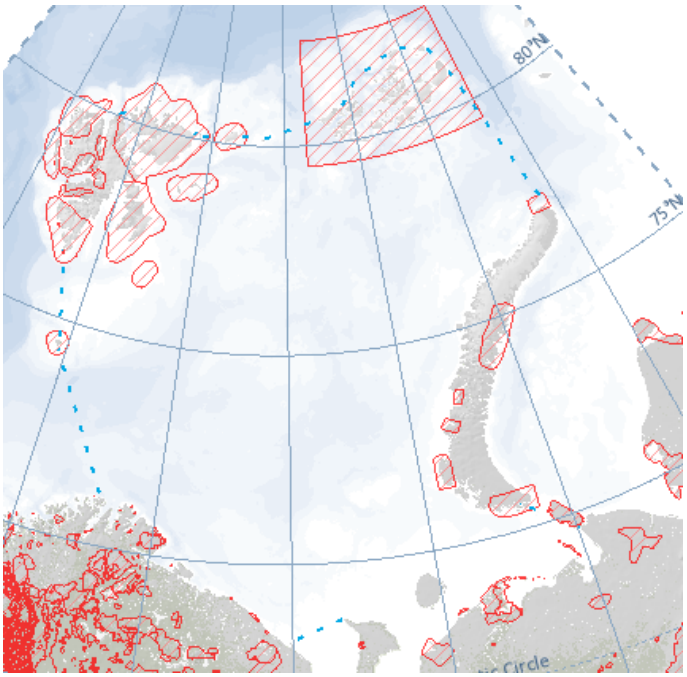


Figure 18: Protected areas in the Barents Sea area. (Source: www.barentsportal.com)

The Fishery Regulations for the Northern Fisheries Basin, as well as the protocols of JNRFC indicate fishing areas (including seasonal) in which fishing is prohibited, to protect spawning sites and feeding sites of juveniles of certain commercial species. The decision on closing and opening of fishing areas was adopted by the Directorate of Fisheries (Norway), and the Barents Sea and White Sea Territorial Administration of Rosrybolovstvo (Russia). The criteria for closing areas to fishing are outlined in the Protocol of the Joint Norwegian-Russian Fisheries Commission. This information is posted on the official websites of these organizations and regularly updated, as the closed area locations may change throughout the season. These updates are also reported by the management of the BBTA to all relevant fishing companies (Client information May 2019).

There are currently no closed areas to protect benthic habitats in the Russian Barents Sea, and no such areas are defined in relevant fisheries legislation. While some protection is now in place in the Norwegian Sea, in particular along the coast of Norway, for the less common and more delicate VMEs such as corals (and biogenic reefs more generally), protection remains limited for more widespread but ecologically important habitats, and there is no such protection in the Russian Barents Sea. Jørgensen et al (2019) identified a combination of pressures (temperature, trawling and snow crab expansion) and suggested that management (e.g. closed areas, effort management, gear modification) in the north-western Barents Sea should take steps to limit the effects from bottom trawling and the growing snow crab population inside these species-rich, complex cold-water communities

Russian fishing companies which are MSC certified are planning to establish such areas as protected areas, based on existing habitat maps created through the MAREANO programme, PINRO, and data received from participating fishing vessels through their MSC-logs on benthic organism interactions. Such boundaries, based on concentrations of particular benthic communities, will be set on a voluntary basis. The stated aim is to not fish in those closed areas (Client information and interviews, May 2019). This work is a joint effort of PINRO, WWF, and the fishing companies operating in the Barents and Norwegian seas. Currently, a list is being prepared which contains those species which are indicators of potential VMEs in the Barents Sea; this list is drawn up from those benthic organisms caught in the trap as well as the trawl fisheries.

After extensive field testing and research software designed to record benthos and rare species bycatch was implemented across participating trap and trawl fisheries (those companies that have or are applying for MSC certification). This software and recording programme is being rolled out since the beginning of 2019. Data from vessels will be transmitted to WWF and PINRO for analysis and habitat mapping purposes (Client information May 2019).

c. Gear deployment

The crab pot is designed as follows:

Conical string pots (Figure 19) – 1.5m diameter at the base, 90cm height, 2.5mm 3-strand net. Biodegradable material is used in the attachment of one of the side panels of the trap, consisting of 3mm diameter cotton thread. This degrades after one month (Client interview May 2019). This is regulated by law, as part of the technical regulations for the crab fishery and checked by inspectors.

Figure 19: Conical crab pot.

A dedicated crab fishing vessel can hold between 3000 to 6000 pots. The number of traps is limited by capacity of the vessel to hold traps as well as processing capacity. Between 100 to 150 pots are involved along each line, covering a length of seafloor of 150m, the lines are separated from each other by about 150m. The line of pots is anchored at each end and marked with marker buoys. The buoys are clearly marked with the vessel registration number and name. Soak time is between 3-5 days. The majority of traps employed in the snow crab fishery are deployed at depths of around 300m. The traps are repaired and updated before every season. The deployment of the traps is a continuous process, all day for 18hrs for 105 days, between March to July, as that is the best time for good condition crab.

All eleven crab catchers involved in this fishery use the same type of pots (Client information May 2019). According to client information, about 20 traps are lost per vessel per season, which means around 220 traps are lost per fishing season (i.e. 11 vessels x 20 traps). There is currently no research on pot design, as the design used is traditional and has been tried and tested over many years – so the fishery is sticking with the current design. The only modification over the years has been the use of biodegradable string to hold one of the panels, which biodegrades after one month (according to Client Interview May 2019) in order to avoid ghost fishing where a pot may be lost5.

The skippers are experienced and use that knowledge to find good opilio fishing areas. After each voyage the relevant observations on the voyage, including location, are written up and filed. There are no habitat maps on the bridge for this fishery, skipper's experience is used. The vessels explore new areas for fishing opilio, partly based on the distribution expansion record of the snow crab, which in turn is based on the records made during research grab sampling. There are always scientists on board, the scientists also provide advice on good fishing areas. There is one observer on each voyage, which is deemed adequate, as the vessels fish in a limited area (Client information, May 2019).

There is no formal review process of this fishery regarding the gear and deployment, as traps have been traditionally used and are considered low impact (Client interview, May 2019).

Selectivity of the gear: there is no specific gear selectivity. Observations have shown that small crabs do not enter the trap when adult crabs are already present.

Bait: the pots are baited with squid, cod heads, fish fat or herring. The bait is sourced from a company in Norway. The bait issue is discussed under Section 7.3.1d.ii, as bait is considered under the Primary species component.

Move-on-rule: The NEAFC recommendations for the protection of vulnerable marine ecosystems are specifically designed to "prevent significant adverse effects on vulnerable marine ecosystems". Article 8 prescribes that in the event of any collision with vulnerable marine ecosystems (defined as > 30kg of live coral and/or > 400kg of live sponges), the collision shall be specifically reported and removed by at least 2 nautical miles from the trawl course. Information should be checked and preferably plotted on a map. Note – this applies to trawl gear. Although this recommendation is not mandatory for national jurisdictions, including Russia, and the application of these rules and regulations is not reflected in the Russian regulations, Russian fishing vessels follow these recommendations on a voluntary basis. There are no

5 The crab pots have a side panel of 350x400 mm in size with mesh consisting of 2-3mm diameter biodegradable cotton thread. Before each voyage updated panels with biodegradable twine are installed into the pots. During fishing this cotton thread degrades after one month of pot use and this element of pots is renewed and repaired by the crew (Client information Oct 2019)

specific weight limits for trap gear, which reflects the nature of this passive gear, yet the trap fishers are aware of this recommendation as part of their training.

i. Impact of gear on benthos

Repeated use of mobile fishing gear can degrade habitat complexity by: (1) directly removing or damaging epifauna; (2) smoothing sedimentary bedforms and reducing rugosity; and (3) eliminating taxa that produce structure where fish aggregate (Auster & Langton, 1999). Disturbance to benthic habitat as a result of fishing with passive gear, such as traps, can create impacts similar in scope to that of mobile gear (Auster & Langton, 1999). Despite the widespread use of passive fishing gear, there appear to be few studies on the impacts of traps on benthos.

The extent of bottom impacts from pots depends on the type of bottom habitat where the setting and retrieval of pots occurs. The snow crab fishery takes place in predominantly sandy or silty bottom areas, at depths below 100m. Pots are considered less damaging compared to trawls or dredges because pots are predominantly static gears (NOAA,website accessed 20 July 2019: http://www.fishwatch.gov/profiles/red-king-crab (accessed 1112017). As a bottom gear, they have contact with a substantially smaller area of the seafloor than dredges or trawls. Pots 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 or when pots are stuck in the sand (Morgan and Chuenpagdee 2003). 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 pots (including the kind used in the snow crab fishery) generally have a “medium impact” on physical structure and a “low impact” on biological habitat (seafloor organisms).

A study by Schweitzer et al (2018) indicated that all traps in the line (here a 384m long line of 20 fish traps, for lobster and bass) were dragged along the bottom and damaged living epifauna, suggesting that the real impacts of trap lines may have been underestimated.

Eno et al. (2001) studied the effects of pots and traps set over a range of habitats in Scottish waters, albeit the traps and pots were light compared to those used by the snow crab fishery, and the study was conducted in waters of less than 23m depth (Table 17). The study concluded that the use of pots and traps had no lasting effects on sea pens, sea fans, or sponges. It observed that mud communities fully recovered from pot impact within 72–144 hours of pot removal. Hauling the pots along the ocean bottom during pot removal left a track in the sediments, but biological abundance within the area was not affected. Soft sediments, where snow crabs occur, are less likely to be impacted than hard structures that rise above the seafloor (Quandt 1999). The impact of fishing gear on habitat also depends on the spatial scale of the fishery, because although each pot may have a small impact, the cumulative effect of thousands of pots can be larger (Morgan and Chuenpagdee 2003).

Table 17: Effect of traps/ pots study on habitat. (Source: Johnson, 2002)

Reference	Location	Depth	Sediment	Type of Effects	Recovery	Comments
Eno et al. 2001	Great Britain	<23 m	mud	bending and uprooting of sea pens	sea pens re-root in 24-72 hours	experimental fishing (1 site)
Eno et al. 2001	Great Britain	<23 m	limestone slabs covered by sediment, coarse sediment with boulders	bending of sea fans	immediate after removal of pots	experimental fishing (1site) with 3 types of commercial pots
Eno et al. 2001	Great Britain	<23 m	rocky substrate	abundance of sponges increased		experimental fishing (5 sites) with commercial crustacean pots

The fishery occurs within a specific limited area, where the crabs are found, rather than across the whole of the Barents Sea. Based on the information on gears and deployment available, 11 vessels would theoretically cover an area of roughly 10km^2 at any one time (this figure was derived at by using the information provided by the client on gear deployment, see c) above). But as vessels follow the target species, the areal footprint varies with the distribution of the snow crab and local sea conditions. The vessel tracks available for the 2017 fishing season (Figure 13). Client information 2018) show that the fishery operates within a defined/limited area (the limit relating to snow crab density/catchability). Detailed observations on the presence of non-target species bycatch were conducted between 2013 to 2016 by scientists (PINRO data via Client information 2018), Table 18. The data collected is presence- absence data, no weights or numbers of individuals were given, nor was the information broken down per trap line, for example.

It shows a diversity of benthic species, both sessile and mobile. Some of the echinoderm species for example would be attracted to the trap because of the bait.

Table 18: Invertebrate bycatch observations 2013-2016. (Source: Client Information 2018, from PINRO)

Invertebrates	
Crustaceans	
Spider crab	*Hyas araneus*
Amphipods	*Paramphithoe hystrix*
Sponges	*Tetilla polyura*
	Polymastia thielei
	Thenea muricata
	Stylocordyla borealis
	Tentorium semisuberites
	Phakellia sp.
	Asbestopluma sp.
	Hamacantha implicans
	Forcepia sp.
	Radiella grimaldiii
Anthozoan polyps	*Nephteidae sp.*
	Drifa glomerata
	Gersemia rubiformis
	Duva florida
Bryozoans	*Hornera lichenoides*
	Flustra sp.
	Flustridae g.sp.
	Porella sp.
	Leieschara sp.
	Bowerbankia sp.
Echinoderms	*Strongylocentrotus pallidus*
	Strongylocentrotidae g.
	Solaster endeca
	Ctenodiscus crispatus
	Urasterias linckii
	Icasterias panopla
	Pontasstertenuis pinus
	Lophaster furcifer
	Poraniomorphahus pida
	Thyonidium drummondi
	Molpadia arctica
	M. borealis
	Ophioscolex glacialis
	Ophiopholis aculeate
	Ophiacantha bidentate
	Ophiura sarsi
	O. robusta
	Ophiopleura borealis
	Gorgonocephalus arcticus
	Heliometra glacialis
Worms	*Maldanidae g. sp.*
	Terebellidae g. sp.
	Spiochaetopterus typicus
	Lumbrineris sp.
	Nemertina g. sp.
	Priapulus caudatus (Priapulida)
Bivalves	*Clinocardium ciliatum*
	Portlandia arctica
	Chlamys islandica
Gastropods	*Colus sabini*
	Turrisipho lachesis
	Buccinidae

According to Client interview May 2019, bycatch of benthic species and non-crab bycatch, interaction with birds and marine mammals, is recorded on an MSC type log, using specially designed identification guides where needed. Quantity and type etc, are recorded, where appropriate. After extensive field testing and research software designed to record benthos and rare species bycatch is being implemented across participating trap and trawl fisheries (those companies that have or are applying for MSC certification). This software and recording programme are being rolled out since the beginning of 2019. Data from vessels will be transmitted to WWF and PINRO for analysis and habitat mapping purposes (Client information May 2019).

Information on non-crab bycatch for this assessment of the fishery consisted of the presence absence data for the period 2013-2016. The new software log will provide improved detail, with weights and/or numbers of individuals per fishing season. The data from the vessels will be analysed by PINRO and WWF-Murmansk to aid with the creation of improved habitat maps, possible closed areas based on VMEs where appropriate, as well as improved non-commercial species bycatch knowledge.

Any bycatch of non- commercial species entering the traps is immediately released back into the water, after having been recorded. The bycatch can be measured in numbers of individuals, it is small. (Client information, May 2019). Commercially valuable species are subject to reporting, processing and unloading.

ii. Impact of snow-crab on benthos

Increasingly studies are being published which show the impact of the snow crab, an invasive species in the Barents Sea since first observed in grab surveys in 1996. The spatial impact on benthos biomass done by the snow crab predation (Manushin, 2016) shows that the highest impact is located west of Novaya Zemlya (Figure 20) and in an area dominated by the polychaete *Spiochaetopterus typicus* (deeper areas with adult snow crabs) and the bivalve *Macoma calcarea* (shallower areas with juvenile snow crabs) (Manushin, 2016 in ICES WGIBAR 2017).

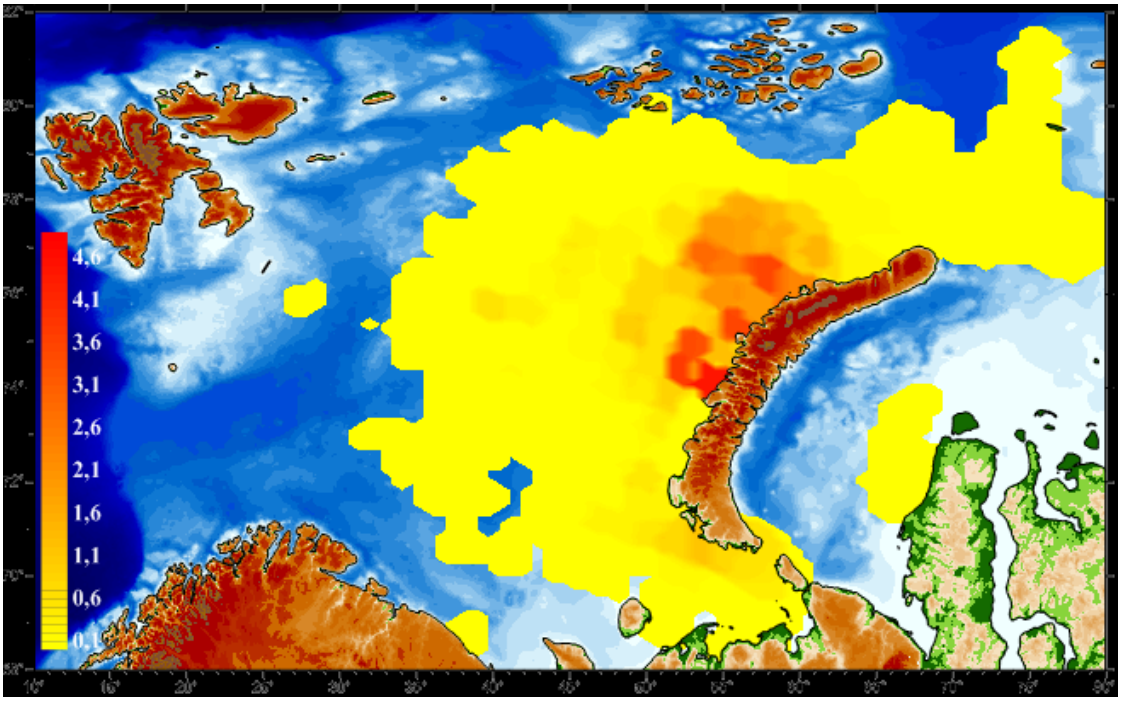


Figure 20: Total biomass (g/m$_2$) of the benthos consumed/ killed by the snow crab population during a nine-year period (2005-2014). (Source: Manushin, 2016 – in ICES WGIBAR 2017)

Studies by Jørgensen et al (2019) show the expansion of snow crab with underlying changes of the benthos community composition.

d. Primary, Secondary Species

The client provided observer data of marine organisms recorded by FSBSI (PINRO) of the by-catch in the snow crab fishery from 2013-2016. The data showed that the by-catch was composed of bottom fish species, crustaceans, echinoderms, molluscs and worms (Table 19). No events of marine birds or mammals being caught by snow crab traps have been reported, nor any interaction with the gear by larger marine mammals. The majority of larger animals attracted

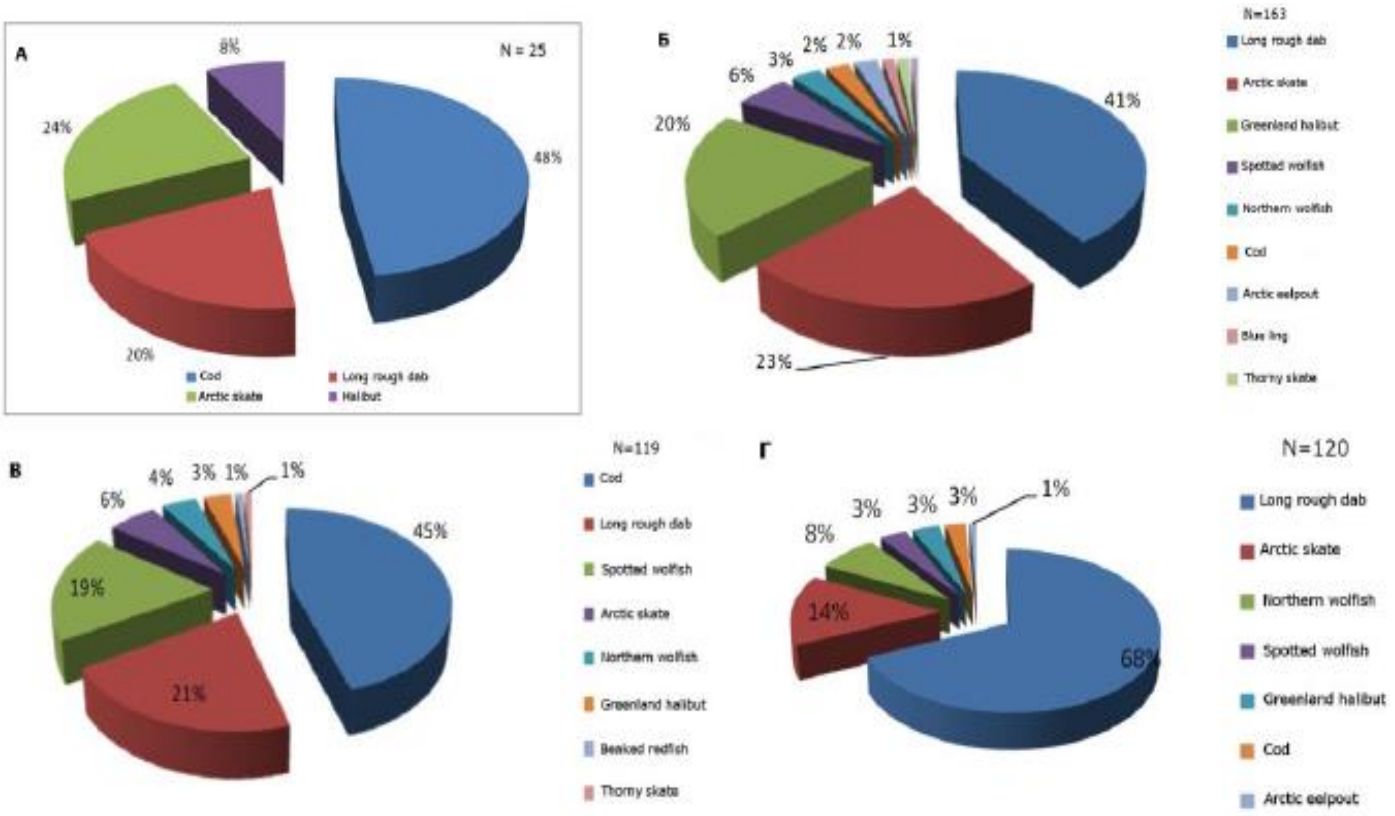
by the bait are capable of escaping a crab trap through its openings that are wide enough (PINRO 2017 report translated and provided by Client information, March 2018.

Table 19: By-catch data in the snow crab fishery 2013-2016. (Source: PINRO 2017 report provided in translation by client)

Species, Taxon	Name in Latin
Fishes	
Atlantic cod	*Gadus morhua*
Beaked redfish	*Sebastes mentella*
Spotted wolfish	*Anarhichas minor*
Northern wolfish	*Anarhichas denticulatus*
Thorny skate	*Amblyraja radiata*
Arctic skate	*Amblyraja hyperborea*
Greenland halibut	*Reinhardtius hippoglossoides*
Long rough dab	*Hippoglossoides platessoides*
Arctic eelpout	*Lycodes reticulatus*
Blue ling	*Molva molva*
Grey gurnard	*Chelidonichthys gurnardus*
Invertebrates	
Crustaceans	
Spider crab	*Hyas araneus*
Amphipods	*Paramphithoe hystrix*
Sponges	*Tetilla polyura*
	Polymastia thielei
	Thenea muricata
	Stylocordyla borealis
	Tentorium semisuberites
	Phakellia sp.
	Asbestopluma sp.
	Hamacantha implicans
	Forcepia sp.
	Radiella grimaldiii
Anthozoan polyps	*Nephteidae sp.*
	Drifa glomerata
	Gersemia rubiformis
	Duva florida
Bryozoans	*Hornera lichenoides*
	Flustra sp.
	Flustridae g.sp.
	Porella sp.
	Leieschara sp.
	Bowerbankia sp.

Echinoderms	*Strongylocentrotus pallidus*
	Strongylocentrotidae g.
	Solaster endeca
	Ctenodiscus crispatus
	Urasterias linckii
	Icasterias panopla
	Pontasstertenuis pinus
	Lophaster furcifer
	Poraniomorphahus pida
	Thyonidium drummondi
	Molpadia arctica
	M. borealis
	Ophioscolex glacialis
	Ophiopholis aculeate
	Ophiacantha bidentate
	Ophiura sarsi
	O. robusta
	Ophiopleura borealis
	Gorgonocephalus arcticus
	Heliometra glacialis
Worms	*Maldanidae g. sp.*
	Terebellidae g. sp.
	Spiochaetopterus typicus
	Lumbrineris sp.
	Nemertina g. sp.
	Priapulus caudatus (Priapulida)
Bivalves	*Clinocardium ciliatum*
	Portlandia arctica
	Chlamys islandica
Gastropods	*Colus sabini*
	Turrisipho lachesis
	Buccinidae

The information on bycatch provided by the client indicated that bycatch was small in that the amount of bycatch was given as numbers of individuals. Descriptive quantities are presented in pie-charts in the PINRO (2017) report: Cod, long rough dab, Arctic skate and spotted wolffish were among the commercial fishes taken in by-catch in the snow crab fishery in the Barents Sea.



А: Nov-Dec 2013; N=25

Б: April-July 2014; N = 163

В: August – September 2015; N = 119

Г: April – June 2016; N = 120

Figure 21: Species composition of bottom fish by-catch in the Barents Sea snow crab trap fishery in November-December 2013 (А); April-July 2014 (Б); August-September 2015 (В); April-June 2016 (г). (Source: PINRO by-catch report 2017)

Among 11 fish species observed, the more frequently recorded fish species were cod, long rough dab, Arctic skate, Greenland halibut (Figure 21). However, these records are in numbers of individual fish. The percentages calculated relate to percentage of bycatch, not percentage of total catch. It is not clear whether each pie-chart represents the total of a fishing season. Although the quantitative information provided gives an idea as to the small numbers and species of bycatch, from that it is not possible to calculate the catch composition for each fishing season.

Fish bycatch is sporadic and does not exceed a few individuals per trap and is recorded in a small number of traps. According to PINRO (2017) the total by-catch of bottom fish in the current snow crab fishery in the Barents Sea does not exceed 10 tonnes per year, but no details as to the catch profile were available to the assessment team and how that figure of 10 tonnes was derived at. For example, looking at the catch per vessel given in Section 5.1.5, a total of 9830 tonnes of opilio was caught in 2018, which would make the whole bycatch about 0.1%, not broken down into a catch profile. This is a rough example of possible proportional quantities, given the information provided.

The bycatch is brought aboard the vessel alive. Generally, the fish bycatch captured by traps is either consumed by the crew or returned to the sea, after having been recorded in the case of commercial species. All by-caught benthic organisms, which are not attractive in terms of consumption for the crew, are returned alive to the sea. Due to the short exposure time onboard the fishing vessel during trap catch sorting operations, benthic organisms generally tend to fully maintain their vitality, and, once returned to the sea, survive (PINRO, 2017; Client information, March 2018).

The catch composition table is further analysed into primary and secondary species bycatch (Table 20), and the current stock status is given for the primary species in Table 21.

Table 20: Primary and Secondary species bycatch.

Common Name	Latin Name	Primary /Secondary	Main/ Minor
Atlantic cod	*Gadus morhua*	Primary	Minor
Cod as bait	*Gadus morhua*	Primary	Minor
Herring as bait	*Clupea harengus*	Primary	Minor
Beaked redfish	*Sebastes mentella*	Primary	Minor
Greenland halibut	*Reinhardtius hippoglossoides*	Primary	Minor
Blue ling*	*Molva dypterygia*	Secondary	Minor
Spotted wolffish	*Anarhichas minor*	Secondary	Minor
Northern wolffish	*Anarhichas denticulatus*	Secondary	Minor
Long rough dab	*Hippoglosaoides platessoides*	Secondary	Minor
Arctic eelpout	*Lycodes reticulatus*	Secondary	Minor
Grey gurnard	*Eutrigla gurnardus*	Secondary	Minor
Starry/Thorny skate	*Amblyraja radiata*	Secondary	Minor
Arctic skate**	*Amblyraja hyperborea*	Secondary	Minor
Spider crab	*Hyas araneus*	Secondary	Minor
Squid (bait)***			Minor

*Blue ling: ICES Advice June 2019 for ling6 states that no reference points have been defined for this stock, and advises zero catch for the next few years, and to maintain closed spawning areas
**IUCN = LC (Least Concern; as assessed in 2015; fishbase.org)
***Squid is used as bait, the species information was not available, nor location where caught, thus it was not possible to determine whether it came from a managed stock. Squid bait quantity used (66t) determined this to be a minor species (0.67% of total catch in 2018)

Table 21: ICES Advice for Primary species. (Source: ICES.dk)

Species	Assessment Unit ICES Area	B_{lim}	MSY	Advisory Category	Stock status	ICES Advice Year/ section
Cod *Gadus morhua*	I + II	Y	Y	Analytical assessment	F above F_{MSY}; Full reproductive capacity	June 2019/ NE Atlantic 1-2
Beaked redfish *Sebastes mentella*	I + II	Y	Y	Analytical assessment	Full reproductive capacity	Sept 2018 / reb.27.1-2
Greenland halibut *Reinhardtius hippoglossoides*	I + II	Y	NA	Age length Gadget model	Stock at full reproductive capacity; no reference points for F; quota advice given	June 2019/ Ghl.27.1-2
Herring *Clupea harengus*	NE Atlantic Norwegian spring-spawning	Y	Y	Analytical assessment	The stock is at full reproductive capacity; F above MSY	Oct 2018/ her.27.1-2

i. Secondary species

Spotted and Northern wolffish: Some quantitative information, in the form of number of individuals at certain observation times over a three year period (see Figure 21) is provided for the wolffish species. Some stock information on the wolffish species was available (Bogstad et al 2015, on barentsportal.com). The stock size of Spotted wolffish, as measured by

6 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/bli.27.nea.pdf

area-swept-clear estimates, has been relatively stable since 2004, which is considered to be evidence that the UoA does not hinder recovery/ rebuilding of these two stocks; SG100 is met for Spotted wolffish.

The Northern wolffish has varied between 35,000 and 90,000 tonnes since 2004- 2012, and the current trend is upwards at 85,000t, this is considered to be evidence that the UoA is not hindering recovery/rebuilding of stock.

Blue ling:

ICES Advice June 2019 for ling states that no reference points have been defined for this stock, and advises zero catch for the next few years, and to maintain closed spawning areas.

Long rough dab: This species is widely distributed in the Barents Sea, and the biomass of long rough dab in the eco-system survey in 2014–2016 has been relatively stable (ICES WGIBAR 2017). No stock information was available for the long rough dab.

Thorny ray: *A. radiata*: The most common skate species in the Barents Sea. Widely distributed in the surveyed area, except in Arctic waters (ICES WGEF 2018). Based on a simple swept area model the stock appear to vary in both biomass and number of individuals, without showing any apparent trend (ICES WGEF 2018). ICES (Oct 2015) advises that when the precautionary approach is applied, there should not be a targeted fishery for this stock and measures should be taken to reduce bycatch. This advice is valid for 2016 to 2019. No stock information was available for Thorny ray, indications are that the stock size has been declining since the 1990 (ICES Advice for *A.radiata* 2015).

Arctic skate (*A.hyperborea*): The species was found in deeper waters along the shelf edge towards the Norwegian Sea and Polar basin, and in Arctic water in the deeper parts of the eastern Barents Sea. The stock increased in biomass and numbers between 2007 and 2014. For the recent years, the estimates have been on the same level as before 2007 (ICES WGEF, 2018).

Amblyraja radiata is the dominant species in the Barents Sea, comprising 96% by number and about 92% by biomass of skates caught in surveys or as bycatch. The next most abundant species are *A. hyperborea* and *R. fyllae* (3% and 2% by number, respectively), and the remaining species are scarce (ICES WGEF 2018)

Arctic eelpout and Grey gurnard, and Spider crab: No stock information is available for these species.

ii. Bait

Bottom traps are a passive fishing gear, baited with herring, cod or squid (Client information March 2018; PINRO 2017), to lure the crabs into the trap. The bait consists of the following species: herring, cod heads, and squid, and is imported frozen from a Norwegian company, although no detailed information was available as to where the fish was sourced, and no details were available as to the species of squid. (Table 22). The bait species were assessed under 'Primary' species, as both herring and cod are managed species. Whether they are considered 'main' or 'minor' depends on the amount of bait used in relation to the overall catch of crab. However, it is highly likely, based on similar crab fisheries in the Barents Sea (Hønneland et al 2018) that the bait will be evaluated under the Primary 'minor' scoring issues.

Table 22: Quantity of bait used per species per season, total for all 11 vessels. (Client information, October 2019)

Bait species	Quantity used 2018 (tonnes)	% of total catch	Main/minor
Herring	330	3.4	Minor
Cod (heads)	22	0.22	Minor
Squid	66	0.68	Minor

During Opilio snow crab fishery each vessel uses the following bait: 1) herring – 25-35 tons, 2) squid – 5-7 tons, 3) cod heads- 2 tons. Therefore, herring is the main bait used (appr.80% of total quantity of bait) (Client information Oct 2019).

e. ETP Species

These are species recognised by national legislation and/or binding international agreements to which Russia is a party to. Russia is a signatory to a number of conventions on species protection and management, notably the Convention on Biological Diversity and the Convention on International Trade in Endangered Species (CITES). Species listed under

Appendix I of CITES are considered ETP species for the purposes of the MSC assessment. The existing Russian Red Data Book is used in parallel with the IUCN system (see outcome of workshop in the autumn of 2014: An international workshop on Methods of Assessment of Status of the Threatened species for the Barents Region Red Data books based on IUCN criteria7). Thus, protection criteria are based on 5 status levels ranging from regionally extinct to near threatened, plus a “data deficient” category.

The following section outlines the evaluation on what kinds of ETP species may be encountered in the Barents Sea, and the interaction with the fishery, if any.

i. Marine Mammals

The Barents Sea is an important area for Marine mammals. The PINRO / IMR Joint Ecosystem work (IMR/PINRO 2016 - McBride et al 2016; IMR/PINRO 2018) concludes that the most common marine mammal species in the Barents Sea is the white-beaked dolphin (*Lagenorhynchus albirostris* – IUCN Least Concern). The following table (Table 21) provides an overview of the relevant marine mammals discussed in that ecosystem report. It should be noted, however, that there is a broad range of uncertainty levels in the assessments of abundance of marine mammal populations in the Barents Region: some populations have been assessed recently and completely (Table 21, symbol - E); while many estimates represent partial estimates by region that have been extrapolated to the whole Barents Sea (see symbols used in Table 22, reasonable =?; somewhat uncertain=??); in some cases there is little or no available abundance data – so the numbers presented represent educated guesses based on sighting records or other non-quantitative estimators (Table 21 symbol=???). Harp and hooded seals “step-out” of the Barents Sea for breeding, and in the case of the latter species, some post-breeding, pre-moulting foraging expeditions as well, although some of the population(s) spend much of the year in the Barents Region (barentsportal.com provides regular on line updates on populations).

The North Atlantic Marine Mammal Commission (NAMMCO) provides a mechanism for cooperation on conservation and management for all species of cetaceans (whales and dolphins) and pinnipeds (seals and walruses) in the region, many of which have not before been covered by such an international agreement. Although Russia is not a member of NAMMCO it does cooperate as a partner on projects and is an observer at the annual meetings. PINRO is actively involved in the Trans - North Atlantic Sightings Survey (TNASS), to estimate the summer distribution and absolute abundance of cetacean populations in the North Atlantic. This will represent a considerable enhancement of understanding of cetacean populations in the North Atlantic, in particular in the Arctic region.

7 https://ib.komisc.ru/add/conf/iucn/en/index.html and
Resolution: https://ib.komisc.ru/add/conf/iucn/en/indexccb4.html?page_id=209

Table 23: Residency status and abundance of marine mammals in the Barents Sea Region. (Source: Barentsportal webpage, Marine Mammals of the Barents Sea (2017))

Common Name *Genus species*	Residency status	Abundance	Uncertainty* level
Polar bear *Ursus maritimus*	Year-round resident	2650 (95% CI: 1900–3600)[1]	E
Walrus *Odobenus rosmarus*	Year-round resident	12000 (Sval. – 3886 - 95% CI: 3553-4262)[2a] Franz Josef Land thought to be similar to Svalbard (not surveyed). (Pechora Sea – 3943 – CI 3605-4325)[2b]	?
Ringed seal *Pusa hispida*	Year-round resident	100000 (Sval. partial - 7585 - 95% CI: 6332–9085)[3a] White Sea 20000[3b]	??
Bearded seal *Erignathus barbatus*	Year-round resident	Northern Barents Sea ~10,000 White Sea ~ 6000	??
Harp seal *Pagophilus groenlandicus*	Year-round resident*	1368200 (95% CO: 1226300-1509378 - Barents Sea stock)[4a] 627410 (95% CI: 470540-786280; Greenland Sea stock)[4b]	E
Hooded seal *Cystophora cristata*	Year-round resident*	84020 (95% CI: 68060-99980)[4c]	E
Grey seal *Halichoerus grypus*	Year-round resident	2000 Troms-Finnmark[5] 3500 Murman coast[5]	E
Harbour seal *Phoca vitulina*	Year-round resident	3,500 (Sval. ~1800, CI range 1300-4418[6], Troms & Finnmark 1967[7], 400-500 Murman Coast [8a], White Sea - unknown numbers[8b])	E/?
Bowhead whale *Balaenoptera acutorostra*	Year-round resident	Some hundreds[11]	??
White whale (beluga) *Delphinapterus leucas*	Year-round resident	10000	???
Narwhal *Monodon monoceros*	Year-round resident	1000	???
White-beaked dolphin	Year-round resident	60000-70000[15]	??

Common Name *Genus species*	Residency status	Abundance	Uncertainty* level
Harbour porpoise *Phocoena phocoena*	Year-round resident	11000[16]	??
Blue whale *Balaenoptera musculus*	Seasonal migrant	NE Atlantic 979 (95% CI: 137-2542)[9]	E
Fin whale *Balaenoptera physalus*	Seasonal migrant	NE Atlantic 6409 (95% CI: 4356-9431)[10] (c. 1,800 in Barents Sea proper and Spitsbergen Shelf)	E
Humpback whale *Megaptera novaeangliae*	Seasonal migrant	NE Atlantic 1450 (95% CI: 898-2341)[10]	E
Minke whale *Balaenoptera acutorostrata*	Seasonal migrant	NE Atlantic 101615[12] Barents Sea (EB)34125[12] Norwegian Sea (EW) 21218[12]	E
Killer whale *Orcinus orca*	Seasonal migrant	NE Atlantic: - a few thousands[13]	???
Northern bottlenose whale *Hyperoodon ampullatus*	Seasonal migrant	A few sightings in the Norwegian Sea and west of Spitsbergen, no accurate estimate available (~60-70[14])	???
Long-finned pilot whale *Globicephala melas*	Seasonal migrant	A few sightings along the Norwegian coast, north to Bjørnøya, no estimate available	-
Sperm whale *Physeter macrocephalus*	Seasonal migrant	NE Atlantic 6,207 (95% CI: 4053-9505)[10]	E
Sei whale (*Balaenoptera borealis*)	Summer vagrant	-	-
Common dolphin *Delphinus delphis*	Summer vagrant	-	-
Bottlenose dolphin *Tursiops truncatus*	Summer vagrant	-	-
White-sided dolphin *Lagenorhynchus acutus*	Summer vagrant	-	-

ii. Protection status of Marine mammals

According to the IUCN Red List, 11 marine mammal species in the Barents Sea are threatened (Table 24). The Red Book of the Russian Federation, Murmansk region (as accessed 18 Feb 2019), lists 3 marine mammal species – Harbour Seal, Grey Sea and Walrus.

Table 24: Protection status of marine mammal species resident in the Barents Sea. (Source: PINRO/ IMR Joint Ecosystem report 2014, IUCN site accessed 10th February 2019; CITES site accessed 10th February 2019; Russian Red List accessed 5th June 2019)

Species	Latin Name	IUCN status	CITES	Russian Red List	Comment
White-beaked dolphin	*Lagenorhynchus albirostris*	LC		Yes	Most common in Barents Sea
Harbour porpoise	*Phocoena phocoena*	LC		Yes	
Minke	*Balaenoptera acutorostrata*	LC	Appendix I		Numerous
Fin whales	*Balaenoptera physalus*	EN	Appendix I	Yes	Numerous
Sei whale	*Balaenoptera borealis*	EN	Appendix I	Yes	Rare
Blue whale	*Balaenoptera musculus*	EN	Appendix I	Yes	Rare - visitor
Bowhead whale	*Balaena mysticetus*	LC	Appendix I	Yes	
Narwhal	*Monodon monocerus*	LC		Yes	
Beluga whale	*Delphinapterus leucas*	LC			
Harp seal	*Pagophilus groenladicus*	LC			
Ringed Seal	*Pusa hispida*	LC			
Walrus	*Odobenus rosmarus*	VU		Yes	
Bearded Seal	*Erignathus barbatus*	LC			
Hooded Seal	*Cystophora cristata*	VU			
Grey Seal	*Halichoerus grypus*	LC		Yes	
Harbour Seal	*Phoca vitulina*	LC		Yes	
Polar Bear	*Ursus maritimus*	VU		Yes	

The anthropogenic factors that are thought to be most harmful for marine mammals are fisheries interactions, pollution and climate warming. The latter phenomenon is a particularly acute problem in the Arctic, and it is a serious threat factor for all ice-associated marine mammals.

Encounters with marine mammal species are thought to be rare, and no interactions have been recorded for trap fisheries. Surveys in 2017 / 2018 show the distribution of whale species in relation to the snow crab fishing area (Figure 22; Figure 23). White-beaked dolphins are abundant in the Barents Sea, they feed predominantly on gadoids. No interactions with White-beaked dolphin have been recorded for trap fisheries (ICES WGIBAR 2017) in general, nor reported for the trap gear for the Russian snow crab trap fishery (PINRO, 2017; client information pack).

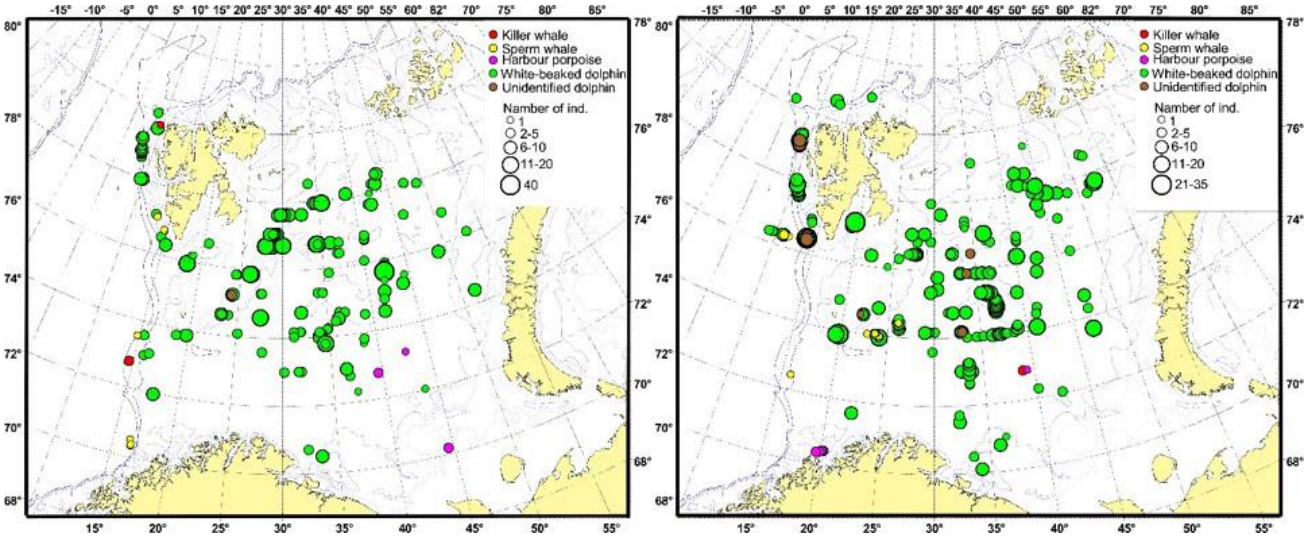


Figure 22: Distribution of toothed whales in August-October: 2017 (left) and 2018 (right). (Source: IMR/ PINRO Ecosystem report 2018)

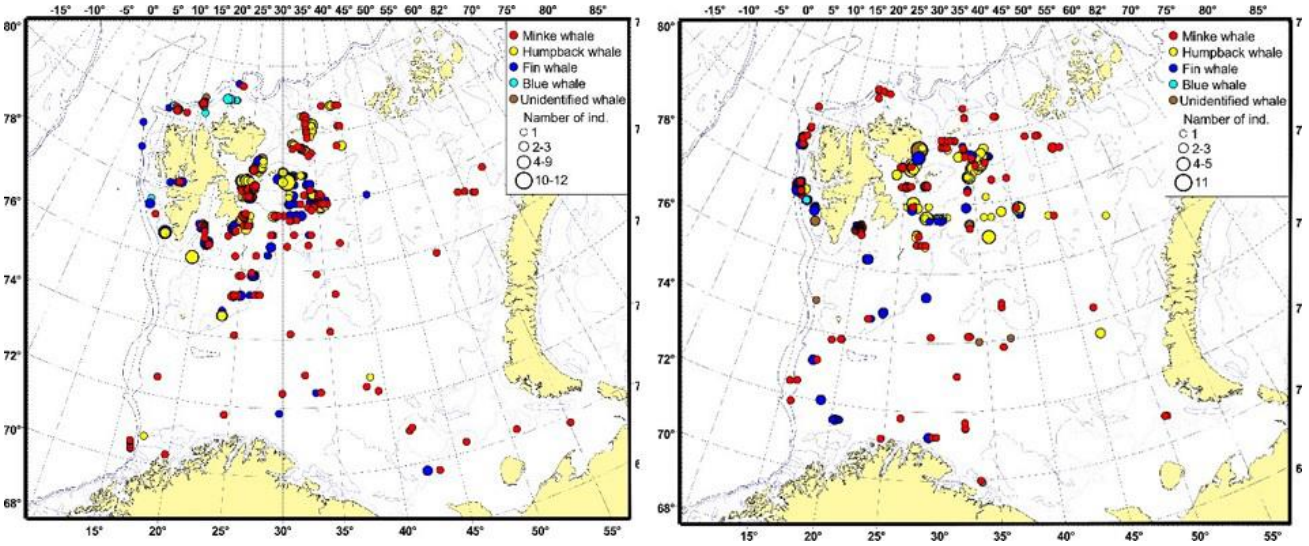


Figure 23: Distribution of Baleen whales in August-October: 2017 (left) and 2018 (right). (Source: IMR/ PINRO Ecosystem report 2018)

iii. Elasmobranchs

None of the elasmobranches species occurring in the Barents Sea are protected by CITES. IUCN status is available for several species occurring in the Barents Sea (Table 25). However, IUCN status alone does not qualify as ETP status (see MSC CR v2.0 SA3.1.5), although the Russian Red List and IUCN Red List run in parallel (as per agreement arrived at, at an international workshop in 20148). Based on this, none of the elasmobranchs listed here are ETP species.

8 International workshop, 2014: An international workshop on Methods of Assessment of Status of the Threatened species for the Barents Region Red Data books based on IUCN criteria

Table 25: Elasmobranchs occurring in the Barents Sea with possible interaction with the Snow crab trap fishery. (Source: IUCN site accessed 1-th February 2019)

Species	Latin Name	IUCN status	Listed as bycatch? (PINRO 2017)
Flapper / blue skate	*Dipturus batis*	CR – the Barents Sea is at the edge of its range	No
Starry/Thorny skate	*Amblyraja radiata*	VU	Yes – Scored as Secondary Species
Porbeagle	*Lamna nasus*	VU	No
Spiny dogfish	*Squalus acanthias*	VU	No
Arctic skate	*Amblyraja hyperborea*	LC	Yes - Scored as Secondary Species
Greenland shark	*Somniosus microcephalus*	NT*	No

* On the basis of possible population declines and limiting life-history characteristics, Greenland shark is listed as Near Threatened in the IUCN Red List. It is not listed in the Russian Red List (ICES WGEF 2017)

Although Thorny Skate (*Amblyraja radiata*) is on the EU list of prohibited species, this prohibition obviously applies only to EU waters and does not cover ICES Division Ia – the Barents Sea. The species is listed as vulnerable by IUCN (site accessed 20 July 2019), but this is not considered an ETP status under the MSC relevant ETP-criteria lists (MSC CR v2.0 SA3.3.1.5.2); it is not listed in the Russian Red Data Book (http://biodat.ru/db/rb/ accessed July May 2019) and neither is it listed on the Norwegian Red List (http://artsdatabanken.no/Rodliste).

Where the fishery accidentally catches elasmobranchs, these are immediately released back into the sea (Client information, May 2019). Post capture survival studies indicate that survival is relatively high, depending on the speed of return (Dolgov et al 2005; Enever et al 2009). Studies indicated that, specifically species of ray, appear to have the highest and most consistent levels of discard survival, although this will vary depending on fishery conditions and on-board handling. In general, observed survival rates of elasmobranchs under experimental conditions, are typically in excess of 50% across all gears and greater than 80% in many cases (see overview of studies provided by STECF 2014).

iv. Seabirds

Several of the seabird populations in the Barents Sea region are of international importance. The summer population comprises around 20-25 million seabirds (more than 40 species) that harvest approximately 1.2 million tonnes of biomass annually. Major concentrations of breeding seabirds (more than 80%) are located on the Norwegian mainland, Novaya Zemlya and Svalbard. The most numerous species are the Brünnich´s guillemot *Uria lomvia*, little auk *Alle alle*, Atlantic puffin *Fratercula arctica*, black-legged kittiwake *Rissa tridactyla*, northern fulmar *Fulmarus glacialis* and common eider *Somateria mollissima*. An important part of the global breeding population of the rare Ivory gull *Pagophila eburnea* is found within the northern part of the region - in Svalbard and Franz Josef Land. Among more than 30 seabird species breeding and wintering in the Barents Sea region, there are seven Red-listed species. Major threats likely limiting population development of the Red-listed seabird species are: (i) - fisheries (competition for the resources and by-catch in gillnets); (ii) - environmental deterioration (pollution, habitat destruction and disturbance); (iii) - climate change (see regularly updated studies published online on barentsportal.com).

Seabirds play a significant role in transferring nutrients from sea to land and from North to South (McBride et al 2014; IMR/PINRO 2016). Fisheries may impact seabird populations directly through bycatch of seabirds in fishing equipment; or indirectly, through competition for the same food sources. Many seabird species are currently in decline, especially in the south of the Barents Sea, for reasons which are unclear. Decline is especially serious in the case of common guillemot and black-legged kittiwake in the Southern Parts of the Barents Sea and Brünnich's guillemot and kittiwake in the north. The trap fisheries are not implicated in this decline, though historic coastal gillnetting may have been a problem.

Several types of interaction with seabirds may take place:

1. Aggregations of seabirds exploiting fish waste
2. Capture of diving seabirds during hauling of traps
3. Indirect impacts through reduction of food resources.

Although birds could become entrapped in traps, such encounters have not been recorded, and even for deep water trawling operations for example, this is now considered to be relatively rare (Grekov and Pavlenko 2011; ICES AFWG, 2012). The seabirds could interact with trap fishers during recovery at the water surface but are more likely to benefit from spilled or waste fish than be adversely affected. Research by the Norwegian Institute for Nature Research (NINA) and the Institute of Marine Research in Norway suggests that most of the fisheries have a minor impact on bird mortality (ICES AFWG 2014), and those impacts that do occur are primarily attributable to inshore gillnet and longline fisheries. Furthermore, there are significant monitoring initiatives related to seabirds and it is likely that any emerging and significant negative interactions with fisheries will be flagged. For example, SEAPOP (http://www.seapop.no/en/about/index.html) is a mapping and monitoring programme for seabird populations in Norwegian waters. It focuses particularly on the collection of data that make it possible to model the effects of human activity and distinguish between these and natural variations.

The fishery under assessment is conducted 12NM offshore, and at a depth of below 100m, thus out of reach of diving seabirds.

v. On-board management of ETPs

A specially designed on-board software programme is currently going live (as of 2019) across a number of vessels participating in the MSC certification programme in the Barents Sea, including this Snow crab fishery under assessment. According to the client (interview May 2019), the programme is designed to both address habitat impact and help with habitat mapping, as well as detailed non-target species bycatch recording, including ETP species.

When the catch is hauled on board, it is sorted and graded, as well as sorted by non-target species and benthic organisms. Skates and rays are identified, recorded and discarded immediately. Commercial species, including non-target, are weighed and recorded and processed where relevant (according to relevant regulations). The unwanted species are recorded in terms of species and numbers of individuals, as there is very little bycatch in the trap fishery (Client interview May 2019), and then discarded where appropriate. Benthos is weighed where appropriate, and recorded to species level, ID manuals for birds, mammals and benthos, designed by PINRO and WWF Murmansk, are available on board to help with identification.

Any by-caught birds are also recorded in numbers of individuals. ETP species are marked as such in the guides and the software. The recording is done using the software, whereby each record is also linked to the vessel and location. The non-target catch is divided into categories, each given a certain number of points as part of scoring:

Баллы / Points:
0 – нет прилова / no bycatch
1 points- 1-10 kg –мало / few
2 points - 10-100 kg– умеренно / moderately
3 points - 100-300 kg– много / lots of
4 points - более 300 кg (more than 300kg) – очень много / a large lots of

The programme automatically selects the required score value, based on species, ETP status, weight. It triggers for example the move-on rule, which is based on the number of points in the score – the score also reflects the sensitivity of the relevant species; thus, each species has a different sensitivity score from the outset. The programme automatically gives points when a certain number of pre-programmed criteria is met, and thus a certain score value reached. The database also records what happens to the bycatch in each case, e.g. whether it is discarded.

With regards to habitat, this software helps in the development and detail of habitat maps, as the information is collated and sent to PINRO monthly. The maps are verified by the various partners cooperating in this project, including the coordination council, as well as observers / scientists by PINRO on board of the vessels. The information eventually becomes official. The software development and implementation are supported by WWF and other sponsors (including some Swedish environmental funds), and the relevant fishing companies, including the fishery under assessment, are contributing towards the updating of the software.

Identification manuals have been specifically designed, together with WWF, and as part of the software design project. These manuals are available on each participating vessel:

a) ‘Field identification guide of the Barents Sea fish occurred in demersal catches (for using onboard commercial vessels). https://yadi.sk/i/yCbIFOtCu9JvX.;

b) ‘Ship’s short identification guide of the Barents Sea mammals and birds’ https://yadi.sk/i/-1Vk2o9j3KGCgt ;

c) ‘Ship’s identification guide of the Barents Sea main megabenthos groups’ https://new.wwf.ru/resources/publications/booklets/palubnyy-opredelitel-osnovnykh-grupp-megabentosa

There are no observers on the vessels as yet, but this issue is currently being discussed with PINRO (Client interview, May 2019).

f. In Conclusion

No endangered, threatened and protected (ETP) species were recorded in the by-catch in the snow crab trap fishery in the Barents Sea. None of the fish species recorded in the by-catch in the Barents Sea snow crab fishery are listed on the species specific in the IUCN Red List, the Red Data Book of the Russian Federation and the Red Data Book of the Murmansk Region of the Russian Federation. None of the invertebrates recorded in the catch composition table in Section 7.3.1d are recorded on any of the lists / Red Data Books mentioned above (Client information, PINRO 2017 report, which also contains photographs of some of the benthic species in the Annex). No evidence or reports were provided to the assessment team that the snow crab fishery has a direct impact on ETP species.

g. Scoring elements / Cumulative impacts

According to the client, there is little if no Cod and Haddock fishing in the area of the Snow crab (opilio) fishery, as trawl gears do not want to interfere with trap lines. Sometimes the fishing vessels can enter the snow crab fishing area, but their impact on the Snow crab harvesting is minor. Other, non-crab fishing vessels prefer not to work near the region because it is impossible to use demersal trawl on the territory where the crab-catching traps are situated. Thus, there is almost no other fishery except crab catching in the relevant area.

Table 26: Scoring elements

Component	Scoring elements	Designation	Data-deficient
Primary	Cod (*Gadus morhua*)	Minor	No
	Herring (*Clupea harengus*)	Minor	No
	Beaked redfish (*Sebastes mentella*)	Minor	No
	Greenland halibut (*Reinhardtius hippoglossoides*)	Minor	No
Secondary	Long rough dab (*Hippoglossoides platessoides*)	Minor	Yes
	Spotted Wolfish (*Anarhichas minor*)	Minor	Yes
	Northern Wolfish (*Anarhichas denticulatus*)	Minor	Yes
	Arctic eelpout (*Lycodes reticulatus*)	Minor	Yes
	Grey gurnard (*Chelidonichthys gurnardus*)	Minor	Yes
	Thorny skate (*Amblyraja radiata*)	Minor	Yes
	Arctic skate (*Amblyraja hyperborean*)	Minor	Yes
	Spider crab (*Hyas araneus*)	Minor	Yes
ETP	None in bycatch		NA
Habitats	Fine*	Commonly encountered	No
	VME:	None in the area, possible indicator species only.	No

*Substrate-Geomorphology-Biotope (SGB) Table GSA6

7.3.2 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?	**NA**	**NA**	**NA**
Rationale				
There are no main Primary species in this fishery.				
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**
Rationale				

All ‘minor’ species automatically meet SG80.

Each element (minor species) is assessed against scoring issue b). If it does not meet SG100, it is treated as though it still meets SG80 (which is blank), which is automatically met by virtue of being a minor species. Thus, this SI will at least meet SG80 (if not more depending on the status of the elements).

Bait species will be considered as elements here, depending on how much bait is used as a percentage of the total catch. There was quantitative information available on the bait species used, for herring and cod heads.

The catch composition table provided by the client fishery (based on PINRO 2017) lists the following Primary minor species, each being an element: Atlantic cod, Beaked redfish (*S.mentella*), Greenland halibut, herring (bait). Recent stock status information is available on each of these species:

Table 21: ICES Advice for Primary species. (Source: ICES.dk)

Species	Assessment Unit ICES Area	B_{lim}	MSY	Advisory Category	Stock status	ICES Advice Year/ section
Cod *Gadus morhua*	I + II	Y	Y	Analytical assessment	F above F_{MSY}; Full reproductive capacity	June 2019/ NE Atlantic 1-2
Beaked redfish *Sebastes mentella*	I + II	Y	Y	Analytical assessment	Full reproductive capacity	Sept 2018 / reb.27.1-2
Greenland halibut *Reinhardtius hippoglossoides*	I + II	Y	NA	Age length Gadget model	Stock at full reproductive capacity; no reference points for F; quota advice given	June 2019/ Ghl.27.1-2
Herring *Clupea harengus*	NE Atlantic Norwegian spring-spawning	Y	Y	Analytical assessment	The stock is at full reproductive capacity; F above MSY	Oct 2018/ her.27.1-2

The amount of bycatch recorded by PINRO (2017) is given in numbers of individuals and it is stated in the report that all bycatch is less than 10 tonnes per year for the opilio fishery (PINRO 2017)

These species listed above are managed with reference points and are highly likely to be above PRI.

Table 22 shows the amount of bait, indicating that all the bait species used are ‘minor’

SG100 is met.

References

PINRO 2017. Federal Agency for Fisheries FEDERAL STATE BUDGETARY SCIENTIFIC INSTITUTION KNIPOVICH POLAR RESEARCH INSTITUTE OF MARINE FISHERIES AND OCEANOGRAPHY (FSBSI “PINRO”);

REPORT ON RESEARCH WORKS; RESULTS FROM ANALYSIS OF SNOW CRAB *CHIONOECETES OPILIO* STOCK MANAGEMENT IN THE RUSSIAN PART OF THE BARENTS SEA AND STATUS OF ECOSYSTEM IN THESE WATERS IN LIGHT OF THE PROVISIONS IN THE CURRENT MARINE STEWARDSHIP COUNCIL (MSC) STANDARD ; Contract *No.*16/2017 dated 20.03.2017 with ZAO “Arktikservis”

ICES Advice June 2019 for NE Atlantic cod 1-2; ICES Advice for Sebastes mentella Sept 2018, reb27.1-2; ICES Advice Greenland halibut Sept 2017 Ghl.27.1-2; ICES Advice herring October 2018 her.27.1-2

Overall Performance Indicator score	**100**
Condition number (if relevant)	**NA**

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?	**Yes**	**Yes**	**Yes**
Rationale				
SG60 and SG80 is met, there are no main Primary species. SG100 requires that there is a strategy in place to manage main and minor Primary species. 'Primary species are species of commercial value with management tools controlling exploitation. These tools, which comprise a strategy as they are regularly reviewed through the ICES process, Joint Russia and Norway Fisheries Commission, as well as by PINRO scientists, include: a requirement for accurate information on landings of bycaught species (via log book, landings notes and on-board checks by inspectors, all commercial species have to be retained and recorded), fishing season, technical measures for gear (mesh size and design of trap) and bycatch exclusion measures where possible. Bycatch data is shown in numbers of individuals, which show that bycatch of Primary species is low. SG100 is 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 fisheries/species).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	**Yes**	**Yes**	**No**
Rationale				
SG60 and SG80 is met as there are no main primary species, and the SI relates to SIa at SG80. The level of primary species bycatch is small, given the passive gear involved (trap) and the species targeted (snow crab) and therefore it is highly likely that the low amount of Primary species caught will have little impact on the relevant stock. There is no quantitative information available over a sufficient period of time, e.g. over several fishing seasons to allow testing. SG100 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 overall**

				objective as set out in scoring issue (a).
	Met?		**Yes**	**Yes**

Rationale

Given the low proportion of bycatch in this trap fishery, the partial strategy is working in practice for the client fleet, and the species in question are within biological limits, as regularly evaluated through stock specific ICES and JRNFC workshops. Evidence is in terms of logbooks where retained commercially important species are recorded (PINRO 2018, and Client interviews May 2019), compliance records, and VMS records, for example. SG80 is met.

Information on bycatch collected by the fleet, coupled with analysis by PINRO (PINRO 2017), and ongoing scientific surveys of the stock status of the species involved, provide a basis for confidence that the strategy is working. Furthermore, there is good compliance with the regulations as implemented by the strategy. The bycatch is counted in numbers of individuals and is thus low. SG100 is 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

There are no unwanted catches of shark as primary species.

e	Review of alternative measures			
	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?	**NA**	**NA**	**NA**

Rationale

There is very little bycatch, so researching into alternative measures seems not warranted or appropriate at this stage. There is no formal review process of this fishery regarding the gear and deployment, as traps have been traditionally used and are considered low impact (Client interview, May 2019). However, a Recommendation has been raised to consider possible increase of bycatch with an expanding fishery.

References

PINRO 2017. Federal Agency for Fisheries FEDERAL STATE BUDGETARY SCIENTIFIC INSTITUTION KNIPOVICH POLAR RESEARCH INSTITUTE OF MARINE FISHERIES AND OCEANOGRAPHY (FSBSI “PINRO”);

REPORT ON RESEARCH WORKS; RESULTS FROM ANALYSIS OF SNOW CRAB *CHIONOECETES OPILIO* STOCK MANAGEMENT IN THE RUSSIAN PART OF THE BARENTS SEA AND STATUS OF ECOSYSTEM IN THESE WATERS IN LIGHT OF THE PROVISIONS IN THE CURRENT MARINE STEWARDSHIP COUNCIL (MSC) STANDARD ; Contract *No.*16/2017 dated 20.03.2017 with ZAO “Arktikservis

As for PI 2.1.1

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

3 Recommendation for PI 2.1.2 and PI 2.2.2:

Although the current low bycatch does not warrant a review of alternative measures it may well be that with this expanding fishery, bycatch could increase. There are currently no guidelines as to what level of bycatch should trigger a review of alternative measures. The fishery may need to address this in the fishery management plan

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?	**NA**	**NA**	**NA**
Rationale				
Given that there are no 'main' species Scoring Issue a) is not used.				
b	Information adequacy for assessment of impact on minor primary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			**Bait Herring – No** **Bait cod heads – No** **Cod – Yes** **Beaked Redfish – Yes** **GL Halibut - Yes**
Rationale				
There is some quantitative information on bycatch. The bycatch information provided consists of numbers of individuals, observed in the traps at different times. This applies to all the Primary species elements, apart from Bait species, where there is no quantitative information on how much bait is used per season. Bait: herring SG80; cod heads SG80 Cod SG100; S.mentella, SG100; GL halibut, SG100				
c	Information adequacy for management strategy			
	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?	**Yes**	**Yes**	**No**

Rationale

There are no main Primary species. SG60 and SG80 is met.

The amount of bycatch is low, it is measured in numbers of individuals. This is a result of the type of gear used, and species targeted. However, quantitative information on Primary species bycaught is limited (PINRO 2017), and the analysis of available quantitative data does not make it possible to evaluate any trends. Therefore, it is not possible to say with a high degree of certainty that the strategy is achieving its objective. SG100 is not met.

A Recommendation is raised, to suggest that bycatch is recorded regularly, and the analysis of bycatch includes number/ amount for each species per season, so it is possible to calculate the proportion from the total each season. In other words, a more detailed catch profile each fishing year.

References

PINRO 2017. Federal Agency for Fisheries FEDERAL STATE BUDGETARY SCIENTIFIC INSTITUTION KNIPOVICH POLAR RESEARCH INSTITUTE OF MARINE FISHERIES AND OCEANOGRAPHY (FSBSI “PINRO”);

REPORT ON RESEARCH WORKS; RESULTS FROM ANALYSIS OF SNOW CRAB *CHIONOECETES OPILIO* STOCK MANAGEMENT IN THE RUSSIAN PART OF THE BARENTS SEA AND STATUS OF ECOSYSTEM IN THESE WATERS IN LIGHT OF THE PROVISIONS IN THE CURRENT MARINE STEWARDSHIP COUNCIL (MSC) STANDARD ; Contract *No.*16/2017 dated 20.03.2017 with ZAO “Arktikservis”

ICES Advice June 2019 for NE Atlantic cod 1-2; ICES Advice for Sebastes mentella Sept 2018, reb27.1-2; ICES Advice Greenland halibut Sept 2017 Ghl.27.1-2; ICES Advice herring October 2018 her.27.1-2

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

4 Recommendation for PI 2.1.3:

A Recommendation is raised, to suggest that bycatch is recorded regularly, and the analysis of bycatch includes number/ amount for each species per season, so it is possible to calculate the proportion from the total each season. In other words, a more detailed catch profile each fishing year

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
	Main secondary species stock status			
a	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?	**NA**	**NA**	**NA**
Rationale				
There are no main Secondary species in the bycatch. Scoring issue a) is not used.				
	Minor secondary species stock status			
b	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?			**No**
Rationale				
The nature of the classification into Secondary species indicates that these species are not managed, 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. Each Secondary species is an element and is assessed against Scoring Issue b), as they are all 'minor'. If it does not meet				

SG100, it is treated as though it still meets SG80 (which is blank), which is automatically met by virtue of being a minor species.

The amount of Secondary species bycatch is small, recorded in numbers of individuals over a period of 3 seasons (2013 to 2016). The Secondary 'minor' species identified from the catch composition in Section 7.3.1d are listed as the following elements: Spotted and Northern wolfish; Long rough dab; Thorny ray; Arctic skate; Arctic eelpout; Grey gurnard; Spider crab.

Squid as bait was designated as a Secondary species, there was no stock information.

The minor secondary species caught in this fishery should be considered as data-deficient as there are no stock status reference points available (MSC CRv2.0, 7.7.6, Table 3) Paragraph 7.7.6.5 requires that the Risk-Based Framework (RBF) should be used to evaluate scoring elements that are data-deficient. The secondary species identified should therefore be scored using the RBF. However, PF4.1.4 states that "The team may elect to conduct a PSA on "main" species only when evaluating PI 2.1.1 or 2.2.1", and this is the approach taken in this assessment as all secondary species caught were designated as minor secondary species. PF 5.3.2 is therefore applied and the scores for this SI are capped at 80.

Available information is summarised for each of the eight minor species in Section 7.3.1d of this report.

References

PINRO 2017; Bogstad et al 2015 – on barentsportal.com

ICES Advice on *Amblyraja radiata* 2015 http://ices.dk/sites/pub/Publication%20Reports/Advice/2015/2015/rjr-234.pdf;

ICES WGEF 2018; ICES WGIBAR 2017

Overall Performance Indicator score	**80**
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?	**Yes**	**Yes**	**Yes**
Rationale				
There are no main Secondary species. SG60 and SG80 is met. The nature of the fishery is such, that there is little else bycaught besides the target species, snow crab. This is confirmed by the catch composition data from observer reports (PINRO 2017), which show little bycatch. The main strategy to reduce unwanted bycatch consists of trap design (mesh size and design of trap, including biodegradability) and location awareness. SG100 is 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/species).	There is **some objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	**Yes**	**Yes**	**No**
Rationale				
The measures/strategy will work because logbooks, registered landing ports and effectives monitoring, control and surveillance, and catch composition data through an on-board observer and research, as well as trap design research (mesh size), give an objective basis for confidence that the measures designed to minimise the level of retention of non-target species are effective. Available observer data shows little secondary species bycatch (PINRO 2017) SG60 and SG80 is met. 'Testing' implies simulations of the strategy, and/or comparisons with its implementation elsewhere. No evidence for 'testing' was seen by the assessment team. SG100 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?		**Yes**	**Yes**

Rationale
Given the low proportion of bycatch (see Section 7.3.1d) as analysed by PINRO (2017), the partial strategy seems to be working in practice for the client fleet. It is also in the nature of this fishery, passive trap gear, that there is little bycatch. SG80 is met. Information on bycatch collected by scientists on board, and ongoing scientific surveys in the Barents Sea of the stock status of the species involved (e.g. ICES WGEF 2018; ICES WGIBAR 2017), provide clear evidence that the strategy is being implemented successfully, and that it meets the objective as outlined in a). SG100 is 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 are sharks.

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?	**NA**	**NA**	**NA**

Rationale
There is very little bycatch, so researching into alternative measures seems not warranted or appropriate at this stage. There is no formal review process of this fishery regarding the gear and deployment, as traps have been traditionally used and are considered low impact (Client interview, May 2019). The Recommendation raised for PI 2.1.2 also applies here.

References
PINRO 2017; Bogstad et al 2015 – on barentsportal.com ICES Advice on *Amblyraja radiata* 2015 http://ices.dk/sites/pub/Publication%20Reports/Advice/2015/2015/rjr-234.pdf; ICES WGEF 2018; ICES WGIBAR 2017

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

3 Recommendation for PI 2.1.2 and PI 2.2.2:

Although the current low bycatch does not warrant a review of alternative measures it may well be that with this expanding fishery, bycatch could increase. There are currently no guidelines as to what level of bycatch should trigger a review of alternative measures. The fishery may need to address this in the fishery management plan

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?	**NA**	**NA**	**NA**
Rationale				
Because there were no main Secondary species, SI a) was not used.				
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?			**Yes**
Rationale				
Each minor Secondary species automatically scores SG80. There is some quantitative information on bycatch. The bycatch information provided consists of numbers of individuals, observed in the traps at different times of the fishing season, and was collected by scientists on board and analysed by PINRO (PINRO 2017). Individual species concerned, elements, have been identified from the bycatch (see Table 20 in Section 7.3.1). The bycatch was recorded between 2013-2016 and covers a period of fishing in each year. The quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status SG100 is met. A Recommendation is made, similar to PI 2.1.3, as it concerns the collection and collation of bycatch data. The Recommendation suggests that bycatch is recorded regularly, and the analysis of bycatch includes number/ amount for each species per season, so it is possible to calculate the proportion from the total each season. In other words, a more detailed catch profile each fishing year.				
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?	**Yes**	**Yes**	**No**

Rationale

There are no main Secondary species – SG60 and SG80 is met

The amount of bycatch is low, it is measured in numbers of individuals. This is a result of the type of gear used, and species targeted. However, quantitative information on Secondary species bycaught is limited (PINRO 2017), and the analysis of available quantitative data does not make it possible to evaluate any trends. Therefore, it is not possible to say with a high degree of certainty that the strategy is achieving its objective. SG100 is not met.

References

PINRO 2017; Bogstad et al 2015 – on barentsportal.com

ICES Advice on *Amblyraja radiata* 2015 http://ices.dk/sites/pub/Publication%20Reports/Advice/2015/2015/rjr-234.pdf;

ICES WGEF 2018; ICES WGIBAR 2017

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

5 Recommendation for PI 2.2.3:

A Recommendation is made, similar to PI2.1.3, as it concerns the collection and collation of bycatch data. The Recommendation suggests that bycatch is recorded regularly, and the analysis of bycatch includes number/ amount for each species per season, so it is possible to calculate the proportion from the total each season. In other words, a more detailed catch profile each fishing year. It is further recommended to provide detail on the squid (bait), where caught and what species.

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.	Known direct effects of the UoA are 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?	**Yes**	**Yes**	**No**
Rationale				
The snow crab trap fishery has no known direct effects on ETP species. It is a passive gear, where benthic predators are attracted to the trap by the smell of the bait. Bycatch data analysed for a period from 2013-2016 showed that the bycatch consisted of a number of species, none of which were ETPs, which could be counted in numbers of individuals. The PINRO scientists also compiled a presence /absence list of species (Table 18, in Section 7.3.1) encountered in the traps, and that list did not show any ETP species either. Considering that no ETP species have been recorded in the catch (PINRO 2017). SG60 and 80 are met. The bycatch data is limited, based on few observations (PINRO 2017), and covers a short time series (2013-16) during different seasons (thus each year is not directly comparable), due to the fact that fishery only started in 2013. It is not possible to evaluate with a high degree of confidence that there are no significant detrimental effects of the UoA on ETP species, as the way the data is collected does not allow the detection of any trends. SG100 is not met.				
c	Indirect effects			
	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?		**Yes**	**Yes**
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). As snow crab was introduced into the area only recently, in 1996, there are few observations and studies on snow crab ecology and indirect effects of the fishery				

on ETP species. However, there are some studies which show a direct impact of snow crab on benthos, causing benthos biomass reduction (ICES WGIBAR 2017).

Other indirect effects include the impact of the deployment of the traps gear on ETP, such as entanglement by marine mammals. No observations to that effect have been recorded. (PINRO 2017)

There have been no records in the observer reports, or other reports made available to the assessment team to indicate that ETP species are indirectly affected by this trap fishery, the fishery has only been in existence for few years (since 2013).

Indirect effects have been considered for this UoA and are thought to be highly unlikely to create unacceptable impact. SG80 is met.

Considering the type of gear, passive traps, the depth and area of deployment, and the high selectivity of the gear there is a high degree of confidence that there are no significant detrimental indirect effects of the UoA on ETP species. SG100 is met.

References

PINRO 2017 client information; ICES WGIBAR 2017; IMR/PINRO 2018; on-line updates on ecosystem components of the Barents Sea on barentsportal.com

McBride, M. M., Filin, A., Titov, O., and Stiansen, J. E. (Eds.) 2014. IMR/PINRO update of the “Joint Norwegian-Russian environmental status report on the Barents Sea Ecosystem” giving the current situation for climate, phytoplankton, zooplankton, fish, and fisheries during 2012-13. IMR/PINRO Joint Report Series 2014(1), 64 pp. ISSN 1502-8828.

Jakobsen T., Ozhigin V., 2011. The Barents Sea, ecosystem, resources, management. Half a century of Russian – Norwegian Co-operation. PINRO/ IMR. Tapir Academic Press, ISBN 978-82-519-2545-7

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

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 (MSC CR SA3.11.2) 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?	**Yes**	**Yes**	**No**
Rationale			
There are measures in place, amounting to a strategy, which is expected to ensure the UoA does not hinder the recovery of ETP species. This consists of keeping detailed records of all bycatch, including ETP species, by scientists in cooperation with PINRO and self-recording (such as the recently, Jan 2019, implemented bycatch recording software). This is helped by detailed identification guides designed specifically for use by the fishers in conjunction with the bycatch recording software and general trip observations. The amount of bycatch, including possible ETP species in this trap fishery is small and can be counted in individuals (PINRO 2017). Trap design, including biodegradability of the gear, reduce the potential of catching ETP species. Recording of bycatch and location of fishing, and the quick release of any bycatch not suitable for human consumption, are all expected to not hinder the recovery of possible ETPs. SG60 and SG80 are met. A comprehensive strategy entails a regular review of the catch composition in terms of ETP species, as well as the information being detailed enough to make it possible to see trends over time, not just on observations of actual bycatch but also observations on possible gear interactions with marine mammals and seabirds. There does not appear to be such an ETP specific review. SG100 is not met.			
c	Management strategy evaluation		
	Guide post	The measures are **considered likely** to work, based on **plausible argument** (e.g., general	There is an **objective basis for confidence** that the measures/strategy will work, based on **information** directly	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species

		experience, theory or comparison with similar fisheries/species).	about the fishery and/or the species involved.	involved, and a **quantitative analysis** supports **high confidence** that the strategy will work.
	Met?	**Yes**	**Yes**	**No**

Rationale

The bycatch, including possible ETP species in this trap fishery is small and can be counted in individuals (PINRO 2017). The current measures in place, such as recording of bycatch through PINRO (2017) and gear deployment, provides an objective basis for confidence that measures will work. No ETPs have been recorded in the bycatch. The amount of bycatch is small and can be counted in individuals, any non-edible bycatch is released quickly back into the sea. SG 60 and SG80 are met.

As yet, the does not appear to be an ETP specific strategy in place. SG100 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?		**Yes**	**Yes**

Rationale

Analysed bycatch data, including ETPs, are available (PINRO 2017), with detailed records (species/ numbers of individuals); identification guides are available on board each vessel, as well as guidance on how to use these. Training workshops to use these identification guides and self-recording systems have been conducted (Client information, 2018/19). Systems are being implemented on board in order to reduce and/or avoid interaction with ETPs (e.g. on-board handling and quick release into the water). An automated system is currently being rolled out across the fleet to record electronically ETP and benthos species interactions (see description of this in Section 7.3.1e). All these measures provide clear evidence that the strategy is being implemented successfully and is achieving its objective. SG100 is met.

e	Review of alternative measures to minimize 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

This SI was not scored, as scientists' reports show (PINRO 2017) that any bycatch in this trap fishery is small, and no ETPs have been caught in this UoA (between 2013-16). No publications have been found which would indicate otherwise for this fishery, and this suggests that reviews and research on alternative measures to minimise ETP mortality are not relevant.

References

PINRO 2017; See also for PI2.3.1

McBride, M. M., Filin, A., Titov, O., and Stiansen, J. E. (Eds.) 2014. IMR/PINRO update of the "Joint Norwegian-Russian environmental status report on the Barents Sea Ecosystem" giving the current situation for climate,

phytoplankton, zooplankton, fish, and fisheries during 2012-13. IMR/PINRO Joint Report Series 2014(1), 64 pp. ISSN 1502-8828.

Jakobsen T., Ozhigin V., 2011. The Barents Sea, ecosystem, resources, management. Half a century of Russian – Norwegian Co-operation. PINRO/ IMR. Tapir Academic Press, ISBN 978-82-519-2545-7

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

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?	**Yes**	**Yes**	**No**

Rationale

The PINRO / IMR Reports (Jakobsen & Ozhigin, 2011; McBride et al 2014; IMR/PINRO 2018) on the State of the Barents Sea ecosystem offer an overview of the ETP species which occur in the Barents Sea including their spatial and temporal distribution and ecology. Species recording requirements of bycatch, by PINRO scientists, generate data on the catch of a wide range of species, and the analysis of the catch composition data (see Section 7.3.1d) suggests that encounters with ETP species are likely to be rare, as no ETP species were recorded (PINRO 2017). There is therefore some quantitative information available to adequately 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. SG60 and SG80 is met.

Bycatch composition information and detailed observations of any gear interactions covering several years is not available, therefore, a high degree of certainty cannot be achieved. SG100 is not met.

Recommendation:

The fishery is encouraged to record sightings and observations of marine mammals, giving species, location number of individuals, of sighting, in collaboration with PINRO scientists. PINRO, with IMP, is actively involved in such surveys (e.g. Transatlantic marine mammal surveys - TNASS), and the observations by the fishery would be a valuable contribution to ongoing marine mammal distribution studies.

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, minimize mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives.
	Met?	**Yes**	**No**	**No**

Rationale

The quantity of bycatch in this trap fishery is small, primarily due to the specifics of the UoA (passive gear of baited traps of particular design, and species targeted). The information is adequate to support measures to manage possible impacts on ETPs. SG60 is met.

The data is based on records collected at different seasons over a 3-year period, and are thus not directly comparable, as well as presence / absence data of a number of different species encountered in the traps over that time period. The information is not adequate to measure trends. SG80 is not met

However, it has to be pointed out that the fishery under assessment has recently (Jan 2019) implemented software on each vessel which will help with detailed recording of all bycatch, including ETP species.

References

PINRO 2017 client information; ICES WGIBAR 2017; IMR/PINRO 2018; on-line updates on ecosystem components of the Barents Sea on barentsportal.com

McBride, M. M., Filin, A., Titov, O., and Stiansen, J. E. (Eds.) 2014. IMR/PINRO update of the “Joint Norwegian-Russian environmental status report on the Barents Sea Ecosystem” giving the current situation for climate, phytoplankton, zooplankton, fish, and fisheries during 2012-13. IMR/PINRO Joint Report Series 2014(1), 64 pp. ISSN 1502-8828.

Jakobsen T., Ozhigin V., 2011. The Barents Sea, ecosystem, resources, management. Half a century of Russian – Norwegian Co-operation. PINRO/ IMR. Tapir Academic Press, ISBN 978-82-519-2545-7

Overall Performance Indicator score	**70**
Condition number (if relevant)	**3**

6 Recommendation PI 2.3.3:

The fishery is encouraged to record sightings and observations of marine mammals, giving species, location number of individuals, of sighting, in collaboration with PINRO scientists. PINRO, with IMP, is actively involved in such surveys (e.g. Trans-north Atlantic Sightings Survey - TNASS), and the observations by the fishery would be a valuable contribution to ongoing marine mammal distribution studies. Observations and sightings could also be extended to seabirds where appropriate

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?	**Yes**	**Yes**	**No**

Rationale

Based on the habitat requirements of the target species, the snow crab fishery occurs over soft sediment areas, which is thus the commonly encountered habitats.

The nature and distribution of benthic habitats and their interaction with the client fleet has been described in detail in section 7.3.1b.i of the background section, showing details of where the fishery is operating, as well as habitat maps. The commonly encountered habitat within the UoA fishing area is sedimentary substrate, sand and silty bottom (see also http://www.mareano.no/kart/mareano_en.html?language=en , which provides a sediment map of the area, showing predominantly mud, silt, sandy mud bottom substrate). The trap gear is a static gear, with a small footprint on the seafloor, as described in Section 7.3.1c of the background section.

Fishing tracks, showing where the fishery operates, can be overlaid with habitat maps in that area (see also Section 7.3.1), Studies have shown (Morgan and Chuenpagdee 2003; Eno et al 2001) that the trap gear deployed on the sedimentary seafloor is highly unlikely to reduce structure and function of the commonly encountered habitat (sand and silt) to a point where there would be serious or irreversible harm. SG60 and SG80 is met.

Without more detailed habitat maps available for the area the fishery is operating in, as well as improved detail on benthos bycatch over time for this fishery 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?	**Yes**	**Yes**	**No**

Rationale

From the habitat maps and fishing tracks available it could be deduced that currently no actual VME habitats in the snow crab fishing area have been identified, nor designated. Scientific observations on bycatch (PINRO scientists in Client information 2018) showed a list of benthos species brought up when retrieving the traps, and the list (Table 26) identified a number of genera which may be described as VME indicators (e.g. Alcyonaceans, Porifera), although only when occurring in aggregations of particular density and area would they form a VME habitat. There are ongoing benthic surveys, partly to monitor the spread of snow crabs and partly to improve on habitat mapping detail (Jørgensen et al 2019). Based on the knowledge available of the gear type, the current areal footprint of the fishery (as calculated by the number of vessels, traps per vessel and practicalities of deployment and fishing tracks in Figure 13), and the fact that snow crab lives on soft sediments, it can be stated that the fishery is highly unlikely to reduce structure and function of VME habitats to a point where there would be serious or irreversible harm. SG60 and SG80 is met.

Habitat maps of the fishing area (as evidenced by VMS tracks) are increasingly available (see Section 7.3.1), although not yet in enough detail/ resolution to show aggregations of VME indicator species, such as sponge aggregations, or soft coral aggregations, for example. SG100 is not met.

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?			**Yes**

Rationale

The minor habitats are those that are not commonly encountered by the gear (i.e. those not considered under SI(a), such as particular combinations of sediments, outcrops and gullies, etc. The sediment map of the area, as well as maps produced as part of several surveys of the megabenthos (see also Section 7.3.1) showed that there seemed to be no distinct minor habitats in the area where the UoA is fishing (outwith 12NM). The fishing area consists of fine substratum, as defined in MSC v2.0 Table GSA6, and associated biota, which studies show is not irreversibly harmed by the trap fishery (Morgan and Chuenpagdee 2003; Eno et al 2001). SG100 is met.

References

Morgan and Chuenpagdee 2003; NMFS 2004; Eno et al 2001; Anisimova et al., 2010; Jakobsen and Ozhigin 2011, Spiridinov et al 2011; Jørgensen et al 2019.

The “Mareano programme” http://www.mareano.no/__data/page/9235/Focus-Oceans_Mareano-Mai-2010.pdf; the Joint Russian/Norwegian Ecosystem Assessment (Barents Portal: http://barentsportal.com/barentsportal_v2.5/index.php/en/);

Larsen, T. Nagoda, D. and Andersen, J.R. (Eds) 2003. A biodiversity assessment of the Barents Sea Ecoregion WWF;

Overall Performance Indicator score	**85**
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?	**Yes**	**Yes**	**No**

Rationale

The snow crab fishery occurs in fine substratum areas.

Measures in place to mitigate habitat impacts include on-going mapping programmes to improve access management. Grabs and trawl sampling continue to be used for surveys of the benthos. Since 2006, the 'Russian – Norwegian Joint Annual Ecosystem surveys' provide both spatial and temporal data of benthic fauna for more than 400 stations annually. There has been research into habitat impacts of gear types (interpretation from other studies, such as outlined in Section 7.3.1). Management measures, which specifically addresses habitat impact has largely focused on closing inshore waters, the crab fishery is not allowed within 12NM of the coast.

As a passive gear, the move on rule in relation to benthic organisms is not applicable. Although benthic organisms (such as echinoderms which have moved into the trap) have been brought up with trap gear retrieval, it may at this stage be considered inappropriate to apply threshold values of weight per species/genus, as this is a passive trap fishery. A move on rule is in place with regards to protecting juveniles of the target species (i.e. if too many juvenile crabs move into the trap, although observations have shown that when adult crabs are present, juveniles do not move in [client interview May 2019). Local knowledge by the crew is a further determinant as to where fishing occurs and avoidance of particular areas.

Software is being implemented on fishing vessels designed to create and maintain a database of any bycaught species including, which would also identify possible VME indicator species. The data recorded includes numbers of individuals, not just presence/absence data. This work is done in collaboration with PINRO and WWF Murmansk, and relevant ID guides have been created and distributed on the vessels. On the basis of these data, which will be analysed by scientists at PINRO, areas of VME indicator species and clusters will eventually be mapped. If at any stage of this mapping process it is found that particular indicator species occur in greater frequency this is flagged, and appropriate measures are implemented (Client interview May 2019). SG60 and SG80 is met

The recording of benthos as well as other bycatch using the custom-made software is still new, training is being organised for specialists who will be working on the vessels, to be able to identify the relevant species. There are plans to have on-board observers in the various regions of the Barents Sea (NEZ, Spitsbergen and EEZ of the Russian Federation) on different fisheries MSC-certified vessels, in order to better co-ordinate ecological information. (Client interview, May 2019). Russian fishing companies which are MSC certified are planning to establish such areas protected areas, based on existing habitat maps created through the MAREANO programme, PINRO, and data received from participating fishing vessels through their MSC-logs on benthic organism interactions. Such boundaries, based on concentrations of particular benthic communities, will be set on a voluntary basis. The stated aim is to not fish in those closed areas (Client information and interviews, May 2019). This work is a joint effort of PINRO, WWF, and the fishing companies operating in the Barents and Norwegian seas. Currently, a list is being prepared which contains those species which are indicators of potential VMEs in the Barents Sea; this list is drawn up from those benthic organisms caught in the trap as well as the trawl fisheries.

This strategy is not yet implemented. SG100 is not met.

A Recommendation is raised as a pointer for future audits to observe and note the progress on these voluntary closed areas based on benthos habitat protection. The successful implementation of such voluntary closed areas may well improve the score for this PI.

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?	**Yes**	**Yes**	**No**

Rationale

The extensive and increasingly more sophisticated benthos mapping initiatives, the habitat requirements of the target species (fine substratum), the passive gear used (traps), location of the fishery is verifiable (VMS) and the fact that the fishery takes place 12NM offshore thus avoiding rocky inshore areas, provide some objective basis for confidence that the measures/ partial strategy are likely to work to help protect potential vulnerable habitats. SG60 and SG80 is met.

Time series of data for testing and modelling of strategy is not yet available. 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?		**Yes**	**No**

Rationale

Habitat maps and VMS maps indicate that the vessels fish in the areas described by the maps as predominantly types of soft sediments and associated fine substrate species communities. The grab samples and surveys conducted to date show the dominant benthic species (Section 7.3.1b.i), and mapping of the benthic Barents Sea is an ongoing programme. Data on benthos bycatch, collected and analysed for 2013-2016 by PINRO scientists provides presence/ absence information on a list of species found in the bycatch of the traps. SG80 is met.

The data collection consists of presence / absence data. Some of the species identified in the mapping programmes may be VME indicator species and could possibly be used to designate VME areas, provided the aggregations are significant in extent. Detail of information, i.e. numbers of individuals/ or weight per species encountered per trip or per fishing season is not available to help formulate a strategy in these relevant benthic areas. SG100 is not met.

A Recommendation is raised to improve on the quantitative evidence:

The bycatch information currently available consists of presence/ absence data. It is highly recommended to improve on the detail of benthos bycatch data by recording numbers of individuals and /or weight per species/genus and to analyse this data for each season. Thus, it will be possible to build a picture of the type of benthos encountered in the fishing area. This information should be shared with ongoing habitat mapping programmes, for example as outlined by Jørgensen et al 2015 (which is a joint project between IMR and PINRO).

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?	**NA**	**NA**	**NA**

Rationale
From the habitat surveys available, there are no designated VMEs in the snow crab fishery area under assessment, and therefore there are no associated management requirements set. Surveys are ongoing to assess whether VME indicator species would constitute VMEs (based on extent of aggregation). This SI is reviewed at future audits, by evaluating the information obtained from the benthos recording software analysis and maps.
References
Jørgensen et al 2015; background section 7.3.1b Client information on benthos bycatch and Client interviews May 2019;

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

7 Recommendation for PI 2.4.2:

a. The bycatch information currently available consists of presence/ absence data. It is highly recommended to improve on the detail of benthos bycatch data by recording numbers of individuals and /or weight per species/genus and to analyse this data for each season. Thus, it will be possible to build a picture of the type of benthos encountered in the fishing area. This information should be shared with ongoing habitat mapping programmes, for example as outlined by Jørgensen et al 2015 (which is a joint project between IMR and PINRO). The software for recoding bycatch is currently being rolled out across participating fisheries will provide quantitative detail. Future audits will monitor the implementation of this programme.

b. A Recommendation is raised as a pointer for future audits to observe and note the progress on these voluntary closed areas based on benthos habitat protection. The successful implementation of such voluntary closed areas may well improve the score for this PI.

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
a	Information quality			
	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?	**Yes**	**Yes**	**No**

Rationale

Detailed habitat maps of the Barents Sea are available (Section 7.3.1a/b), and the distribution of benthos is updated through ongoing surveys in the Barents Sea (such as the annual IMR-PINRO ecosystem surveys). Information based on studies in other areas (not the Barents Sea) is available, which indicates the impact of the fishing gear, traps, on the benthos (Section 7.3.1c) (Eno et al 2001; Schweitzer et al 2018; Morgan & Chuenpagdee 2003; Auster & Langton 1999). SG60 and SG80 is met.

Although vulnerable habitats and their distribution are being identified as part of these ecosystem surveys, it cannot yet be said that the distribution of all habitats with particular attention to the occurrence of VMEs is known. SG100 is not met.

Recommendation:

With the expansion of the distribution of snow crab further into the Barents Sea basin (northwest wards for example), the fishery will follow the snow crab. This will potentially mean that new areas will be exploited, hitherto not fished. (Jørgensen et al 2015). These areas will likely contain undisturbed benthic communities, with associated larger individuals (see observations in studies by Jørgensen et al 2015/16/19). Before fishing in new areas, it is highly recommended to conduct research (with PINRO/IMR) to establish what benthos is there, and if possible, actually close areas to fishing. The rationale being, that these closed areas will provide seed areas of benthic organisms, as fishing areas expand northwards, following changing fish community distribution patterns (not just for trap fishery but also trawl fishery).

b	Information adequacy for assessment of impacts			
	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	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.

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

Rationale

Several studies have been undertaken to assess the impact of the trap/pots gear on benthos (Eno et al 2001; Schweitzer et al 2018; Morgan & Chuenpagdee 2003; Auster & Langton 1999). These studies can be extrapolated for the benthic habitats of the Barents Sea (see background section 7.3.1a/b on habitat descriptions). There is adequate information to allow the main impact of the gear on the main habitats, which is soft sediment where the target species (snow crabs) is found. The annual Joint Russian Norwegian ecosystem survey undertakes benthic sampling and generates broad-scale benthic composition/distribution time series throughout the Barents Sea. Information is available on spatial overlap from snow crab fleet 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 impacts on the main habitats. SG60 and SG80 is met.

The physical impact of the gear on all the habitats have not been quantified fully. SG100 is not met.

c	Monitoring			
	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?		**Yes**	**No**

Rationale

The main habitats concerning this fishery are fine substrate habitats, which is where the target species lives. Habitat mapping programmes continue to be rolled out across the Barents Sea with increasing detail (see also Joint Russian Norway Barents Sea surveys; Jørgensen et al 2015/16/19), and the published information is updated regularly online (www.barentsportal.com). SG80 is met.

As the mapping programmes continue, it will increasingly become possible to measure changes in spatial distribution of all habitat types, once a relevant time series becomes available. This is not yet possible, SG100 is not met**.**

References

As for PI 2.4.1.; Section 7.3.1a/b; Eno et al 2001; Schweitzer et al 2018; Morgan & Chuenpagdee 2003; Auster & Langton 1999

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

8 Recommendation for PI 2.4.3:

With the expansion of the distribution of snow crab further into the Barents Sea basin (northwest wards for example), the fishery will follow the snow crab. This will potentially mean that new areas will be exploited, hitherto not fished. Jørgensen et al (2015). These areas will likely contain undisturbed benthic communities, with associated larger individuals (see observations in studies by Jørgensen et al 2015/16/19). Before fishing in new areas, it is highly recommended to conduct research (with PINRO/IMR) to establish what benthos is there, and if possible, actually close areas to fishing. The rationale being, that these closed areas will provide seed areas of benthic organisms, as fishing areas expand northwards, following changing fish community distribution patterns (not just for trap fishery but also trawl fishery).

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?	**Yes**	**Yes**	**Partial**

Rationale

Snow crab is an invasive species which recently expanded its range into the Barents Sea. After the first snow crab had been found on the Goose Bank in 1996 the number of reports on the snow crab by-catches in bottom trawl fishery has gradually increased (Pavlov, 2002). Since 2003 the snow crab has been observed in stomachs of cod, haddock, catfishes and thorny skate and thereby became a new food item for bottom fishes in the Barents Sea. In 2005, a snow crab was, for the first time, found during the ecosystem survey. Survey results indicate that the snow crab has adapted to the Barents Sea and it is assumed that the abundance of this crab will grow in the eastern Barents Sea in the nearest future. Due to this, the distribution and abundance of the crab is monitored, in order to estimate any impact on the native ecosystem.

Several ICES working groups provide annual assessments of the state of the Barents Sea Ecosystem: ICES Arctic Fisheries Working group; WG for Regional Ecosystem Description; WGIBAR - working group on integrated assessment in the Barents Sea. The ICES working group on crabs, WGCRAB, looks specifically, amongst other crab species, at the invasive snow crab species in the context of the wider Barents Sea ecosystem. This information is supplemented by on-going data collected under the Joint Norwegian-Russian Environmental Status Report for the Barents Sea (which issues annual Barents Sea ecosystem status report, trends, highlights expected future situation, as well as on-line updates of research on barentsportal.com.

All these assessments suggest that broadly speaking, the Barents Sea Ecosystem is relatively healthy, and that current fishing activities are not disrupting ecosystem structure and function. There has been a decline in seabird populations (similar to that throughout the NE Atlantic), but the reasons for this are unclear (drivers are a combination of these: local food shortage; increased predation; historic bycatch in drift net and long-line fisheries, climate change – see barentsportal.com for updates) and are not attributed to current fishing activity of the snow crab fishery, the fishery under assessment. The stocks of key species at different trophic levels (cod/ haddock and capelin) suggest that the finfish related elements of the ecosystem are evaluated and researched. Significant distributional changes are however taking place, probably related to climate change causing oceanographic shifts (e.g. Jørgensen et al 2019).

Considering that the snow crab is a ‘new’ species in the BS, and its impact on the Barents Sea ecosystem has yet to be quantified, the effect of the fishery on this species could be argued to ‘be evidence to be highly unlikely to be disrupting the key elements of ecosystem structure and function’, as the fishery is removing an ‘invasive’ species. In addition, the gear (traps) has comparatively little impact on habitats, as the crab fishery occurs in fine substrate areas, and the gear is target species specific with little bycatch. However, the overall understanding of the impact of the snow crab fishery on all ecosystem elements is limited. SG60 and SG80 is met and a partial score of SG 90 is met.

References

ICES AFWG 2016 and 2919; ICES. WGIBAR. 2014. Working Group on Integrated Assessments of the Barents Sea (WGIBAR); ICES Ecosystem overview Barents Sea 2016; ICES WGCRAB 2015; Jørgensen et al 2019; Arneberg et al 2013; Blanchard et al 2002; Prozorkevich et al 2018 IMR/PINRO ecosystem survey; IMR/PINRO 2014; Jakobsen, T. and Ozhigin, K (Eds) 2011; Johannesen et al 2017; Johannesen et al 2012; .

Tsyganova et al 2015. Introduced species; red king crab and snow crab. http://www.barentsportal.com/barentsportal/index.php/en/technology/85-technology-3/introduced-species/564-

Lyubina et al 2015. http://www.barentsportal.com/barentsportal/index.php/en/bioticcomponents/36-biotic-topics-1/benthos/327-

Dvoretsky & Dvoretsky, 2015. Nedreaas et al 2015; Important indirect effects of fisheries on the ecosystem [in the Barents Sea. http://www.barentsportal.com/barentsportal/index.php/en/human-activities/53-fisheriesand-other-harvesting/579-

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

PI 2.5.2 – Ecosystem management strategy

The Default Assessment Tree was modified for P2, Ecosystem management (PI 2.5.2) in order to reflect the fact that the Snow crab is an introduced species. The introduction was non-deliberate and occurred at least 20 years prior to the date the application is made for assessment against the MSC standard (first found in benthos surveys grab samples 1996).

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, in the fishery, to prevent further ecosystem impacts that may have occurred as a result of the introduction of the species	There is a **strategy** that consists of a **plan**, in place which contains measures to **address all main impacts of the UoA** on the ecosystem, and at least some of these measures are in place.
	Met?	**Yes**	**Yes**	**No**

Rationale

A range of technical measures and protocols leading to a partial strategy are in place to minimize bycatch of other fish species (described under PIs 2.1 and 2.2, and PI 2.3) that may play an important role in ecosystem structure and function. There is no fishing within the 12NM zone, and there are protocols and gear design to reduce bycatch. By default, due to the biology of the target species, gear deployment has limited impact on benthos (see Section 7.3.1a/b/c for habitat descriptions and impact studies).

No interaction with marine mammals and seabirds has been recorded (PINRO 2017, client interviews May 2019), therefore additional specific measures are not considered necessary at this stage. The mix of Russian-Norwegian research cooperation initiatives, ecosystem monitoring and assessments, seabed mapping, detailed benthos studies to specifically study any potential impact of the species on benthic ecology, fishing effort distribution monitoring, ICES advice, and the range of individual measures designed to protect different elements of the ecosystem, taken together may be regarded as comprising a partial strategy, and is expected to restrain impacts of the UoA on the ecosystem.

These surveys and assessments are also supported by several ecosystem modelling studies related specifically to the Barents Sea, which have explored for example the trophic relations between fish species, and links between capelin, cod, seabirds, marine mammals. These include ecopath type studies by Blanchard *et al* 2002; EcoCod (which seeks to estimate cod MSY taking into account a range of ecosystem factors), Gadget (multispecies interactions between cod, herring, capelin, minke whale, krill) in the Barents Sea; Biofrost (multispecies model for Barents Sea (Quilfeldt et al 2009) – addressing primarily cod / capelin dynamics); STOCOBAR (Stock of cod in the Barents Sea). Broader ecosystem models include NORWECOM.E2E, which includes plankton and fish, and is under development and semi-operational, and both PINRO and IMR have developed hydrodynamic models that complement these mainly biologically based models.

Information was available as to the frequency of lost traps (20/boat/season; Client information at site visit 2019). In order to prevent ghost fishing, biodegradable rope is used on one of the panels, which allows the trap to open within a season if lost. A Recommendation is raised to document such gear loss annually.

The Russian Federation is a signatory of The Convention for the Prevention of Marine Pollution from ships (MARPOL, see also www.imo.org), and has ratified a number of relevant annexes: Annex IV – sewage from ships; Annex V: garbage from ships; Annex VI air pollution from ships to reduce greenhouse gas emissions. In particular annex IV and V have a direct impact on the marine ecosystem. Management measures are on board the vessels to address these issues. (Annex IV - The pipelines used to deliver sewage to reception facilities are equipped with standard drain connections. The vessels are audited in accordance with regulation 4 of Annex IV to the Convention, and are found to comply satisfactorily regarding construction, equipment, systems, devices and materials. At sea, sewage is discharged at a distance of at least 12 nautical miles from the shore and at vessel's speed of at least 4 knots. Regarding Annex V, garbage is separated into various categories (plastic, food waste, domestic waste etc) and stored in separate special containers and delivered to the onshore receiving facilities or at sea to transport

vessels for further delivery to a port. The onshore receiving facilities or transport vessels issue receipts. Regarding Annex VI. “International Air Pollution Prevention Certificates” are available and relevant vessel audits show that the equipment, systems, fittings, devices and materials fully comply with the applicable requirements of MARPOL Annex VI.)

SG60 and SG80 is met.

However, while there is an overarching ecosystem management plan for the Norwegian Barents Sea and Lofoten Area, there is not yet an equivalent plan in the Russian Barents Sea. Furthermore, several of the initiatives relating to benthic impacts have only recently been implemented by the client fishery and participating other fisheries (such as custom designed software to record bycatch of all kinds) this cannot yet be considered to be part of a strategic plan. There appears to be no strategy which consists of a plan to prevent possible further expansion of the species (if it were to occur with changing oceanographic conditions), although there is regular monitoring of survey stations and research (e.g. stomach content research, in Jørgensen et al 2019) to evaluate the extend of the distribution and effect on the benthos. 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?	**Yes**	**Yes**	**No**

Rationale

There is some objective basis for confidence that the measures /partial strategy will work, as can be seen from the survey results, data collection by scientific studies (PINRO 2017), and extensive mapping exercises and ecosystem surveys of the Barents Sea as a whole. The information provided indicates that the partial strategy employed by the fishery is expected to restrain impacts on the ecosystem. A fundamental part of the partial strategy is the process of Russian and Norwegian scientist collaborating annually on joint IMR / PINRO ecosystem research cruises, which result in annual status reports which specifically focus on ecosystem trends, threats and projections, and that this then directly contributes to both the work of ICES in producing advice for target species, and perhaps more importantly, the considerations of the Joint Norwegian Russian Fisheries Commission, when considering that advice and determining catch levels. SG60 and SG80 is met.

However, as noted under issue a), the lack of an overarching ecosystem management plan within the Russian zone, and the limited understanding of the wider effects of changes in benthic communities and benthic community functioning means this cannot be scored at SG100. SG100 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?		**Yes**	**No**

Rationale

The partial strategy consists of monitoring and research, to understand the impact and distribution of snow crab on the ecosystem, as well as managing the fishery so that the activity of fishing per se has minimal impact on the ecosystem (gear design, bycatch). Evidence relating to successful implementation at the fleet level includes:

- VMS data relating to the spatial intensity of fishing effort
- Catch records
- Vessel inspections

- Review and analysis of fishing activity, species caught and habitats affected - by PINRO and the inspectorates.

SG 80 is met.

Fishing the species is a form of direct management of this species which was unintentionally introduced into the Barents Sea in the mid-1990s, thus slowing its expansion. At this stage, there is little information available to show the ecosystem impact of snow crab per se. SG100 is not met

References

As in 2.5.1 above; Blanchard et al 2002;

STOCOBAR https://www.imr.no/filarkiv/2016/04/7_a._filin_and_d._howell_-impact_of_limitation_in_interannual_variations_of_cod_yield_on_its_stock_dynamics.pdf/nb-no (accessed 20 July 2019)

NORWECOM.E2E http://bio.uib.no/te/papers/NORWECOMstrategy.pdf (accessed 20 July 2019)

http://arcticgovernance.custompublish.com/norway-and-integrated-oceans-management-the-case-of-the-barents-sea.4651095-142902.html

Hoel, A.H., von Quillfeldt, C.H., Olsen, E. 2009 Norway and Integrated Oceans Management – the Case of the Barents Sea. REPORT SERIES NO 129 Norsk Polar Institutt

Ottersen, G., Olsen C,.van der Meeren, G., Dommasnes., and Loeng H. 2011. The Norwegian plan for integrated ecosystem-based management of the marine environment in the Norwegian Sea. Marine Policy35(2011)389–398 Quillfeldt, C. Olsen, E.,Dommasnes A., and Vongraven, D. 2009. Integrated ecosystem-based management of the Barents Sea-Lofoten Area. In Sakshaug, E., Johnsen, G. and Kovacs, K. (eds) Ecosystem Barents Sea. Tapir Academic Press, Trondheim. Norway, 587 p.

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

9 Recommendation for PI 2.5.2:

It is recommended that annual records are kept, per fishing season, of traps lost (even though traps are disabled through biodegradable panels)

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?	**Yes**	**Yes**	
Rationale				
The Barents Sea food web and ecosystem are well researched, a range of models at different levels of complexity have been developed, and key relationships analysed. A good deal of biodiversity (location, migrations etc.) has been mapped. Key indicators and parameters are monitored on a regular basis and trend data is collected. These surveys and assessments are also supported by several ecosystem modelling studies (see ICES WGIBAR 2017) related specifically to the Barents Sea, which have explored for example the trophic relations between fish species, and links between capelin, cod, seabirds, marine mammals. These include ecopath type studies by Blanchard *et al* 2002; EcoCod (which seeks to estimate cod MSY taking into account a range of ecosystem factors), Gadget (multispecies interactions between cod, herring, capelin, minke whale, krill) in the Barents Sea; Biofrost (multispecies model for Barents Sea - addressing primarily cod / capelin dynamics); STOCOBAR (Stock of cod in the Barents Sea). Broader ecosystem models include NORWECOM.E2E, which includes plankton and fish, and is under development and semi-operational, and both PINRO and IMR have developed hydrodynamic models that complement these mainly biologically based models. Information is adequate to broadly understand the key elements of the ecosystem. SG60 and SG80 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?	**Yes**	**Yes**	**No**
Rationale				
The main impacts of the fishery on key ecosystem elements can be inferred from existing information. The exact impact of the snow crab fishery may not yet be fully quantifiable, as the species has only recently invaded the Barents Sea and its impact is under investigation. Ongoing research in the form of surveys being carried out by PINRO and research scientists in both Norway and Russia on the ecological spread of the snow crab is more than adequate to enable main impacts to be inferred - certainly sufficient for management purposes. SG60 and SG80 is met. Detailed information on the impact (both positive and negative) of the invasive species, snow crab, on the ecosystem is not yet available, and may anyhow be difficult to ascertain above the background noise of ecological variation and changes due to climate change. SG100 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?		**Yes**	**Yes**

Rationale

The main functions of Target, Primary and Secondary and ETP species are known (see background information provided in section 7.3.1). Ecosystem research, as listed in PI 2.5.2 above, has shown that the main functions of the components in the ecosystem are known. SG80 is met.

The impacts of the UoA (trap fishery for snow crab) on P1 target species (snow crab), bycatch species (Primary: cod, Greenland halibut, herring (bait), Beaked redfish, Blue ling) and Secondary: Spotted and Northern wolffish, long rough dab, Arctic eelpout, Grey gurnard, Thorny skate, Arctic skate), and potential ETP species (although none recorded as by-caught in this fishery, PINRO 2017), as well as habitats – are identified and the main functions of these components in the ecosystem are understood. Quantitative information is available on the amount of bycatch removal, and research has been conducted on the effects of the gear on the relevant habitat. SG100 is 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?		**Yes**	**No**

Rationale

Survey and monitoring as well as some modelling all support fishery impact assessment studies, and some of the consequences for the ecosystem have been inferred, such as direct impact of the gear on benthos, and removal of bycatch species. Relations between the target species, snow crab, and benthic species are researched, as snow crab is a recently invasive species (mid- 1990s). The role of benthic species on the wider ecosystem, and the implications of the snow crab invasion and consequent crab fishery continue to be investigated. SG80 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 UoA on the components is adequate, this cannot be said for some of the elements, as the time series data for by-catch is short and based on relatively few observations (due to this being a young fishery – started in 2013). SG100 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?		**Yes**	**No**

Rationale

There is a relatively comprehensive monitoring programme in place related to the Joint Norwegian-Russian Barents Sea Ecosystem assessment, the MAREANO mapping programme, as well as long term benthos studies. Other related initiatives monitor marine mammals and seabirds. Survey results on biotic and abiotic components of the ecosystem are regularly and frequently updated on the barentsportal.com website. PINRO and IMR collect comprehensive data related to the major commercial fisheries. Risks associated with changing populations or relations between fisheries and various elements of the ecosystem should be picked up as part of the longer-term time series assessments. SG80 is met.

Although there are inevitably some gaps in our understanding, there is enough information available to support the development of strategies to manage marine ecosystem impacts, especially if a precautionary approach were to be taken to avoid and/or reduce damage to benthic habitats. Currently there are habitat mapping projects underway in the Barents Sea to improve the detail of benthic habitats. However, considering that detailed information on bycatch to species level and time series is not yet available, SG100 is not met.

References
As for 2.5.1 ICES WGIBAR 2017 for ecosystem models

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

7.3.3 Principle 2 References

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7.4 Principle 3

7.4.1 Principle 3 background

a. Jurisdiction

The fishery takes place on the continental shelf of the Russian Federation in the Barents Sea. All marine living resources from the Russian EEZ and continental shelf have to be taken to Russian port before being exported. Opilio catches are landed in Murmansk and Arkhangelsk in Russia, Kirkenes, Hammerfest and Tromsø in Norway, and Eemshaven and Velsen in the Netherlands. The opilio fishery in the Barents Sea is managed separately by Norway and Russia on their respective continental shelves since they in 2016 agreed on treating the stock as sedentary and hence managed under the continental shelf provisions of the Law of the Sea Convention, and not under the Convention's EEZ regime.

b. 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, in so far 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 in the Federal Fisheries Act, 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. Furthermore, the provisions of international agreements entered into by the Russian Federation stand above those of national law, according to the 1993 Russian Constitution. The Russian Federation has signed and ratified a number of international agreements which adopt the precautionary approach, including the 1995 UN Straddling Stocks Agreement, and works actively in international organizations or arrangements which explicitly adhere to the precautionary approach to fisheries management, such as ICES and NEAFC.

c. Legal basis and management set-up

The Russian Federation has signed and ratified relevant international agreements such as the 1982 Law of the Sea Convention and the 1995 Straddling Stocks Agreement. The Russian Constitution of 1993 states that the provisions of international agreements entered by the Russian Federation stand above those of national law. The Federal Fisheries Act of the Russian Federation was signed in 2004 and last revised in 2014. This is a framework law, and a number of supporting legal documents have been issued in recent years to implement the intensions behind the 2007 revision. Specific regulations are given at the level of fishery basins. Current regulations for Russia's Northern fishery basin (covering fisheries conducted by companies in Murmansk and Arkhangelsk Oblasts, the Republic of Karelia and Nenets Autonomous Okrug, i.e. not strictly a 'basin') were adopted in 2014 and last revised in 2017, providing, among other things, rules for closed areas, fishing gear (e.g. mesh size), by-catch and minimal allowable size of different species. There are also annual regulations for the fishery of each species.

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 – in Russian: Rosrybolovstvo), which is the successor of the former State Committee for Fisheries (abolished in 2004), and in turn the Soviet Ministry of Fisheries. The Federal Border Service (since 2003 part of the Federal Security Service, the FSB)/Coast Guard is responsible for enforcement at sea. The Barents and White Sea Territorial Administration of the Federal Fisheries Agency (BBTA – in Russian: BBTU) was established in 2007 as the implementing body of the Federal Fisheries Agency in the Northern basin, located in Murmansk. 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.

d. Stakeholders and consultation processes

A number of bodies of governance, industry organizations and research institutions are involved in the management of Russian fisheries. The formal arena for interaction between the Russian fishing industry and the government are the advisory bodies, the so-called fishery councils, found at federal, basin and regional levels. At the federal level, the Public Fisheries Council was established in 2008 on the basis of the requirement in the Federal Public Chamber Act to have a public council for most federal bodies of governance. Basin-level and regional fishery councils have existed since Soviet times, and the 2004 Federal Fisheries Act makes them mandatory for all basins and regions located on their territory. The rules of procedures for 'basin scientific and fishery councils' in the Russian Federation were approved in 2008. They state that the councils shall advice on a wide range of fishery-related issues, including conduct of fisheries in the relevant

region; 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.

Russia has an extensive system of fisheries research in oceanography, biology of marine organisms, resource assessment, fishing gear and processing technology, among other things. Research institutes subordinate to the FFA are highly integrated in the management process and also participate in the fishery councils at different levels. As follows from the above, the FFA is the implementing body for fishery policies under the Ministry of Agriculture. The Federal Border Service (since 2003 part of the Federal Security Service, the FSB)/Coast Guard is responsible for enforcement at sea. The Barents and White Sea Territorial Administration of the Federal Fisheries Agency (the BBTA) was established in 2007 as the implementing body of the Federal Fisheries Agency in the Northern basin, located in Murmansk.

There is a strong Russian (and previously Soviet) tradition of stakeholder consultation in the management process. The fishery councils at different (referred to above) consist of representatives of the fishing industry, federal executive authorities, executive bodies of the Russian federal subjects (the regions), research institutions and non-governmental organizations (NGOs), including the indigenous people of the North, Siberia and the Far East. The current regulations of the Northern Basin Scientific and Fishery Council were given in 2002 and corresponding regulations for the Murmansk Territorial Fishery Council in 2005, stating, inter alia, that the council shall contribute to a harmonized fishery policy in the region, liaise between the fishing industry, fishery authorities, scientific institutions and NGOs. In addition, the Fishing Industry Union of the North (FIUN) has developed into an important lobbying organization in the Northern fishery basin, with direct access to the highest levels of federal authorities. 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 Chamber 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.

e. Enforcement and sanctions

The UoA fishery takes place on the Russian continental shelf, and the catch is landed in Norway and Russia. The certificate also covers landings in the Netherlands. Hence, the enforcement systems of both must be assessed, as well as the NEAFC port state control regime. All landings in Norway are registered by the Norwegian Fishermen's Sales Organization and checked towards catch information sent electronically to the Norwegian Directorate of Fisheries after each haul, as well as before entering the Norwegian Economic Zone (NEZ). The Norwegian Food Safety Authority checks all landings by foreign vessels in Norwegian ports, while the Directorate of Fisheries conducts physical inspections of at least 15 % of these landings. The Norwegian Coast Guard performs spot checks at sea (in the NEZ and the Protection Zone around Svalbard), including from helicopters during fishing activities and inspections at check points that foreign vessels have to pass when entering or leaving the NEZ and in connection with transhipments in Norwegian waters, which have to be reported in advance. Coast Guard inspectors board fishing vessels and control the catch from last haul (e.g. catch composition and fish size) and fishing gear (e.g. mesh size) on deck and the volume of fish in the holds. Using the established conversion factors for the relevant fish product, the inspectors calculate the volume of the fish in round weight and compare this with the catches reported to the Directorate through the logbooks. Both landing and at-sea control is conducted using a risk-based framework aimed at utilizing resources to optimize compliance at any given moment.

In Russia, the FFA (in the northern basin: the BBTA as the Agency's regional branch) keeps track of how much fish each vessel and company (quotas are given to companies, not vessels in Russia) has fished at any moment, based on daily reports from each fishing vessels and accumulated reports each 15th day from all fishing companies, as well as VMS data. The Inspection Service of the Russian Border Guard, which is part of the Federal Security Service (FSB), conducts inspections at sea and in port. Fish caught in the REZ must be taken to any port of the Russian Federation for state control, but some of it is subsequently transhipped for export. The Border Guard conducts random inspections at sea during fishing, following the same procedures as the Norwegian Coast Guard, with inspection of documentation, fish from last haul, gear and catch in holds. It also conducts physical inspections of all transhipments at sea (weather conditions allowing) and at the control points that all foreign vessels – and Russian vessels having fished outside the REZ – have to go through when entering and leaving the REZ. When Russian vessels land in other European ports, they are subject to the NEAFC port state control scheme, which implies that the port state has to check with the flag state that the landed catch is counted towards a quota, inspect a fixed share of the catch physically, and inform the flag state of the landed volumes. Both Norwegian and Russian inspectors have the authority to close an area with too much juvenile or bycatch (real-time closure).

Enforcement bodies on both sides – the Coast Guard and the Directorate of Fisheries in Norway and the BBTA and the Border Guard in Russia – cooperate closely in the enforcement of fisheries regulations in the Barents Sea, including running exchange of inspection data and more analytical material related to compliance, as well as regular exchange of inspectors both at sea and in port. Inspection procedures have also been harmonized between the two countries.

The Russian sanctioning system makes wide use of administrative fines and refers serious cases to the judicial system. The Russian Federal Fisheries Act requires the withdrawal of quota rights in the following situations, inter alia: i) the company fails to take 50 % of its quota two years in a row; ii) the company has committed two serious violations of the fisheries regulations within one calendar year; iii) the company has failed to go to Russian port with catch taken in the REZ; iv) the vessel has switched off the VMS system for more than 48 hours within a calendar year without approval from the authorities. 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.

In Norway, statutory authority for the use of sanctions in the event of infringements of fisheries regulations is given in the Marine Resources Act. Intentional or negligent violations are punished with fines or prison up to one year, while infringements committed with gross intent or negligence may be punished with prison up to six years. In the judgment of the seriousness of the infringement, the economic gain of the violation, among other things, is to be taken into consideration. Alternatively, catch, gear, vessels or other properties can be confiscated.

f. 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 councils' meetings, found at federal, basin and regional levels (see SI 3.1.2 b) above), management authorities receive feedback on management practices from the industry and other interested stakeholders, including NGOs. The FFA and the Ministry of Agriculture report annually to the Government and the Presidential Administration 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 PINRO is peer reviewed by the federal fisheries research institute, VNIRO, 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.

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?	**Yes**	**Yes**	**No**

Rationale

The fishery takes place on the continental shelf of the Russian Federation in the Barents Sea. Catches are landed in Norwegian and Russian ports. The opilio fishery in the Barents Sea is managed separately by Norway and Russia on their respective continental shelves since they in 2016 agreed on treating the stock as sedentary and hence managed under the continental shelf provisions of the Law of the Sea Convention, and not under the Convention's EEZ regime. Hence, the national management regime in Russia must be covered by the assessment as well as the land-based control regime in Norway.

The Russian Federation has signed and ratified relevant international agreements such as the 1982 Law of the Sea Convention and the 1995 Straddling Stocks Agreement. The Russian Constitution of 1993 states that the provisions of international agreements entered by the Russian Federation stand above those of national law. The Federal Fisheries Act of the Russian Federation was signed in 2004 and last revised in 2014. This is a framework law, and a number of supporting legal documents have been issued in recent years to implement the intensions behind the 2007 revision. Specific regulations are given at the level of fishery basins. Current regulations for Russia's Northern fishery basin (covering fisheries conducted by companies in Murmansk and Arkhangelsk Oblasts, the Republic of Karelia and Nenets Autonomous Okrug, i.e. not strictly a 'basin') were adopted in 2014 and last revised in 2017, providing, among other things, rules for closed areas, fishing gear (e.g. mesh size), by-catch and minimal allowable size of different species. There are also annual regulations for the fishery of each species.

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 – in Russian: Rosrybolovstvo), which is the successor of the former State Committee for Fisheries (abolished in 2004), and in turn the Soviet Ministry of Fisheries. The Federal Border Service (since 2003 part of the Federal Security Service, the FSB) is responsible for enforcement at sea. The Barents and White Sea Territorial Administration of the Federal Fisheries Agency (BBTA – in Russian: BBTU) was established in 2007 as the implementing body of the Federal Fisheries Agency in the Northern basin, located in Murmansk. 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. In Murmansk Oblast (country), the Ministry of Fisheries and Agriculture (at the Governor's office, the executive branch of government at regional level in Russia) is responsible for inland fisheries, recreational fisheries and the distribution of the indigenous peoples' quota (see SI 3.1.1 c) below).

The management system is considered to be effective insofar as it constitutes a coherent set of binding rulemaking practices. Norway and Russia decided in 2016 to treat the stock as sedentary and hence managed separately on their respective continental shelves, but continue to inform and consult each other about the management of the snow crab fishery in the Joint Norwegian–Russian Fisheries Commission, so the SG 80 requirement of organized

and effective cooperation with other parties is met, as this is considered sufficient for the scope and context of the fishery. However, the SG 100 requirement of 'binding procedures' governing cooperation with other parties is not 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?	**Yes**	**Yes**	**Yes**

Rationale

In Russia, most disputes are solved within the system for fisheries management, not requiring judicial treatment. There is a well-established system of consultation with user groups (see SI 3.1.2 b) below), through fishery councils at different levels (the public chamber at federal level) and directly between user groups and government. Quota allocation and other regulatory measures are subject to consultation between user groups and government. The process is transparent for actors within the Russian fisheries complex. Internal fishery infringements are processed and dealt with by the enforcement bodies (see SI 3.2.3 a) below), and fishermen and ship owners have the possibility to bring their case to court instead of accepting a fine. The Russian system for fisheries management has evolved more than a century, and in the Northern basin large-scale fishery commenced in the early 1920s. The dispute resolution mechanisms at both national and regional level have been refined over the years and the consistent ability to provide for compromise and dispute resolution testifies to the appropriateness of the system for the fishery under assessment.

Hence, 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 is appropriate to the context of the UoA. SG 80 is met.

It has been tested and proven to be effective since all disputes are resolved in the arenas for interaction between authorities and stakeholders. SG 100 is met.

c	Respect for rights			
	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?	**Yes**	**Yes**	**Yes**

Rationale

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 (e.g., 'industrial fisheries', 'coastal fisheries' and 'fisheries for scientific and enforcement purposes'). In the Northern basin, a fixed quota of cod and haddock is given to the Saami, based on their traditional fishing rights in the region.

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

ФЕДЕРАЛЬНЫЙ ЗАКОН О РЫБОЛОВСТВЕ И СОХРАНЕНИИ ВОДНЫХ БИОЛОГИЧЕСКИХ РЕСУРСОВ (‘Federal Act on Fisheries and Protection of Aquatic Biological Resources’ – Federal Fisheries Act), N 166-ФЗ, Federal Assembly of the Russian Federation, 2004 (last revised 2014).

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Jørgensen, Anne-Kristin, ‘Рыбное хозяйство и управление отраслью в России’ (‘The fishing industry and fisheries management in Russia’), in Anne-Kristin Jørgensen and Geir Hønneland, Общее море, общие задачи: Сравнительный анализ рамочных условий рыбной отрасли России и Норвегии (‘Common sea, common challenges: a comparative analysis of the framework conditions for the fishing industries in Russia and Norway’), Lysaker: Fridtjof Nansen Institute, 2015.

ОБ УТВЕРЖДЕНИИ ПРАВИЛ РЫБОЛОВСТВА ДЛЯ СЕВЕРНОГО РЫБОХОЗЯЙСТВЕННОГО БАССЕЙНА (‘On the Confirmation of Fisheries Regulations for the Northern Fishery Basin’), N 414, Ministry of Agriculture, the Russian Federation, 2014 (last revised 2017).

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?	**Yes**	**Yes**	**Yes**
Rationale				
The functions, roles and responsibilities of the different countries involved in the management of the Barents Sea fisheries, as well as of the different organizations and individuals involved at the national level, are explicitly defined in international agreements and national laws and regulations, as well as in long-standing practice; see SI 3.1.1 a) for an overview of the main state bodies engaged in the management of the fishery, and SI 3.1.2 b) for an overview of non-governmental organizations involved. Organisations and individuals involved in the management process have been identified, and according to the submitted client checklist, their functions, roles and responsibilities are generally understood, according to interviews at the site visit. 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. SG 80 is met. According to interviews at the site visit, 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?	**Yes**	**Yes**	**No**
Rationale				
There is a strong Russian (and previously Soviet) tradition of stakeholder consultation in fisheries management. A formal arena for interaction between the Russian fishing industry and the government are the advisory bodies, the so-called fishery councils, found at federal, basin and regional levels. At the federal level, the Public Fisheries Council was established in 2008 on the basis of the requirement in the Federal Public Chamber Act to have a public council for most federal bodies of governance. Basin-level and regional fishery councils have existed since Soviet times, and the 2004 Federal Fisheries Act makes them mandatory for all basins and regions located on their territory. Rules of procedures for 'basin scientific and fishery councils' in the Russian Federation were adopted in 2008. They				

state that the councils shall advice on a wide range of fishery-related issues, including conduct of fisheries in the relevant region; 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 the fishing industry, federal executive authorities, executive bodies of the Russian federal subjects (the regions), research institutions and non-governmental organizations (NGOs), including the indigenous people of the North, Siberia and the Far East. Hence, in the Northern basin (covering the counties of Murmansk and Arkhangelsk, the Republic of Karelia and Nenets Autonomous Region) both federal authorities (the FFA through its representation in Murmansk, the BBTA) and regional authorities (the Ministry of Fisheries and Agriculture under the Governor) meet regularly with representatives of the fishing industry (individual companies and associations such as the Fishing Industry Union of the North (FIUN) and the Association of coastal fisheries in Murmansk Oblast), and other stakeholders that have taken an interest in fisheries management in the region, notably WWF-Murmansk.

The current regulations of the Northern Basin Scientific and Fishery Council were given in 2002 and corresponding regulations for the Murmansk Territorial Fishery Council in 2005, stating, inter alia, that the council shall contribute to a harmonized fishery policy in the region, liaise between the fishing industry, fishery authorities, scientific institutions and NGOs. 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. (For public hearings in the fishery-specific management system, see PI 3.2.4 below.) Further, the FFA has a dedicated ‘Open Agency’ initiative which is comprehensively detailed on their website. In addition to the use of the Public Chamber 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. User groups from both countries also participate in the respective national delegations to the JNRFC and regular fishery consultations with third countries. Management authorities actively seek advice from user groups in preparation for the international consultations and negotiations.

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 processes regularly seek and accept relevant information, and the management system demonstrates consideration of the information obtained. SG 80 is met.

Interviews at the site visit leave it somewhat open whether authorities always provide adequate explanations of how stakeholder input is used or not used, so SG 100 is not met.

c	Participation			
	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?		**Yes**	**No**

Rationale

As follows from SI 3.1.2 b) above, the consultation processes provide opportunity for all interested and affected parties to be involved at both national and international level. Meetings are publicly announced, and authorities encourage all interested parties, including NGOs and the media, to attend. The various hearing opportunities available online also contribute to encouraging and facilitating public involvement.

Hence, the consultation process provides opportunity for all interested and affected parties to be involved. SG 80 is met.

Interviews at the site visit leave it somewhat open whether authorities not only provide opportunity, but actively encourage all parties to be involved and facilitate their effective engagement. SG 100 is not met.

References

ФЕДЕРАЛЬНЫЙ ЗАКОН О РЫБОЛОВСТВЕ И СОХРАНЕНИИ ВОДНЫХ БИОЛОГИЧЕСКИХ РЕСУРСОВ (‘Federal Act on fisheries and protection of aquatic biological resources’ – Federal Fisheries Act), N 166-ФЗ, Federal Assembly of the Russian Federation, 2004 (last revised 2014).

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Об утверждении Положения о Северном научно-промысловом совете и Положения о Рабочей группе Северного научно-промыслового совета (‘On the confirmation of the Order of a Northern scientific and fishery council and the Order of a working group of the Northern scientific and fishery council’), Federal Fisheries Agency, Russian Federation, 2002.

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ОБ УТВЕРЖДЕНИИ ПОЛОЖЕНИЯ О ПОРЯДКЕ ДЕЯТЕЛЬНОСТИ ТЕРРИТОРИАЛЬНОГО РЫБОХОЗЯЙСТВЕННОГО СОВЕТА МУРМАНСКОЙ ОБЛАСТИ И ЕГО СОСТАВА (‘On the confirmation of arrangements for the territorial fishery council of Murmansk Oblast and its composition’), N 239-ПП/8, the Government of Murmansk Oblast, Russian Federation, 2005 (last revised 2016).

ОБ УТВЕРЖДЕНИИ ПРАВИЛ РЫБОЛОВСТВА ДЛЯ СЕВЕРНОГО РЫБОХОЗЯЙСТВЕННОГО БАССЕЙНА (‘On the confirmation of fisheries regulations for the Northern fishery basin’), N 414, Ministry of Agriculture, Russian Federation, 2014 (last revised 2017).

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Overall Performance Indicator score	**85**
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?	**Yes**	**Yes**	**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 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. Furthermore, the provisions of international agreements entered into by the Russian Federation stand above those of national law, according to the 1993 Russian Constitution. The Russian Federation has signed and ratified a number of international agreements which adopt the precautionary approach, including the 1995 UN Straddling Stocks Agreement, and works actively in international organizations or arrangements which explicitly adhere to the precautionary approach to fisheries management, such as ICES and NEAFC.

Hence, clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy. SG 60 and SG 80 are met.

However, such objectives are not required by management policy. SG 100 is not met.

References

ФЕДЕРАЛЬНЫЙ ЗАКОН О РЫБОЛОВСТВЕ И СОХРАНЕНИИ ВОДНЫХ БИОЛОГИЧЕСКИХ РЕСУРСОВ ('Federal Act on fisheries and protection of aquatic biological resources' – Federal Fisheries Act), N 166-ФЗ, Federal Assembly of the Russian Federation, 2004 (last revised 2014).

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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?	**Yes**	**Yes**	**Partial**

Rationale

Objectives broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2 are explicit in the Russian regulations of snow 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 short- and long-term, so SG 80 is also met.

P1 objectives are well defined and measurable in the sense that performance against them can be measured through 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

ФЕДЕРАЛЬНЫЙ ЗАКОН О РЫБОЛОВСТВЕ И СОХРАНЕНИИ ВОДНЫХ БИОЛОГИЧЕСКИХ РЕСУРСОВ ('Federal Act on Fisheries and Protection of Aquatic Biological Resources' – Federal Fisheries Act), N 166-ФЗ, Federal Assembly of the Russian Federation, 2004 (last revised 2014).

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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?	**Yes**	**Yes**	
Rationale				
Established decision-making procedures at federal and regional levels have evolved over several decades and are now codified in the Fisheries Act, general provisions for fishery in the Barents Sea and specific regulations for the snow crab fishery. The Ministry of Agriculture decides on policy and regulatory schemes, while the Federal Fisheries Agency acts as an implementing body under the Ministry, with a main responsibility for secondary legislation (see SI 3.1.1 a) above). The Federal Fisheries Agency through its regional offices, and the Fishery Inspection Service under the Federal Security Service, perform compliance control on shore and at sea respectively. The decision-making processes include the allocation of quotas based on scientific advice and corroborated in stakeholder bodies, public hearings and environmental impact assessments. Further, technical regulations are defined by the Federal Fisheries Agency, after consultations with user groups and other stakeholders (see SI 3.1.2 b) above). The enforcement system is further described in PI 3.2.3 a) below. Hence, there are decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives. This applies to the UoA fishery as it does to Russian fisheries in general; see PIs 3.1.1 and 3.1.2 above. SG 60 is met. These processes are established – evolved over several decades and now codified in the 2004 Federal Fisheries Act and secondary legislation – so SG 80 is also 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?	**Yes**	**Yes**	**Yes**
Rationale				
The well-established decision-making procedures at national 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 first and foremost in the fishery councils at basin level, further through ad hoc 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 PINRO. Stakeholders interviewed at the site visit claim that the relevant governmental agencies are open to any kind of input at any time. They feel that the authorities' response is transparent and timely and that the ensuing policy options take adequate account of their advice. It is a principal challenge to claim that decision-making processes respond			

to ‘all’ issues, but from an opposite point of view, there is no evidence of issues not responded to. SG100 is met for the national part of the management system.

c	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		**Yes**	

Rationale

Decision-making processes at the national level in Russia are based on scientific recommendations from PINRO. The Federal Fisheries Act, which applies to the capture of all marine species, requires fisheries management to be based on the precautionary approach (see PI 3.1.3 above). 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?	**Yes**	**Yes**	**No**

Rationale

Information is available on the fishery’s performance and management action on the websites of the Russian Federal Fisheries Agency and its regional office in the Northern basin, BBTA. SG 60 is met.

Since explanations are provided for actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity, SG 80 is also met.

However, no formal reporting to all interested stakeholders takes place, so 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?	**Yes**	**Yes**	**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.

When occasionally taken to court by fishing companies, the management authority complies with the judicial decision in a timely manner. SG 80 is met.

The management authority works proactively to avoid legal disputes. This is done partly 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

Interviews with the client, PINRO, IMR and WWF-Murmansk during the site visit.

ОБ УТВЕРЖДЕНИИ ПРАВИЛ РЫБОЛОВСТВА ДЛЯ СЕВЕРНОГО РЫБОХОЗЯЙСТВЕННОГО БАССЕЙНА (‘On the Confirmation of Fisheries Regulations for the Northern Fishery Basin’), N 414, Ministry of Agriculture, the Russian Federation, 2014 (last revised 2017).

Websites of the Russian Federal Fisheries Agency (www.fish.gov.ru) and its regional office in the Northern basin, BBTA (www.bbtu.ru).

Overall Performance Indicator score	**95**
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?	**Yes**	**Yes**	**No**

Rationale

The UoA fishery takes place on the Russian continental shelf, and the catch is landed in Norway and Russia; the certificate also covers landings in the Netherlands. Hence, the enforcement systems of both Norway and Russia, as well as the NEAFC port state control regime, must be assessed. All landings in Norway are registered by the Norwegian Fishermen's Sales Organization and checked towards catch information sent electronically to the Norwegian Directorate of Fisheries after each haul, as well as before entering the Norwegian Economic Zone (NEZ). The Norwegian Food Safety Authority checks all landings by foreign vessels in Norwegian ports, while the Directorate of Fisheries conducts physical inspections of at least 15 % of these landings. The Norwegian Coast Guard performs spot checks at sea (in the NEZ and the Protection Zone around Svalbard), including from helicopters during fishing activities and inspections at check points that foreign vessels have to pass when entering or leaving the NEZ and in connection with transhipments in Norwegian waters, which have to be reported in advance. Coast Guard inspectors board fishing vessels and control the catch from last haul (e.g. catch composition and fish size) and fishing gear (e.g. mesh size) on deck and the volume of fish in the holds. Using the established conversion factors for the relevant fish product, the inspectors calculate the volume of the fish in round weight and compare this with the catches reported to the Directorate through the logbooks. Both landing and at-sea control is conducted using a risk-based framework aimed at utilizing resources to optimize compliance at any given moment.

In Russia, the FFA (in the northern basin: the BBTA as the Agency's regional branch) keeps track of how much fish each vessel and company (quotas are given to companies, not vessels in Russia) has fished at any moment, based on daily reports from each fishing vessels and accumulated reports each 15th day from all fishing companies, as well as VMS data. The Inspection Service of the Russian Border Guard, which is part of the Federal Security Service (FSB), conducts inspections at sea and in port. Fish caught in the REZ must be taken to Murmansk for customs clearance, but some of it is subsequently transhipped for export. The Border Guard conducts random inspections at sea during fishing, following the same procedures as the Norwegian Coast Guard, with inspection of documentation, fish from last haul, gear and catch in holds. It also conducts physical inspections of all transhipments at sea (weather conditions allowing) and at the control points that all foreign vessels – and Russian vessels having fished outside the REZ – have to go through when entering and leaving the REZ. When Russian vessels land in other European ports, they are subject to the NEAFC port state control scheme, which implies that the port state has to check with the flag state that the landed catch is counted towards a quota, inspect a fixed share of the catch physically, and inform the flag state of the landed volumes. Both Norwegian and Russian inspectors have the authority to close an area with too much juvenile or bycatch (real-time closure).

Enforcement bodies on both sides – the Coast Guard and the Directorate of Fisheries in Norway and the BBTA and the Border Guard in Russia – cooperate closely in the enforcement of fisheries regulations in the Barents Sea, including running exchange of inspection data and more analytical material related to compliance, as well as regular exchange of inspectors both at sea and in port. Inspection procedures have also been harmonized between the two countries.

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.

The client has provided copies of inspection forms for their own vessels, which give evidence of a satisfactory level of monitoring. However, since no aggregated data on inspections have been provided from Russian enforcement authorities (this is considered confidential information), it cannot be concluded that the Russian part of the enforcement system if comprehensive. SG 100 is not met.

b	Sanctions			
	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?	**Yes**	**Yes**	**No**

Rationale

Sanctions to deal with non-compliance in Russian and Norwegian waters exist in both countries' systems for fisheries management, as well as in their wider legal systems. 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. The Norwegian Marine Resources Act opens up for 6 years' imprisonment for serious violations of fisheries regulations, but this applies only to Norwegian citizens. However, the fines issued for infringements of the fisheries legislation are significantly higher in Norway than in Russia. Alternatively, catch, gear, vessels or other properties can be confiscated. In the judgment of the seriousness of the infringement, the economic gain of the violation, among other things, is to be taken into consideration.

Hence, sanctions to deal with non-compliance exist and there is evidence that they are applied. SG 60 is met.

Sanctions are consistently applied and thought to provide effective deterrence; see SI 3.2.3 c) below on compliance. SG 80 is met.

Since no aggregated information on inspections and infringements is available on the Russian side, it cannot be concluded that sanctions demonstrably provide effective deterrence, so SG 100 is not met.

c	Compliance			
	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?	**Yes**	**Yes**	**No**

Rationale

Compliance is considered to be high in areas under Norwegian jurisdiction. In 2017, the Coast Guard carried out 1427 inspections, of which 55 inspections (4 %) resulted in a fine or prosecution. The Directorate of Fisheries performed 1326 inspections of vessels catching cod, haddock and herring in 2017. Infringements leading up to prosecution were found in 43 inspections (3 %). Fines were issued in 18 instances (1 %).

The client has provided the assessment team with an overview of inspections by the Russian Coast Guard (FSB) during the 2018 fishing season. From 10 March to 17 July, each vessel was inspected on average 3.4 times. One

written warning was given for lack of updated conversion factor table on board (which was immediately rectified) – all other inspections resulted in 'no remarks'.

Hence, fishers are generally thought to comply with the requirements of the management system, including, when required, providing information of importance to the effective management of the fishery. SG 60 is met.

Some evidence exists, in the overview of inspections, that fishers comply, so SG 80 is met.

Since no aggregated information from Russian enforcement authorities has been made available to the assessment team, it cannot be concluded that SG 100 is met.

d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		**Yes**	

Rationale

Based on information collected so far, there is no evidence of systematic non-compliance in the fishery. SG 80 is met.

References

Email correspondence with the Norwegian Coast Guard and Directorate of Fisheries (available on request)

ФЕДЕРАЛЬНЫЙ ЗАКОН О РЫБОЛОВСТВЕ И СОХРАНЕНИИ ВОДНЫХ БИОЛОГИЧЕСКИХ РЕСУРСОВ ('Federal Act on fisheries and protection of aquatic biological resources' – Federal Fisheries Act), N 166-ФЗ, Federal Assembly of the Russian Federation, 2004 (last revised 2014).

КОДЕКС РОССИЙСКОЙ ФЕДЕРАЦИИ ОБ АДМИНИСТРАТИВНЫХ ПРАВОНАРУШЕНИЯХ ('Code of the Russian Federation on Administrative Offences'), N 195-ФЗ, Federal Assembly of the Russian Federation, 2001 (last revised 2017).

Inspection forms for the client vessels 2018.

Nordlys, 1 January 2018, 'Carried out 3159 missions'; https://www.nordlys.no/kystvakten/kystvakta/forsvar/har-gjennomfort-3159-oppdrag/s/5-34-759145 (on inspections and compliance).

ОБ УТВЕРЖДЕНИИ ПРАВИЛ РЫБОЛОВСТВА ДЛЯ СЕВЕРНОГО РЫБОХОЗЯЙСТВЕННОГО БАССЕЙНА ('On the confirmation of fisheries regulations for the Northern fishery basin'), N 414, Ministry of Agriculture, the Russian Federation, 2014 (last revised 2017).

Report from the Parallel Review of the Barents Sea Fisheries by the Norwegian and Russian Auditor Generals ('Document No. 3:2 (2007–2008) from the Norwegian Auditor General'), Office of the Auditor General of Norway, 2008.

Riksrevisjonens oppfølging av parallellrevisjonen med Den russiske føderasjons riksrevisjon om forvaltningen av fiskeressursene i Barentshavet og Norskehavet, Dokument 3:8 (2010–2011) ('The Office of the Auditor General's Follow-up of the Parallel Audit with the Office of the Auditor General of the Russian Federation relating to the Management of Fish Resources in the Barents Sea and Norwegian Sea, Document 3:8 (2010–2011)'), Office of the Auditor General of Norway, 2011.

Websites of the Federal Fisheries Agency (www.fish.gov.ru) and its regional office in the Northern basin, ВВТА (www.bbtu.ru).

Overall Performance Indicator score	**80**
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?	**Yes**	**Yes**	**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 3.1.2 b) above), management authorities receive feedback on management practices from the industry and other interested stakeholders, including NGOs. The FFA and the Ministry of Agriculture report annually to the Government and the Presidential Administration 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 PINRO is peer reviewed by the federal fisheries research institute, VNIRO, 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.

Hence, there are mechanisms in place to evaluate some parts of the fishery-specific management system. SG 60 is met.

These include key parts of the management system, so SG 80 is also 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 system as such, which does not seem to be the case for the national management system in Russia. 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?	**Yes**	**No**	**No**

Rationale

Regular internal review of the fishery-specific management system is performed through FFA's continuous evaluation of the performance of regional management in the Northern basin, and other forms of review listed under SI 3.2.4 a) above. SG 60 is met.

However, the assessment team concludes that the fishery-specific management system is not subject to external review. The MSC Fisheries Standard specifies that external here means 'external to the fishery', but not necessarily international. It is a matter of definition where the line goes between internal and external reviews. In some MSC assessments, reviews of the fishery-specific management system by a state's Auditor General, on behalf of the Parliament, has been accepted as external since it is the legislative branch of government that evaluates the performance of the executive branch. Such review does take place in Russia (see SI 3.2.4 a) above), but only of peripheral aspects of the management system, primarily its financial components. In the opinion of the assessment team, this does not qualify as an external review of the fishery-specific management system as such, i.e. the

management of the Russian Barents Sea snow crab fishery. Nor have we come across any other such reviews, so SG 80 is not met.

References

ФЕДЕРАЛЬНЫЙ ЗАКОН О РЫБОЛОВСТВЕ И СОХРАНЕНИИ ВОДНЫХ БИОЛОГИЧЕСКИХ РЕСУРСОВ (‘Federal Act on fisheries and protection of aquatic biological resources’ – Federal Fisheries Act), N 166-ФЗ, Federal Assembly of the Russian Federation, 2004 (last revised 2014).

Interviews with representatives of the client, PINRO and WWF-Murmansk during the site visit.

ОБ УТВЕРЖДЕНИИ ПРАВИЛ РЫБОЛОВСТВА ДЛЯ СЕВЕРНОГО РЫБОХОЗЯЙСТВЕННОГО БАССЕЙНА (‘On the confirmation of fisheries regulations for the Northern fishery basin’), N 414, Ministry of Agriculture, the Russian Federation, 2014 (last revised 2017).

Report from the Parallel Review of the Barents Sea Fisheries by the Norwegian and Russian Auditor Generals (Document No. 3:2 (2007–2008) from the Norwegian Auditor General), Office of the Auditor General of Norway, 2008.

Riksrevisjonens oppfølging av parallellrevisjonen med Den russiske føderasjons riksrevisjon om forvaltningen av fiskeressursene i Barentshavet og Norskehavet, Dokument 3:8 (2010–2011) (‘The Office of the Auditor General’s Follow-up of the Parallel Audit with the Office of the Auditor General of the Russian Federation relating to the Management of Fish Resources in the Barents Sea and Norwegian Sea, Document 3:8 (2010–2011)’), Office of the Auditor General of Norway, 2011.

Websites of the Federal Fisheries Agency (www.fish.gov.ru) and its regional office in the Northern basin, BBTA (www.bbtu.ru).

Overall Performance Indicator score	**70**
Condition number (if relevant)	**4**

7.4.2 Principle 3 References

ФЕДЕРАЛЬНЫЙ ЗАКОН О РЫБОЛОВСТВЕ И СОХРАНЕНИИ ВОДНЫХ БИОЛОГИЧЕСКИХ РЕСУРСОВ (‘Federal Act on Fisheries and Protection of Aquatic Biological Resources’ – Federal Fisheries Act), N 166-ФЗ, Federal Assembly of the Russian Federation, 2004 (last revised 2014).

Jørgensen, Anne-Kristin, ‘Рыбное хозяйство и управление отраслью в России’ (‘The fishing industry and fisheries management in Russia’), in Anne-Kristin Jørgensen and Geir Hønneland, Общее море, общие задачи: Сравнительный анализ рамочных условий рыбной отрасли России и Норвегии (‘Common sea, common challenges: a comparative analysis of the framework conditions for the fishing industries in Russia and Norway’), Lysaker: Fridtjof Nansen Institute, 2015.

КОДЕКС РОССИЙСКОЙ ФЕДЕРАЦИИ ОБ АДМИНИСТРАТИВНЫХ ПРАВОНАРУШЕНИЯХ (‘Code of the Russian Federation on Administrative Offences‘), N 195-ФЗ, Federal Assembly of the Russian Federation, 2001 (last revised 2017).

Об образовании Общественного совета при Федеральном агентстве по рыболовству (‘On the formation of a public chamber under the Federal Fisheries Agency’), N 301, Federal Fisheries Agency, Russian Federation, 2008.

Об утверждении Положения о Северном научно-промысловом совете и Положения о Рабочей группе Северного научно-промыслового совета (‘On the confirmation of the Order of a Northern scientific and fishery council and the Order of a working group of the Northern scientific and fishery council’), Federal Fisheries Agency, Russian Federation, 2002.

ОБ УТВЕРЖДЕНИИ ПОРЯДКА ДЕЯТЕЛЬНОСТИ БАССЕЙНОВЫХ НАУЧНО-ПРОМЫСЛОВЫХ СОВЕТОВ (‘On the confirmation of arrangements for basin scientific and fishery councils’), Federal Fisheries Agency, Russian Federation, 2008.

ОБ УТВЕРЖДЕНИИ ПОЛОЖЕНИЯ О ПОРЯДКЕ ДЕЯТЕЛЬНОСТИ ТЕРРИТОРИАЛЬНОГО РЫБОХОЗЯЙСТВЕННОГО СОВЕТА МУРМАНСКОЙ ОБЛАСТИ И ЕГО СОСТАВА (‘On the confirmation of arrangements for the territorial fishery council of Murmansk Oblast and its composition’), N 239-ПП/8, the Government of Murmansk Oblast, Russian Federation, 2005 (last revised 2016).

ОБ УТВЕРЖДЕНИИ ПРАВИЛ РЫБОЛОВСТВА ДЛЯ СЕВЕРНОГО РЫБОХОЗЯЙСТВЕННОГО БАССЕЙНА (‘On the confirmation of fisheries regulations for the Northern fishery basin’), N 414, Ministry of Agriculture, Russian Federation, 2014 (last revised 2017).

ПОЛОЖЕНИЕ об Общественном совете при Баренцево-Беломорском территориальном управлении Федерального агентства по рыболовству (‘Regulation on the Fishery Council at the Barents and White Sea Territorial Administration of the Federal Fisheries Agency’), N 61, Federal Fisheries Agency, Russian Federation, 2014.

Protocols from the annual sessions of the JNRFC, available in Norwegian and Russian on the Commission’s website (www.jointfish.org).

Report from the Parallel Review of the Barents Sea Fisheries by the Norwegian and Russian Auditor Generals (Document No. 3:2 (2007–2008) from the Norwegian Auditor General), Office of the Auditor General of Norway, 2008.

Riksrevisjonens oppfølging av parallellrevisjonen med Den russiske føderasjons riksrevisjon om forvaltningen av fiskeressursene i Barentshavet og Norskehavet, Dokument 3:8 (2010–2011) (‘The Office of the Auditor General’s Follow-up of the Parallel Audit with the Office of the Auditor General of the Russian Federation relating to the Management of Fish Resources in the Barents Sea and Norwegian Sea, Document 3:8 (2010–2011)’), Office of the Auditor General of Norway, 2011.

8 Appendices

8.1 Assessment information

8.1.1 Small-scale fisheries

Table 27: Small scale fisheries

Unit of Assessment (UoA)	Percentage of vessels with length <15m	Percentage of fishing activity completed within 12 nautical miles of shore
UoA 1	0%	0%

8.2 Evaluation processes and techniques

8.2.1 Site visits

The site visit for this assessment was held in Tromsø 7-9 May 2019. Meetings were conducted with the client, PINRO, WWF-Murmansk and the Institute of Marine Research.

8.2.2 Stakeholder participation

Stakeholder participation was encouraged prior to the site visit and throughout the assessment process. The fishery was formally announced as entering assessment on the 6th March 2019. In the announcement, stakeholders were notified and encouraged to submit comments on the ACDR. No comments were submitted.

At the site visit the team met with representatives of:

- the client

- PINRO

- IMR

- WWF-Murmansk

The fishery's performance against the MSC requirements were discussed at the meetings, and stakeholders were given the opportunity to express any concern they might have.

Stakeholders will have another opportunity to submit comments at the Public Comment Draft Report (PCDR) Stage. All written submissions and a summary of all verbal submissions and interview shall be appended to the reports as the assessment process progresses.

8.2.3 Evaluation techniques

This assessment was conducted against MSC Standard v2.0 and using V1.0 of the template and Fisheries Certification Process v2.1. All aspects of the assessment process were carried out under the management of Lloyd's Register, Edinburgh, UK, an accredited MSC conformity assessment body (CAB) in accordance with the MSC requirements V2.0.

The information used for this assessment was gathered before, during and after the site visit. Published sources of information were used, as well as unpublished reports and interviews with stakeholders. The Announcement Comment Draft Report was published on 6 March 2019. As at that time there were no stock status reference points available for the snow crab and a lack of information on secondary species, the assessment team concluded that the RBF would be used to score Performance Indicators 1.1.1 and 2.2.1 at the site visit. An announcement to that effect was published on the MSC website on 28 March 2019. At the site visit the Client and stakeholders provided additional information on a new stock assessment approach and subsequent development of reference points which ensured that it was no longer necessary to use the RBF to score PI 1.1.1. There were some secondary species caught in the trawl fishery which can be designated as data-deficient, and therefore MSC CRv2.0 7.7.6 states that these scoring elements should be assessed using the risk-based framework (RBF). However, PF4.1.4 states that "*The team may elect to conduct a PSA on "main" species only when evaluating PI 2.1.1 or 2.2.1*", and this is the approach taken in this assessment as all secondary species caught in the fishery were designated as minor secondary species. The RBF was not used therefore to score any of the PIs.

The Default Assessment Tree was modified for P2, Ecosystem management (PI 2.5.2) in order to reflect the fact that the Snow crab is an introduced species. The introduction was non-deliberate and occurred at least 20 years prior to the date the application is made for assessment against the MSC standard (first found in benthos surveys grab samples 1996).

8.2.4 Modified assessment tree

The Default Assessment Tree was modified for P2, Ecosystem management (PI 2.5.2) in order to reflect the fact that the Snow crab is an introduced species. The introduction was non-deliberate and occurred at least 20 years prior to the date the application is made for assessment against the MSC standard (first found in benthos surveys grab samples 1996).

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 place9			
	Guidepost	There are measures in place in the fishery to prevent further ecosystem impacts that may have occurred as a result of the introduction of the species.	There is a partial strategy in place in the fishery to prevent further ecosystem impacts that may have occurred as a result of the introduction of the species.	There is a strategy that consists of a plan, in place in the fishery to prevent further ecosystem impacts that may have occurred as a result of the introduction of the species.
	Met?			
	Justification			
b	Management strategy evaluation			
	Guidepost	The **measures** are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ 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?			
	Justification			
c	**Management strategy implementation**			
	Guidepost		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?			
	Justification			
References				
OVERALL PERFORMANCE INDICATOR SCORE:				
CONDITION NUMBER (if relevant):				

9 Please note that the wording has been changed for SI 2.5.2 a) from the Default Assessment Tree in order to accommodate the fact that this is an introduced species.

8.3 Peer Review reports

8.3.1 Peer Reviewer A

a. General Comments

Question	Yes/No		CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	Scoring of the fishery is done according to MSC standard. Evidences presented by the team are clearly formulated and fully explained in the rationale.	
Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.1, 7.18.1 and sub-clauses]	Yes	There're 4 conditions raised for PIs 1.2.3, 1.2.4, 2.3.3, 3.2.4 and they will help to achieve the SG80 or higher in future. But as far as no Client Action Plan is provided for peer review in the FCP version 2.1, no timeframes are mentioned. The team also proposed recommendations for 6 PIs, but two of them are for the same PIs as conditions (1.2.4 and 2.3.3), probably it would be better to join them just in conditions.	Conditions must be met during the period of the certification and are therefore considered to be deficiencies in the fishery under assessment, whereas recommendations are non-binding and cover issues that the assessment team consider to be non-essential but which, if met, would improve the information available on the fishery. It is not appropriate therefore to aggregate a condition and a recommendation into a single condition. For example, the condition raised against PI 1.2.4 relates to the lack of sufficient peer review of the stock assessment, which the assessment team considered essential to resolve. In comparison, the recommendation related to assessment methodology, and whilst the current stock assessment methodology was considered sufficiently robust to meet the SG80, the assessment team recommended that alternative methods currently being developed in Norway could be evaluated for application to the Russian fishery.
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]	N/A	No Client Action Plan is provided for peer review in the FCP version 2.1.	

Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	N/A	N/A. It is a non-enhanced fishery, but an Introduced Species Based Fishery (ISBF).	
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)	N/A	1. One of the strengths are: "Russia has a well-developed legal framework for crab fisheries". I would say that it sounds too optimistic if we talk about Russia in general and it would be better to put it out from strengths of the fishery. Legal framework may look well on paper, but the real situation with crab fisheries in Russia is still complicated. For example, as recently as in 2018 during one of the site-visits the interview with people working in the crab fishery sphere showed, that almost ALL crab which is sold in Vladivostok shops and market in Russia is caught not legally and all legally caught crab is sold for export. 2. The report contains a number of misprints, but it does not spoil the overall impression of the text. For example, on the p. 14 in the table with vessels details there's a word in Russian language. Parts 1, 2, 4 and 5 of this table contain empty rows of table cells and it looks strange. 3. Not all acronyms from the text are described in the acronyms table, so it's not always easy to understand what was meant. For example, acronym HACPP (p. 16), IMP (p. 18) (should be IMR?), FSS (p. 25) (should be FSB?), RFMOs (p. 58) etc. Acronym TNASS (p. 18) is decoded as "Transatlantic marine mammal surveys" in the text and in the other (correct) way in the acronyms table. 4. At the p. 24 and further "nautical miles" are abbreviated as nm, but this abbreviation is usually used for nanometers. I would use "n.m." or "naut.m." 5. Numbers of figures and references to them in the text are mixed up. The first figure appears on the p. 12, but it has no number. The figure called 1 is with the picture of trap, but on p. 26 the reference to figure 1 is the reference to another figure, there's no reference to figure 3 and so on. Please, check all	1. This formulation refers to the legal framework itself, not its implementation. 2/3. Thanks to the peer reviewer for noticing this - errors are corrected and acronyms included in the list. 4. We have amended from ‘nm’ to NM’ – the standard abbreviation. 5. Figures/ Table numbering has been amended. 6. Noted as a suggestion for the MSC to consider revising their template. 7. Noted and figure legend has been amended. 8. As far as the audit team understood from the client interview, all pots have one panel which biodegrades within 4 weeks, which means that there is one side of the trap which opens eventually, so that any trapped crabs/ fish can escape, and there is no ghost fishing. However, if we are dealing with waste/ rubbish on the seafloor to be picked up, there is a Recommendation for PI 2.5.2 - It is recommended that annual records are kept, per fishing season, of traps lost (even though traps are disabled through biodegradable panels). We have not added a recommendation to retrieve all lost traps because we’re unsure how practical and or reasonable that is, because we have not specifically asked that question. We’d assumed that a lost trap would become the equivalence of an artificial reef (solid substrate for larvae to settle out on). 9. This is taken from the client meetings. As I understood it, there are scientists or equivalent (technical staff) on board who are solely responsible for checking the catches of target species and retained species. However, there staff do not look at anything else. So, the term observer/ scientist are not the same thing. PINRO, based on the client interviews, is broadening the remit of those 'scientists' (technical staff). to include MSC related issues (non-retained bycatch observations/ ETPs/ habitat mapping.

		references and numbers of the figures. 6. It would be easier to read if conditions would be written also at the scoring tables (now only numbers of conditions are there). 7. Figure 15 taken from Jakobsen and Ozhigen, 2011 has its own number, name and legend taken from the publication and also number and name in the report. It would be better to mix the needed information and leave one number with name and legend. 8. There's a question/recommendation concerning lost pots. Not all construction of pots is biodegradable, so some actions could be taken to clean the area of fishery from the lost pots taking into account that the area is not so big. 9. There're contradictory statements concerning observer coverage: "There are always scientists on board" (p. 61), but after assessment team writes that in total the coverage by observers is 20%, and on p. 78 is written: "There are no observers on the vessels as yet, but this issue is currently being discussed with PINRO (Client interview, May 2019)."	

b. PI Specific Comments

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
1.1.1	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 90.	No response needed.	
1.1.2			NA	Not relevant.	No response needed.	

1.2.1	Yes	No (scoring implications unknown)	NA	In the PI 1.2.1 (f) justification it is stated: "The current fishing season appears to avoid the main moulting season thereby reducing the likelihood of mortality of soft, recently molted snow crabs." But at the same time the assessment team points out the following: "Following the moult, it may be many months before the shell fully hardens during which time there is a low meat content and so the crabs are not commercially exploited. In addition, these soft-shelled crabs are extremely vulnerable to handling during the fishing process and so significant pre-recruit mortality may occur" (p. 23) and "It is thought that the fishing season ends in late June or early July as this coincides with the start of the melting season, but there is little data on molt cycles of snow crab in the Barents Sea" (p. 25). It seems that mortality of recently molted snow crabs could be quite high and this issue requires special research to be conducted. It could be another recommendation to the client. No conditions have been raised since overall PI score is 80.	The peer reviewer makes a good point that mortality of recently-molted snow crabs could be quite high if there is any overlap of the fishing season with the main moulting season. The assessment team has accepted the suggestion that a recommendation should be made to conduct research to gain a greater understanding of the molt cycle in the Barents Sea. The rationale for scoring issue (f) has been revised accordingly.	Accepted (no score change)
1.2.2	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 85.	No response needed.	
1.2.3	Yes	Yes	Yes	Scoring agreed. Condition №1 have been raised since overall PI score is 75.	No response needed.	
1.2.4	Yes	Yes	Yes	Scoring agreed. Condition №2 have been raised since overall PI score is 75.	No response needed.	
2.1.1	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 100. Note also issue regarding bait species raised in PI 2.1.2.	No response needed.	

2.1.2	Yes	No (scoring implications unknown)	NA	No conditions have been raised since overall PI score is 90. I don't agree with scoring, because from 5 scoring issues (a, b, c, d, e) only 3 were scored, and in this case the overall score should be 95. But I don't agree that the scoring issue "e" shouldn't be scored. There're no main primary species, so the SG80 is achieved by default. At the rationale to this scoring issue it is stated that: "There is very little bycatch, so researching into alternative measures seems not warranted or appropriate at this stage" (p. 83). But in the very beginning on the page 7 assessment team writes about areas covered by conditions, among them is "the lack of quantitative recording of bycatch information detailed enough to allow the measuring of possible trends over a number of years", so to my opinion in the frames of precautionary approach the by-catch issue deserves close attention.	Regarding whether the score is 90 or 95, Table 4 from FCP V2.1 has been used to determine this, applying precautionary approach. SIe: The text has been edited in order to clarify that the client has to improve on the detail of recording bycatch, i.e. to species level per fishing season, rather than broader categories, in order to allow trend analysis over time. Furthermore, following an observation made by PR-B a recommendation was raised to introduce guidelines as part of the management of bycatch which would state at which point a review would be triggered.	Accepted (no score change)
2.1.2	Yes	No (scoring implications unknown)	NA	The question with bait remained undetermined. On the p.25 it is said: "Traps are baited with herring, squid and cod heads", on the p. 61 also fish fat is mentioned as a bait. But in the assessment only cod heads and herring are mentioned as primary minor species, there's absolutely no information on other types of bait. Moreover, the quantitative data on how much bait is used are absent. Noting the guidance in Section GSA3.4.2 of the FCR v2.0, it does not seem that the team have adequately complied with the requirement in SA3.4.1: the team shall determine and justify which primary species are considered ‘main’ and which are not. Even with several different species used as bait, it is quite common in trap fisheries that the most common bait species need to be treated as ‘main’ species (being more than 5% of the catch, as defined in SA3.4.2).	There was an organisational delay, more detailed info on bait was sought from the client and it did not arrive in time for the PRs. The bait issue has been updated since, both in the relevant report section (Table 22) and in the scoring table.	Accepted (no score change)
2.1.3	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 85. Note also issue regarding bait species raised in PI 2.1.2.	No response needed.	

2.2.1	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 80.	No response needed.	
2.2.2	Yes	No (scoring implications unknown)	NA	The comment is the same as for PI 2.1.2. No conditions have been raised since overall PI score is 90. I don't agree with scoring, because from 5 scoring issues (a, b, c, d, e) only 3 were scored, and in this case the overall score should be 95. But I don't agree that the scoring issue "e" shouldn't be scored. There're no main secondary species, so the SG80 is achieved by default. At the rationale to this scoring issue it is stated that: "There is very little bycatch, so researching into alternative measures seems not warranted or appropriate at this stage" (p. 83). But in the very beginning on the page 7 assessment team writes about areas covered by conditions, among them is "the lack of quantitative recording of bycatch information detailed enough to allow the measuring of possible trends over a number of years", so to my opinion in the frames of precautionary approach the by-catch issue deserves close attention.	Regarding whether the score is 90 or 95, Table 4 from FCP V2.1 has been used to determine this, applying precautionary approach. SIe: The text has been edited in order to clarify that the client has to improve on the detail of recording bycatch, i.e. to species level per fishing season, rather than broader categories, in order to allow trend analysis over time, including for ETPs. The bycatch recording system the client fishery is using is providing that kind of detail but has only been implemented across the vessels recently. The Recommendations for the information PIs will ensure that future audits will keep an eye on this issue.	Accepted (no score change)
2.2.3	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 90.	No response needed.	
2.3.1	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 90. The first part of the definition of ETP species is: "Species that are recognised by national ETP legislation" (FCR SA3.1.5.1). In the report it is stated: "None of the fish species recorded in the by-catch in the Barents Sea snow crab fishery are listed on the species specific in the IUCN Red List, the Red Data Book of the Russian Federation and the Red Data Book of the Murmansk Region of the Russian Federation" (p. 78). The Red Data Book of the Murmansk Region should not be taken into account.	Where a species is protected under regional legislation it is an ETP. It is not for the MSC to decide whether one set of national legislation overrides/ undermines another set of national legislation.	Accepted (no score change)

2.3.2	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 85. On the p. 77 it is said about onboard management of ETP species: "The relevant fishing companies are contributing towards the updating of the software", does the client participate in it?	Yes. Text has been added to clarify this.	Accepted (no score change)
2.3.3	Yes	Yes	Yes	Scoring agreed. Condition №3 have been raised since overall PI score is 70.	No response needed.	
2.4.1	Yes	No (score increase expected)	NA	No conditions have been raised since overall PI score is 90. There're 3 scoring issues with scores 100, 80, 100, so the overall score should be 95.	Table 4 of MSC CR v2.0 has been used as well as applying precautionary approach implicit in the methodology to arrive at the overall score.	Not accepted (no score change)
2.4.2	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 80. Scoring issue "d" was not scored with the rationale that "there are no designated VMEs in the snow crab fishery area under assessment". But for the PI 2.4.1(b) the justification why the SG100 level is not met is: "Habitat maps of the fishing area (as evidenced by VMS tracks) are increasingly available (see Section 7.3.1), although not yet in enough detail/ resolution to show aggregations of VME indicator species, such as sponge aggregations, or soft coral aggregations, for example. SG100 is not met." So, does it mean that there's a chance that some VME indicator species could be encountered at the fishery area? In this case I would score scoring issue "d".	SId is addressing management requirements specific to designated vulnerable marine ecosystems. As there are no designated VMEs in the area fished, this does not apply. Yes, there will most likely be VME indicator species, a designated VME is not the same as VME indicator species. I have added further clarification under SId to indicate that this issue will be reviewed at future audits when information on benthic species distributions becomes available as part of the detailed recording measure.	Not accepted (no score change)
2.4.3	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 80.	No response needed.	

2.5.1	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 90. The assessment team uses controversial statements on this PI: on p. 51 it is said that "Capelin is a key species serving as major predator of zooplankton and major prey species of other fish, birds and mammals. It has suffered three major collapses in the last 25 years, though the causes are poorly understood" and in the rationale on p. 107 it is said that "The stocks of key species at different trophic levels (cod/ haddock and capelin) suggest that the fin-fish related elements of the ecosystem are broadly speaking in good shape."	Noted rational has been amended	Accepted (no score change)
2.5.2	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 80.	No response needed.	
2.5.3	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 90.	No response needed.	
3.1.1	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 95.	No response needed.	
3.1.2	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 85. The vessels seem to be very similar, why some vessels have one permit for harvesting and others have two? What are the differences between vessels, that they get different quotas for fishing?	The team notes that the peer reviewer agrees with the score. There is no mention of vessels or permits under this PI.	
3.1.3	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 80.	No response needed.	
3.2.1	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 90.	No response needed.	
3.2.2	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 95.	No response needed.	

3.2.3	Yes	Yes	NA	Scoring agreed. No conditions have been raised since overall PI score is 80. It is not very clear situation with infringements. On the p. 26 it is stated: "One infringement was recorded in 2017". Is there any information, what kind of infringement it was? Further, in the rationale for PI 3.2.3(b) it is said that "no aggregated information on inspections and infringements is available on the Russian side, it cannot be concluded that sanctions demonstrably provide effective deterrence".	The one infringement was self-reported by the client to the assessment team - it was not of a nature that would threaten the sustainability of the fishery (nor is there any requirement that no single infringement take place). The extract from the rationale for PI 3.2.3(b) relates to the lack of aggregate inspection/infringement information from the enforcement bodies, the result of which is that SG 100 is not met.	Not accepted (no score change)
3.2.4	Yes	Yes	Yes	Scoring agreed. Condition №4 have been raised since overall PI score is 70.	No response needed.	

8.3.2 Peer Reviewer B

a. General Comments

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)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	The draft report shows that information on the C. opilio stock in the Barents Sea continues to increase. The stock indices indicate an abundant and expanding stock and the evolving stock assessment models support the indices. There is good information related to ecosystem issues and management appears to be comprehensive. I agree with most of the scoring but recommend a second look at several PIs in P1, P2 and P3. None of these would result in a material decrease in the scores. A condition is raised related to peer review of the stock assessment (1.2.4). In the draft, PI 1.2.4 does not meet SG80 even though the rationale and evidence presented indicates there has been internal peer review.	The assessment team considered that there had not been sufficient peer review of the latest stock assessment. Whilst there is normally internal peer review within the Russian scientific institutes, the new stock assessment approach had been developed between the publication of the ACDR and the site visit, and the scientist responsible for the new assessment approach confirmed that there had not been sufficient peer review yet of this methodology as applied to the snow crab fishery. The assessment team concluded therefore that the SG80 had not been met for PI 1.2.4e. The rationale for this scoring issue has been revised accordingly.

Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.1, 7.18.1 and sub-clauses]	Yes	Meeting the conditions will result in achieving SG80 Condition 2 is questionable given evidence of internal peer review.	See comment above about Condition 2 relating to peer review of the stock assessment.
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)	N/A	The draft report is comprehensive, readable and generally in good shape. A few points: - Understanding the spatial extent of the fishery in relation to bottom habitat and features would be improved if the fishing locations could be overlaid on the habitat map. This of course is relevant to the assessment of P2 - Clarification of how internal peer review is conducted and why this does not meet SG80 - Recommendations are relevant but those related to bycatch could likely be combined	A few points: - We have not got the technical means nor the raw data to draw up such a map. We did however point to the fishery distribution map in the background report. - Clarification has been provided in the rationale for PI 1.2.4e as to why the peer review of the stock assessment does not meet the SG80. - We have tried to keep the Recommendations in relation to specific PIs - even if they repeat. (It would be the same for conditions under information PIs for example, we can't just write one conditions covering several different PIs).

b. PI Specific Comments

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 Res-ponse Code
1.1.1	No (no score change expected)	Yes	NA	Agree with scoring. Rationale would be bolstered by reference to conservative technical measure that include (i) no retention of females; (ii) assumed high survival of females and undersized crab returned to sea	Additional information on how the harvest strategy has been designed to mitigate against recruitment failure has been added to the scoring rationale for scoring issue a.	Accepted (no score change)

1.1.1	No (no score change expected)	Yes	NA	No consideration of C. opilio generation time and implications for time period considered in assessing stock fluctuations	The peer reviewer raises an interesting question. The biology and life cycle of snow crab in the Barents Sea is not fully understood because of the species' recent introduction in the area. In Newfoundland, age at first maturity is estimated to be around 5 years, and the youngest year-classes entering the fishery are estimated to be around 10 years (Marcello *et al*., 2012). As the most recent stock assessment estimates stock biomass from only 2005 to 2018, and the stock trend is continuously increasing, it is not yet possible to evaluate how generation time may be influencing stock fluctuations.	Accepted (no score change)
1.1.2	Yes	Yes	NA	Agree with scoring	No response needed.	
1.2.1	Yes	Yes	NA	Agree with scoring	No response needed.	
1.2.2	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	1.2.2a is scored at 100 but there is no reference to ecological role of the stock. The SG text is somewhat ambiguous but has been interpreted as meaning that a "consideration of ecological role" is required for SG100.	We agree with the peer reviewer that the SG 100 text for 1.2.2a is ambiguous. However, we accept the peer reviewer's interpretation and agree that the fishery does not meet the SG100 because the HCRs do not take into account the ecological role of the stock. The overall score for PI 1.2.2 has been reduced from 85 to 80.	Accepted (non-material score reduction)
1.2.3	Yes	Yes	Yes	Agree with scoring. Condition is clear which 1.2.3 issue needs to be met.	No response needed.	
1.2.4	No (score increase expected)	No (score increase expected)	NA	1.2.4 a. Clarification needed - explain use of term "depletion experiments" which imply controlled fishing. Text indicates Leslie analysis was applied to commercial fishing data.	The peer reviewer correctly notes that the catchability estimates were derived from depletion analysis of commercial fisheries data rather than a controlled fishing experiment. The rationale for PI 1.2.4a has been clarified.	Accepted (no score change)

1.2.4	No (score increase expected)	No (score increase expected)	NA	1.2.4 e. If as stated in the Rationale that there is internal peer review conducted by PINRO, then SG80 should be met (the assessment is subject to peer review). The assessment has evolved and at a minimum part have been reviewed but not externally. Rationale goes on to say, "there appears to have been no formal peer review if the latest stock assessment". Does this mean no internal or external review? Agree that there is no external peer review and thus SG100 is not met	Stock assessments are generally reviewed internally within PINRO and by a wider specialist group within the Russian Institutes, and this process has been followed for previous assessments of the Barents Sea snow crab stock. However, the application of the Bayesian stock production model to this stock is a newly developed approach for the snow crab stock and was developed in the time between the publication of the ACDR and the site visit. There has not yet been sufficient time for a formal internal or external peer review of this latest stock assessment approach, and therefore the assessment team concluded that the SG80 had not been met.	Not accepted (no score change)
1.2.4	No (score increase expected)	No (score increase expected)	No	Condition may not be needed if rescored at SG80 for 1.2.4d. If condition remains, it should clarify what level of peer review would meet SG80	As described above, the application of the Bayesian stock production model to the snow crab stock is a newly developed approach and has not yet been peer reviewed either internally or externally. The new stock assessment approach must be peer-reviewed in order to subsequently meet the SG80.	Not accepted (no score change)
2.1.1	Yes	Yes	NA	Agree with scoring	No response needed.	
2.1.2	Yes	Yes	NA	Agree that current low bycatch does not warrant review of alternative measures and this can be left unscored. A concern is that with this expanding fishery, bycatch could increase and there are no guidelines as to what level of bycatch should trigger a review of alternative measures. Could this be addressed through a recommendation?	Good thinking. A Recommendation has been raised.	Accepted (no score change)
2.1.3	Yes	Yes	NA	Agree with scoring and recommendation	No response needed.	
2.2.1	Yes	Yes	NA	Agree with scoring	No response needed.	
2.2.2	Yes	Yes	NA	2.2.2e - See 2.1.2e comment	The recommendation raised for PI 2.1.2 will also apply here.	Accepted (no score change)
2.2.3	Yes	Yes	NA	Agree with scoring and recommendation	No response needed.	
2.3.1	Yes	Yes	NA	Agree with scoring	No response needed.	
2.3.2	Yes	Yes	NA	Scoring agreed	No response needed.	

2.3.3	Yes	Yes	Yes	Agree with scoring. Condition is written so that scoring issue (2.3.3b - information to measure trends) will be met	No response needed.	
2.4.1	No (scoring implications unknown)	No (scoring implications unknown)	NA	Need better documentation of areal footprint of fishery. Please provide basis of 10 km2 estimate (p. 62). Is it area of trap*no. of traps/vessel * no. of vessels or does it account for the number of times the trap is hauled? A fishery footprint that is small and that occurs mainly on soft sediments is good rationale for SG80 and possibly SG100. However, sponges and bryozoans are encountered by the fishery (presence/absence data, Table 16), and the fishery likely encounters some harder bottom. Schweitzer et al. (2018) [cited] indicates that when traps are fished in lines of 20 traps, damage of epifauna can occur during retrieval. Other studies cited (Eno et al.) studied traps fished singly or in lines of 3.	The areal footprint is a theoretical calculation, and text has been added to that paragraph to indicate that the distribution of the vessels changes with that of the snow crab. Fig 12 provides a map of the location of the fishery and indicates that the fishery is currently confined to a limited area (defined by the distribution and density of the snow crab). SIa has been re-evaluated and re-scored to 80, resulting in a lower score for this PI.	Accepted (non-material score reduction)
2.4.2	Yes	Yes	NA	Agree with scoring and recommendation	No response needed.	
2.4.3	Yes	Yes	NA	Agree with scoring and recommendation	No response needed.	
2.5.1	Yes	Yes	NA	Agree with scoring	No response needed.	
2.5.2	Yes	Yes	NA	Agree with scoring. The rationale mentions an industry estimate of trap loss. A recommendation that this be documented annually may be justified given that there is no limit on the number of traps deployed (other than capacity)	A Recommendation has been raised.	Accepted (no score change)
2.5.3	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	2.5.3.e scoring at SG100 is questionable given that there is a condition and several recommendations related to providing more information on bycatch	Noted. The issue has been rescored, with appropriate justification.	Accepted (non-material score reduction)
3.1.1	Yes	Yes	NA	Agree with scoring		

3.1.2	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	3.1.2a Scoring at SG 100 is not justified in the rationale. Lack of evidence to the contrary is not strong evidence.	Rationale is rephrased.	Accepted (no score change)
3.1.3	Yes	Yes	NA	Agree with scoring	No response needed.	
3.2.1	Yes	Yes	NA	Agree with scoring	No response needed.	
3.2.2	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	Same comment as for 3.1.2	While we see that the rationale of 3.1.2 a) could be rephrased differently, we maintain that under 3.2.2 b) the SG 100 requirement of 'all' issues being responded to must be met as long as the team has scrutinized all aspects of the management process and not identified any issues that are not responded to by the management system. It is simply not possible to make a list of 'all' issues.	Accepted (no score change)
3.2.3	Yes	Yes	NA	Agree with scoring	No response needed.	
3.2.4	Yes	Yes	Yes	Agree with scoring. Condition is directly linked to 3.2.4b shortcoming	No response needed.	

8.4 Stakeholder input

No written submissions from stakeholders were received at the ACDR or site visit stages of this assessment.

No written submissions from stakeholders were received following an additional 30-day consultation Friday 6th December – 6th January 2020.

No written submissions from stakeholders were received following the 30-day Public Comment Draft Report (PCDR) consultation held 30th January - 29th February 2020.

Following the PCDR the MSC provided Technical Oversight comments, detailed in the next section.

8.4.1 MSC Technical Oversight

SubID	PageReference	Grade	RequirementVersion	OversightDescription	CABComment
30616	22	Minor	FCP-7.9.2 v2.1	Section 6.3 - There are two points of change of ownership for the products (that is points from which subsequent Chain of Custody should start): transport vessel or port". Please clarify would the transport vessel require CoC, will there will be earlier transfer of ownership?	There is only one change of ownership: at the point of landing in port. Some catch is landed direct by the fishing vessels in Norway and Russia, while some is transshipped to transport vessels for landing in the Netherlands. The products are separated and marked before, during and after transshipment, and there is a strict control regime in connection with both transshipment and landings. CoC certificate is not required for the transport vessels. The report has been revised for clarification.
30617		Minor	FCP-7.9.1.3 v2.1	Table 7 - Traceability within the fishery has excluded row 3 of the template, "Potential for vessels outside of the UoC or client group fishing the same stock". Please add this row in the table and provide a description of the risks present and the associated mitigation plans.	We believe the TO may have been looking at the MSC full assessment reporting template v2.0, as the indicated missing row is not in the V2.1 reporting template. In any case we have added the 'missing row' as requested and added the following text. The demersal Barents Sea fishery is a large-scale fishery with hundreds of vessels taking part. All Norwegian and third country vessels in the Barents Sea, as well as the majority of the Russian vessels, are MSC certified. 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 offloading.
30618		Guidance	FCP-7.9.2 v2.1	Please further clarify whether these fishing vessels in UoA also handle non-certified product at the same time?	All target species are MSC certified while by-catch species are not. As follows from the report, there is a strict regime of segregation on board.

8.5 Conditions

8.5.1 Condition 1: PI 1.2.3

Condition 1: PI 1.2.3 Information and Monitoring

Performance Indicator	PI 1.2.3
Score	75
Justification	Scoring issue c. There is good information on all other fishery removals from the stock. There are some bycatches of snow crab in the trawl fisheries for haddock, cod and halibut in the Barents Sea, but these bycaught snow crabs are generally damaged by the trawl and therefore not landed. Any such damaged and discarded snow crabs caught in the trawls will be recorded by observers, but there is currently no formal estimate of these other fishery removals.
Condition	By the 4th annual surveillance audit, there should be an estimate of bycatches of snow crab from the trawl fisheries in the Barents Sea so that total fishery removals from the snow crab stock can be estimated.
Milestones	Year 1. The Client should have designed a sampling programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea. Score: remains at 75. Year 2. The Client should have implemented the sampling programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea, and obtained initial results. Score: remains at 75. Year 3. The Client should have continued the sampling programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea. Score: remains at 75. Year 4. The Client should have continued the sampling programme to provide estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea, and provide quantitative estimates of annual bycatch of snow crabs in the Barents Sea and consequently total annual fishery removals from the snow crab stock. Score: 80
Consultation on condition	See section 8.6.5a

8.5.2 Condition 2: PI 1.2.4

Condition 2: PI 1.2.4 Peer Review of Assessment

Performance Indicator	PI 1.2.4
Score	75
Justification	Scoring issue e. The assessment of stock status is subject to peer review. The Client advised that stock assessments are generally reviewed internally within PINRO and by a wider specialist group within the Russian Institutes, and this process has been followed for previous assessments of the Barents Sea snow crab stock. However, the application of the Bayesian stock production model to this stock is a newly developed

	approach for the snow crab stock and was developed in the time between the publication of the ACDR and the site visit. There has not yet been sufficient time for a formal internal or external peer review of this latest stock assessment approach.
Condition	By the 2nd annual surveillance audit, the assessment of stock status should be subject to peer review.
Milestones	Year 1. The Client should have identified and commissioned a suitable expert (or experts) to carry out a peer review of all aspects of the stock assessment. Score: remains at 75. Year 2. A peer review of all aspects of the stock assessment should have been completed. Score: 80
Consultation on condition	See section 8.6.5a

8.5.3 Condition 3: PI 2.3.3

Condition 3: PI 2.3.3 ETP information

Performance Indicator	PI 2.3.3 ETP Information
Score	70
Justification	Information is not adequate to measure trends in order to evaluate the impact of the UoA on ETP species. At the moment the information available is based on presence and absence data of species encountered in the traps, as well as some quantitative bycatch data collected over 3 years, but not at a similar time of year and time-frame, thus adding a further variable (season, number of months over which data collected) which makes it difficult to allow direct comparison for any trends..
Condition	The recording bycatch information in this fishery will need to be quantitative and detailed enough to allow the measuring of possible trends over a number of years. This would include collecting information at a similar time of year, and over a similar timeframe. The records would also need to include marine mammal and seabird interaction, if any. (Where there are no such interactions, this would need to be specifically recorded)
Milestones	It ought to be stated here that the client is currently implementing on participating vessels a custom designed software to record bycatch. Year 1. Demonstrate successful implementation of bycatch recording software on snow crab catching vessels. Score remains at 70. Year 2. Demonstrate ongoing bycatch data collection. Score remains 70 Year 3. Demonstrate ongoing bycatch data collection and analysis. Score: 80
Consultation on condition	See section 8.6.5b

8.5.4 Condition 4: PI 3.2.4

Condition 4: PI 3.2.4 Monitoring and management performance evaluation

Performance Indicator	PI 3.2.4 Monitoring and management performance evaluation
Score	70

Justification	Scoring issue b: Internal and/or external review The fishery-specific management system is not subject to external review.
Condition	The client provides a written external review of the fishery-specific management system.
Milestones	Year 1. The client must provide a written update on the status of the external review, including terms of reference for the review. No revision - SG 60 Year 2. The client must provide evidence that the external review has been commissioned. No revision – SG60 Year 3: The client must provide the written external review. Expected score – SG 80
Consultation on condition	N/A

8.6 Client Action Plan

8.6.1 PI 1.2.3

Condition Number	Condition 1
Performance Indicator(s)	**PI 1.2.3 Information and Monitoring**
Score	75
Condition (s)	By the 4th annual surveillance audit, there should be an estimate of bycatches of snow crab from the trawl fisheries in the Barents Sea so that total fishery removals from the snow crab stock can be estimated. Scoring issue C. There is good information on all other fishery removals from the stock. There are some bycatches of snow crab in the trawl fisheries for haddock, cod and halibut in the Barents Sea, but these bycaught snow crabs are generally damaged by the trawl and therefore not landed. Any such damaged and discarded snow crabs caught in the trawls will be recorded by observers, but there is currently no formal estimate of these other fishery removals.
Milestone(s)	**Year 1:** The Client should have designed a sampling programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea. Score: remains at 75. **Year 2:** The Client should have implemented the sampling programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea, and obtained initial results. Score: remains at 75. **Year 3:** The Client should have continued the sampling programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea. Score: remains at 75. **Year 4:** The Client should have continued the sampling programme to provide estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea, and provide quantitative estimates of annual bycatch of snow crabs in the Barents Sea and consequently total annual fishery removals from the snow crab stock. Score: 80
Summary of action plan	There is an agreement reached with “VNIRO” (“PINRO”) regarding complex of scientific researches to be conducted for considering of snow crab by-catches during trawl fishery of main species in the Barents Sea.

Timeframe	Action	Expected result	Responsibilities	Evidence
Year 1	The Client will provide the assignment specification for the scientific researches of “VNIRO” (“PINRO”) and development of programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea.	Score remains at 75.	The Client will provide the assignment specification for the scientific researches of “VNIRO” (“PINRO”).	Provide evidence of assignment specification for the scientific researches of “VNIRO” (“PINRO”) and development of programme to provide quantitative estimates of bycatch of snow crab in the trawl fisheries in the Barents Sea.
Year 2	The Client will provide the initial results of sampling for the first year for quantitative estimates of snow crab bycatch in the trawl fisheries in the Barents Sea.	Score remains at 75.	The Client will provide the initial results of sampling for the **first year** for quantitative estimates of snow crab bycatch in the trawl fisheries in the Barents Sea.	Evidence of initial results of sampling for the **first year** for quantitative estimates of snow crab bycatch in the trawl fisheries in the Barents Sea.
Year 3	The Client will provide the initial results of sampling for two years for quantitative estimates of snow crab bycatch in the trawl fisheries in the Barents Sea.	Score remains at 75.	The Client will provide the initial results of sampling for **two years** for quantitative estimates of snow crab bycatch in the trawl fisheries in the Barents Sea.	Evidence of initial results of sampling for **two years** for quantitative estimates of snow crab bycatch in the trawl fisheries in the Barents Sea.
Year 4	The Client will provide the final report of “VNIRO” (“PINRO”) regarding complex of scientific researches to be conducted for considering of snow crab by-catches during trawl fishery of main species in the Barents Sea including estimates of total annual fishery removals from the snow crab stock.	Score SG 80 achieved.	The Client will provide the final report of “VNIRO” (“PINRO”).	Provide the final report of “VNIRO” (“PINRO”) regarding complex of scientific researches to be conducted for considering of snow crab by-catches during trawl fishery of main species in the Barents Sea including estimates of total

				annual fishery removals from the snow crab stock.

8.6.2 PI 1.2.4

Condition Number	Condition 2
Performance Indicator(s)	**PI 1.2.4 Peer Review of Assessment**
Score	75
Condition (s)	By the 2nd annual surveillance audit, the assessment of stock status should be subject to peer review. Scoring issue e. The assessment of stock status is subject to peer review. The Client advised that stock assessments are generally reviewed internally within PINRO and by a wider specialist group within the Russian Institutes, and this process has been followed for previous assessments of the Barents Sea snow crab stock. However, the application of the Bayesian stock production model to this stock is a newly developed approach for the snow crab stock and was developed in the time between the publication of the ACDR and the site visit. There has not yet been sufficient time for a formal internal or external peer review of this latest stock assessment approach.
Milestone(s)	**Year 1:** The Client should have identified and commissioned a suitable expert (or experts) to carry out a peer review of all aspects of the stock assessment. Score: remains at 75. **Year 2:** A peer review of all aspects of the stock assessment should have been completed. Score: 80
Summary of action plan	Stock status of snow crab population, its distribution in the Barents Sea and ecological interrelations are closely monitored by the scientists of “VNIRO” (“PINRO”). We plan to engage the scientists of “VNIRO” (“PINRO”) to perform in-depth study of the stock and to obtain the latest updated information on this issue. Besides researches of special features of spatial distribution of snow crab in the Barents Sea we also expect to get the scientists’ actual recommendations to keep the fishery sustainability and information on density and structure of its aggregations. In 2019 “VNIRO” (“PINRO”) specialists applied new approach to stock assessment, reference points estimating and harvest control rules for the Barents Sea snow crab. From the end of 2019 until mid-2020 new approach will undergo expert review both within the framework of “VNIRO” (“PINRO”) and beyond this institution (public consultations, environmental review). After successful expert review by mid-2020 the “VNIRO” (“PINRO”) scientists will prepare the report for MSC including detailed description of the TAC assessment method.

Timeframe	Action	Expected result	Responsibilities	Evidence
Year 1	The Client will conclude the contract with VNIRO (PINRO) to perform in-depth study of the snow crab stock and to obtain the latest updated information using approach of Bayesian stock production model. From the end of 2019 until mid-2020 new approach will undergo expert review both within the framework of “VNIRO” (“PINRO”) and beyond this institution (public consultations, environmental review).	Score remains at 75.	The Client will conclude the contract with VNIRO (PINRO).	Evidence that VNIRO (PINRO) have been contracted to perform in-depth study of the snow crab stock and to obtain the latest updated information using approach of Bayesian stock production model. Evidence that expert review has been undertaken within framework of “VNIRO” and beyond this institution.
Year 2	The Client will provide the final report of VNIRO (PINRO) on stock estimation of snow crab population, its distribution in the Barents Sea and ecological interrelations. After successful expert review by mid-2020 the “VNIRO” (“PINRO”) scientists will prepare the report for MSC including detailed description of the TAC assessment method.	**After fulfilment of this condition (according to the plan - Year 2) the Score goes up to 80.**	The Client will provide the final report from VNIRO (PINRO).	The Client will provide the final report of VNIRO (PINRO) on stock estimation of snow crab population, its distribution in the Barents Sea and ecological interrelations, and expert review of stock assessment approach.

8.6.3 PI 2.3.3

Condition Number	Condition 3
Performance Indicator(s)	**PI 2.3.3 ETP Information**
Score	70
Condition (s)	The recording bycatch information in this fishery will need to be quantitative and detailed enough to allow the measuring of possible trends over a number of years. This would include collecting information at a similar time of year, and over a similar timeframe. The

	records would also need to include marine mammal and seabird interaction, if any. (Where there are no such interactions, this would need to be specifically recorded) Information is not adequate to measure trends in order to evaluate the impact of the UoA on ETP species. At the moment the information available is based on presence and absence data of species encountered in the traps, as well as some quantitative bycatch data collected over 3 years, but not at a similar time of year and time-frame, thus adding a further variable (season, number of months over which data collected) which makes it difficult to allow direct comparison for any trends.
Milestone(s)	It ought to be stated here that the client is currently implementing on participating vessels a custom designed software to record bycatch. **Year 1:** Demonstrate successful implementation of bycatch recording software on snow crab catching vessels. Score remains at 70. **Year 2:** Demonstrate ongoing bycatch data collection. Score remains 70 **Year 3:** Demonstrate ongoing bycatch data collection and analysis. Score: 80
Summary of action plan	Client comments: At present, all the vessels of Non-profit organization "Association of Crab Catchers of North" keep compulsory recording of bycatch information in snow crab fishery. All data on collisions with species of vulnerable marine ecosystems, with seabirds, mammals, etc., if any, must be recorded by ship specialists in MSC logs. After fishery completion, by-catch information from all 11 vessels is systematized and analyzed. **Summary of action plan:** The client will implement the ship's software application "Bort 2.0" aimed to register presence of non-target, protected and rare objects in bycatch onboard all vessels. This software application was developed by OOO "Morskaya Informatika" specifically for the fishing vessels according to the order made by the fishing companies being members of the Coordination Council of the Companies which passed the fishery assessments according to MSC standards. Software application "Bort 2.0" is approved by WWF Russia. The software package contains necessary illustrated reference guides developed by the PINRO scientists. These reference guides assist the ship's specialists to promptly find the required species and register in the program. Records of the objects encountered during harvesting is provided in kilograms - for commercial fish species; in pieces - for rare species of non-commercial fish species (for example, skates, sharks, etc.), mammals, birds; in scores - for benthic organisms (corals, sponges, polyps, etc.). Report documents are automatically generated in the program based on the entered data. The entered data is stored in the program for an indefinite period. These report documents are regularly sent by the ship's specialists to the person in charge in the central office for control and analysis. As long as the certain amount of the collected information is accumulated, it is sent to OOO "Morskaya Informatika", where it is finally handled and processed (data refinement and mapping). The company plans to involve the "VNIRO" ("PINRO") scientists to analyze the collected data and set the boundaries of dense aggregations of ETP species

Timeframe	Action	Expected result	Responsibilities	Evidence

Year 1	On board all the vessels the Client will implement software to record the presence of non-targeted, protected and rare objects in bycatch. Installation of the ship's software application "Bort 2.0" aimed to register presence of non-target, protected and rare objects in bycatch. Staff training in the software package operation. Collection and analysis of ship's data on shellfish, algae and non-commercial fishery objects (protected fish species, benthos, birds, mammals) encountered during fishery. Reporting on the records of shellfish, algae and non-commercial fishery objects (protected fish species, benthos, birds, mammals) encountered during fishery to the certification body including extensive details and maps of the registered objects distribution.	Score remains at 70.	Consultations with PINRO specialists and involving them as consultants and observance onboard the fishing vessels.	The client will provide evidence of the software being implemented to record the presence of non-targeted, protected and rare objects in bycatch. Reporting on the records of shellfish, algae and non-commercial fishery objects (protected fish species, benthos, birds, mammals) encountered during fishery to the certification body including extensive details and maps of the registered objects distribution.
Year 2	The Client shall continue the started work on the collection, analysis and registration of information on the presence of the types of vulnerable marine ecosystems in bycatch and data on collisions with sea birds, mammals and etc. in the software package "Bort 2.0"	Score remains at 70.	Involvement of the "VNIRO" ("PINRO") scientists as consultants and observers onboard the fishing vessels.	Reporting on the records of shellfish, algae and non-commercial fishery objects got during harvesting (protected fish species, benthos, birds, mammals) encountered during fishery to the certification body including extensive details and maps of the registered objects distribution.

Year 3	The Client will provide data analysis about the presence of types of vulnerable marine ecosystems in bycatches and data on collisions with seabirds, mammals, etc. The obtained results will be submitted to “VNIRO” (“PINRO”) for mapping and boundary marking of aggregation areas of these objects. **After fulfilment of this condition (according to the plan - Year 3) the Score goes up to 80.** The Client shall continue the started work on the collection, analysis and registration of information on the presence of the types of vulnerable marine ecosystems in bycatch and data on collisions with sea birds, mammals and etc. in the software package “Bort 2.0” Reporting on the records of shellfish, algae and non-commercial fishery objects encountered during fishery (protected fish species, benthos, birds, mammals) to the certification body including extensive details and maps of the registered objects distribution. Obtaining of the “VNIRO” (“PINRO”) scientists’ recommendations, analyzing and estimating of UoA impact on ETP species.	**After fulfilment of this condition (according to the plan - Year 3) the Score goes up to 80.**	Involvement of the “VNIRO” (“PINRO”) scientists as consultants and observers onboard the fishing vessels.	The Client will provide data analysis about the presence of types of vulnerable marine ecosystems in bycatches and data on collisions with seabirds, mammals, etc. The obtained results will be submitted to “VNIRO” (“PINRO”) for mapping and boundary marking of aggregation areas of these objects. Obtaining of the “VNIRO” (“PINRO”) scientists’ recommendations, analyzing and estimating of UoA impact on ETP species.

8.6.4 PI 3.2.4

Condition Number	Condition 4
Performance Indicator(s)	PI 3.2.4 Monitoring and management performance evaluation
Score	70
Condition (s)	The client provides a written external review of the fishery-specific management system. Scoring issue b: Internal and/or external review The fishery-specific management system is not subject to external review.
Milestone(s)	**Year 1:** The client must provide a written update on the status of the external review, including terms of reference for the review. No revision - SG 60 **Year 2:** The client must provide evidence that the external review has been commissioned. No revision – SG60 **Year 3:** The client must provide the written external review. Expected score – SG 80
Summary of action plan	Non-profit organization "Association of Crab Catchers of North" shows the utmost responsibility in monitoring the commercial harvesting rate and has interest in maintaining a high level of snow crab stock management in the Barents Sea. To assess the effectiveness of managing the snow crab fishery, we plan to address experts of the Russian representative office of WWF.

Timeframe	Action	Expected result	Responsibilities	Evidence
Year 1	The Client will provide the Contract with the Russian representative office of WWF (Fund for support and development of nature conservation and other socially important projects “Our Fund”), and action plan to estimate stock management of snow crab in the Russian part of the Barents Sea	Score remains at 60.	The Client will provide the Contract with the Russian representative office of WWF.	The Client will provide the Contract with the Russian representative office of WWF (Fund for support and development of nature conservation and other socially important projects “Our Fund”), and action plan to estimate stock management of snow crab

				in the Russian part of the Barents Sea
Year 2	The Client will provide preliminary results of the Russian representative office of WWF (Fund for support and development of nature conservation and other socially important projects “Our Fund”) of external review of stock management of snow crab in the Russian part of the Barents Sea.	Score remains at 60.	The Client will provide preliminary results of the Russian representative office of WWF.	The Client will provide preliminary results of the Russian representative office of WWF (Fund for support and development of nature conservation and other socially important projects “Our Fund”) of external review of stock management of snow crab in the Russian part of the Barents Sea.
Year 3	The Client will provide the external review of stock management system of snow crab in the Russian part of the Barents Sea prepared by the Russian representative office of WWF (Fund for support and development of nature conservation and other socially important projects “Our Fund”).	**After fulfilment of this condition (according to the plan - Year 3) the Score goes up to 80.**	The Client will provide the external review of stock management system of snow crab in the Russian part of the Barents Sea.	The Client will provide the external review of stock management system of snow crab in the Russian part of the Barents Sea prepared by the Russian representative office of WWF (Fund for support and development of nature conservation and other socially important projects “Our Fund”).

8.6.5 Consultation on the conditions

a. Condition 1 & 2: PI 1.2.3 & PI 1.2.4

Logotype: «VNIRO from 1881»

Federal Agency for Fisheries
Federal State Budgetary Scientific Institution
"RUSSIAN FEDERAL RESEARCH INSTITUTE OF FISHERIES AND OCEANOGRAPHY"
FSBSI "VNIRO"

Polar branch of FSBSI "VNIRO"
("PINRO" named after N.M. Knipovich)
OGRN 1157746053431/INN 7708245723
6 Akademika Knipovicha str., Murmansk, 183038
Telephone +7 8152 47 31 81, 40 26 01
Fax +7 8152 47 33 31
E-mail: persey@pinro.ru/www.pinro.ru

To: T.S. Sokolova

Executive Director of
Association of Crab Catchers of North,
Nonprofit Organization

43 Tralovaya str.
183038 Murmansk
Tel.: +7 8152 999 200
Fax: +7 8152 47 40 92

27.11.2019 Ref. No. 12/4118-ф
to ref. No. 8 dated 21.11.2019

Subject: On possibility of research works performance

Dear Tatiana Sergeevna,

Please, be noted of the actual readiness of the specialists of the Polar branch FSBSI "VNIRO" to perform research works connected with preparation of materials for the certification of the Barents Sea Snow crab opilio fishery according to the standards of MSC (Marine Stewardship Council) on a payment basis in 2020 – 2023.

Preliminary we find it reasonable to perform these works in three areas:

1. Assessment of removal of Snow crab opilio as by-catch during bottom trawl fishery in EEZ of the Russian Federation in 2021, 2022, 2023.
2. Assessment of possible effect of Snow crab opilio by-catch in the Barents Sea on its commercial and general stocks;
3. Preparation of the materials analyzing the biomass dynamics of Snow crab opilio commercial stock in the Russian waters of the Barents Sea in 2020 – 2021 (longer series of years will possibly be considered);
4. Preparation of materials describing long-term improvement of fishery management rules of these species in the Barents Sea.

In addition we suppose that in order to perform these works it will be needed to arrange annual surveillance by the Polar branch specialists onboard the vessels harvesting Snow crab opilio in EEZ of the Barents Sea in 2020-2022.

Looking forward to a further cooperation.

With best regards,

Branch manager */Signature/* V.A. Mukhin

Performer:
K.M. Sokolov
402614

b. Condition 3: PI 2.3.3

Fund for Support and Development of Nature Conservation and Other Socially Important Projects "Nash Fond" (Fund "Nash Fond")

Legal address:
Gorbunova str., 2, Building 3, 8 Floor, Premises II, Room 2, Office 7, Moscow, 121596
OGRN 1187700013192
The decision on the state registration of the fund establishment was adopted on 30.06.2018
The record on the non-profit organization in the Unified State Register of Legal Entities was entered on 08.08.2018
Record No. 7714016646
Current account 40703810602600000042
in AO «ALFA-BANK», Moscow
correspondent account 30101810200000000593
BIC 044525593
obandalova@nash-fund.ru

Ref. No. 11/11
29.11.2019

To: **V. Zhuravalev**
General Director of JSC "Arcticservice"

Dear Vladimir,

The foundation "Nash Fond" hereby informs you of the possibility to elaborate recommendations on ecologization of the Russian snow crab (Chionoecetes opilio) fishery in order to minimize its potential negative impact on the ecosystems of the Barents Sea within the maritime exclusive economic zone of the Russian Federation in the course of the materials preparation for the snow crab fishery certification according to the international standards of the Marine Stewardship Council (MSC).
We suggest performing this work during two years: 2020 and 2021.
We estimate to prepare the final report by 2022.

According to preliminary estimates the report will include the following issues:

- Analysis and benchmarking of the best Russian and world practice on the snow crab harvesting (Majidae family);
- Elaboration of recommendations to minimize the potential negative impact of snow crab fishery on the ecosystems of the Barents Sea.

In the course of recommendations working out we offer to base on the components of Principle 2 of MSC standard on the assessment of the aquatic biological resources:

- Analysis of the primary species in by-catch and development of the measures to minimize values of its by-catch;
- Analysis of the secondary species in by-catch and development of the measures to minimize values of its by-catch;
- Offers to prevent by-catch of ETP species, first of all, marine mammals and seabirds, cartilaginous fish and other animals;
- Analysis of potential negative impact of the fishery on the important habitats of other aquatic organisms including breeding sites, juvenile habitations and etc.'
- Analysis of potential negative impact on the bottom vulnerable marine ecosystems which include bottom habitations of the attached aquatic invertebrates (corals, sea sponges, pennatularians and others).

We are looking forward to the fruitful cooperation in the project implementation.

Best regards,

Olga Bandalova
Director of Fund "Nash Fond" */Signature/* O.M. Bandalova <Seal>

Logotype: «VNIRO from 1881»

Federal Agency for Fisheries
Federal State Budgetary Scientific Institution
"RUSSIAN FEDERAL RESEARCH INSTITUTE OF FISHERIES AND OCEANOGRAPHY"
FSBSI "VNIRO"

Polar branch of FSBSI "VNIRO"
("PINRO" named after N.M. Knipovich)

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20.01.2020 Ref. No. 12-122
to ref. No. dated 15.01.2020

To: T.S. Sokolova

Executive Director of
Association of Crab Catchers of North,
Nonprofit Organization

Dear Tatiana Sergeevna,

Polar branch of FSBSI "VNIRO" hereby preliminary agrees to perform works on the analysis of the impact of Snow crab opilio trap fishery on the stocks of other species encountered in the by-catch during crab harvesting in EEZ RF in the Barents Sea aimed for certification of the companies being members of the Nonprofit Organization "Association of Crab Catchers of North" according to MSC (Marine Stewardship Council) standards.

We estimate that a specialist of the Polar branch of FSBSI "VNIRO" will start working onboard one of the crab-catching vessels owned by the Nonprofit Organization "Association of Crab Catchers of North" in the first half of 2020.

The first version of the documents regulating the obligations of the parties regarding the works within the expected contract will be prepared and forwarded to you for further discussion in the closest time.

With best regards,

Branch manager */Signature/* V.A. Mukhin

8.7 Surveillance

Table 28: Fishery surveillance program

Surveillance level	Year 1	Year 2	Year 3	Year 4
Level 5	On-site surveillance audit	On-site surveillance audit	Off-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
1	~March	~March 2021	To line up with the certificate anniversary date.

Table 30: Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
1	On-site audit	Two auditors on-site with remote support from two auditors	Since this is a first assessment and the fishery has four conditions across all three principles, an on-site audit is required. Since progress against the conditions can partly be monitored remotely, only two auditors are required on-site.
2	On-site audit	One auditor on-site with remote support from two auditors	Since this is a first assessment and the fishery has four conditions across all three principles, an on-site audit is required. Since progress against the conditions can partly be monitored remotely, only one auditor is required on-site.
3	Off-site audit	Three auditors off-site	Since progress against the conditions can partly be monitored remotely, one of the surveillances can be done off-site.
4	On-site audit and re-certification site visit	Three auditors on-site	The full assessment team is required on-site for re-certification.

8.8 Harmonised fishery assessments

Table 31: Overlapping fisheries

Fishery name	Certification status and date	Performance Indicators to harmonise
Russia Barents Sea Red Kind Crab Fishery	Certified (22.02.2018)	All P3 PIs.

Table 32: Overlapping fisheries

Supporting information	
No other opilio fisheries in the Barents Sea are MSC certified or in assessment. Hence, there is no need for harmonisation of P1. One other crab fishery in the area is certified, the Russia Barents Sea Red King Crab fishery (same client as the present fishery). The two fisheries take place in distinctly different locations (at great distance from each other and at different depths), so harmonisation is not required for P2 either. Since both fisheries are subject to the same management system, both the general management framework (Russian fisheries management) and the fishery-specific management (Russian management of crabs), harmonisation is needed across P3. The two crab fisheries are the only Barents Sea fisheries that are under national Russian jurisdiction in the Barents Sea, so it is not necessary to harmonise with other fisheries in the area. Below are the scores for the red king crab fishery and preliminary scores for the opilio fishery.	
Was either FCP v2.1 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 **(NA)**	

Table 33: Scoring differences

Performance Indicators (PIs)	Russia Barents Sea Red King Crab	Russia Barents Sea Opilio Trap
PI 3.1.1	**95**	**95**
PI 3.1.2	**100**	**85**
PI 3.1.3	**100**	**80**
PI 3.2.1	**90**	**90**
PI 3.2.2	**95**	**95**
PI 3.2.3	**80**	**80**
PI 3.2.4	**70**	**70**

Table 34: Rationale for scoring differences

If applicable, explain and justify any difference in scoring and rationale for the relevant Performance Indicators (FCP v2.1 Annex PB1.3.6)
There following scores are identical: PIs 3.1.1, 3.2.1, 3.2.2, 3.2.3 and 3.2.4. PIs 3.1.2 and 3.1.2 scores at SG 100 for the red king crab fishery and at SG 85 and SG 80, respectively, in the opilio fishery. PI 3.1.2 on consultation mechanisms explicitly asks about perceptions that can only be checked in direct interviews with stakeholders;

hence the difference in scoring is fishery specific. As regards PI 3.1.3 on objectives, there are differences in opinion (e.g. among teams and peer reviewers) what the difference is between the requirement that objectives are 'explicit' in (SG 80) and 'required' by (SG 100) the management system. There are on-going discussions about this in other assessments, and the team has in that context chosen a precautionary scoring.
If exceptional circumstances apply, outline the situation and whether there is agreement between or among teams on this determination
NA

8.9 Objection Procedure

To be added at Public Certification Report stage

The report shall include all written decisions arising from a ‘Notice of Objection’, if received and accepted by the Independent Adjudicator.

Reference(s): FCP v2.1 Annex PD