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Snow crab (Chionoecetes opilio) in the Barents Sea: range expansion, legal status as a sedentary species and development of the fishery

A narrative review

Renat Besolov
Independent researcher; BFISHERMAN
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Abstract. The snow crab (*Chionoecetes opilio*) was first recorded in the Barents Sea in 1996 and within two decades occupied most of the central, eastern and northern parts of the sea, supporting a commercial fishery that started in 2012. This narrative review synthesises openly available peer-reviewed literature, court decisions and official Norwegian documents on four themes: (1) the spread of the species and the debate on its origin, where early interpretations of ballast-water introduction have given way to genetic evidence consistent with natural range expansion; (2) its legal classification as a sedentary species under Article 77(4) of the UN Convention on the Law of the Sea, confirmed by the Norwegian Supreme Court in the *Senator* case (HR-2019-282-S), and the related disputes with the European Union and Latvian interests over the shelf around Svalbard; (3) the development of Norwegian regulation from the 2015 general ban, through annual total allowable catches from 2017, to closed participation and vessel quotas from 2025; and (4) stock assessment by the Institute of Marine Research and the documented and potential ecosystem effects, including benthic predation and ghost fishing by lost pots. The Norwegian quota rose from 4,000 tonnes in 2017 to 12,336 tonnes advised and set for 2026. Key knowledge gaps include the lack of an analytical stock assessment, limited knowledge of benthic impacts, unknown pot-loss rates and the unresolved status of the Svalbard Treaty beyond the territorial sea. A short practitioner perspective relates the literature to operational experience in Barents Sea crab fisheries.

Keywords: snow crab; Chionoecetes opilio; Barents Sea; sedentary species; UNCLOS Article 77; Svalbard; fisheries management; non-native species

1 Introduction

The snow crab (*Chionoecetes opilio*) is a cold-water majid crab whose native range covers the northern Pacific, including the Bering, Okhotsk and Beaufort seas and the Sea of Japan, and the north-western Atlantic, with major stocks off eastern Canada and western Greenland (Havforskningsinstituttet [HI], n.d.). Before the 1990s it was not known from the north-east Atlantic (Alvsvåg et al., 2009). Its appearance in the Barents Sea, first

reported by Russian scientists in 1996 from Gåsbanken (Goose Bank) in the south-east of the sea (HI, n.d.; Zalota et al., 2019), was followed by one of the fastest documented range expansions of a shelf invertebrate (Zalota et al., 2019).

In the space of roughly fifteen years, the snow crab went from scientific curiosity to the basis of a fishery worth hundreds of millions of Norwegian kroner per year, and to the subject of a Grand Chamber judgment of the Supreme Court of Norway, an international investment arbitration and a long-running diplomatic disagreement between Norway and the European Union (Henriksen, 2020; Østhagen & Raspotnik, 2019). Few marine species illustrate as clearly how biology, the law of the sea and fisheries economics interact in the Arctic.

This review brings together the openly available literature on four linked questions: how and from where the species arrived and spread; why it is legally treated as a "sedentary species" belonging to the continental shelf rather than as a fish stock of the water column; how the Norwegian fishery and its regulation have developed; and what is known about the stock and its ecosystem effects. The review is aimed at fisheries practitioners, managers, students and researchers who need a concise, referenced overview. It closes with a brief practitioner perspective, a list of knowledge gaps and conclusions.

2 Methods

This is a narrative (non-systematic) review of openly available literature and official statistics. Searches were carried out in October 2026 using general web search and direct consultation of publisher pages, bibliographic databases (Crossref, OpenAlex) and institutional repositories. Search terms included combinations of "snow crab", "*Chionoecetes opilio*", "Barents Sea", "snøkrabbe", "sedentary species", "Svalbard", "Senator", "Article 77" and "Loophole".

Priority was given to (a) peer-reviewed articles in fisheries science, marine biology and international law; (b) reports and web pages of the Institute of Marine Research (Havforskningsinstituttet, HI) and the Norwegian Directorate of Fisheries (Fiskeridirektoratet); (c) primary legal sources, namely the UN Convention on the Law of the Sea (UNCLOS), the Norwegian snow crab regulation as published on Lovdata, the Supreme Court judgment HR-2019-282-S and the ICSID award in the related investment dispute; and (d) official press releases of the Norwegian government. A small number of news reports were used only to confirm dates and procedural outcomes. Every source cited was opened during the review, and its bibliographic details were checked against the publisher or a bibliographic database; the verification record is provided as a separate file (sources_check.md).

Limitations are substantial. Russian-language literature from the Polar Branch of VNIRO (formerly PINRO), which holds a large part of the scientific record on the Russian shelf, is represented only indirectly, through works that cite it. Several articles could be consulted only at abstract level. Catch statistics from different sources are not always directly comparable, since some refer to Norwegian vessels only, others to the whole Barents Sea, and some are provisional. The review does not attempt a quantitative syn-

thesis.

3 Arrival, spread and the origin debate

3.1 First records and establishment

The first snow crab in the Barents Sea was recorded in 1996 (Zalota et al., 2019, citing Kuzmin et al.), and the first catch in the Norwegian part of the sea followed in 2004 (HI, n.d.). The ICSID tribunal's summary of the fishery history gives 1996 for the Russian shelf and 2003 for the Norwegian shelf (*Pildegovics and SIA North Star v. Norway*, 2023). Zalota et al. (2019), drawing on Alvsvåg et al. (2009) and Russian sources, suggest that the introduction itself may have taken place between the mid-1980s and 1993, which implies that the founding population went unnoticed for several years.

The first systematic evidence that the species had formed a self-sustaining population came from Norwegian–Russian bottom-trawl surveys in 2004–2006. Alvsvåg et al. (2009) found crabs from 14 to 136 mm carapace width, egg-bearing females above 70 mm and a large share of juveniles below 50 mm, indicating successful local recruitment; small crabs occurred only in the north, which the authors interpreted as the main recruitment area. Agnalt et al. (2011) subsequently reported on recent trends in its distribution and abundance. By 2014, Sundet and Bakanev (2014), writing jointly for IMR and PINRO, described the crab as occurring across most of the Russian economic zone, parts of international waters, the Norwegian zone and the Svalbard area, with single specimens along the Finnmark coast, and noted that the spread had been much faster than that of the red king crab.

Reproduction in the Barents Sea has since been confirmed directly. In plankton samples from the central Barents Sea in June–July 2019, Hjelset et al. (2021) found snow crab zoea I larvae in 20 of 22 samples, at densities up to 143 larvae per m^2, with the highest densities over the Central Bank; all 601 majid larvae examined were identified as snow crab, confirmed by DNA barcoding.

3.2 Spread beyond the Barents Sea and towards the west

By the mid-2010s crabs occupied the entire central and eastern and most of the northern Barents Sea (Zalota et al., 2019). The expansion continued east into the Kara Sea: crabs were found at the Barents–Kara boundary in 2008, in the north-western Kara Sea in 2010–2011, and adults and larvae in the south-western Kara Sea in 2012 (Zalota et al., 2019). A 2014 trawl survey found snow crabs across the western Kara Sea, mostly juveniles, between about 50 and 290 m depth (Zalota et al., 2018). Larval sampling with molecular identification has since shown that most snow crab larvae in the Kara Sea are likely of local origin (Lipukhin et al., 2024).

Westward spread into the Norwegian zone and towards Svalbard has been slower. In survey data for 2010–2019, benthic crabs were concentrated on the Russian shelf, and occurrence declined westward (Huserbråten et al., 2023). HI notes that distribution

largely follows bottom temperature, with the species doing best below about 3 °C, and that only single finds have been made around Svalbard and along the Finnmark coast (HI, n.d.). Using a larval drift model, Huserbråten et al. (2023) found that only about 14% of simulated larvae completed development, mainly those carried into Atlantic water south and west of the Central Bank, and concluded that further westward colonisation would probably require new adult spawning aggregations rather than larval transport. They estimated the remaining uncolonised area with suitable bottom temperature at about 389,000 km², but only a fraction of it is reachable by larvae from the Central Bank, and they concluded that the potential for expanding the fishery to the western Barents Sea is limited. Consistent with this, the Directorate of Fisheries reported in 2023 that crabs had been found north-west and south-west of Spitsbergen, but at densities too low for commercial fishing (Fiskeridirektoratet, 2023).

3.3 Introduction or natural range expansion?

The origin of the population has practical and legal significance. If the crab was introduced by human activity, for example in ballast water, obligations relating to alien species under international environmental law may apply; if it arrived by natural range expansion, those obligations are weaker or do not apply (Hansen, 2016; Henriksen, 2020).

Early literature generally favoured an anthropogenic introduction. Alvsvåg et al. (2009) considered that the first isolated specimens in the eastern Barents Sea were likely introduced through ballast water,. Sundet and Bakanev (2014) were more cautious, describing the pathway as unclear and naming as the leading hypothesis a route north of Siberia from the Chukchi Sea.

The most detailed genetic study to date analysed 759 crabs from the Barents Sea, eastern Canada, West Greenland and Alaska with twelve microsatellite loci (Dahle et al., 2022). The Barents Sea sample formed a distinct genetic cluster, was most distant from West Greenland, and showed no signal of a population bottleneck, which argues against a small ballast-water founder event. The authors suggested that the population may reflect recent natural range expansion from around Alaska. The data do not, however, identify a single source population unequivocally, and the Barents Sea sample was genetically almost as close to eastern Canada as to Alaska. Indirect support for a non-ballast origin has been sought in parasitology: screening of 142 crabs from 2016 found no *Hematodinium* infections, which the authors noted could be consistent with an introduction that did not carry the parasite, while cautioning that many factors remain unknown (Skår et al., 2024).

The genetic evidence has had a direct administrative consequence. In the Norwegian Alien Species List 2023, the snow crab was not risk-assessed because it is no longer regarded as alien; it had been classed as “very high risk” in 2012 and “potentially high risk” in 2018, and the change was explicitly based on Dahle et al. (2022) and natural range expansion (Agnalt et al., 2023). The question is thus best described as unsettled but tilted towards natural expansion. Henriksen (2020) argues that, legally, the distinction matters less than often assumed, since a coastal state has a due-diligence duty to

protect the marine environment whatever the pathway.

4 Legal status: a sedentary species of the continental shelf

4.1 Article 77(4) UNCLOS

Under UNCLOS, a coastal state exercises sovereign rights over its continental shelf for the purpose of exploring and exploiting its natural resources, and these rights are exclusive: no one may exploit them without the coastal state's express consent (UNCLOS, 1982, art. 77(1)–(2)). Article 77(4) defines the living resources of the shelf as organisms of sedentary species, namely those which at the harvestable stage are immobile on or under the seabed or unable to move except in constant physical contact with it. Sedentary species are therefore governed by the continental-shelf regime rather than by the rules for fisheries in the water column.

For the Barents Sea this classification is decisive because of the Loophole (Smutthullet), a high-seas enclave in the central Barents Sea outside both the Norwegian and Russian 200-nautical-mile zones, but whose seabed is continental shelf of one or the other state following their 2010 delimitation agreement (Henriksen, 2020). If snow crab were a free-swimming fishery resource, the Loophole stock would be open to all states; as a sedentary species it belongs to the shelf state (*Pildegovics and SIA North Star v. Norway*, 2023).

4.2 State practice: Norway, Russia and the 2015 understanding

Commercial harvesting began in 2012–2013, and most catches between 2012 and 2016 were taken in the Loophole on the Russian shelf (HI, n.d.). Zalota et al. (2019) describe the first years as uncontrolled fishing in the international enclave and the Svalbard fisheries protection zone. Vessels from EU member states, notably Latvia, fished there on the understanding that snow crab was not regulated under the North-East Atlantic Fisheries Commission (NEAFC); the ICSID award records that in 2013 the European Commission advised Latvia to this effect (*Pildegovics and SIA North Star v. Norway*, 2023). On the Russian side, a regulated fishery in the Russian EEZ began in 2016 (Zalota et al., 2019).

Norway adopted the Regulation on the prohibition of snow crab fishing on 19 December 2014, in force from 1 January 2015. It prohibits Norwegian and foreign vessels from catching snow crab in Norwegian territorial and internal waters and on the Norwegian continental shelf, and Norwegian vessels also on the shelves of other states, with dispensations available to holders of Norwegian commercial licences (Forskrift om forbud mot fangst av snøkrabbe, 2014). An amendment of 22 December 2015 added a provision allowing Russian vessels to catch snow crab on the Norwegian shelf beyond 200 nautical miles in the Barents Sea, that is, in the Norwegian part of the Loophole. In 2015 Norway and Russia also stated jointly that snow crab is a sedentary species and that only the two coastal states have exclusive rights to harvest sedentary species on the

Barents Sea shelf (*Pildegovics and SIA North Star v. Norway*, 2023; Henriksen, 2020). According to Henriksen (2020), Russia closed its shelf to foreign vessels in 2017 and prohibited Russian vessels from harvesting on the Norwegian shelf; HI notes that EU vessels were excluded from 2017 and that the two shelf states alone manage the stock (HI, n.d.). Henriksen (2020) also notes that Canada manages snow crab as sedentary and that the EU has accepted this classification for both the Barents Sea and Canadian shelves.

4.3 The Svalbard dimension and the *Senator* case

The remaining dispute concerns the shelf around Svalbard. The 1920 Svalbard (Spitsbergen) Treaty gives nationals of contracting parties equal rights to fishing and certain economic activities. Norway maintains that the treaty does not apply beyond the 12-nautical-mile territorial sea, while the EU has argued that its vessels have equal access to snow crab on the Svalbard shelf and has issued licences for that area, which Norway regards as a violation of its sovereign rights (Henriksen, 2020). Østhagen and Raspotnik (2019) interpret the EU's pursuit of what is, economically, a minor issue as an instance in which specific interests were able to use EU machinery to challenge Norway's Svalbard regime.

The test case was the Latvian-flagged *Senator*. On 15 January 2017 it began setting pots on the Central Bank, on the Norwegian shelf within the Svalbard Fisheries Protection Zone, holding a Russian permit but no Norwegian one; on 16 January the Coast Guard boarded the vessel, which had set 13 chains with 2,594 pots, and brought it to Kirkenes (HR-2019-282-S). The owner and master were convicted in the district court and in Hålogaland Court of Appeal. Henriksen (2019) reports a fine of NOK 150,000 and confiscation of NOK 1,000,000 for the owner and a fine of NOK 40,000 for the master. An earlier case, concerning another Latvian vessel (*Juras Vilkas*) fishing in the Loophole, had proceeded on the parties' acceptance that snow crab is sedentary (Henriksen, 2019).

On 14 February 2019 the Supreme Court, sitting in Grand Chamber with eleven justices, unanimously dismissed the appeal (HR-2019-282-S; Henriksen, 2019). Relying on expert evidence accepted by the Court of Appeal that the crab has negative buoyancy and cannot swim, the Court held that the words "that is to say" in Article 77(4) make the definition exhaustive: a species is sedentary if it is immobile or can move only in constant contact with the seabed, and wide-ranging migration is irrelevant as long as that contact is maintained. Occasional climbing on rocks or pots or brief drifting did not change the assessment. The Court also held that because Norwegian nationals are subject to the same permit requirement, punishment did not amount to discrimination on grounds of nationality, and that a refusal of a permit must be challenged in a civil action rather than ignored. Crucially, the Court did not decide whether the Svalbard Treaty applies to the shelf or the 200-mile zone (HR-2019-282-S; Henriksen, 2020).

4.4 Aftermath: arbitration and continuing debate

The Latvian company and its owner then brought an investment claim against Norway under the Norway–Latvia bilateral investment treaty, in force since 1992, (*Pildegovics and SIA North Star v. Norway*, 2023). The award, dated 22 December 2023, rejected the claims; according to Latvian public media the claimants had sought about EUR 388 million and were ordered to bear Norway's arbitration and legal costs (Latvian Public Broadcasting, 2024; Essex Court Chambers, 2024). Henriksen (2020) also records that a complaint to the EFTA Surveillance Authority was closed and that a Latvian action before the EU General Court was found inadmissible.

Legal scholarship continues to treat the snow crab as a proxy for larger questions. Hansen (2016) identifies the combination of non-native status, a shared shelf harvested beyond economic zones, and disputed rights around Svalbard as the main management challenges. Henriksen (2020) contrasts Norway's pragmatic approach to fisheries in the 200-mile zone around Svalbard with its more restrictive approach on the shelf, and expects further disputes. Uhlířová (2025) places the case in the broader context of resource jurisdiction in Svalbard waters, including future access to seabed resources such as oil and gas. Kaiser et al. (2018) have framed the Barents Sea snow crab explicitly as a case for the commons.

5 Development of the Norwegian fishery and its regulation

5.1 From open access to a quota fishery

Table 1 summarises the main regulatory steps documented in official sources.

Table 1: Table 1. Main steps in Norwegian snow crab regulation.

Year	Measure	Source
2015	General ban; dispensations only	Forskrift (2014)
Dec 2015	Russian access, Loophole shelf	Forskrift (2014)
2017	First annual Norwegian TAC	HI (n.d.)
2019	Separate snow crab permit	Fiskeridir. (2025)
2022	10% quota flexibility	Fiskeridir. (2025)
2022	No new permits after 24 May	Fiskeridir. (2023)
2025	Closed group; vessel quotas	Fiskeridir. (2025)

The fishery started from very small volumes. Total landings were 2 tonnes in 2012 and 251 tonnes in 2013, then 8,204 tonnes in 2014, when EU vessels landed about 2,300 tonnes (*Pildegovics and SIA North Star v. Norway*, 2023). For the whole Barents Sea, landings peaked at about 18,000 tonnes in 2015 and have since varied between roughly 10,000 and 16,000 tonnes, approaching 20,000 tonnes in recent years (HI, n.d.); Huser-

bråten et al. (2023) give about 20,000 tonnes for 2021. Norwegian vessels' share was modest at first and grew after 2017, as shown in Table 2.

Table 2: Table 2. Norwegian snow crab quota, catch (round weight) and number of active vessels. Sources: Fiskeridirektoratet (2023) for 2014–2022; Fiskeridirektoratet (2025) for 2024–2025; Nærings- og fiskeridepartementet (2025) for 2026. *Provisional, as of 8 October 2025.

Year	Quota (t)	Catch (t)	Vessels
2014	–	1,881	9
2016	–	5,406	15
2017	4,000	3,101	17
2019	4,000	4,056	11
2021	6,500	6,861	13
2022	6,725	7,960	32
2024	10,300	10,464	21
2025	12,725	12,241*	24
2026	12,336	–	–

First-hand value rose accordingly, from about NOK 56 million in 2014 to about NOK 641 million in 2021 (Fiskeridirektoratet, 2023). Hansen (2016) referred to estimates that the fishery could eventually be worth about NOK 7.5 billion per year; observed values have so far remained well below such projections, and an IMR presentation from the same period warned against a "gold rush" in which predicted catch potential exceeds what management can sustain (Hvingel, 2016).

5.2 Participation, technical measures and product form

For several years participation was relatively open to Norwegian vessels holding a dispensation and, from 2019, a snow crab permit. The number of permits rose from 39 in 2019 to 77 in 2022, while the number of active vessels rose to 32 in 2022 (Fiskeridirektoratet, 2023). The resulting race for fish shortened seasons: in 2023 fishing was stopped on 3 April, and in 2024 on 19 March, after the quota was judged to have been taken (Fiskeridirektoratet, 2023, 2025). After consultation on several models in 2023, including a closed group based on historical participation (Fiskeridirektoratet, 2023), participation restrictions took effect on 1 January 2025, with 30 vessels qualifying under the new conditions (Fiskeridirektoratet, 2025). For 2025, maximum quotas of 650 tonnes were set, of which 250 tonnes were guaranteed per vessel; for 2026 the Directorate proposed guaranteed vessel quotas with 10% over-allocation and no redistribution date (Fiskeridirektoratet, 2025).

Technical measures include a minimum carapace width of 95 mm, a closed season from 1 July to 30 November, a soft-shell by-catch limit of 20% with a duty to move, and the possi-

bility of area or time closures for biological reasons (Fiskeridirektoratet, 2025; Nærings- og fiskeridepartementet, 2025). Only males are fished in practice: very few females reach 95 mm, so the female spawning stock is protected by the size limit alone (Fiskeridirektoratet, 2025). The maximum number of pots per vessel was 9,000 in 2023, when the Directorate proposed a reduction to 6,000 (Fiskeridirektoratet, 2023).

The Norwegian fishery has been dominated by on-board processing into frozen clusters ("claws"): 9,758 tonnes of the 12,173 tonnes landed in 2025 by product category, compared with 2,401 tonnes landed live. A live-delivery scheme, with 10% of the 2025 TAC (1,202 tonnes) set aside, contributed to that increase. Average prices in 2025 were about NOK 82 per kg for live and NOK 131 per kg for frozen crab (Fiskeridirektoratet, 2025).

6 Stock assessment and ecosystem effects

6.1 Biology relevant to management

Snow crab growth is slow and occurs through moults; it takes about 8–9 years from hatching to fishable size, and growth stops after a terminal moult at which the crab becomes mature, at 58–165 mm carapace width in males and roughly 37–100 mm in females (HI, n.d.). Males become available to the fishery some three to four years after the terminal moult, and newly moulted crabs need three to six months for the shell to harden (HI, n.d.). These features make the fishery sensitive to recruitment variability, and to handling of soft-shelled or low-fill crabs. HI has argued that crabs have the highest meat fill and are least sensitive to handling about nine months after their last moult, and recommended extending the closed season through December (Hjelset & Humborstad, 2024).

6.2 How HI assesses the stock

HI's data on snow crab have come mainly from crabs caught as by-catch in research trawls during the annual winter survey and the joint ecosystem survey, supplemented since 2018 by annual snow crab cruises (HI, n.d.). The sources are not fully consistent on this point: in its 2024 consultation response, HI stated that it has no dedicated snow crab survey and therefore depends heavily on catch-per-unit-effort data from logbooks. It warned that the introduction of vessel quotas could change fishing patterns and thereby these data, and proposed that each vessel carry out up to two days of research fishing to strengthen the basis for quota advice (Hjelset & Humborstad, 2024). Quota advice has been followed closely in recent years: HI recommended 12,724 tonnes for 2025 and 12,336 tonnes for 2026 (HI, n.d.), and the 2026 quota was set at exactly the advised level (Nærings- og fiskeridepartementet, 2025).

Several data-quality issues are documented. The share of damaged crabs above minimum size in pots was about 20% in 2024, up from about 8% the year before, and HI recommends reporting all discards and studying selection, sorting and release survival (Fiskeridirektoratet, 2025). Because the stock is shared with Russia and most of it lies

on the Russian shelf (Henriksen, 2020; HI, n.d.), Norwegian advice concerns a portion of a larger population, and the published sources reviewed here do not describe a joint analytical assessment.

6.3 Ecosystem effects

The snow crab is a generalist benthic predator. Zakharov et al. (2021) found that its diet in the Barents Sea includes nearly all groups of benthic invertebrates, that juveniles and females mainly occupy shallower bivalve-dominated areas while males occupy deeper slopes and depressions dominated by polychaetes and crustaceans, and that the population consumes at least 30,000 tonnes of benthos per year, about 0.1–0.2% of macrozoobenthic biomass in the study area. The impact was greatest in the north-eastern Barents Sea and south of Novaya Zemlya. Sundet and Bakanev (2014) expected the crab to become an important component of the ecosystem, and an IMR presentation reported modelled effects of 7–27% on benthic animals and 10–30% on cod, haddock and capelin, without specifying the direction or basis of the change in the slides (Hvingel, 2016). Hansen (2016) noted that no harmful effects had been detected at that time, while Henriksen (2020) observed that Norway's ecosystem-related measures consisted mainly of data collection.

Fishing itself has ecosystem effects through lost gear. A retrieval cruise in 2018 recovered about 8,600 abandoned pots about 1.5 years after they were set; 43% of a 1,000-pot subsample contained crabs, mostly large live males with frequent injuries and depleted energy reserves, and the authors pointed to substantial unaccounted mortality from self-baiting and cannibalism (Humborstad et al., 2021). Cerbule et al. (2025) modelled losses of 0.5–3% of an assumed 90,000 pots per season and estimated that one season's lost pots could catch between about 11.5 and 70 tonnes of crab over 36 months; they noted that biodegradable cotton twine became mandatory in 2024 and could at least halve the ghost-fishing period. Actual loss rates remain unknown. A Norwegian climate assessment summarised by HI projects a negative development for the snow crab towards 2050 (HI, n.d.), consistent with the species' dependence on cold bottom water.

7 Practitioner perspective

The author has worked on Norwegian fishing vessels since 2015, over approximately eleven fishing seasons on six large and medium vessels, including crab vessels and a crab catcher-processor on which he worked for four consecutive seasons (2022–2025), with more than 1,500 days at sea above the Arctic Circle in deck and processing roles in Barents Sea crab fisheries. This experience does not generate data and is not used as evidence in this review.

In general terms, the operational picture described in the regulatory documents is consistent with the author's experience of the fishery: a pot fishery carried out far offshore in winter and spring, in which on-board processing, crew organisation and sorting of catch are central to day-to-day work. The literature reviewed here shows how strongly

the working environment on deck is shaped by decisions taken elsewhere, by courts on the legal status of the species, by the ministry on quotas and seasons, and by scientists on what data are needed.

Two topics in the literature appear particularly relevant to practitioners. The first is handling quality and discards: the documented rise in the proportion of damaged crabs and HI's recommendations on sorting, release survival and the timing of the season (Fiskeridirektoratet, 2025; Hjelset & Humborstad, 2024) concern tasks performed directly by deck and processing crews. The second is gear loss, where the work of Humborstad et al. (2021) and Cerbule et al. (2025) suggests that systematic reporting of lost pots by crews would close one of the clearest gaps in current knowledge.

8 Knowledge gaps and research needs

1. **Stock assessment.** The sources reviewed do not describe an analytical, model-based assessment of the Barents Sea snow crab, and HI itself has stressed its dependence on fishery CPUE and the absence of a dedicated survey (Hjelset & Humborstad, 2024). Joint Norwegian–Russian assessment of the whole population and transparent reporting of methods would strengthen advice.
2. **Origin and connectivity.** Genomic methods with higher resolution than microsatellites, and sampling from the Siberian shelf seas, could clarify the route of colonisation suggested by Dahle et al. (2022).
3. **Benthic impacts.** Beyond the diet study of Zakharov et al. (2021), there is little published, quantitative evidence on how snow crab predation alters benthic community structure, or on interactions with the red king crab and commercial fish.
4. **Discards and release survival.** HI's recommendations to quantify discards and survival (Fiskeridirektoratet, 2025) have yet to be reflected in published studies.
5. **Gear loss.** Real pot-loss rates and the effectiveness of biodegradable twine under Barents Sea conditions are unknown (Cerbule et al., 2025).
6. **Climate and distribution.** Projections of westward spread (Huserbråten et al., 2023) and climate effects need to be tested against survey data as bottom temperatures change.
7. **Legal questions.** The application of the Svalbard Treaty to the shelf and the 200-mile zone remains unresolved (HR-2019-282-S; Henriksen, 2020).

9 Conclusions

Within three decades of its first record in 1996, the snow crab has become an established, reproducing component of the Barents Sea benthos, concentrated on the Russian shelf and spreading further east than west. Genetic evidence now leans towards natural range expansion rather than ballast-water introduction, and Norway no longer lists the species as alien, though the source population is not definitively identified.

The species' legal classification as sedentary under Article 77(4) UNCLOS, established through Norwegian–Russian practice and confirmed unanimously by the Supreme Court

of Norway in 2019, placed the resource under the exclusive rights of the two shelf states, closed the Loophole to third-state vessels, and withstood an investment claim. The question of the Svalbard Treaty beyond the territorial sea, however, was deliberately left open and continues to underlie the dispute with the EU.

The Norwegian fishery developed from a few tonnes in 2012 into a quota fishery of over 12,000 tonnes, with regulation progressing from a general ban with dispensations to annual quotas, a closed participant group and vessel quotas. Management currently rests on a limited knowledge base, in which catch data play a large role and ecosystem effects, discards and lost gear are only partly quantified. Strengthening the scientific basis, especially through joint assessment and dedicated surveys, is the main precondition for keeping the fishery sustainable.

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