DISKO FAN CONSERVATION AREA: A CANADIAN CASE STUDY

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ABSTRACT

In 2010, under the United Nations Convention on Biological Diversity, Canada agreed to protect 10 per cent of its coastal and marine areas by 2020 through marine protected areas and other effective area-based conservation measures. In 2015, the Government of Canada committed to an interim target of increasing the protection of marine and coastal areas to 5 per cent by 2017. To aid this endeavour, Fisheries and Oceans Canada (DFO) developed science-based guidance, in advance of the finalisation of international voluntary guidance, to determine which area-based management measures should count towards Canada's 2017 target and beyond. DFO's guidance identifies five criteria to be met: a clearly defined geographic location; conservation or stock management objectives; presence of ecological components of interest; long-term duration; and, effective conservation of the ecological components of interest from existing and foreseeable pressures. As announced in December 2017, Canada has 51 area-based fishery closures that meet these criteria, covering approximately 275,000 km^2 or 4.78 per cent of Canada's ocean territory. This paper describes one such closure in Canada's Eastern Arctic, the Disko Fan Conservation Area, and the steps taken to ensure protection of an ecologically important area which benefits marine biodiversity. Lessons learnt in the establishment of this Conservation Area are shared.

Key words: Aichi Biodiversity Targets, protected areas, other effective area-based conservation measures, conserved areas, Baffin Bay, Canada, fishery closures

INTRODUCTION

With the world's longest coastline, and adjacency to three ocean basins, Canada's heritage, culture and economy have significant connections to the marine environment. In 2015, in response to international commitments under the Convention on Biological Diversity, Canada adopted a suite of national targets known as the "2020 Biodiversity Goals and Targets for Canada", based on the international Aichi targets. Canada's Target 1 states: By 2020, at least ... 10% of marine and coastal areas are conserved through networks of protected areas and other effective area-based conservation measures (Government of Canada, 2017). In addition, in 2015 the Government of Canada also committed to an interim target of protecting 5 per cent of marine and coastal areas by 2017. When this commitment was made, Canada's protected areas accounted for only 0.92 per cent of its marine territory (Government of Canada, 2018a). Given the short time period required to meet the 2020 commitments, Canada has gone to significant lengths to use all available tools to protect the marine environment, and this is evident in the progress made in identifying existing other effective area-based conservation measures (OECMs) and establishing new ones using powers under Canada's *Fisheries Act*.

Advancing OECMs is part of the plan that the Government of Canada developed to meet its Marine Conservation Targets (MCT). Other elements of the plan include: completing marine protected area establishment processes underway; protecting large offshore areas; protecting areas under pressure; and establishing marine protected areas faster and more effectively (DFO, 2018a). To advance OECMs, Canada reviewed existing area-based fishery closures under Canada's *Fisheries Act* and established new ones, to be considered as OECMs towards Canada's MCT, with an understanding that internationally accepted guidance was not yet available. The Government of Canada's commitment to meet its 5 per cent interim MCT provided an incentive to assess whether existing area-

based fishery closures were meeting their conservation objectives and adjust their restrictions where necessary, thereby increasing their contributions to biodiversity conservation.

International guidance on OECMs is currently being developed so that CBD Parties can adequately measure progress towards Aichi Target 11 in a consistent manner (CBD, 2018). In advance of internationally accepted voluntary guidance and to ensure areas that Canada reports as contributing to Aichi Target 11 meet specific standards for conservation, Fisheries and Oceans Canada (DFO) sought scientific advice through the Canadian Science Advisory Secretariat (CSAS) to identify characteristics and factors to determine whether a marine area-based management measure is likely to provide biodiversity conservation benefits (DFO, 2016a). Based on this advice, as well as emerging direction by an IUCN Task Force (IUCN WCPA, 2015, 2016), advice developed by the Canadian Council on Ecological Areas (CCEA) (MacKinnon et al., 2015) and operational realities in Canada's oceans, DFO developed operational guidance for identifying marine OECMs (DFO, 2017a). Efforts have been underway within Canada and within DFO to explore what areas may qualify as OECMs ever since the term was introduced through Aichi Target 11. However, the provisioning of the CSAS science advice over the 2015–2016 time period can be seen as the starting point for developing DFO's operational guidance in its current form. Canada's interim commitment to conserve 5 per cent of the marine environment provided a major driver for advancing this work, and applying the guidance within Canadian waters.

Whereas the IUCN guidance and CCEA guidance are designed to apply more broadly to marine and terrestrial areas across a range of jurisdictions and governance types, the DFO guidance is only applicable to the marine environment and to date has only been applied to assess Critical Habitats identified under Canada's *Species at Risk Act* and area-based fishery closures established under Canada's *Fisheries Act*. In addition, DFO's operational guidance aligns with the scientific advice that protecting a single habitat type can yield important benefits for biodiversity conservation if that habitat type is particularly important (DFO, 2016a), which differs from the view in the IUCN and CCEA guidance that all elements of biodiversity in a given area must be protected. DFO's operational guidance lists five criteria for an area to be considered an OECM: clearly defined geographic location; conservation or stock management objectives; presence of ecological components of interest, including an important habitat and species; long-term duration; and effective conservation of the ecological components of interest from existing and foreseeable pressures.

Greenland halibut among bamboo coral aggregation in Disko Fan Conservation Area (DFCA) © ArcticNet-CSSF-DFO

As announced in December 2017, Canada has 51 area-based fishery closures that are recognised as meeting DFO's OECM criteria. These closures are known domestically as marine refuges and cover approximately 275,000 km^2 or 4.78 per cent of Canada's ocean territory. Area-based fishery closures only prohibit fishing, therefore, to be considered as a marine refuge within DFO guidelines it must be determined that fishing is the only existing or foreseeable human activity likely to pose a risk to the ecological components of interest identified for protection in the area.

The following case study provides an overview of one marine refuge, the Disko Fan Conservation Area (DFCA), the application of the Canadian OECM operational guidance, and lessons learnt.

LOCATION AND ECOLOGICAL CONSIDERATIONS

Geography and oceanography

DFCA is located in southern Baffin Bay in Canada's Eastern Arctic (Figure 1). It encompasses the majority of the glacial alluvial fan known as the Disko Fan found in Canadian waters. The oceanography of this area is complex due to a wide bathymetric range (300 m in the southeast corner to 1,600 m on the western boundary of DFCA), steep gradient and a combination of water masses (warm West Greenland slope current along the eastern boundary and cold Baffin Island current along the western boundary). Ice cover in this area is considerably more dense and dynamic than along the west coast of Greenland. Leads may be present even in heavily consolidated pack ice, which is of great significance to marine biota occupying this area in winter.

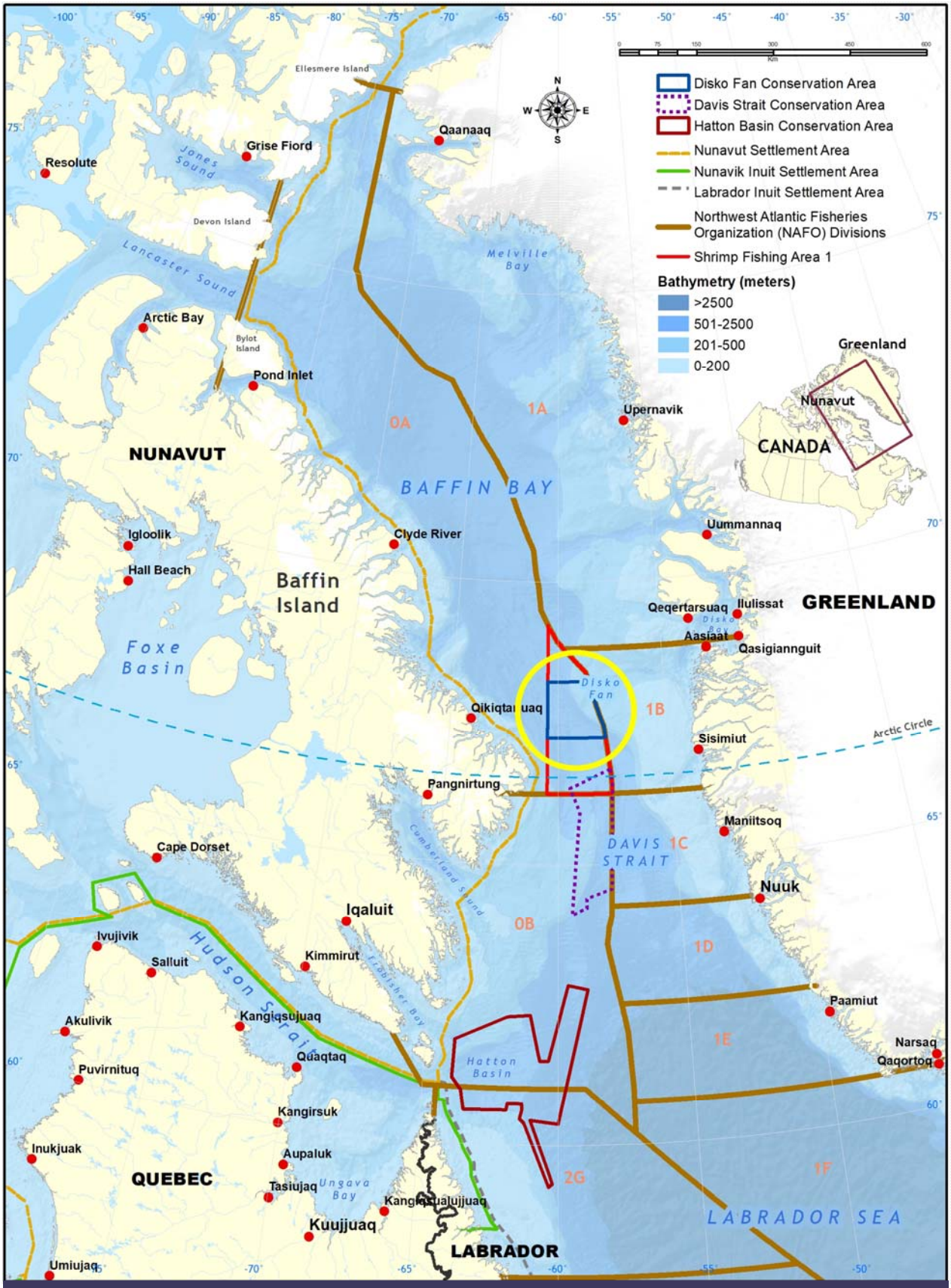

Figure 1. Management areas in Canada's Eastern Arctic relevant to the implementation of the Disko Fan Conservation Area (circled)

Features of ecological importance and connectivity

The Disko Fan was identified as an Ecologically and Biologically Significant Area (EBSA) in 2011 based on oceanographic characteristics, overwintering habitat for narwhal (*Monodon monoceros*), presence of other marine mammals (including sperm whales (*Physeter macrocephalus*) and northern bottlenose whales (*Hyperoodon ampullatus*)), and presence of several coral species (Cobb, 2011; DFO, 2011). In 2016, DFO delineated significant benthic areas of coral and sponge in Eastern Canada, including the Eastern Arctic. Large gorgonian coral (*Alcyonacea*, formerly classed as *Gorgonacea*) concentrations in the Disko Fan were mapped based on a modelling process that considered scientific trawl surveys and historical commercial catch information (Kenchington et al., 2016). Of particular note were aggregations of 1 m high bamboo corals (*Keratoisis spp.*), one of the slowest growing and longest lived coral species, which have not been found anywhere else in the world to date (de Moura Neves et al., 2015), (Figure 2).

In addition to specific ecological components, DFCA is also in close proximity to other areas managed for biodiversity protection. While more research is required to better understand connectivity across species and trophic levels between protected areas (Burgess et al., 2014), there are several neighbouring designated areas (i.e. within approximately 100 km) with conservation objectives complementary to DFCA, including (Figure 1):

- Davis Strait Conservation Area: A closure to bottom contact fishing gear to protect sensitive benthic areas, specifically significant aggregations of corals, sponges and sea pens;
- Akpait National Wildlife Area: To protect key marine habitat supporting numerous seabirds, including one of Canada's largest thick-billed murre (*Uria lomvia*) colonies; and Qaqulluit National Wildlife Area: To protect Canada's largest breeding colony of northern fulmars (*Fulmarus glacialis*) as well as other nesting seabirds such as black guillemots (*Cepphus grille*), glaucous gulls (*Larus hyperboreus*) and Iceland gulls (*Larus glaucoides*).

GOVERNANCE

While there are several federal departments and agencies with mandates related to the marine environment, DFO has the lead role in managing Canada's fisheries. Canada's *Fisheries Act (1985)*, the *Fishery (General) Regulations (1993)* and *Atlantic Fishery Regulations (1985)* made thereunder, as well as the *Oceans Act (1996)* and the *Species at Risk Act (2002)* are the main pieces of federal legislation under which marine fisheries are managed (see Government of Canada, 2018b). The powers granted pursuant to these Acts and Regulations permit the Minister of Fisheries and Oceans to specify licence conditions including those related to vessel type, gear, fishing restrictions, information reporting and vessel monitoring system, as well as to issue Variation Orders that outline fishing seasons and areas.

DFO has developed a national Sustainable Fisheries Framework (SFF) to ensure Canadian fisheries are conducted in a manner that supports conservation and sustainable use (DFO, 2016b). Policies contained within the SFF promote a precautionary and ecosystem-based approach to fisheries management.

DFO uses Integrated Fisheries Management Plans (IFMPs) to guide the conservation and sustainable use of marine resources. An IFMP is developed for a particular species or group of species in a given region. During IFMP development, the expertise and activities of DFO, along with input from resource users, Indigenous organisations, and other stakeholders, are integrated into decisions regarding management and conservation measures. Generally this is done via stakeholder advisory committees. The IFMP communicates basic information on the fishery and its management to stakeholders and the general public.

The commercial marine fisheries in Baffin Bay are managed consistent with the *Nunavut Agreement* (INAC & NTI, 2013). This Agreement between the Government of Canada and the Inuit of Canada's central and eastern Arctic sets out a co-management system for wildlife/resource management within and outside the Nunavut Settlement Area (NSA). For example, the Nunavut Wildlife Management Board (NWMB) provides fisheries management decisions (inside the NSA) and recommendations (outside the NSA) to the Minister of Fisheries and Oceans. NWMB decisions/ recommendations, as accepted by the Minister, are incorporated into relevant IFMPs.

MANAGEMENT

Fisheries management

Two commercial marine fisheries operate in Baffin Bay off the coast of Baffin Island, Nunavut, within Canada's Exclusive Economic Zone: a Greenland halibut (*Reinhardtius hippoglossoides*) fishery in the Northwest Atlantic Fisheries Organization (NAFO) Subarea 0, and a northern shrimp (*Pandalus borealis*) fishery in

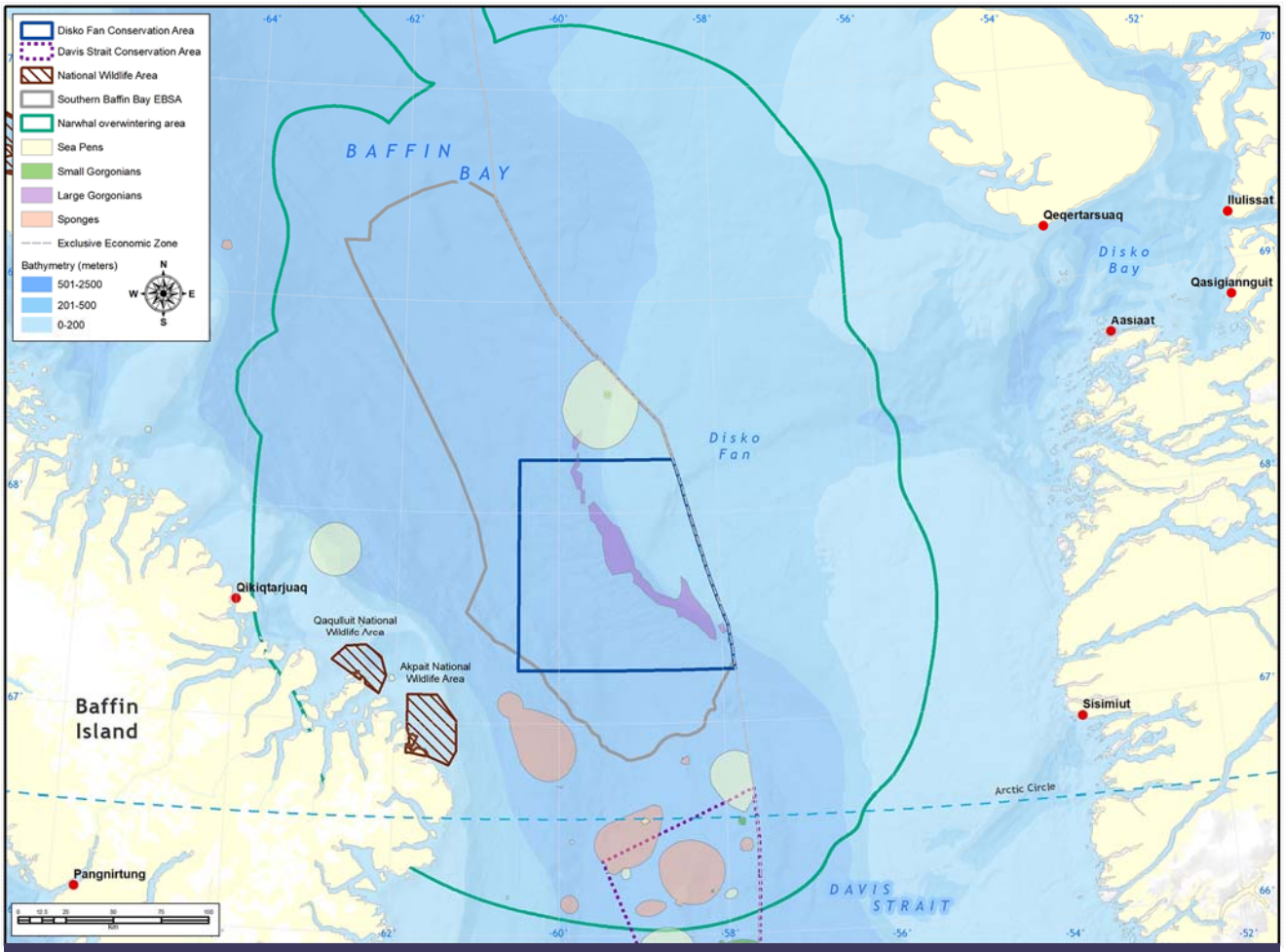

Figure 2. Winter home ranges of Baffin Bay narwhals (modified from DFO, 2014); significant concentrations of corals, sponges and sea pens (from Kenchington et al., 2016); and Southern Baffin Bay Ecologically and Biologically Significant Area (from DFO, 2011).

Shrimp Fishing Area (SFA) 1 (Figure 1). The management regimes are described in their respective IFMPs (Greenland Halibut NAFO Subarea 0, effective 2014; Northern Shrimp SFAs 0–7 and the Flemish Cap, effective 2007) (DFO, 2018b).

Regular stakeholder advisory committee meetings are held to review current management measures, discuss management issues and provide management recommendations. For the Baffin Bay fisheries, the main fora for consultations are the Eastern Arctic Groundfish Stakeholder Advisory Committee (EAGSAC) and Northern Shrimp Advisory Committee (NSAC).

Previous marine conservation efforts in the Disko Fan

In 1998, DFO reviewed available information on narwhal winter habitat use in Baffin Bay and created an area where fishing effort for Greenland halibut was restricted. The objective was to minimise impacts on the winter food source and overwintering habitat for narwhal.

Coral concentrations, including gorgonian and antipatharian species, were first located along the steep Greenland Shelf break in this area during research surveys conducted in 1999 and 2001. Given the known negative impacts to corals by bottom contact fishing gear and science advice (DFO, 2006 and 2007), DFO expanded the objectives for this area to include the conservation of cold water coral concentrations and established an area closure to all Greenland halibut fishing using bottom contact gear. The area closure, called the Narwhal Overwintering and Coldwater Coral Zone (name changed to DFCA in December 2017) was incorporated into the 2006–2008 NAFO Subarea 0 Greenland Halibut IFMP and implemented for the 2008 season via groundfish licence conditions and Variation Orders. This groundfish fishery closure has remained in

place since and been included in subsequent versions of the IFMP.

Conservation efforts in the Disko Fan since Canada announced its Marine Conservation Targets: With the impetus of Canada's 2017 interim MCT, planning began in July 2016 to reassess DFCA in light of new scientific information against the Policy for Managing the Impact of Fishing on Sensitive Benthic Areas, objectives stated in IFMPs and DFO's OECM operational guidance.

In January 2017, EAGSAC established a Working Group to recommend groundfish fishing closures in Baffin Bay and Davis Strait. In March 2017, following consultations with shrimp fishery stakeholders, the Working Group's mandate expanded to include recommendations for shrimp fishing closures. DFO sought science advice on the compatibility of the northern shrimp fishery operating within the shallower depths of DFCA with conservation objectives. It was concluded that a full ecological risk assessment (considering all activities, stressors and threats) would be required to fully evaluate the winter habitat aspect of the conservation objectives (DFO, 2017b). The Working Group considered known science for Baffin Bay and Davis Strait as well as the economics of the fisheries, including fishing footprints (DFO, 2017c; Koen-Alonso et al., 2018) and landed values. The Working Group met six times and collaborated intensely to review and negotiate area-based fishery closure proposals, including adjustments to the DFCA groundfish fishery closure and a new shrimp fishery closure within DFCA. The Working Group provided a final recommendation to DFO on DFCA closures in May 2017. Although the Working Group was the primary venue for consultations, DFO also sought views regarding fishing closure recommendations in Baffin Bay directly from co-management organisations, Indigenous partners, the groundfish and shrimp fishing industries, territorial government and environmental organisations. Throughout all consultations, Inuit and fisher knowledge was solicited.

The proposed closures recommended by the Working Group for DFCA were presented to the NWMB by DFO in June 2017. A letter of support from the NWMB was received in July 2017. Subsequently, DFO accepted and implemented changes in December 2017 via Variation Orders that contained closure boundary coordinates. Groundfish and shrimp harvesters were notified of the change. Beginning 1 April 2018, the closure boundary coordinates will also be included in licences issued to harvesters.

Impacts from 1999 DFO multi-species research vessel survey using bottom trawl still seen in 2013. Fragments are dead bamboo coral with no sign of recovery even with the prohibition of groundfish fishing in DFCA since 2008. © DFO

Within DFCA there are three overlapping closures to bottom contact fishing gear, including: groundfish fishery using fixed gear (gillnets and longlines), groundfish fishery using mobile gear (trawls), and the shrimp fishery which uses only mobile gear (trawls). The area of overlap between these closures, where all bottom contact fishing is now prohibited, covers 7,485 km2 (Figure 3). There are no existing or foreseeable activities that would negatively impact the identified ecological components of interest, within the portion of DFCA that is closed to all bottom contact fishing. Of note, there are no current or former oil and gas leases within DFCA, and a five-year oil and gas development moratorium has been implemented in Canada's Arctic.

EXPECTED BIODIVERSITY OUTCOMES

There are expected benefits to both commercially fished populations as well as the ecological components of interest within DFCA. The three narwhal stocks that use the area in winter (Watt et al., 2012; DFO, 2014; Richard et al., 2014) are protected from fishing impacts (e.g. entanglement, ghost fishing, habitat loss and/or degradation, competition with winter food (Greenland halibut, Pandalus shrimp, Arctic squid (*Gonatus fabricii*), octopus and Arctic cod (*Boreogadus saida*) (Laidre & Heide-Jørgensen, 2005; Watt et al., 2013). The significant concentrations of large gorgonian corals, including large tracts of globally unique, high density bamboo corals, are protected from all fishing. It is important to note that the structural habitat created by the corals also provides habitat for many other species including those of commercial importance (i.e. Greenland halibut, northern shrimp) (DFO, 2010). Conservation benefits may also be conferred to sperm whales, northern bottlenose whales, and benthic fish

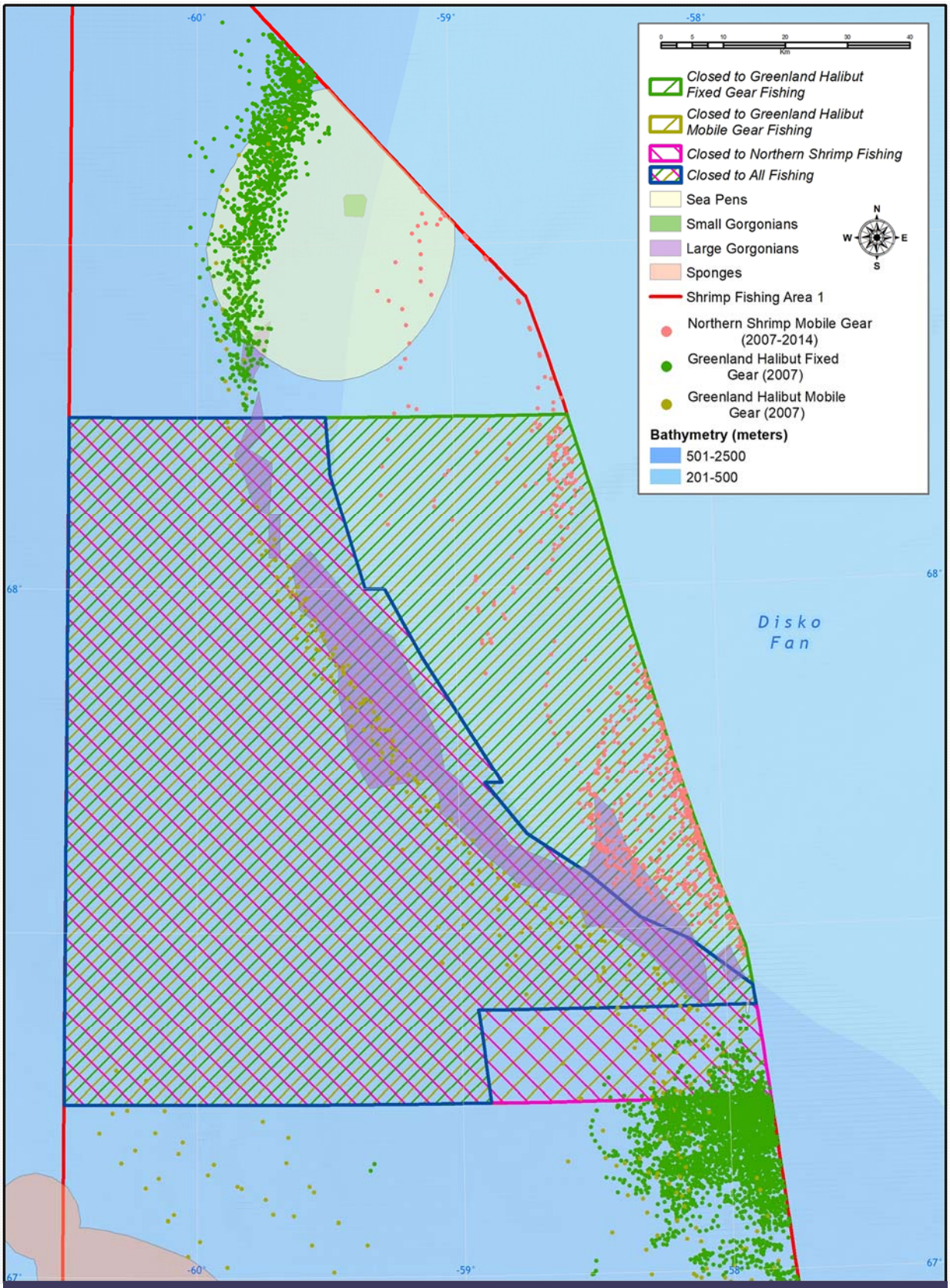

Figure 3. Three overlapping area-based fishing closures constitute the Disko Fan Conservation Area. The portion closed to all bottom contact fishing gear contributes 7,485 km2 to Canada's Marine Conservation Targets.

and invertebrate species that use the area (Davidson, 2016; Krieger & Wing, 2002; Roberts & Hirshfield, 2004).

ECOSYSTEM SERVICES AND CULTURAL VALUES WITHIN DFCA

Baffin Bay narwhal stocks support Inuit subsistence fisheries in Canada and Greenland. For centuries, Inuit have relied on narwhal as a traditional food and source of materials for day-to-day living. The subsistence harvest and the sharing of the proceeds is of social, cultural and economic importance. Narwhal skin and blubber are high in protein, vitamins and other essential nutrients (Government of Nunavut, 2013). Other valuable by-products of the subsistence harvest include ivory tusks, bone and sinew which are used to manufacture carvings, handicrafts and hunting equipment. Communities can also benefit indirectly from non-consumptive activities involving narwhal, such as scientific research and production of educational materials. Narwhal provide food and income to residents of isolated Arctic communities, where employment opportunities are scarce.

By minimising impacts of commercial fisheries to narwhal overwintering habitat and food, DFCA helps maintain the ecosystem services and cultural values associated with narwhal. Conservation measures that enhance the sustainability of narwhal stocks, such as DFCA, are supported by the inhabitants of Nunavut.

Other valuable ecosystem services within DFCA may include the spillover of commercially fished species to adjacent unprotected areas. Studies within temperate and sub-Arctic region area-based fishery closures have demonstrated benefits to community composition and abundance over time (Brown et al., 1998, Fisher & Frank, 2002; Jaworski et al., 2006). In addition to providing these benefits within the closed areas, positive effects have also been observed in adjacent unclosed areas, possibly due to a spillover of species (Fisher & Frank, 2002; Jaworski et al., 2006).

MONITORING EFFECTIVENESS

The Narwhal Overwintering and Coldwater Coral Zone area closure was implemented prior to the 2008 fishing season. During the past ten years, the closure has been evaluated from a compliance, scientific and fishery management perspective. Such assessments will continue and improve.

Compliance monitoring

The Greenland halibut and northern shrimp IFMPs list several management measures, which support DFCA conservation objectives (e.g. reporting requirements, a mandatory Vessel Monitoring System, 100 per cent at-

Juvenile narwhal in Milne Inlet near Pond Inlet, Nunavut. This stock of whales overwinters in DFCA. © Marianne Marcoux

sea observer coverage, lost gear provision, etc.). These measures are monitored for compliance and action is taken as warranted. Compliance issues are articulated in the IFMP and discussed at regular meetings with stakeholders.

Ecological monitoring
There are several research projects ongoing or planned in or near DFCA which can contribute useful information for ecological monitoring. These include: ongoing telemetry and tracking work on several species that use DFCA, including Greenland halibut, Greenland shark (Somniosus microcephalus) and narwhal; monitoring of Circumpolar Marine Biodiversity Monitoring Plan sites in DFCA; remote operated vehicle surveys for benthic habitat in DFCA; and DFO's multi-species research vessel surveys adjacent to DFCA.

Effective and measurable benefits of conserved areas (such as increases in fish population density) may take upwards of 15 years to be observed (Molloy et al., 2009). More time and research are needed to accurately assess the effectiveness of DFCA in meeting its stated conservation objectives.

Fisheries management monitoring
DFO conducts internal postseason reviews of the Subarea 0 Greenland halibut fishery attended by all DFO sectors to identify operational issues encountered during the previous season and recommend actions for improvement, including the exploration of new tools (e.g. electronic logbooks, electronic video monitoring).

Efforts are underway to address findings from the 2016 Office of the Auditor General of Canada Report 2 – Sustaining Canada's Major Fish Stocks (OAG, 2016). Gaps identified relevant to DFCA include the need for improved sharing of fishery monitoring information between DFO regions and systems that allow for data availability and comparison. DFO has committed to reassess the boundaries of the three fishing closures comprising DFCA prior to 2020 as new science information becomes available.

LESSONS LEARNT

Conditions for success: Canada's commitment to protecting 5 per cent of its marine environment was a primary driver in additional protections to this area and in the progress made by fisheries managers to implement the DFO's Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas. The desire by the fishing industry to pursue and maintain eco-certification for the Greenland halibut and northern shrimp fisheries provided an incentive to work collaboratively on protecting this area.

Good stakeholder relationships and an inclusive EAGSAC that encompassed a range of perspectives were important to success. Dedicated DFO resources to organise stakeholder discussions and provide information required for deliberations kept the process moving forward. Time was taken at the beginning of the process to communicate to all stakeholders, over a number of meetings, the importance of features found in the area through maps, dedicated information sessions with science speakers, and repeated presentations, which led to a shared understanding of DFCA biodiversity. Availability of peer-reviewed science on EBSAs, locations of coral and sponge concentrations, and fishing locations provided a sound basis for discussions. The Southern Baffin Bay EBSA covers 29,969 km2, 10,932 km2 (36 per cent) of which overlaps the DFCA, including 7,431 km2 (25 per cent) of overlap with the portion of DFCA that prohibits all bottom fishing. Further meetings were held where stakeholders reviewed and validated fishery footprint and economic analyses, followed by boundary negotiations.

In support of transparency, collaboration and respect for ongoing co-management relations, DFO provided the NWMB with information and updates pertaining to the fisheries area closure and solicited comments at its quarterly in-person meetings. The regularly scheduled meetings provided useful deadlines for decisions and effective fora for engagement. NWMB support for the proposal was critical to the success of the fisheries area closure.

The thorough, stepwise approach followed created trust and allowed for boundaries to be agreed upon in a timely manner. Ongoing discussions and joint public outreach projects between DFO and stakeholders allow for further collaboration and increase pride in the work accomplished on DFCA as well as the other two OECMs in Baffin Bay and Davis Strait.

Opportunities for improvement

There are further steps that could be taken to maximise biodiversity outcomes associated with DFCA. Existing compliance, ecological and fishery management monitoring efforts could be enhanced through formal monitoring plans that outline indicators, targets and measuring methods. These could be used to communicate a strategic vision and clearly articulate outstanding needs, thereby encouraging and directing further research. Regular reporting to stakeholder advisory committees on attainment of targets, or lack thereof, could be used to support accountability and transparency. Issues would be more clearly documented, making it easier to find solutions.

Northern shrimp among bubblegum coral (Paragorgia arborea). Both species are found in DFCA. © DFO

The regulatory tools used to create DFCA are licence conditions and Variation Orders under the *Fisheries Act*. Fishery management measures described in these tools are often long standing. However, they are subject to adjustments or cancellation at any time. Currently, consultations are underway on proposed amendments to the *Fisheries Act* that would give the Minister authority to make regulations to establish spatial restrictions to fishing activities for the purpose of conserving marine biodiversity for the long-term. Should this proposed provision be accepted into the *Fisheries Act*, DFO intends to apply the new provision to marine refuges that count towards Canada's MCT. Fisheries area closures that do not qualify as marine refuges would continue to use Variation Orders and licence conditions to prohibit fishing activities. This means that fishing prohibitions in the portion of DFCA which qualifies as a marine refuge (i.e. the portion of the DFCA that is closed to all bottom contact fishing) would be established via regulation, and fishing activities in the remaining portions of the DFCA would continue to be managed by Variation Order and licence conditions. The proposed regulatory tool under the amended *Fisheries Act* would be complementary to Canada's Marine Protected Areas under the *Oceans Act*. Both tools would be used to protect important species, habitats and features. The appropriate tool to use in a given situation would depend on the ecological components of interest and identified risks.

A network of marine protected areas is a collection of conserved areas (including, for example, *Oceans Act* Marine Protected Areas, marine refuges, National Marine Conservation Areas, marine portions of Migratory Bird Sanctuaries and National Wildlife Areas designated by the federal government, and protected areas of other governments) that operate cooperatively to safeguard important ecological components of ocean biodiversity. Effective networks can enhance the contributions of individual conserved areas to achieve greater ecological benefits that translate into economic, social and cultural benefits (DFO, 2017d). Marine

protected area network development is currently underway on Canada's east coast, west coast and in the western Arctic. Development of a network for the Eastern Arctic would help to ensure that current conserved areas and any future conservation measures lead to long-term biodiversity protection and ecosystem resilience in this rapidly changing environment.

CONCLUSION

Canada's commitment to meeting its interim 5 per cent MCT led to significant momentum in area-based protections, including the use of area-based fishery closures under the *Fisheries Act*. The portion of DFCA closed to all bottom contact fishing aligns with the key elements of the draft IUCN Guidelines on OECMs (IUCN WCPA, 2018). It is expected to provide biodiversity conservation outcomes for narwhals and cold water corals, and will likely benefit other species that use DFCA, including sperm whales, northern bottlenose whales, and benthic fish and invertebrate species. DFCA is also anticipated to support ecosystem services and cultural values associated with the area. There are some areas for improvement for DFCA, including developing formal monitoring plans to measure the effectiveness of DFCA and setting up safeguards to ensure the closure provides long-term conservation value.

The Working Group and secretariat functions provided by DFO enabled proactive and timely discussions. Bilateral discussions between stakeholders also enhanced the level of agreement between stakeholder groups. Boundaries for DFCA were agreed to by all partners and stakeholders, primarily as a result of involvement in these various processes, as well as timely exchange of information with co-management boards and the Government of Nunavut. The boundaries were achieved by compromise and also with a view towards ensuring a future, productive working relationship between conservation interests, resource harvesters and co-management boards. This relationship led to agreement on other area-based fishery closures, Hatton Basin Conservation Area and Davis Strait Conservation Area. This process increased trust between stakeholders and allowed for more open discussion on other conservation initiatives including seabird bycatch, Greenland shark bycatch, and fisheries monitoring. The DFO commitment to review the DFCA boundaries by 2020 allows additional science input and dialogue on biodiversity protection.

Canada's Eastern Arctic has a relatively short history of commercial fishing as compared to other areas in the Northwest Atlantic. Commitment from the Government of Canada, along with a desire for resource sustainability from fisheries interests, co-management boards and all stakeholders provide a strong foundation for long-term ecosystem protection. The process followed for adjusting the measures within DFCA is an example of what should be done in other areas that undergo marine refuge establishment and are considered to count towards Canada's international protection targets.

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Elizabeth Hiltz has worked for DFO since 1988 in a range of positions: Marine Mammal Biologist conducting research in the Central and Eastern Arctic; Impact Assessment Biologist reviewing development proposals in the Prairies for impacts to fish and fish habitat; Coordinator with Oceans Program developing environmental components of the Ecosystem Overview Report and Management Plan for the Beaufort Sea, Western Arctic; and, for the last 10 years, Senior Officer managing the commercial marine fisheries in the Eastern Arctic. Elizabeth led the 2017 process to establish fishing closures in Canada's Eastern Arctic.

Susanna Fuller is a Senior Project Manager with Oceans North and has a PhD in marine biology from Dalhousie University. She studied diversity of marine sponges in the Northwest Atlantic, and has had extensive experience in international and national policy development and implementation focused on protecting vulnerable marine habitats from the impacts of fishing. Susanna believes in working closely with Indigenous peoples, resource harvesters and coastal communities and understanding market-based incentives for sustainable fisheries as important elements of achieving tangible conservation outcomes.

Jessica Mitchell has worked in the Oceans Management group at DFO's headquarters office since 2010, following completion of a Marine Biology Honours degree and a Masters of Resource and Environmental Management degree at Dalhousie

University in Halifax, Nova Scotia, Canada. Her Masters work focused on marine protected areas and marine protected area network development, which are also two of her primary areas of expertise at DFO. Jessica also led development of DFO's Operational Guidance for Identifying 'Other Effective Area-Based Conservation Measures' in Canada's Marine Environment, and has coordinated the application of these criteria nationally, in collaboration with her colleagues.

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RESUMEN

En 2010, de conformidad con el Convenio sobre la Diversidad Biológica de las Naciones Unidas, Canadá acordó proteger el 10% de sus zonas costeras y marinas para 2020 mediante áreas marinas protegidas y otras medidas de conservación eficaces basadas en áreas. En 2015, el Gobierno de Canadá se comprometió con un objetivo provisional de aumentar a 5% la protección de las zonas marinas y costeras para 2017. Para ayudar en este empeño, el Ministerio de Pesquerías y Océanos de Canadá (DFO, por sus siglas en inglés) desarrolló orientaciones de base científica, antes de la finalización de las guías internacionales de aplicación voluntaria, para determinar qué medidas de gestión basadas en áreas deberían contemplarse para alcanzar el objetivo fijado por Canadá para 2017 y más allá. Las directrices del DFO identifican cinco criterios que deben cumplirse: una ubicación geográfica claramente definida; objetivos de conservación o de gestión de poblaciones; presencia de componentes ecológicos de interés; duración a largo plazo; y conservación eficaz de los componentes ecológicos de interés en función de las presiones actuales y previsibles. Tal como se anunció en diciembre de 2017, Canadá ha establecido 51 zonas de veda para la pesca que cumplen estos criterios y abarcan una extensión de aproximadamente 275,000 km^2 o el 4,78 por ciento del territorio oceánico de Canadá. Este artículo describe uno de estos cierres para la pesca en el Ártico oriental de Canadá, el Área de Conservación Disko Fan, y las medidas tomadas para garantizar la protección de una zona de importancia ecológica que favorece la biodiversidad marina. Se comparten las experiencias adquiridas en el establecimiento de esta Área de Conservación.

RÉSUMÉ

En 2010, dans le cadre de la Convention des Nations Unies sur la diversité biologique, le Canada a accepté de protéger 10% de ses zones côtières et marines d'ici 2020 grâce à la mise en place d'aires marines protégées et à d'autres mesures de conservation efficaces. En 2015, le gouvernement du Canada s'est engagé à atteindre un objectif provisoire visant à protéger 5% de ses zones marines et côtières en 2017. A cette fin, dans l'attente de la finalisation des directives volontaires internationales, le Ministère des Pêches et Océans Canada (MPO) a élaboré ses propres directives scientifiques afin de déterminer quelles mesures de gestion par zone seraient comptabilisées pour l'atteinte des objectifs de 2017 et au-delà. Les directives du MPO identifient cinq critères à respecter: un emplacement géographique clairement défini; des objectifs de conservation ou de gestion des stocks; la présence d'éléments d'intérêt écologique; une durée sur le long terme; et la protection efficace des éléments d'intérêt écologique face aux pressions existantes et prévisibles. Comme il a été annoncé en décembre 2017, le Canada a fermé 51 zones de pêche correspondant à ces critères, qui s'étendent sur environ 275 000 km2 soit 4,78% du territoire océanique du Canada. Le présent article présente une de ces fermetures à l'est de l'Arctique canadien, dans l'aire de conservation Disko Fan, ainsi que les mesures prises pour assurer la protection de cette zone écologiquement importante et qui favorise la biodiversité marine. Nous partageons les leçons tirées de l'instauration de cette aire de conservation.