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2022

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Permanent link: https://doi.org/10.4095/329968

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Recommended citation
Dewing, K.E., Lister, C.J., Kung, L.E., Atkinson, E.A., and King, H.M., 2022. Hydrocarbon-potential map of the Canadian Arctic Archipelago and northern offshore areas; Geological Survey of Canada, Open File 8884, 5 p. https://doi.org/10.4095/329968

Publications in this series have not been edited; they are released as submitted by the author.

This map shows the generalized hydrocarbon potential of the Canadian Arctic Archipelago and northern offshore areas. Areas of high potential are shown in green, medium potential in orange, low potential in yellow and no potential in light grey. Sedimentary basins that are not included in this assessment are shown in dark grey (Figure 1).

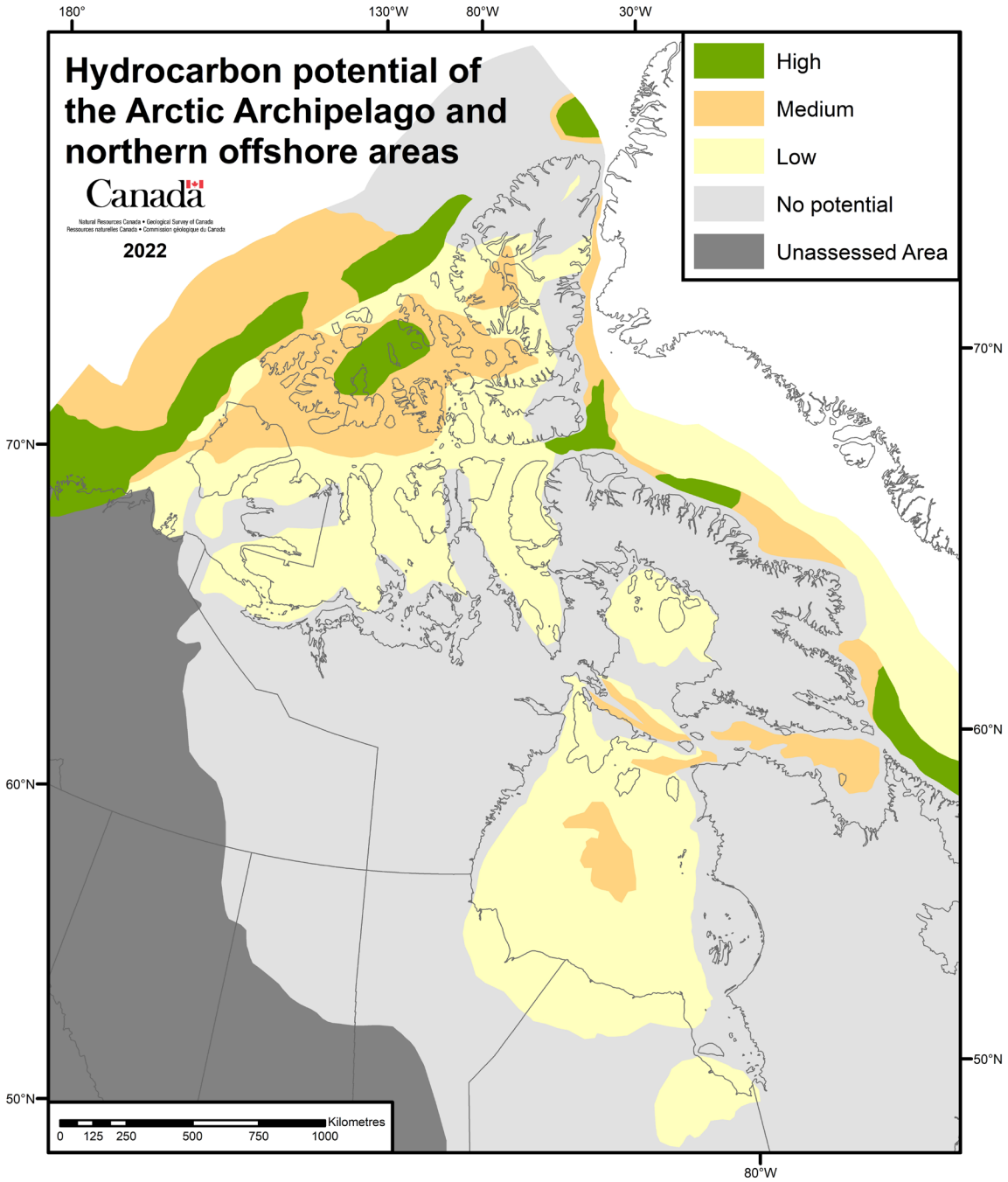

Figure 1. Generalized hydrocarbon potential of the Canadian Arctic Archipelago and northern offshore areas.

High potential is defined as areas where all the petroleum system elements (source, trap, reservoir, and seal) are considered to be likely present and favourable for hydrocarbon accumulations, and where there is potential for large hydrocarbon fields (greater than 100 million barrels of recoverable oil equivalent). Medium potential includes areas where the four petroleum system elements are possibly present and could produce hydrocarbon accumulations, and there is potential for small to medium sized hydrocarbon accumulations (<100 million barrels of recoverable oil equivalent). Low potential covers areas where one or more of the petroleum system elements are considered missing and the chance of a hydrocarbon potential larger than 5 million barrels of recoverable oil equivalent is small.

The areas shown in this assessment are underlain by 16 sedimentary basins that have at least some potential of containing hydrocarbons (Figure 2).

1. Saglek Basin lies offshore Baffin Island, south of Cumberland Sound and extends along the coast of Labrador as far south as about 56°N;
2. Baffin Margin along the east coast of Baffin Island extends south to Cumberland Sound. It contains a number of small rift basins, and sub-basins. The Baffin Margin includes the shelf and extends into the deep waters of Baffin Bay, but does not include the Baffin Fan at the mouth of Lancaster Sound;
3. Lancaster Sound – Baffin Fan occupy Lancaster Sound between Devon and Baffin islands and the opening of Lancaster Sound into Baffin Bay. A similar geological setting is thought to be present in Jones Sound between Devon and Ellesmere islands, but virtually nothing is known of the geology in that area, and there are six other small rift-style basins in northern Baffin Bay and Nares Strait about which very little is known;
4. Hudson Bay Basin underlies most of the modern Hudson Bay and extends onto the mainland of Manitoba and Ontario;
5. Moose River Basin is located under James Bay and extends onshore into northern Ontario;
6. Hudson Strait basins, are a number of small grabens located in Hudson Strait between Southampton Island and the mouth of Hudson Strait.
7. Foxe Basin lies offshore between Melville Peninsula and Baffin Island;
8. Arctic Platform covers the southern Arctic Islands, parts of northern Baffin, and extends onto the northern mainland;
9. Deformed Franklinian Belt forms a belt of deformed rocks that extends through the centre of the Arctic Archipelago from Ellesmere to Melville islands between the Arctic Platform to the south and the Sverdrup Basin to the north;
10. Sverdrup Basin underlies the northern and central parts of the Arctic Archipelago; it is divided here into a northeastern part that is heavily intruded by igneous rocks; and a southwestern part that is generally not intruded by igneous rocks.
11. Lomonosov Ridge is a bathymetric ridge that extends north of Ellesmere Island heading towards the North Pole.
12. Lincoln Sea lies offshore northern Ellesmere Island and Greenland;
13. Arctic Margin occupies the offshore shelf and slope along the northwest side of the Arctic Archipelago, facing the Arctic Ocean
14. Eglinton Basin is a graben, or series of slightly offset grabens extending between Eglinton Island, across M'Clure Strait and onto northern Banks Island.
15. Beaufort-Mackenzie Basin includes the very thick deltaic deposits at the mouth of the Mackenzie River, and the offshore deposits deposited in the slope and toe of the delta complex
16. Canada Basin is the deep water basin underlying the western Arctic Ocean.

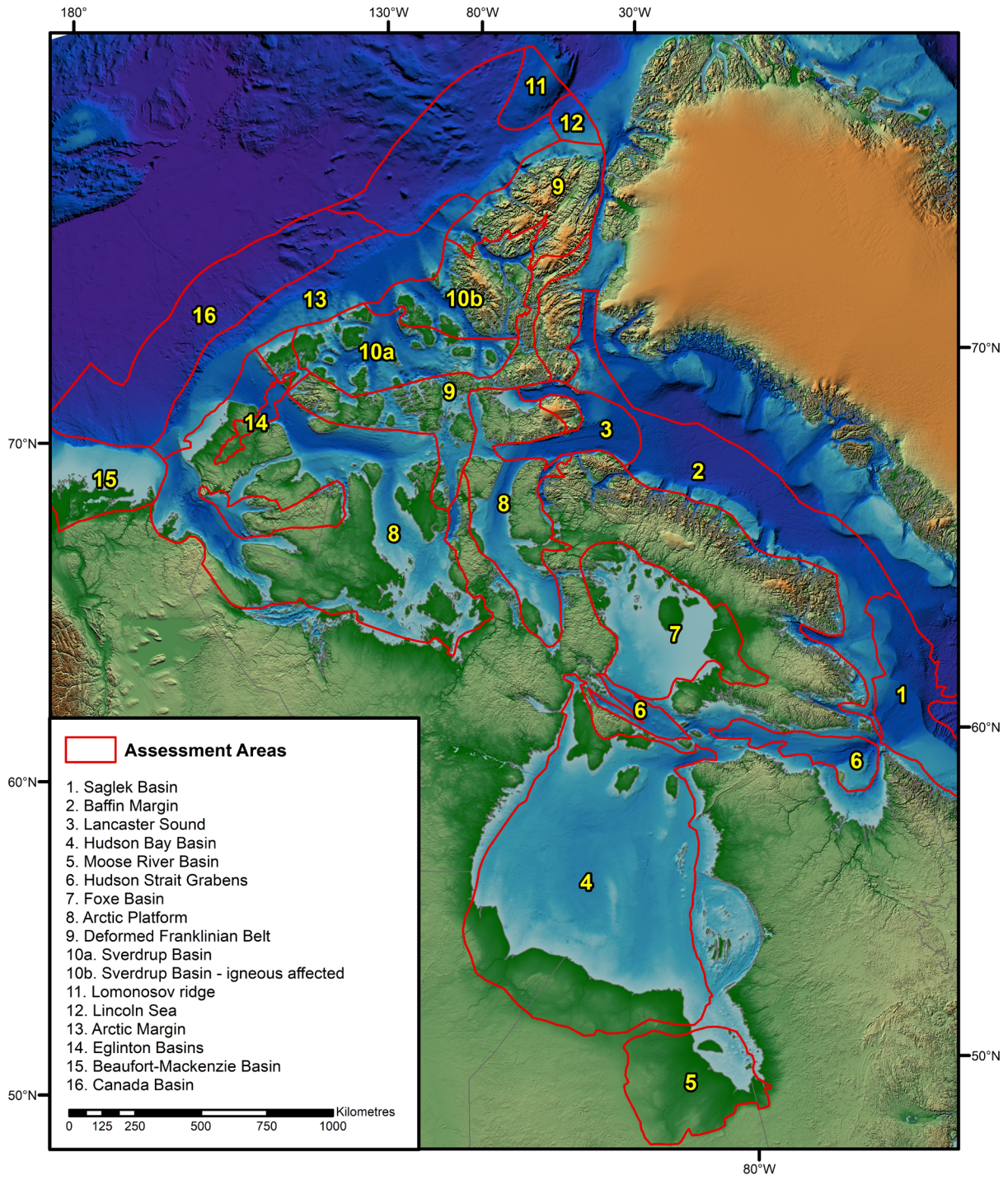

Figure 2. Phanerozoic sedimentary basins in northern Canada.

The highest potential for large oil or gas resources are in areas underlain by relatively young sediments that either have discoveries, or geological conditions that are considered favourable for hydrocarbon accumulations. These areas are: i) the Beaufort-Mackenzie Basin, which hosts a number of very large discoveries; ii) the central Sverdrup Basin in the central Arctic Islands between Melville and Ellef Ringnes islands, which host the two largest conventional gas fields in Canada, along with a number of smaller fields; iii) the Saglek Basin off southeastern Baffin Island which contains one large discovered

gas field; iv) Lancaster Sound and the Baffin Fan at the mouth of Lancaster Sound, with several identified prospects, the largest of which is the Dundas structure; v) the rifted Arctic margin along the northwest side of the Arctic Archipelago; vi) the Lincoln Sea north of Ellesmere Island; vii) Baffin Margin between Cumberland Sound and Lancaster Sound, which includes the Scott Inlet oil seep.

Medium potential is identified in several basins. In the center of Hudson Bay Basin there is some potential for oil generation, but expected traps are small, the source rock is thin and may be only locally mature, so the chance of drilling success considered low. Along Hudson Strait, parts of the Baffin Margin and into Nares Strait, young, poorly known sediments are present in fault-bounded grabens and sub-basins. These may have some oil or gas potential, but information is limited due to the lack of drilling. The Deformed Franklinian Belt includes the small oil discovery at Bent Horn, but generally in the central and western Arctic Archipelago, where strata of the Sverdrup Basin are either thin or intruded by igneous rocks, and where strata of the Deformed Franklinian Belt have experience repeated tectonic episodes since the time of hydrocarbon generation, there is limited potential for large hydrocarbon discoveries. Medium potential exists under Banks Island where Mesozoic and younger strata are persevered in the Eglinton basin, and locally within Paleozoic strata.

Lower hydrocarbon potential is predicted for the Foxe Basin, Arctic Platform, northeastern parts of the Deformed Franklinian Belt, and Lomonosov Ridge. The Foxe Basin was not deeply buried and lacks prolific source rocks. Hydrocarbon generation in the Arctic Platform and Deformed Franklinian Belt would have occurred a long time ago (Devonian, ~370 million years ago), and subsequent tectonic events have likely reduced the potential for preserving hydrocarbon pools. The Lomonosov Ridge has also seen major tectonic movements, uplift and erosion since any hydrocarbon may have formed, reducing the chance that significant hydrocarbon pools remain. No potential for hydrocarbons existing in areas underlain by the Canadian Shield, Proterozoic sedimentary basins, or in areas of Phanerozoic rocks with a penetrative deformation on Ellesmere and adjacent islands. Proterozoic basins have low potential because hydrocarbon generation occurred in pre-Cambrian times and hydrocarbons likely escaped or were destroyed during subsequent erosion or intrusion by igneous rocks. These events likely degraded reservoirs and seals, and made the rocks too hot to preserve oil or gas.

This map is based in part on maps produced for the Marine Conservation Targets program for Hudson Bay (Hanna et al., 2018; 2019); Foxe Basin (Fustic et al. 2018); Arctic Rifted Margin, Lincoln Sea, and Lomonosov Ridge (Lister et al. 2022); and Lancaster Sound and Baffin Fan (Atkinson et al., 2017; Harrison et al., 2011). The hydrocarbon potential assessment of other areas is based on: Baffin Margin and Saglek Basin (Atkinson et al., 2017; Harrison et al., 2011; Jauer, 2009; Jauer et al., 2014, 2019; Klose et al., 1982); Arctic Platform (Dewing and Obermajer, 2009; Rayer, 1981); Deformed Franklinian Belt (Harrison, 1994; Lister et al., 2022; Obermajer et al. 2010; Rayer, 1981); Sverdrup Basin (Chen et al. 2000; Meneley, 1986; Rayer, 1981); Mackenzie Delta and Beaufort Sea (Dixon et al., 1994); Canada Basin (Dietrich et al., 2018).

Acknowledgements

Barbara Medioli and Sonya Dehler are thanked for their support of the Marine Conservation Targets program. Rod Smith (GSC-Calgary) provided an internal review of this publication.

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