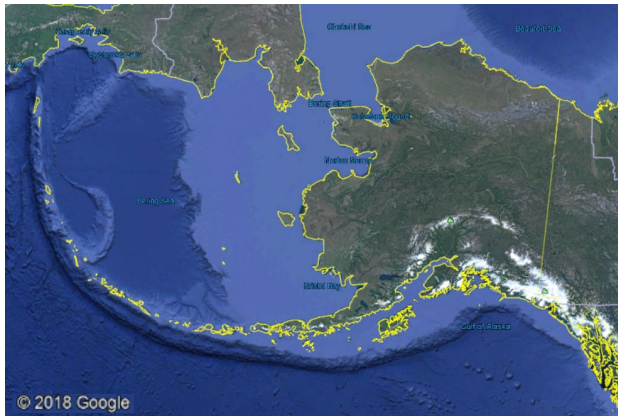


Update to the History and Areal Distribution of Exploration Drilling Targets Categorized by Play Type, North Slope and Offshore Arctic Alaska



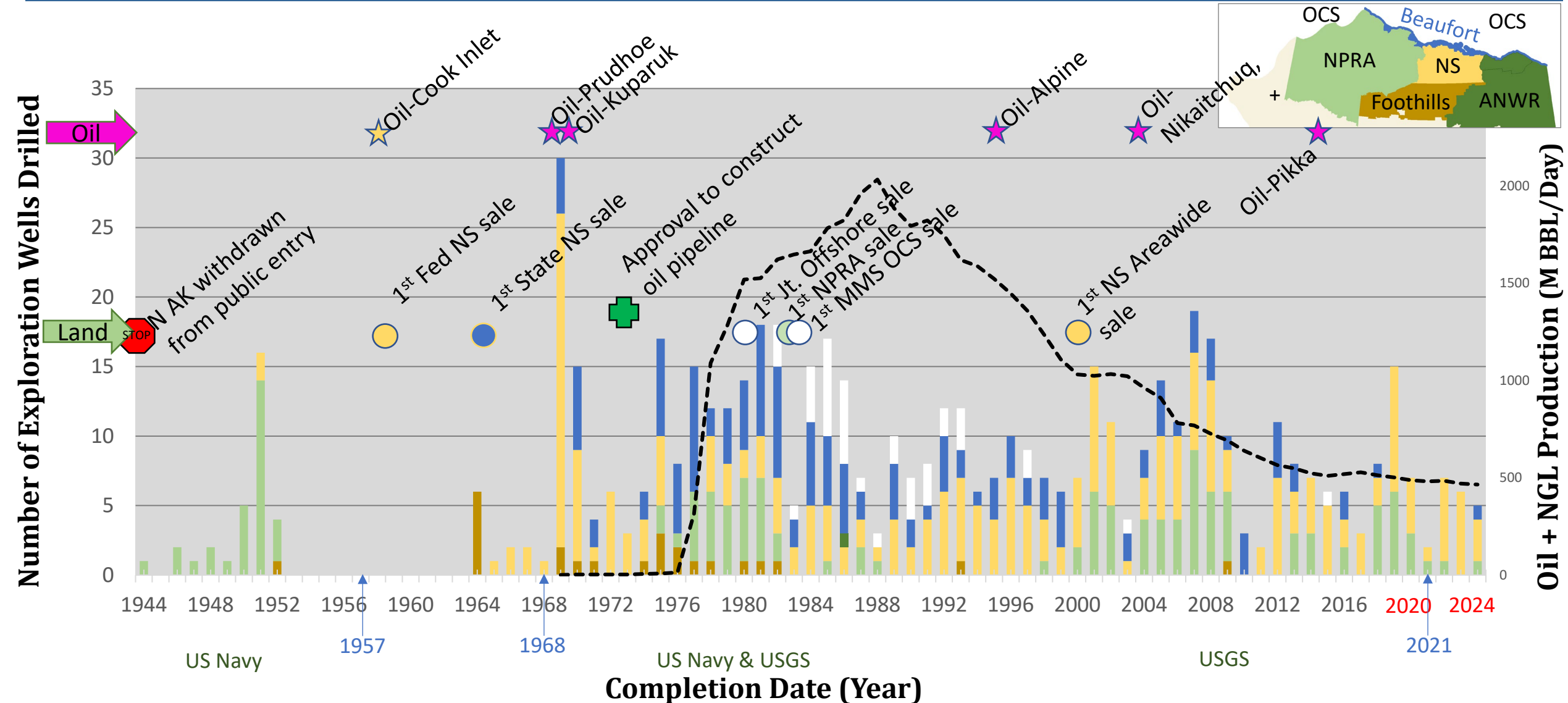
Alaska Geological Society 2025 Technical Conference

Presentation by Laura Gregersen, Petroleum Geologist
Alaska Department of Natural Resources, Division of Oil and Gas
April 26, 2025



UPDATED
to include 2019 through 2024

NORTH ALASKA EXPLORATION AS INFLUENCED BY - LAND AVAILABILITY, PIPELINE ACCESS, AND KEY DISCOVERIES -



WHAT PLAYS ARE THE EXPLORERS TARGETING?

- GENERALIZED STRATIGRAPHIC COLUMN AND CROSS SECTION -

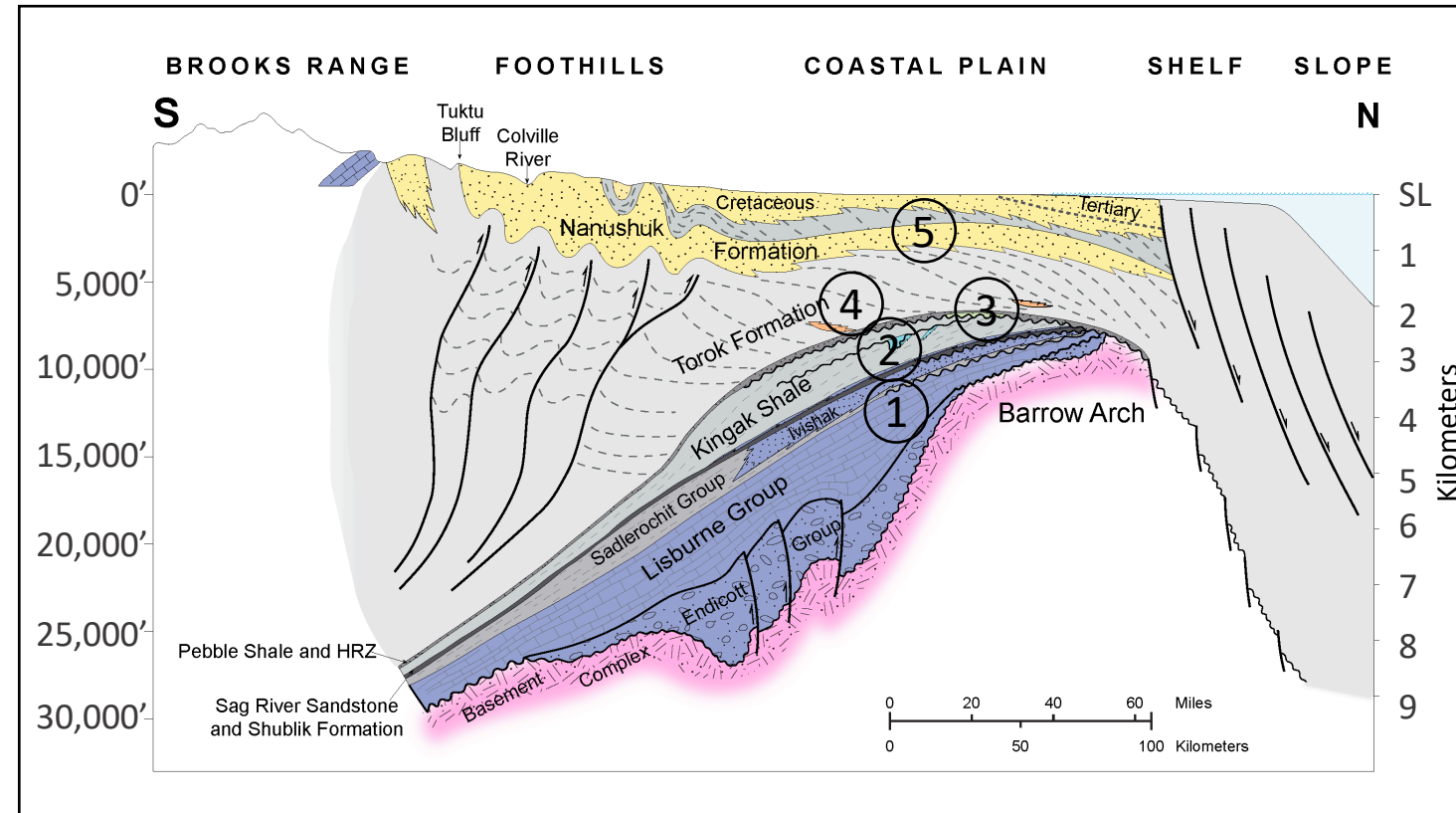
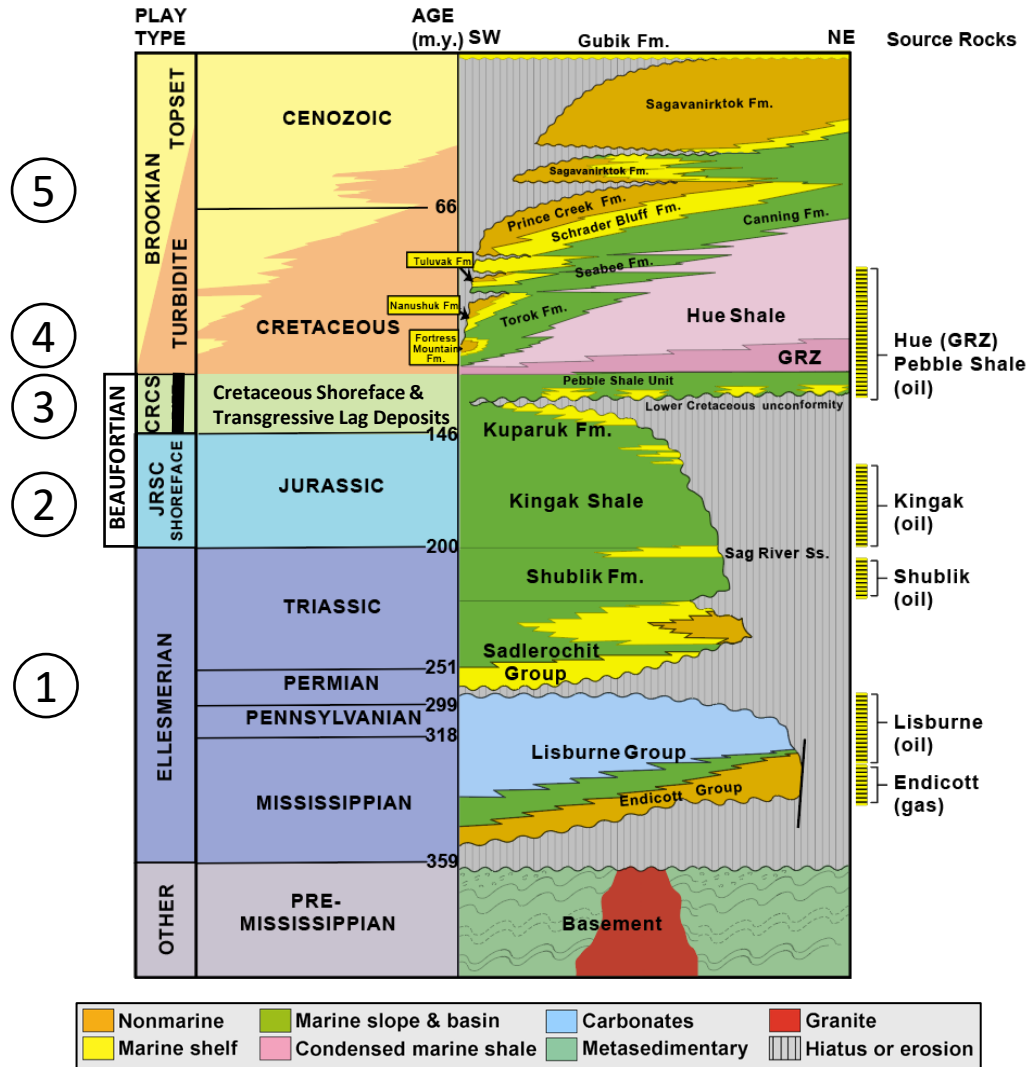
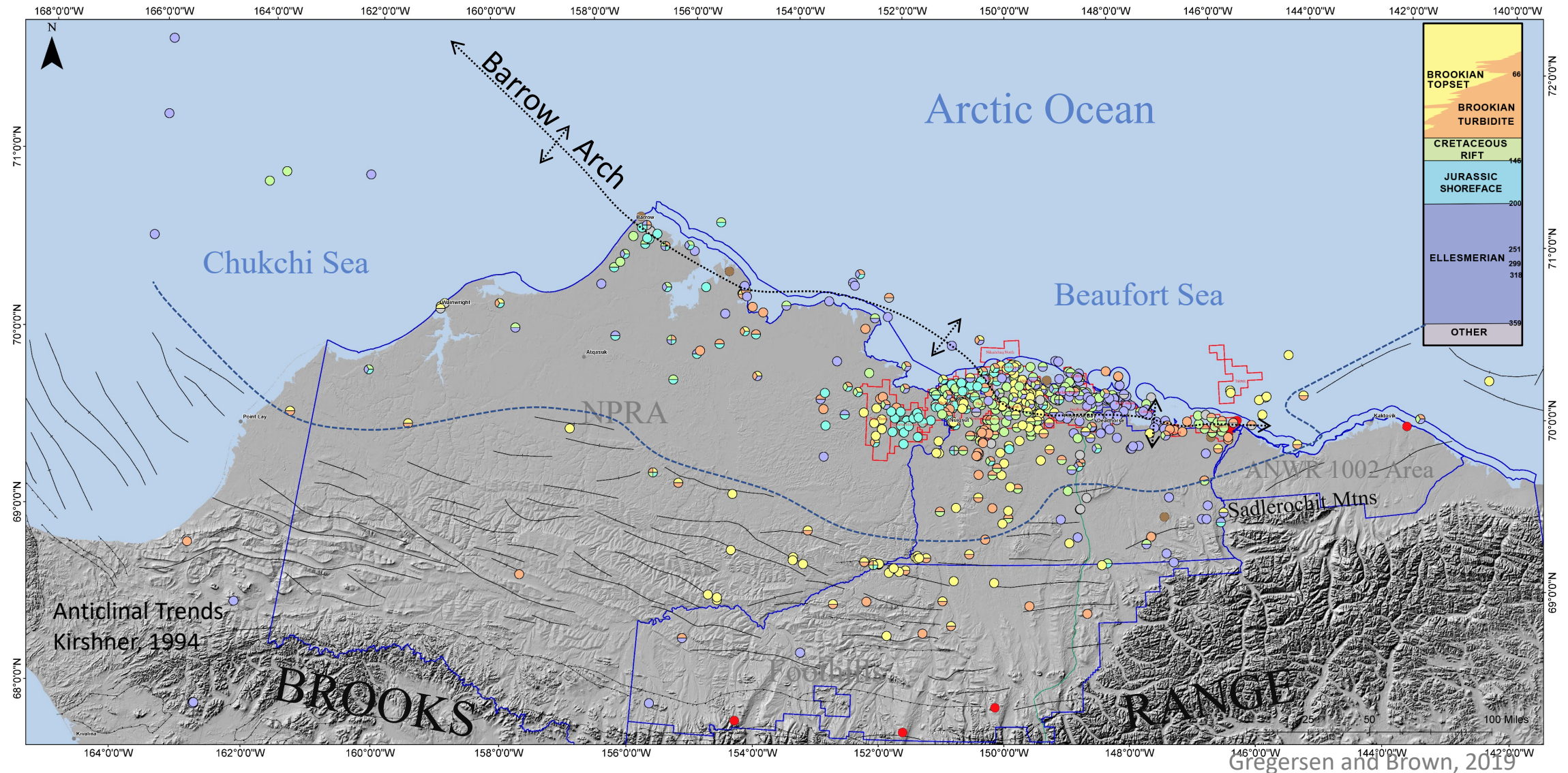


Figure modified from Bird and Molenaar, 1992; AKDOG; DGGS; and P. Decker personal communication.

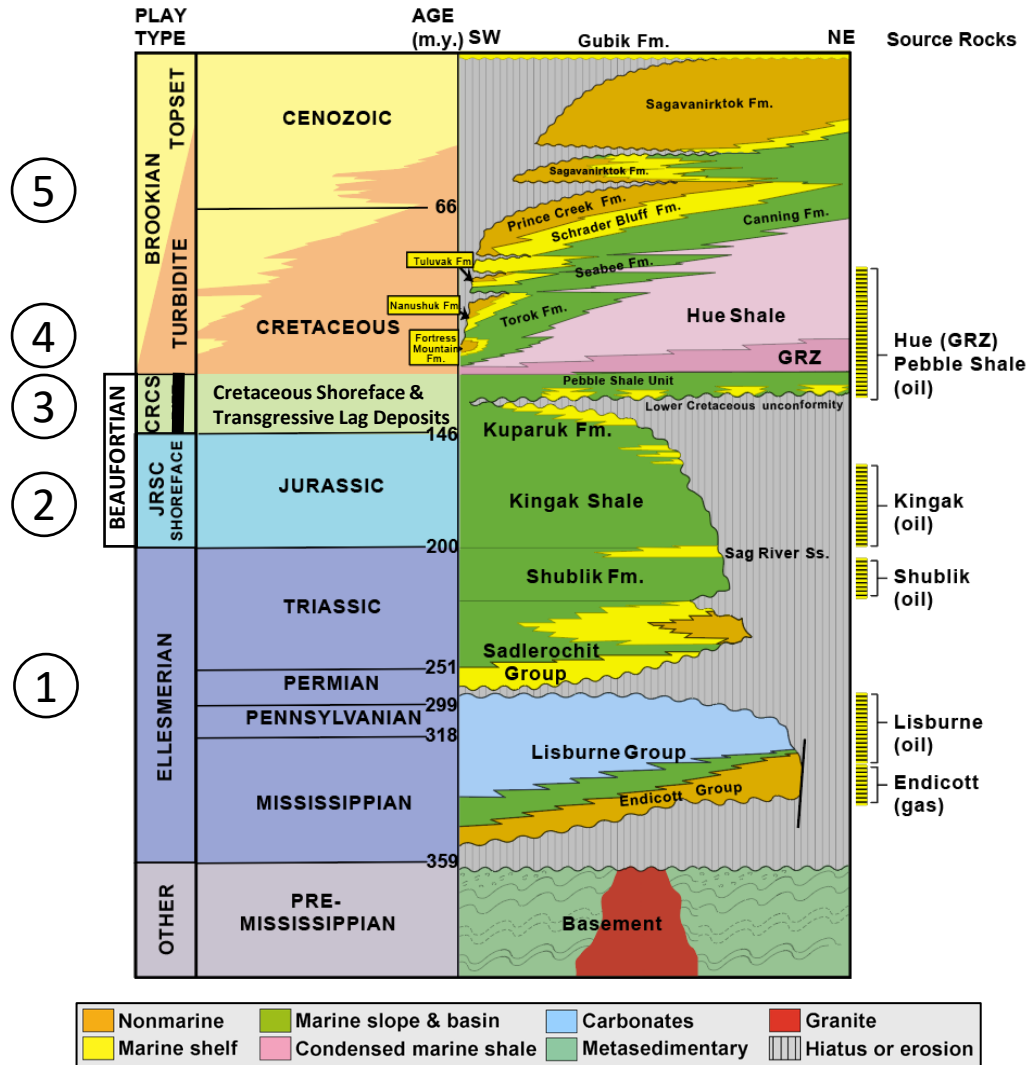
Figure modified from Houseknecht and Bird, 2006; Garrity and others, 2005; and AKDOG.

EXPLORATION DRILLING TARGETS – ALL CATEGORIES - AND REGIONAL TECTONIC ELEMENTS -

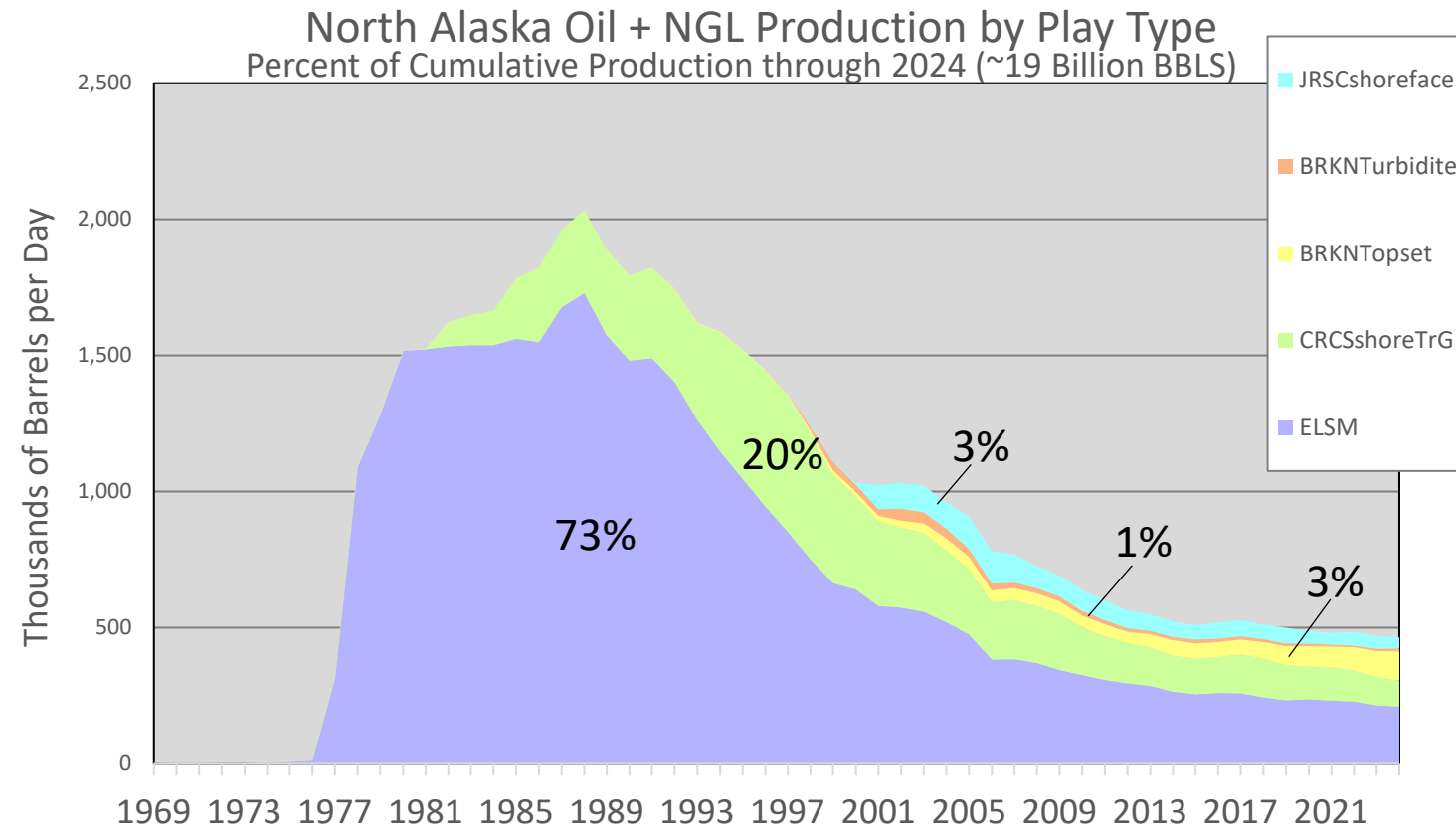


HOW DO PLAYS CONTRIBUTE TO PRODUCTION?

- THROUGHOUT TIME AND TODAY -



~19 Billion Barrels Oil +NGL produced through 2024



Data source: AOGCC; AKDOG

Figure modified from Houseknecht and Bird, 2006;
Garrity and others, 2005; and AKDOG.

Gregersen 2025, modified Gregersen and Brown, 2019

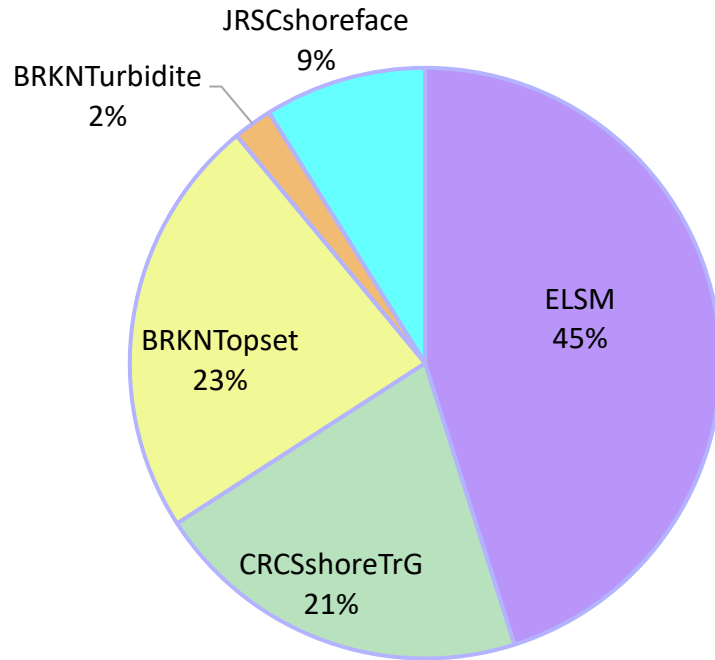
HOW DO PLAYS CONTRIBUTE TO PRODUCTION?

- THROUGHOUT TIME AND TODAY -

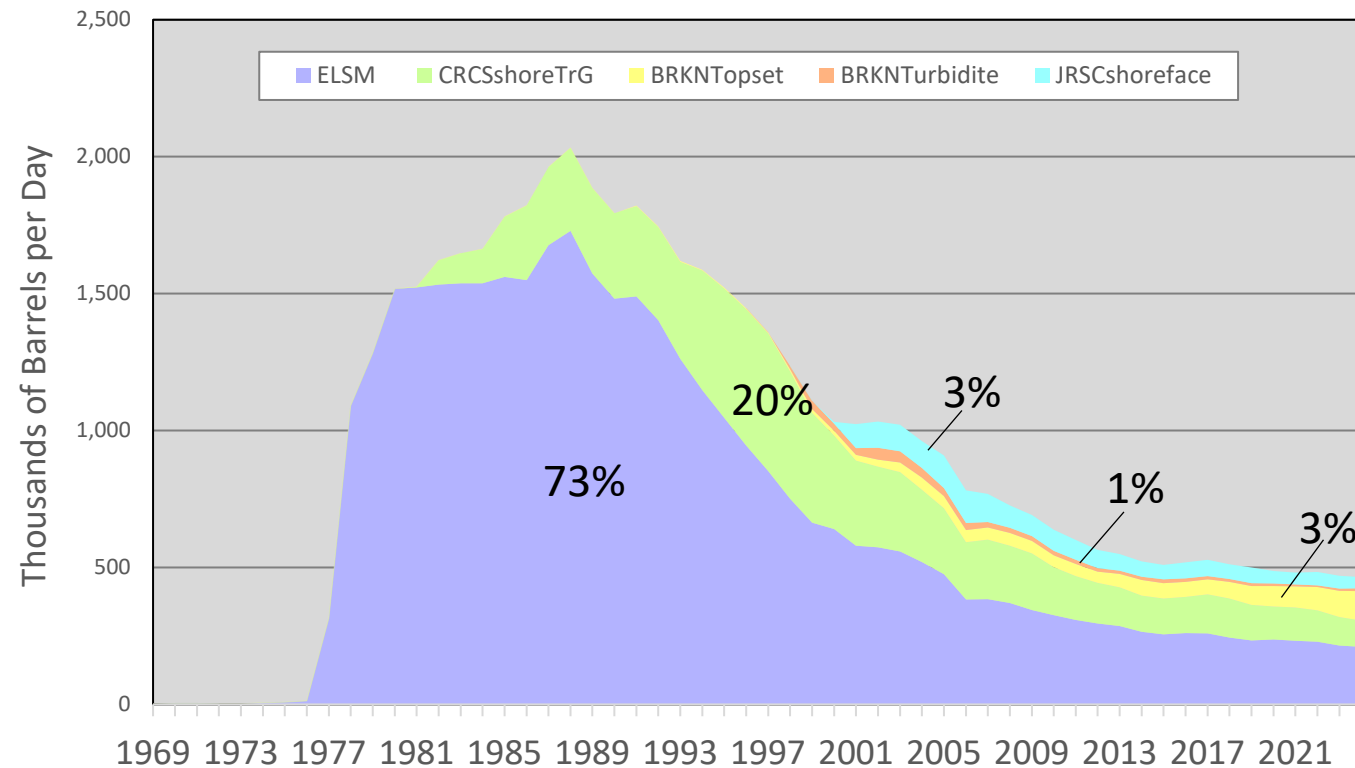
~170 Million Barrels Oil +NGL produced **in 2024**

~19 Billion Barrels Oil +NGL produced **through 2024**

Percent of 2024 North Alaska Production



North Alaska Oil + NGL Production by Play Type



Data source: AOGCC; AKDOG

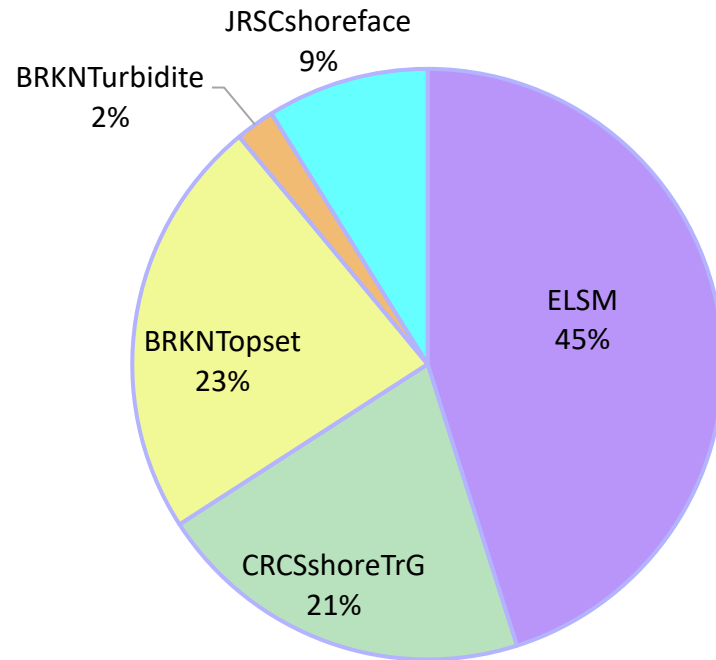
Gregersen, 2025

HOW DO PLAYS CONTRIBUTE TO PRODUCTION?

- THROUGHOUT TIME AND TODAY -

~170 Million Barrels Oil +NGL produced **in 2024**

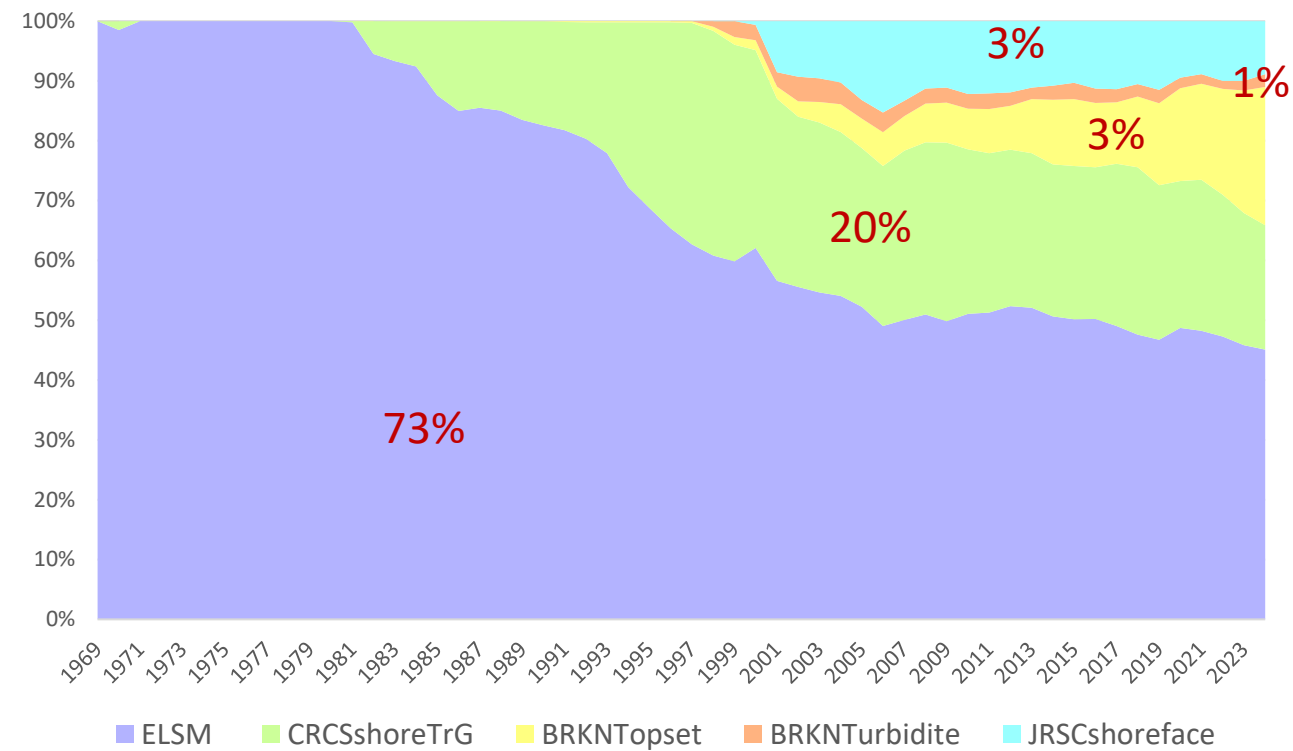
Percent of 2024 North Alaska Production



■ ELSM ■ CRCShoreTrG ■ BRKNTopset ■ BRKNTurbidite ■ JRSCshoreface

~19 Billion Barrels Oil +NGL produced **through 2024**

Percent of North Alaska Oil +NGL Production by Play Type



■ ELSM ■ CRCShoreTrG ■ BRKNTopset ■ BRKNTurbidite ■ JRSCshoreface

Data source: AOGCC; AKDOG

Gregersen, 2025

WHAT PLAYS ARE THE EXPLORERS TARGETING?

- AOGCC POOLS -

AOGCC Producing Pools on Alaska's North Slope	
Brookian Topset Pools	
ZzMpuUGNU	Milne Point Unit, Ugnu Ss
ZzKruUgnuUnd	Kuparuk River Unit, Ugnu Ss Undefined
ZzPbuPolaris	Prudhoe Bay Unit, Polaris
ZzPbuOrion	Prudhoe Bay Unit, Orion
ZzKruTabasco	Kuparuk River Unit, Tabasco
ZzNikaScbf	Nikaitchuq Schrader, Bluff Fm
ZzKruWssk	Kuparuk River Unit, West Sak Ss
ZzMpuSCBF	Milne Point Unit, Ugnu Ss
ZzCRUQANNIK	Colville River Unit, Qannik Ss
Brookian Turbidite Pools	
ZzBadmBadm	Badami Unit, Badami Ss
ZzBadmUndOil	Badami Unit, Undefined
ZzKruTarn	Kuparuk River Unit, Tarn Ss
ZzKruMelt	Kuparuk River Unit, Meltwater
ZzOoogTorokOil	Oooguruk Unit, Torok Fm
ZzKruTorok	Kuparuk River Unit, Torok Fm
ZzCRUNANUQ	Colville River Unit, Nanuq Ss
Cretaceous Shoreface & Transgressive Lag Pools	
ZzKruKprk	Kuparuk River Unit, Kuparuk Fm
ZzMpuKPRK	Milne Point Unit, Kuparuk Fm
ZzPbuWB	Prudhoe Bay Unit, West Beach
ZzPbuPtmc	Prudhoe Bay Unit, Pt. MacIntyre
ZzPbuNiakuk	Prudhoe Bay Unit, Niakiuk
ZzPbuMidSun	Prudhoe Bay Unit, Midnight Sun
ZzWalakpaGas	Walakapa Gas
ZzPbuAuro	Prudhoe Bay Unit, Aurora
ZzPbuBore	Prudhoe Bay Unit, Borealis
ZzNstarKprk	North Star Unit, Kuparuk Fm
ZzCRUALPINENK	Colville River Unit, Nanuq PA, Kuparuk Fm
ZzCRUFIORDKPRK	Colville River Unit, Fiord PA, Kuparuk Fm
ZzOoogKprk	Oooguruk Unit, Kuparuk Fm
ZzPtThomUndOil	Point Thomson Unit, Undefined Oil

Jurassic Pools	
ZzBrrwSouthGas	Barrow South Gas
ZzBrrwEastGas	Barrow East Gas
ZzCRUALPN	Colville River Unit, Alpine Ss
ZzOoogNuiq	Oooguruk Unit, Nuiqsut Ss
ZzCRUFIORDNECH	Colville River Unit, Nechelik Ss
ZzGMTAlpine	Greater Mooses Tooth Unit, Alpine Ss
Ellesmerian Pools	
ZzPbuPrudhoe	Prudhoe Bay Unit, Prudhoe
ZzPbuLsbr	Prudhoe Bay Unit, Lisburne Group
ZzEdctKkkk	Endicott Unit, Kekiktuk Ss
ZzEdctlvsk	Endicott Unit, Ivishak Fm
ZzPbuNPB	Prudhoe Bay Unit, North Prudhoe Bay
ZzMpuSAGRIV	Milne Point Unit, Sag River Ss
ZzPbuPtmcIvsk	Prudhoe Bay Unit, Pt McIntyre Ivishak Fm
ZzEdctEider	Endicott Unit, Eider
ZzPbuRaven	Prudhoe Bay Unit, Aurora
ZzNstarlvsk	North Star Unit, Ivishak Fm
ZzEdctSagRivlvsk	Endicott Unit, Sag River Ss & Ivishak Fm

**Zz designates an AOGCC pool

What AOGCC pools have been added since 2018?
CRU Minke, KRU Coyote, Pikka Nanushuk, Fiord West Kuparuk
production from Alpine Pool.

WHAT PLAYS ARE THE EXPLORERS TARGETING?

- EXPLORATION TARGET NAMES-

Exploration Drilling Target Abbreviations	
HYDRATE	Gas Hydrate Stability Zone
CBM	Coal Bed Methane
MARINEClastics	Marine Clastic Rocks
TURB	Turbidite
SVKK	Sagavanirktok Formation
CNNG	Canning Formation
FLAX	Flaxman Sandstone
BDAM	Badami Sandstone
KILLIAN	Killian Sandstone
PCCK	Prince Creek Formation
KGKK	Kogosukruk tongue of Prince Creek abandoned
UGNU	Ugnu Sandstone
UGNUB	Ugnu B Sandstone
SCBF	Schrader Bluff Formation
SCBFN	Schrader Bluff N Sandstone
SCBFO	Schrader Bluff O Sandstone
SCBFOa	Schrader Bluff Oa Sandstone
SLHL	Sentinel Hill Mbr of Schrader Bluff abandoned
BRTL	Barrow Trail Mbr of Schrader Bluff abandoned
WSSK	West Sak Sandstone
WSSKD	West Sak D Sandstone
WSSKB	West Sak B Sandstone
TABSCO	Tabasco Sandstone
TLVK	Tuluva Formation
SEBE	Seabee Formation
AYYK	Ayiyak Mbr of Seabee Formation abandoned
TARN	Tarn Sandstone
ICEBERG	Iceberg Sandstone
ARETE	Arete Sandstone
CAIRN	Cairn Sandstone
BRMA	Bermuda Sandstone
NNSK	Nanushuk Formation
NNLK	Ninuluk Formation abandoned
CDLR	Chandler Formation abandoned
GRDD	Grandstand Formation abandoned
TUKT	Tuktu Formation abandoned
WILLOW	Willow Sandstone
QNNK	Qannik Sandstone
K2	Brookian K2 Marker

Exploration Drilling Target Abbreviations	
TOROK	Torok Formation
MORAINE	Moraine Sandstone
NUNA	Nuna Sandstone
NANUQ	Nanuq Sandstone
CASSIN	Cassin Sandstone
BLACKBURN	Blackburn Sandstone
SANFORD	Sandford Sandstone
OMLK	Oumalik Formation abandoned
TPGK	Topogoruk Formation abandoned
FRTR	Fortress Mountain Formation
HUE	Hue Shale
HRZ	HRZ
PBLK	Pebble Shale
KLBK	Kalubik Formation
PTRR	Put River Sandstone
THOM	Thomson Sandstone
KEMIK	Kemik Sandstone
KPRK	Kuparuk Formation
KPRKC	Kuparuk C Sandstone
KPRKB	Kuparuk B Sandstone
KPRKA	Kuparuk A Sandstone
WLKP	Walakpa Sandstone
BURGER	Burger Sandstone
KNGK	Kingak Shale
ALPN	Alpine Sandstone
ALPNC	Alpine C Sandstone
NUIQ	Nuiqsut Sandstone
NECH	Nechelik Sandstone
SIMP	Simpson Sandstone
KUGRA	Kugrua Sandstone
BRRW	Barrow Sandstone
J5	Jurassic J5 Marker
J4	Jurassic J4 Marker
SGRV	Sag River Formation
SBLK	Shublik Formation
EILN	Eileen Formation
SDLC	Sadlerochit Group
IVSK	Ivishak Formation
KAVIK	Kavik Shale
ECHK	Echooka Formation

Exploration Drilling Target Abbreviations	
LSBR	Lisburne Group
WHOO	Wahoo Limestone
ALPH	Alaph Limestone
EDCT	Endicott Group
KAYAK	Kayak Shale
KKKK	Kekiktuk Sandstone
KVLA	Kivalina Mbr of Kuna Formation Red Dog Mine
BSMN	BASEMENT
ARGL	Argillite Basement

BRKN	Brookian Aged Target
TRTR	Tertiary Aged Target
MIOCENE	Miocene Aged Target
PLCN	Paleocene Aged Target
OLIG	Oligocene Aged Target
CCTR	Cretaceous Tertiary Aged Target
PreMSCZ	Pre Mesozoic Aged Target
CRCS	Cretaceous Aged Target
CRCSLower	Lower Cretaceous Aged Target
CRCSUpper	Upper Cretaceous Aged Target
ALBN	Albian Aged Target
JRSC	Jurassic Aged Target
ELSM	Ellesmerian Aged Target
TRSC	Triassic Aged Target
PMTC	Permian Triassic Aged Target
MSSP	Mississippian Aged Target
PREMISS	Pre Mississippian
DVNN	Devonian Aged Target

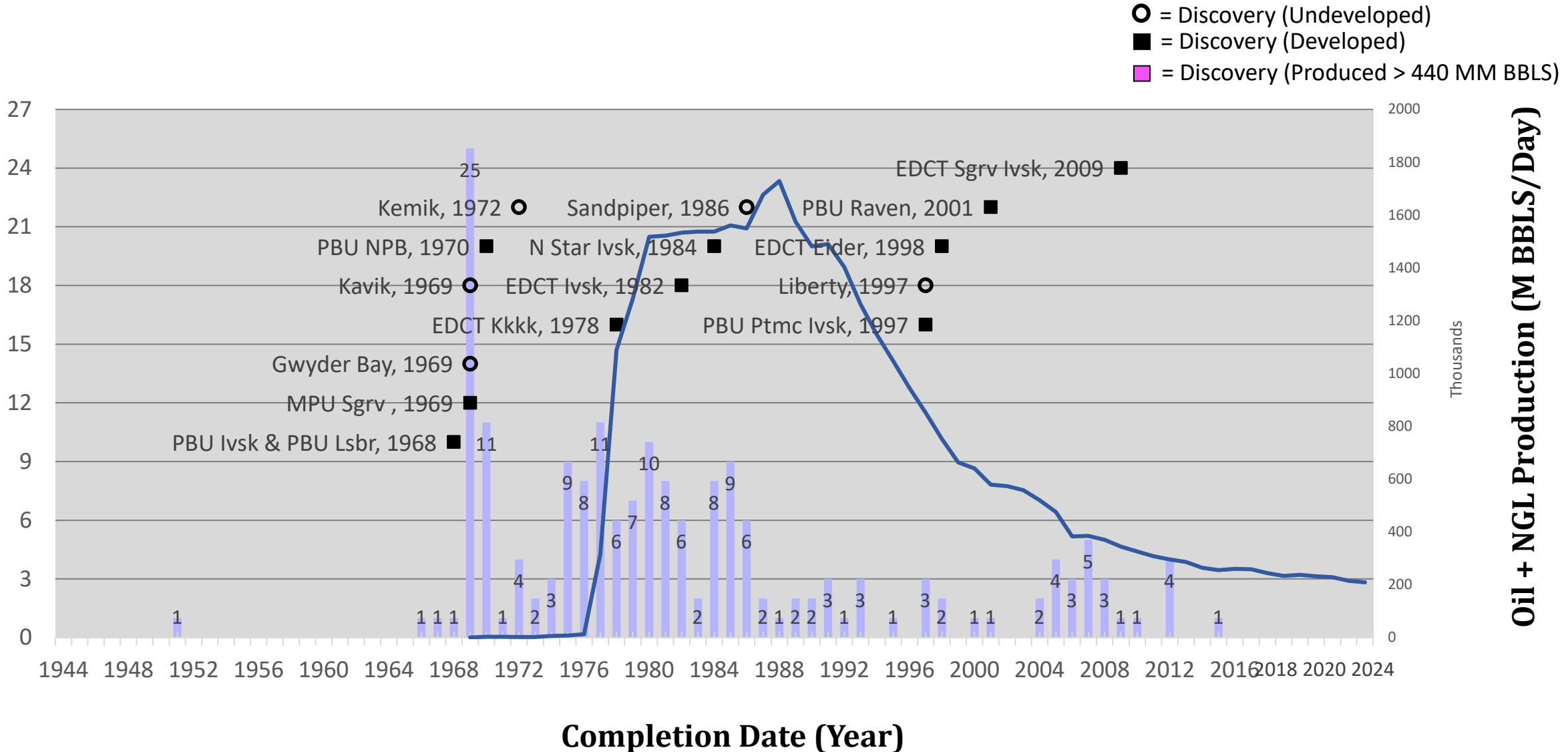
What exploration targets have been added since 2018?

Minke, Coyote, Harpoon, West Willow, and Narwhal

EXPLORATION TARGETS AND DISCOVERIES

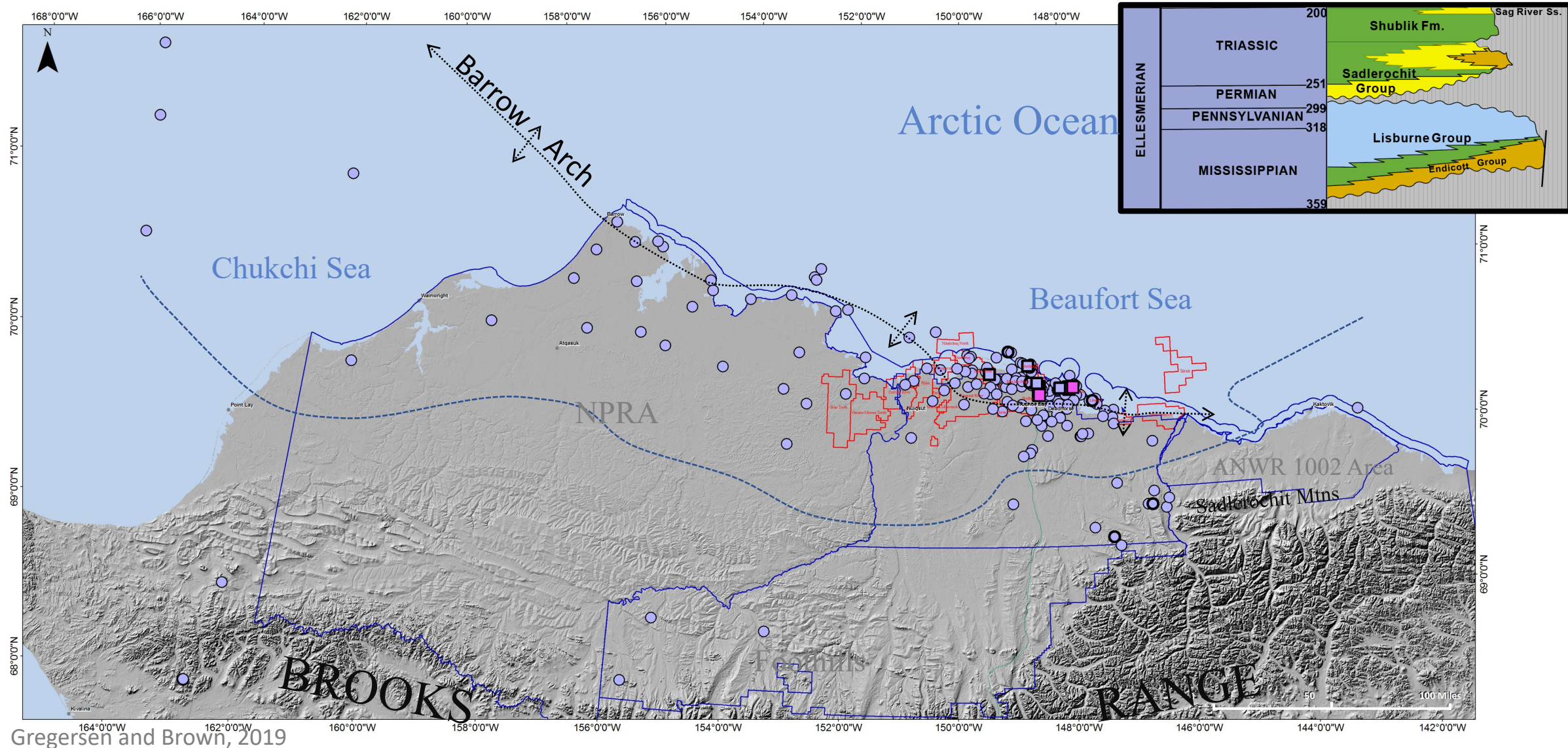
- ELLESMERIAN CLASTICS AND CARBONATES -

Number of Wells Targeting Objective



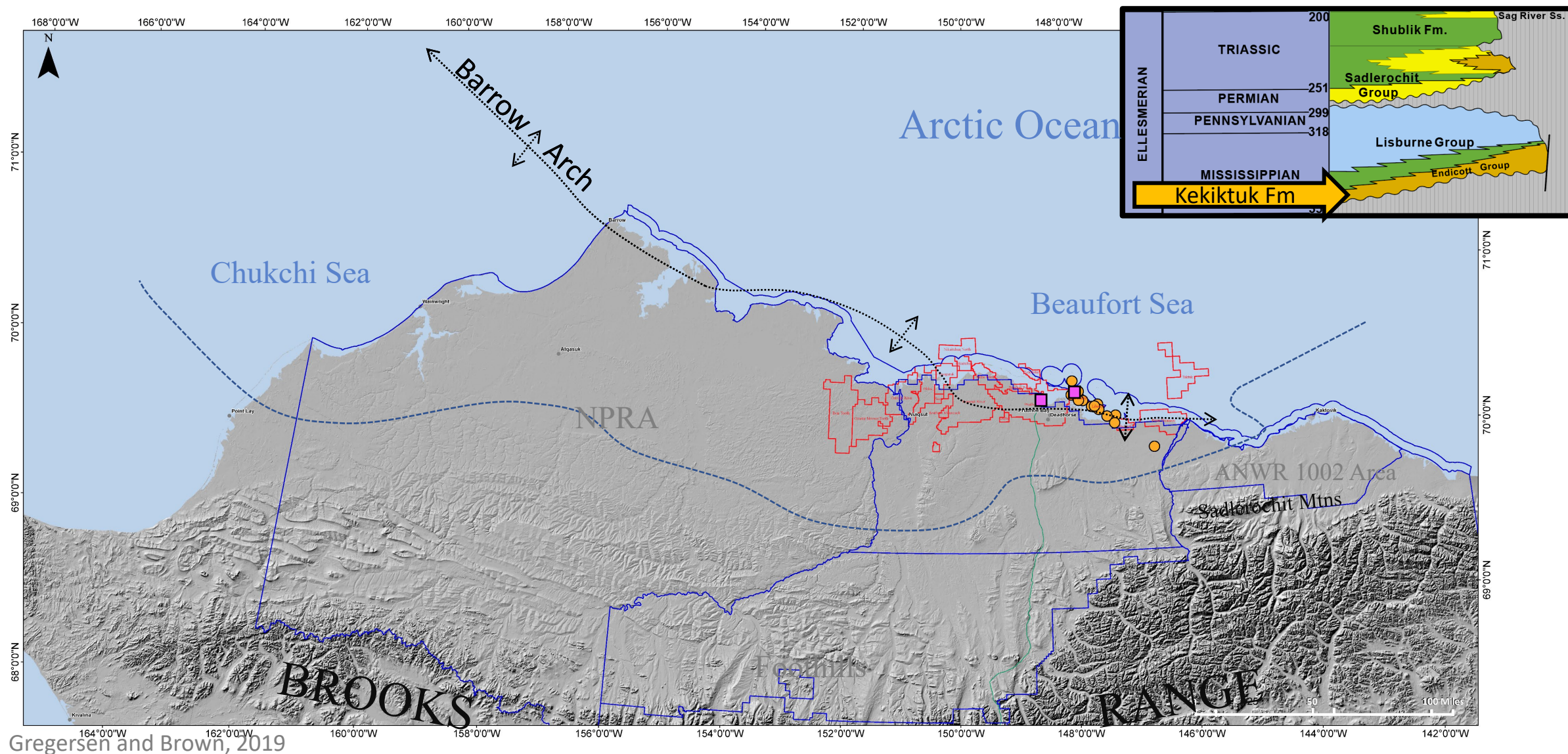
ELLESMERIAN EXPLORATION TARGETS

- CLASTIC AND CARBONATE DEPOSITION ON A STABLE SHELF -



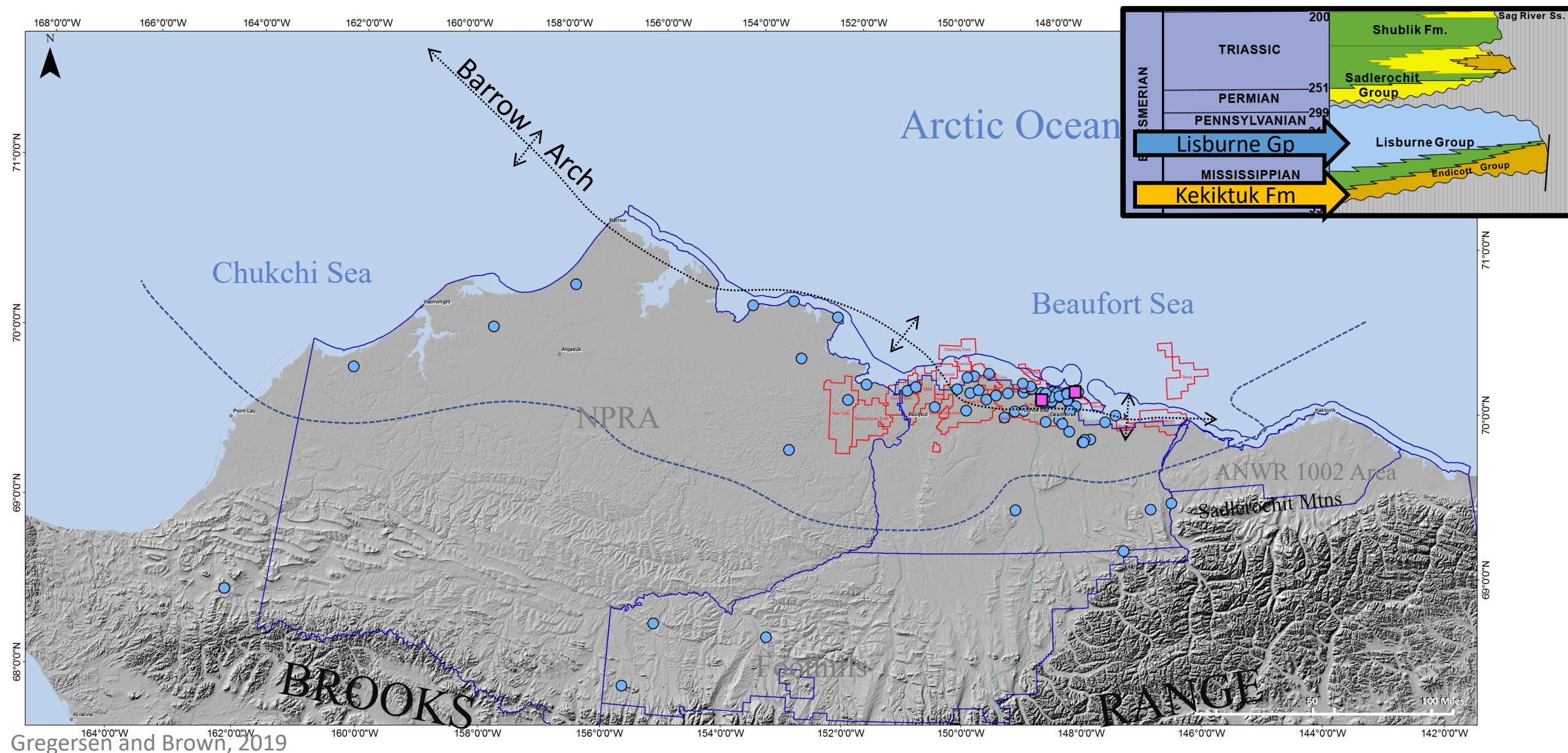
ELLESMERIAN EXPLORATION TARGETS

- KEKIKTUK FORMATION: NON-MARINE -



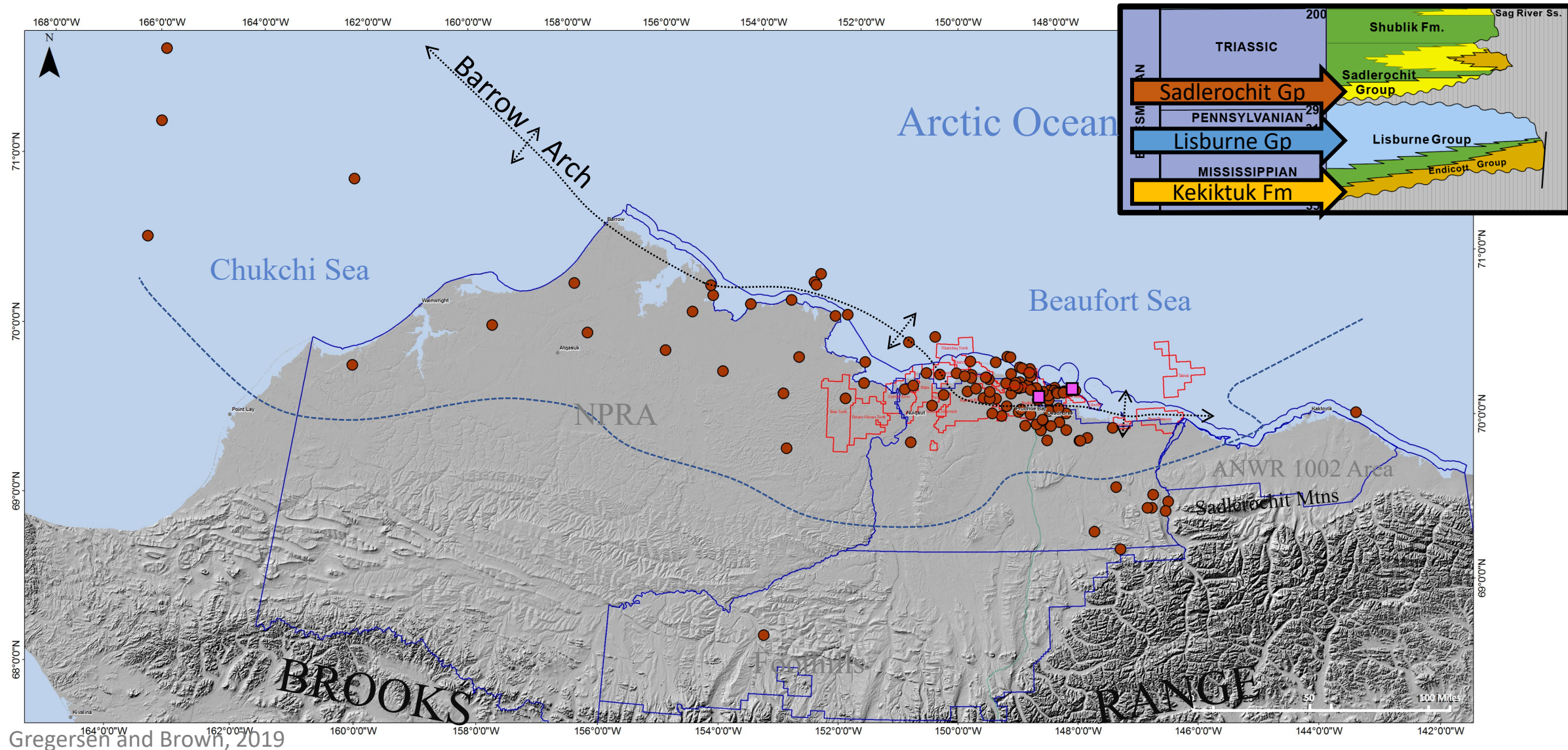
ELLESMERIAN EXPLORATION TARGETS

- LISBURNE GROUP: PLATFORM CARBONATES -



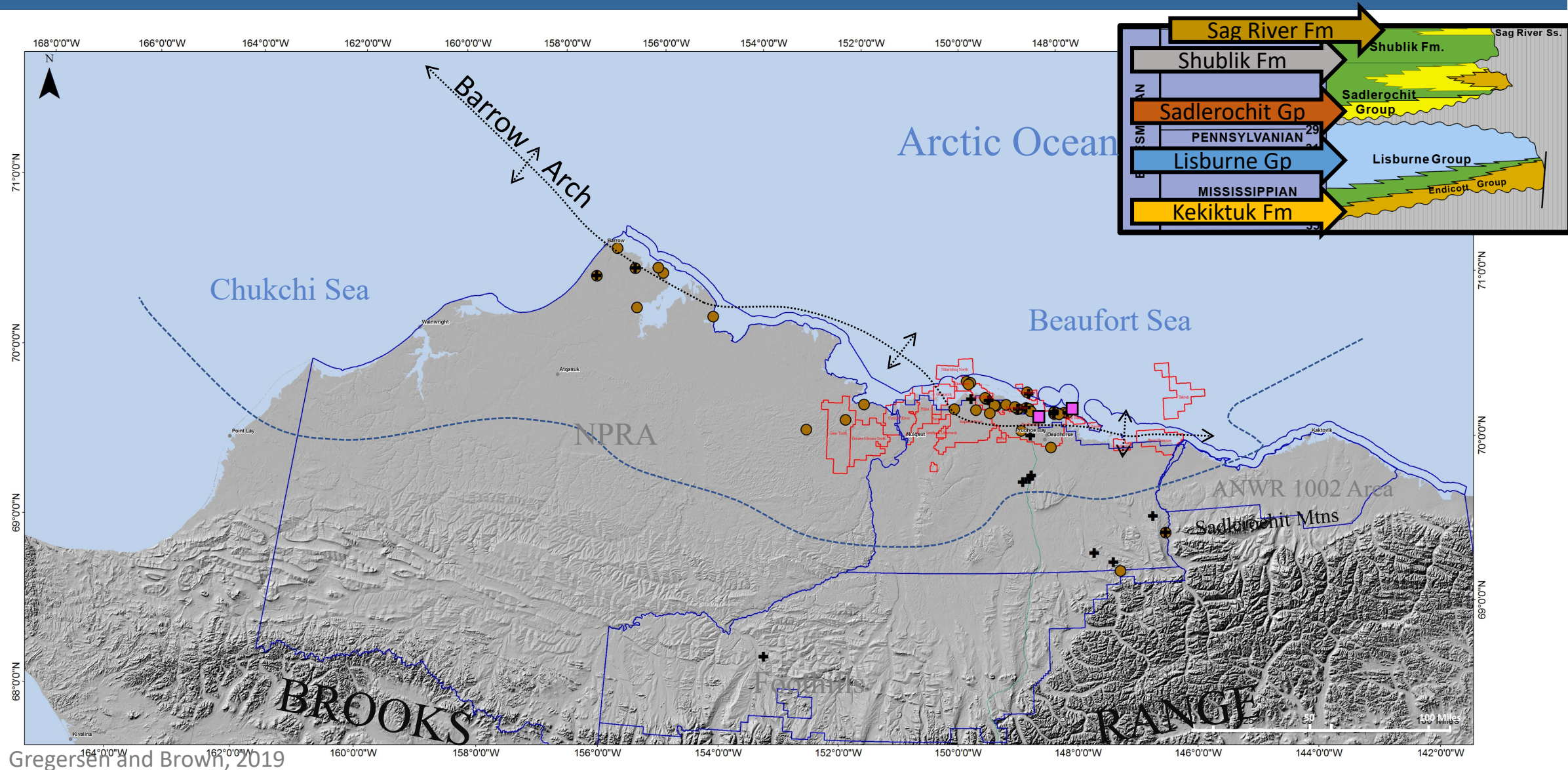
ELLESMERIAN EXPLORATION TARGETS

- SADLEROCHIT GROUP NON-MARINE TO SHALLOW MARINE -



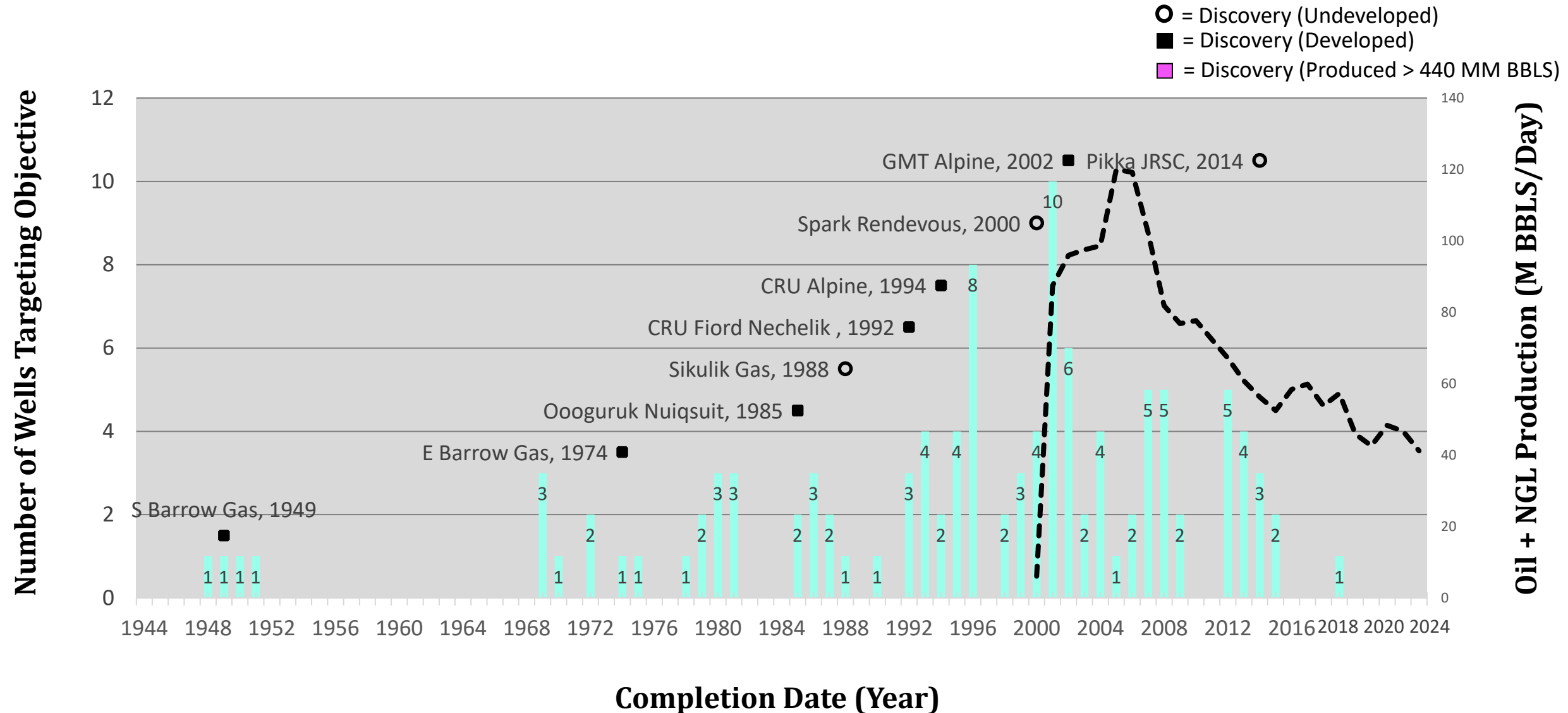
ELLESMERIAN EXPLORATION TARGETS

- SHUBLIK AND SAG RIVER FORMATIONS: MARINE -



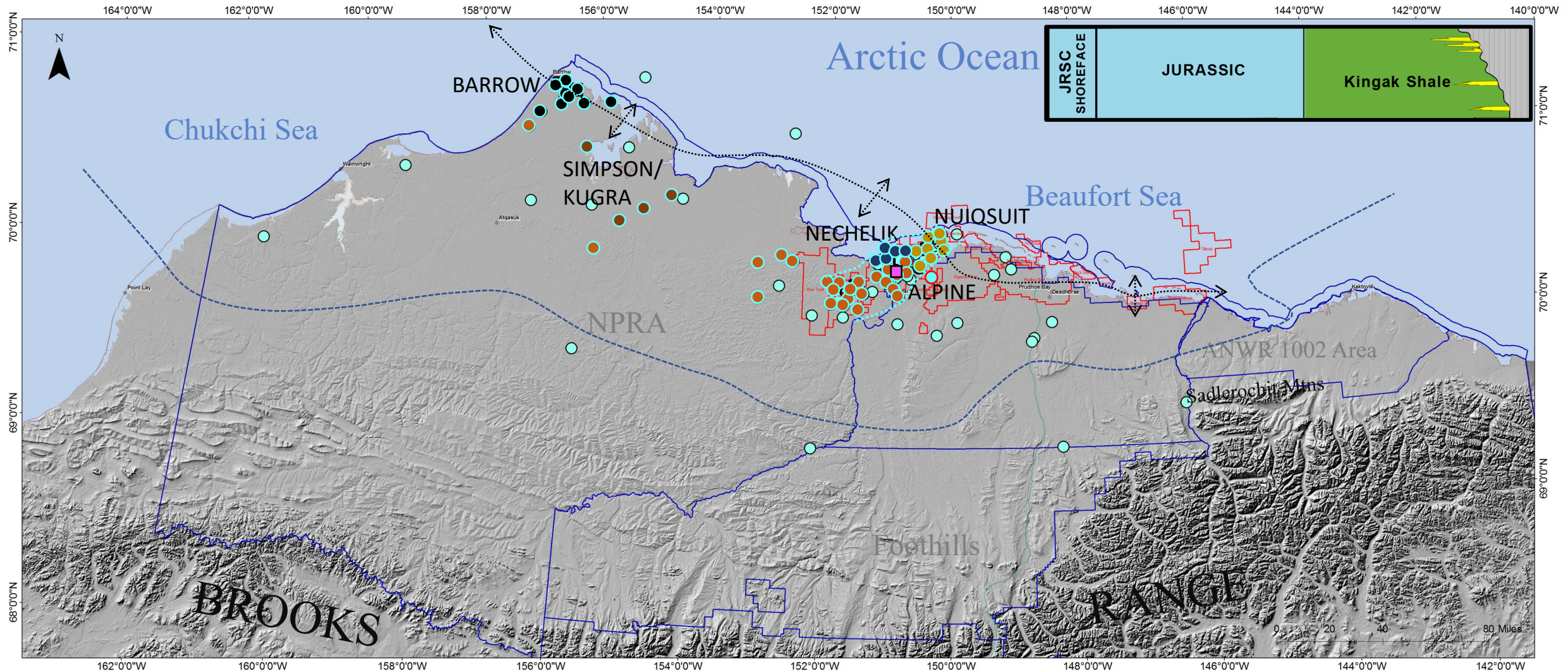
EXPLORATION TARGETS AND DISCOVERIES

- JURASSIC SHOREFACE -



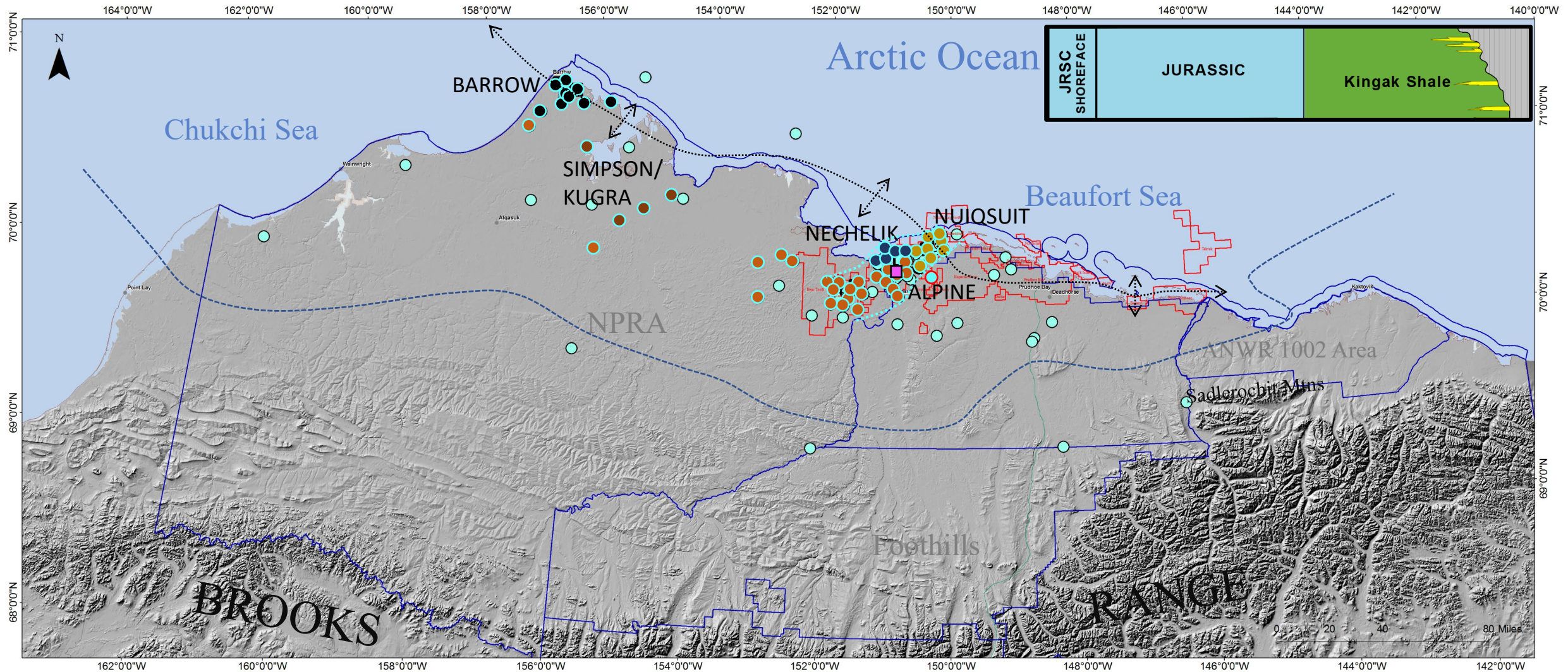
JURASSIC SHOREFACE EXPLORATION TARGETS

- EARLY RIFTING: OPENING OF ARCTIC OCEAN -



JURASSIC SHOREFACE EXPLORATION TARGETS

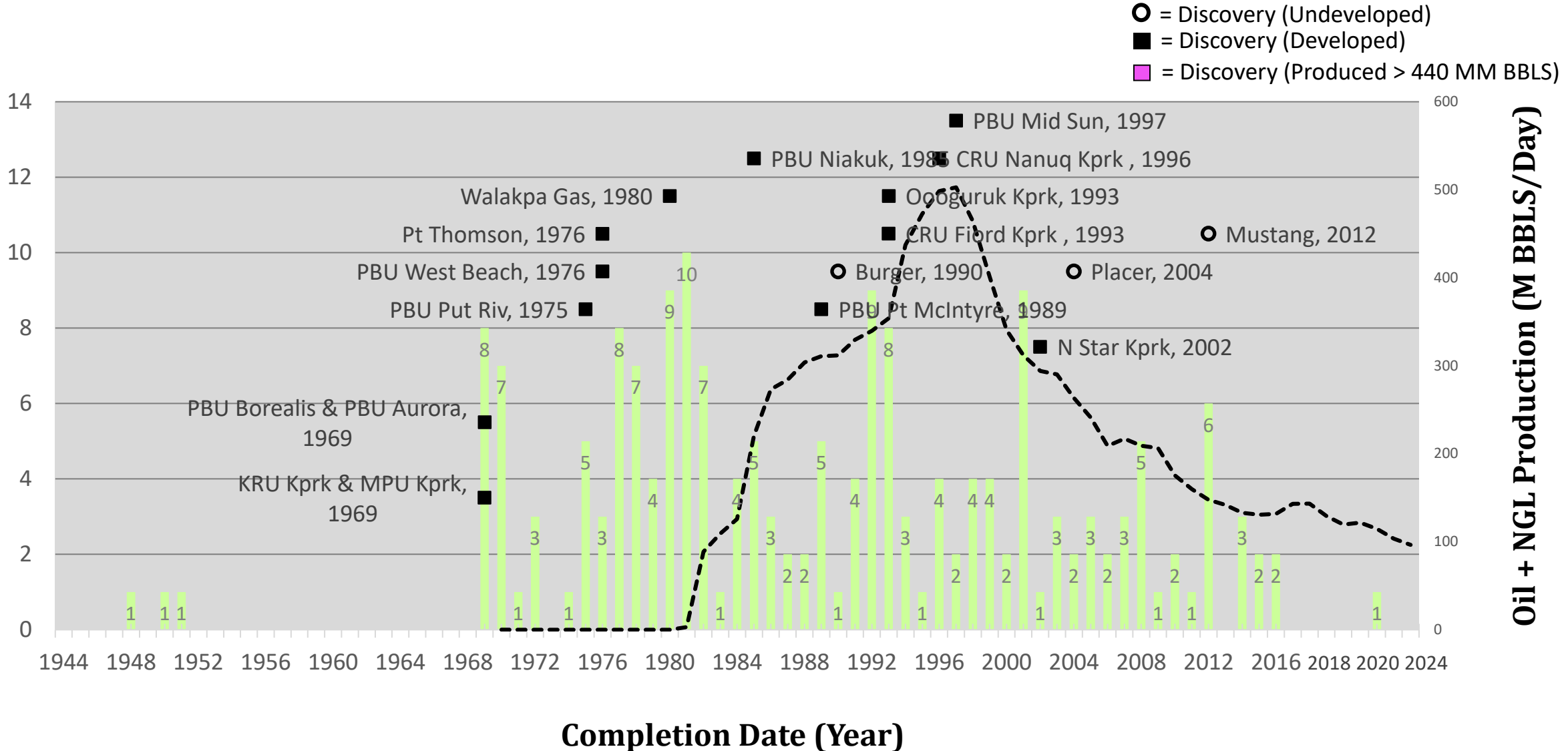
- EARLY RIFTING: OPENING OF ARCTIC OCEAN -



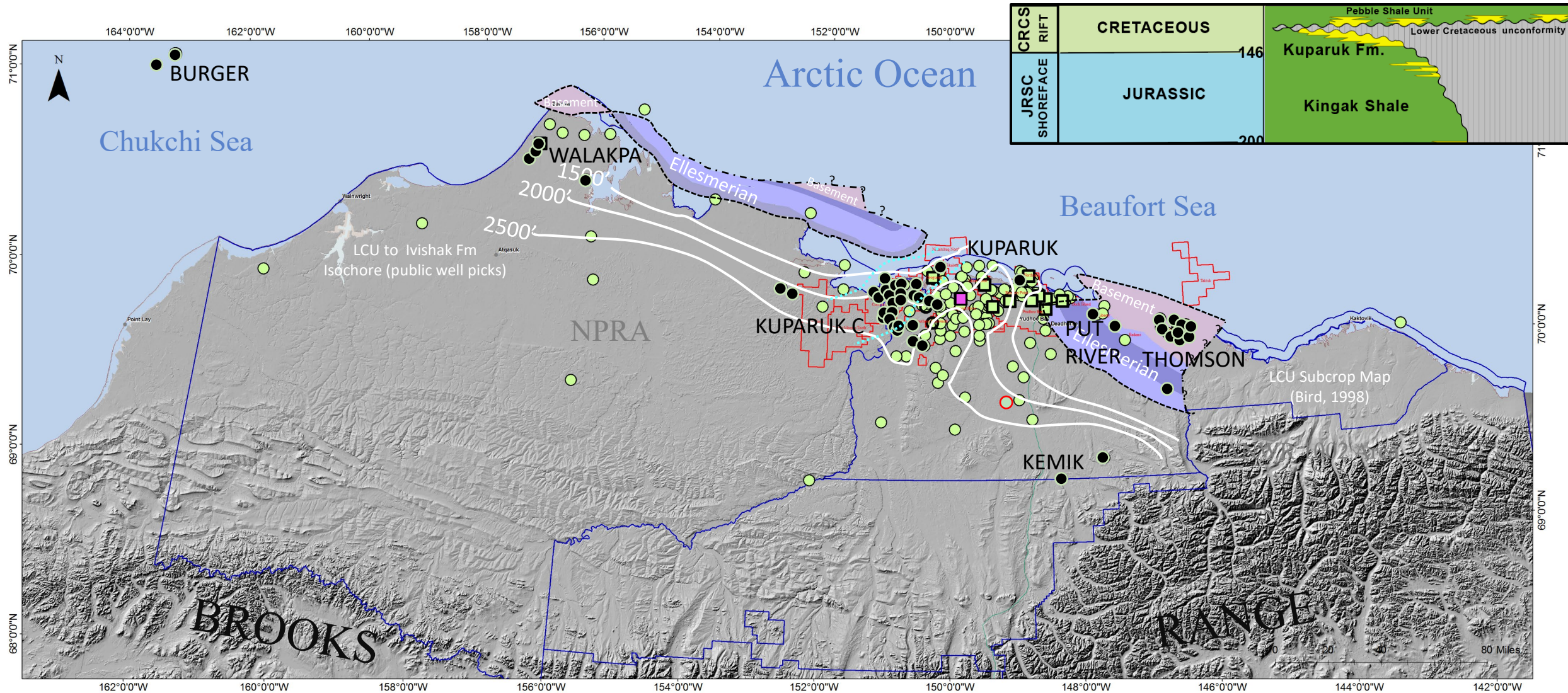
EXPLORATION TARGETS AND DISCOVERIES

- CRETACEOUS SHOREFACE & TRANSGRESSIVE LAG -

Number of Wells Targeting Objective

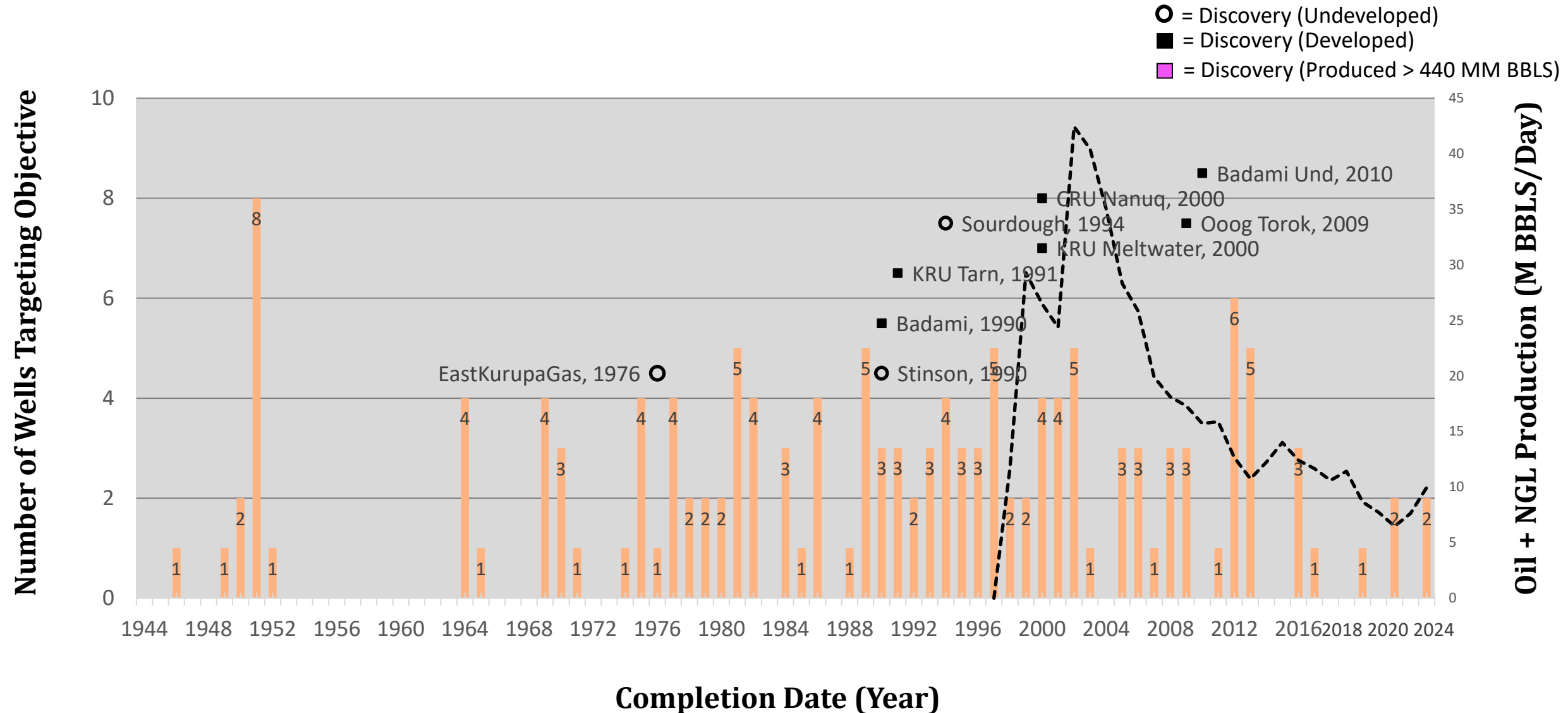


CRETACEOUS SHOREFACE & TRANSGRESSIVE LAG EXPLORATION TARGETS - CONTINUED UPLIFT OF BARROW ARCH -



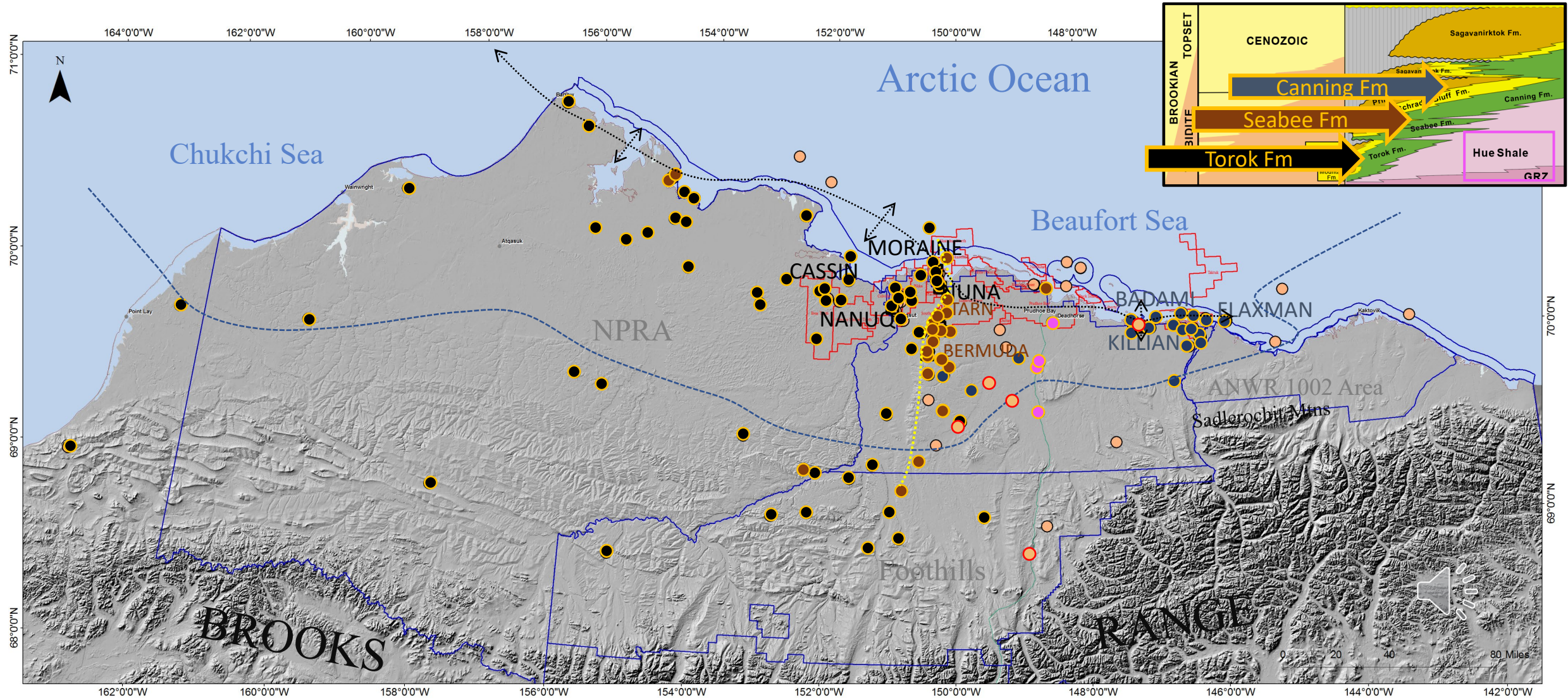
EXPLORATION TARGETS AND DISCOVERIES BY YEAR

- BROOKIAN TURBIDITE -



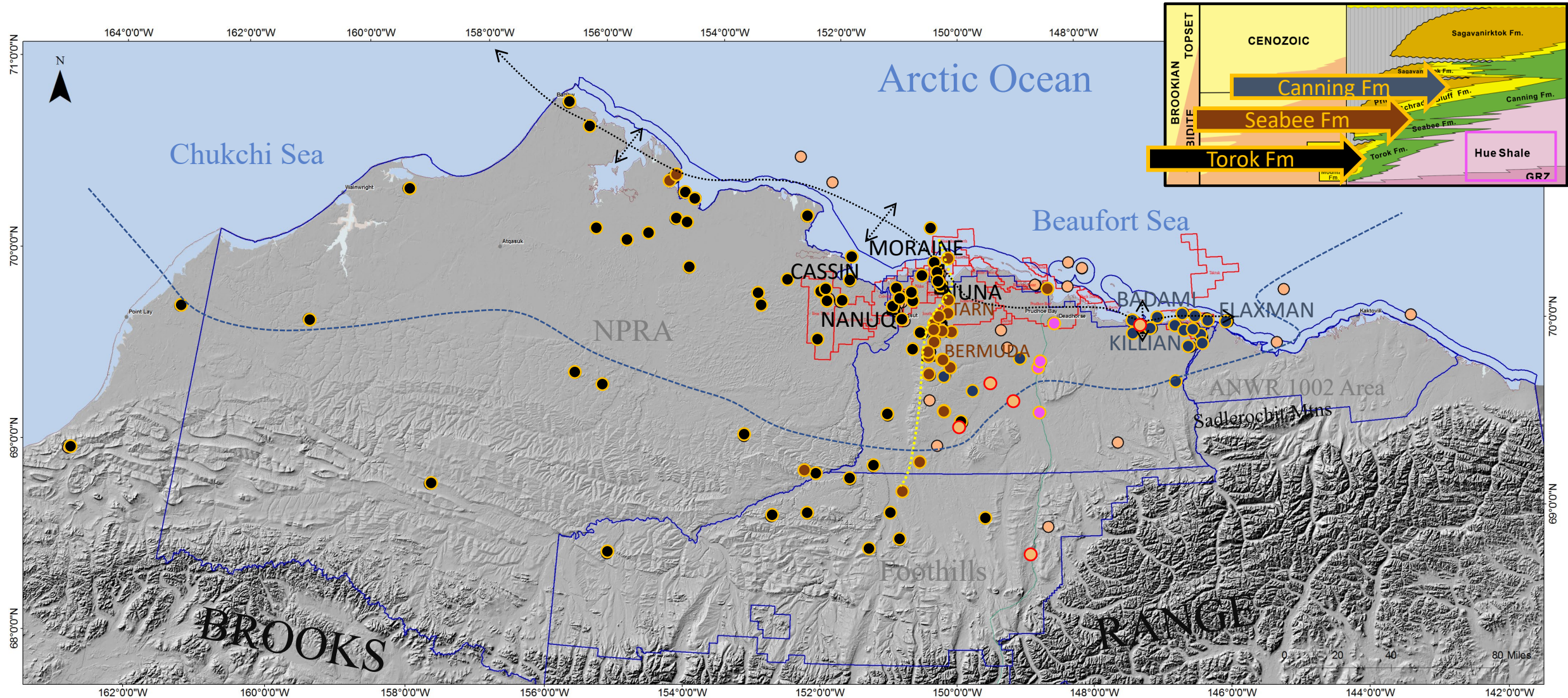
BROOKIAN TURBIDITE EXPLORATION TARGETS

- FILLING IN COLVILLE TROUGH: PRO-DELTA TO DEEP MARINE -



BROOKIAN TURBIDITE EXPLORATION TARGETS

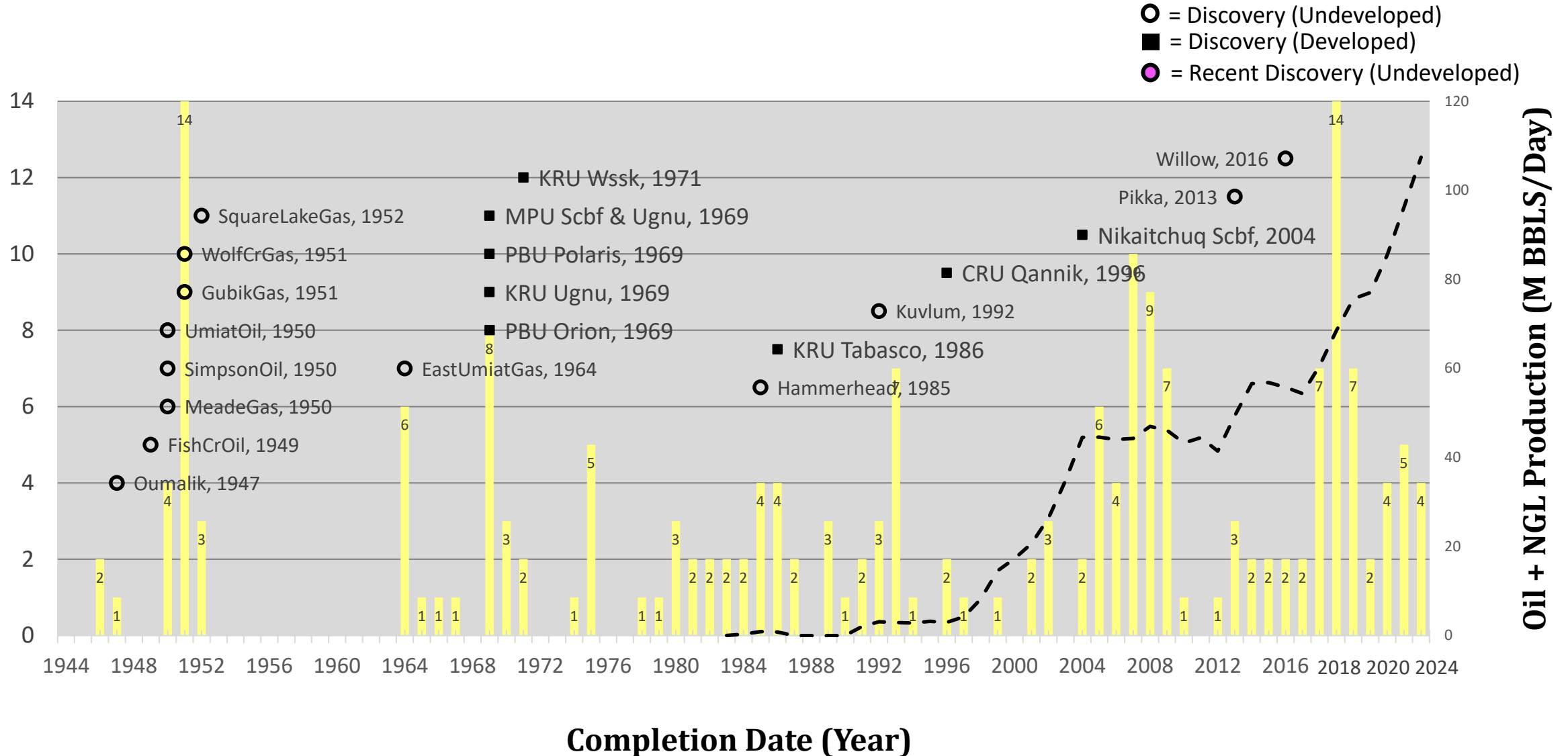
- FILLING IN COLVILLE TROUGH: PRO-DELTA TO DEEP MARINE -



EXPLORATION TARGETS AND DISCOVERIES

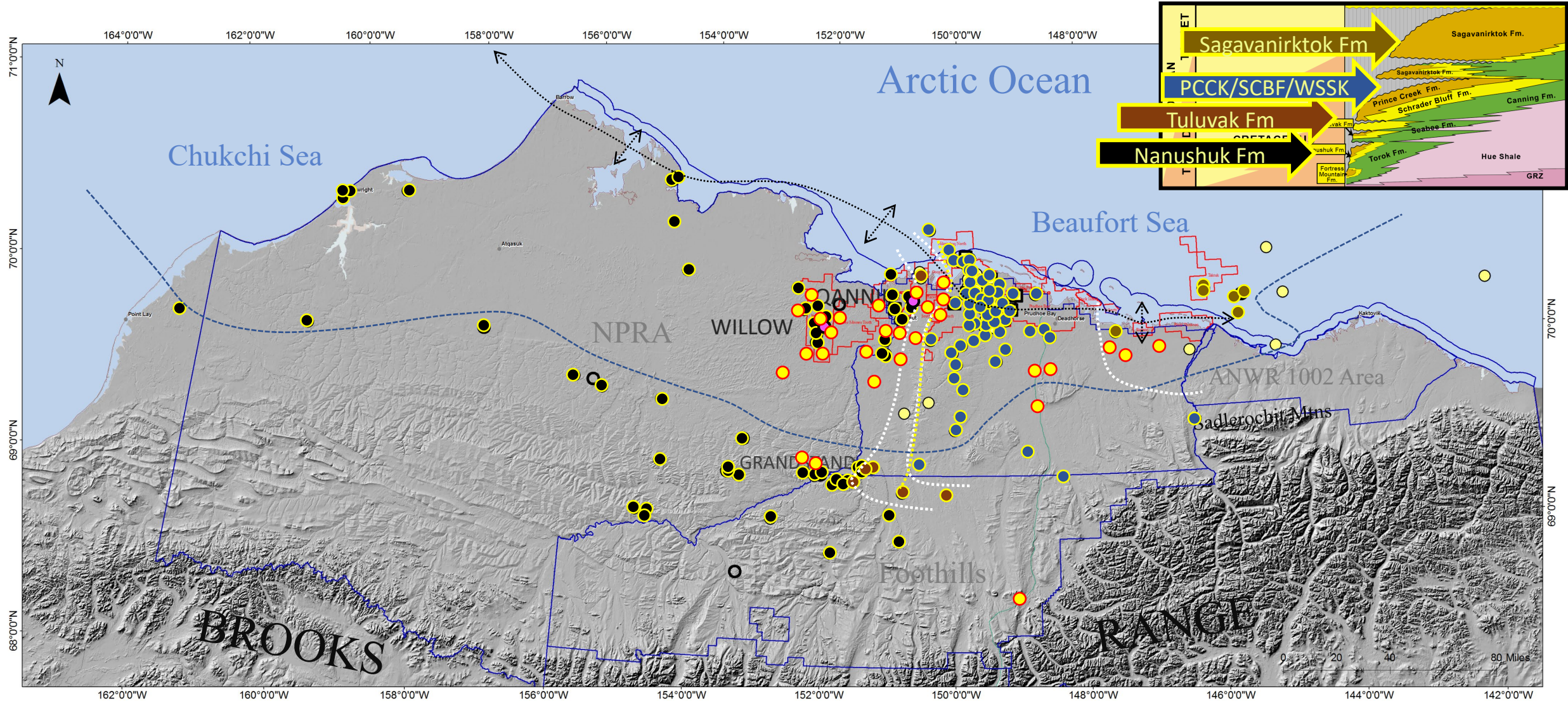
- BROOKIAN TOPSET-

Number of Wells Targeting Objective

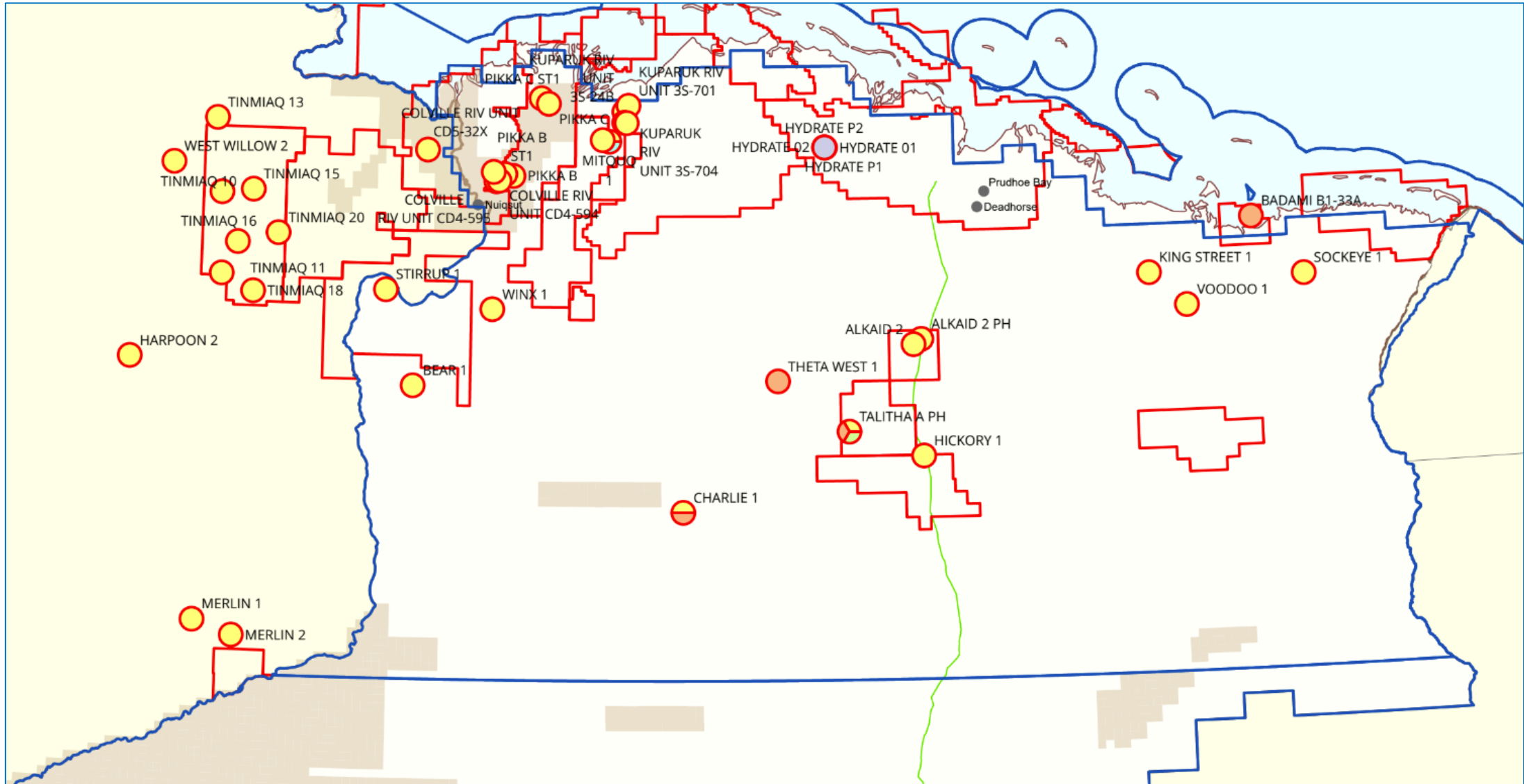


BROOKIAN TOPSET EXPLORATION TARGETS

- COEVAL NON-MARINE, SHALLOW MARINE, AND DELTA -



UPDATED EXPLORATION WELL TARGETS (2019-2024)

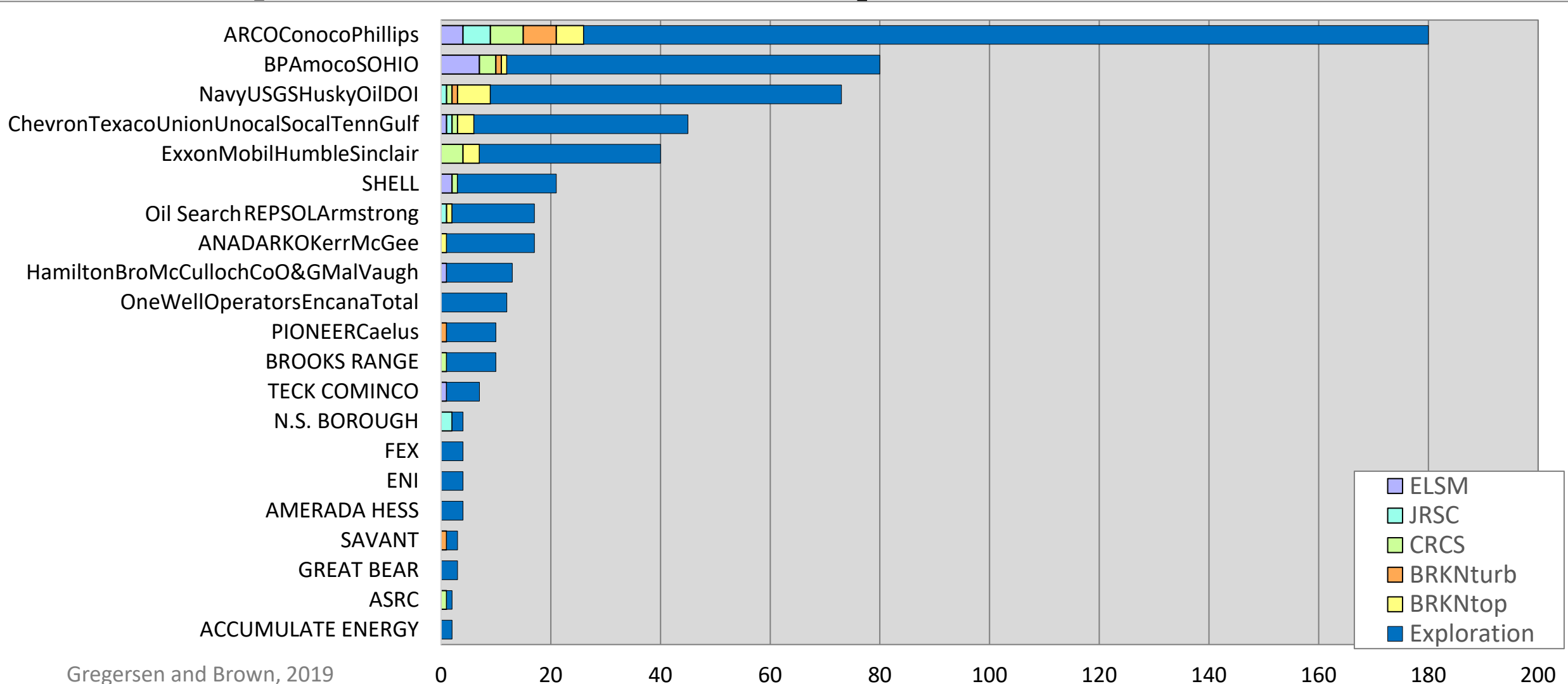


EXPLORERS AND DISCOVERERS

- ALASKA THANKS YOU -

Explorer

Number of Exploration Wells Drilled



CONCLUSIONS

1. Land availability, pipeline access, and large oil discoveries have historically fueled exploration drilling in North Alaska.
2. Mapping exploration drilling targets by stratigraphic play type highlights regional geologic trends.
3. Ellesmerian reservoirs have contributed more oil than any other play type, with Cretaceous shoreface and transgressive lag reservoirs coming in second.
4. Exploration discoveries in the past two decades have resulted in the Jurassic shoreface reservoirs and Brookian topset reservoirs making up a larger portion of our present day annual production (combined 32% in 2024).
5. Giant sized oil accumulations are still being discovered in North Alaska.
6. The Map and Database of Exploration Drilling Targets Categorized by Play Type, North Slope and Offshore Arctic Alaska (Gregersen, 2025; Gregersen and Brown, 2019) is available on the Alaska Division of Oil and Gas' website:

<http://dog.dnr.alaska.gov/Information/Studies>



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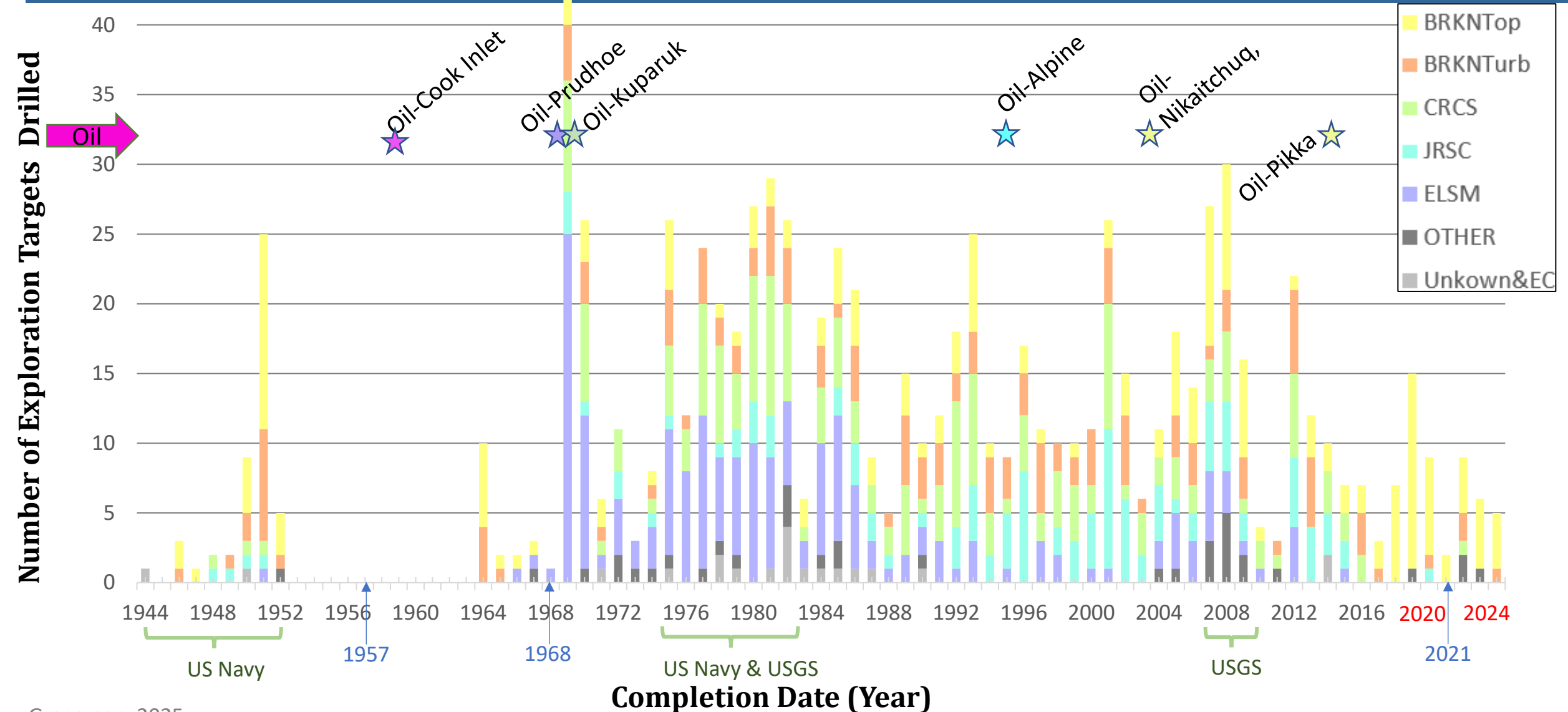
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Decker, Paul L, 2018, Nanushuk Formation Discoveries: World-class exploration potential in a newly proven stratigraphic play, Alaska North Slope, 2018 AAPG ACE Discovery Thinking Forum. Available on line at: <http://doa.alaska.gov/ogc/poolstatistics/annual/current/poolStatisticsCurrent.html>

Gregersen and Brown, 2019

NORTH ALASKA EXPLORATION BY PLAY TYPE

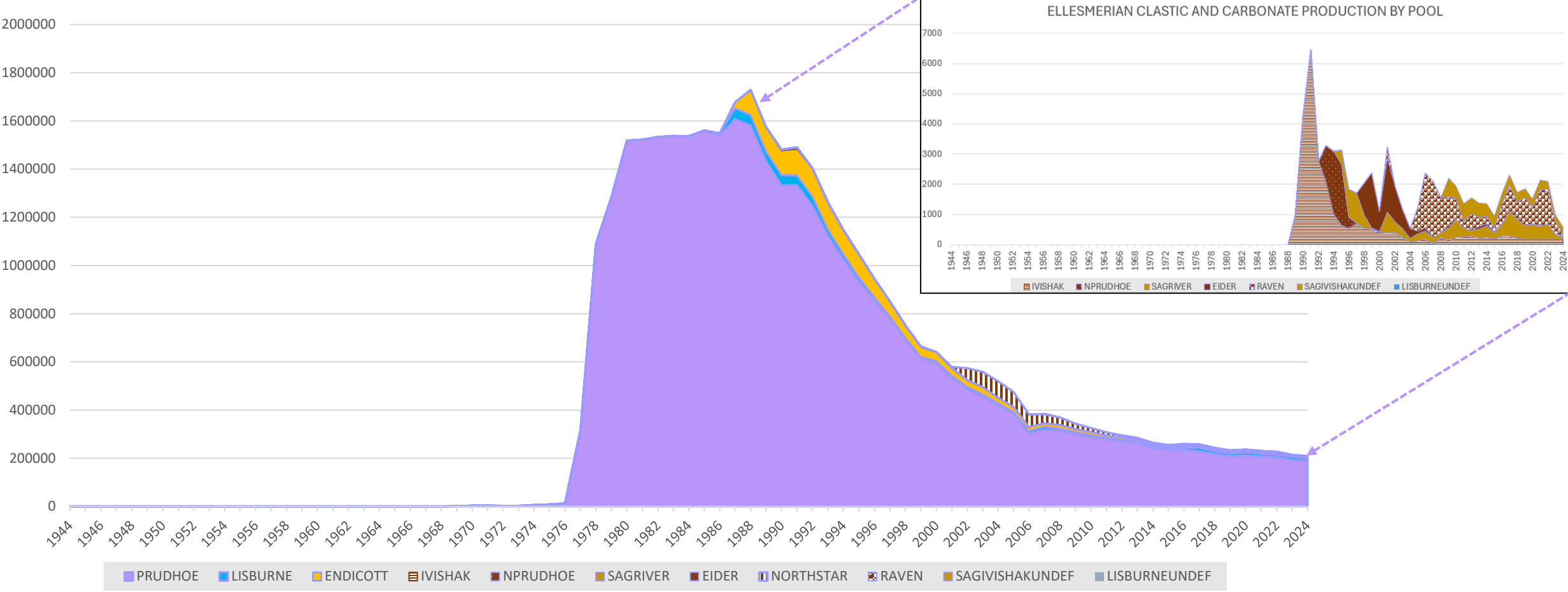
- INFLUENCED BY KEY DISCOVERIES -



ELLESMERIAN EXPLORATION TARGETS

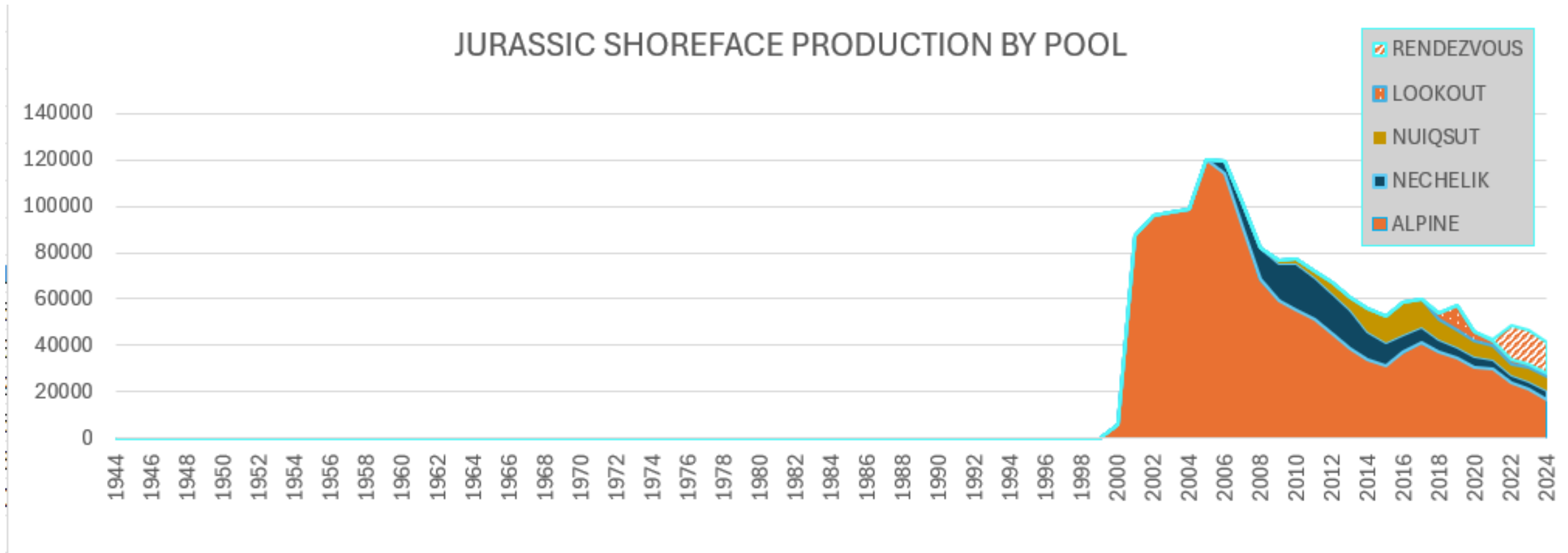
- CLASTIC AND CARBONATE DEPOSITION ON A STABLE SHELF -

ELLESMERIAN CLASTIC AND CARBONATE PRODUCTION BY POOL



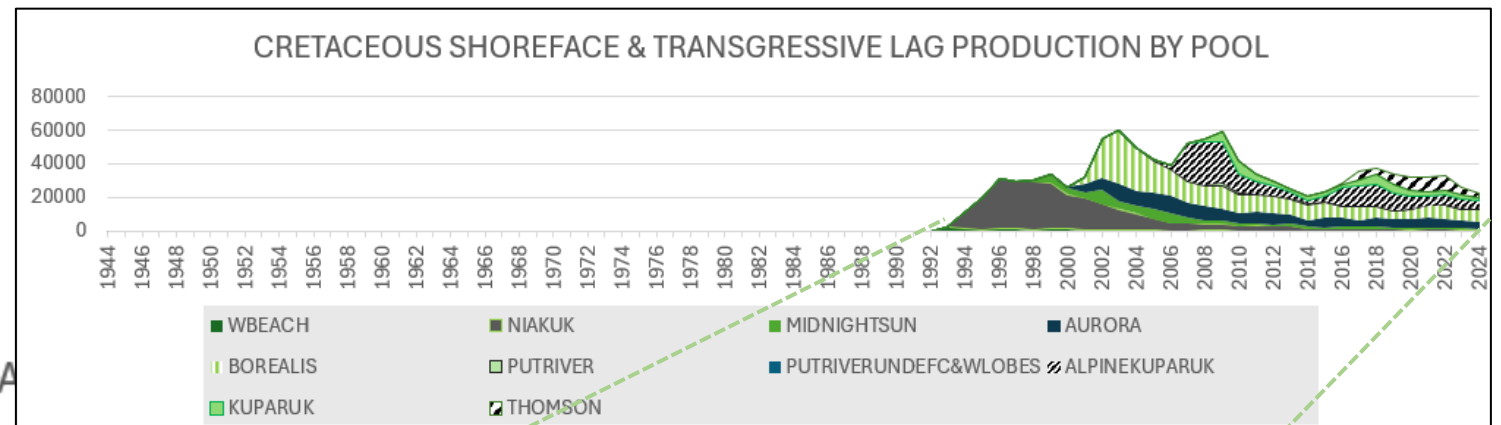
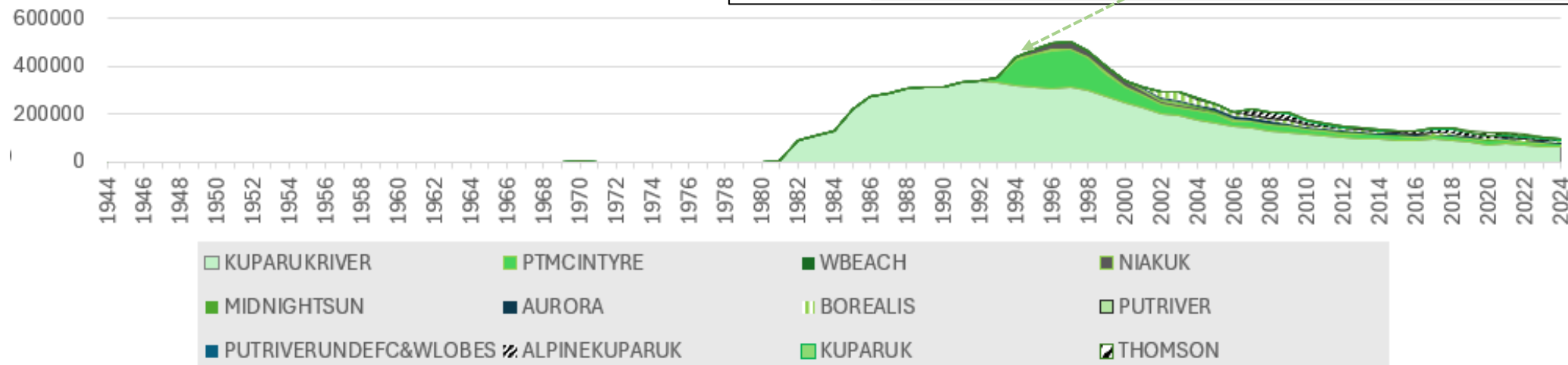
JURASSIC SHOREFACE EXPLORATION TARGETS

- EARLY RIFTING: OPENING OF ARCTIC OCEAN -



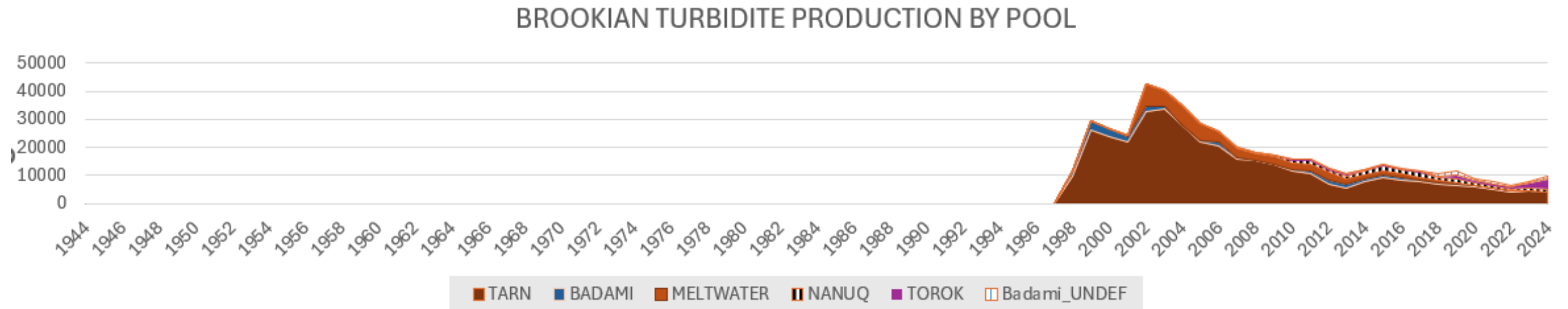
CRETACEOUS SHOREFACE & TRANSGRESSIVE LAG EXPLORATION TARGETS - CONTINUED UPLIFT OF BARROW ARCH -

CRETACEOUS SHOREFACE & TRA



EXPLORATION TARGETS AND DISCOVERIES BY YEAR

- BROOKIAN TURBIDITE -



EXPLORATION TARGETS AND DISCOVERIES

- BROOKIAN TOPSET-

