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

Alaska Geological Society, Anchorage, Alaska

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Alaska Department of Natural Resources, Division of Oil and Gas
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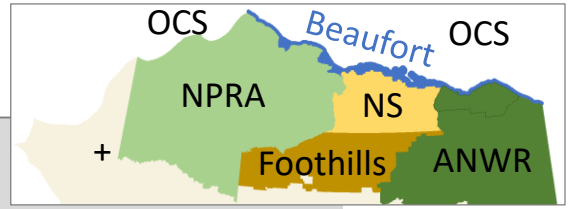
North Alaska Exploration Wells
- Identified By Sale Regions -



Number of Exploration Wells Drilled

35
30
25
20
15
10
5
0

1944 1948 1952 1956 1960 1964 1968 1972 1976 1980 1984 1988 1992 1996 2000 2004 2008 2012 2016

US Navy

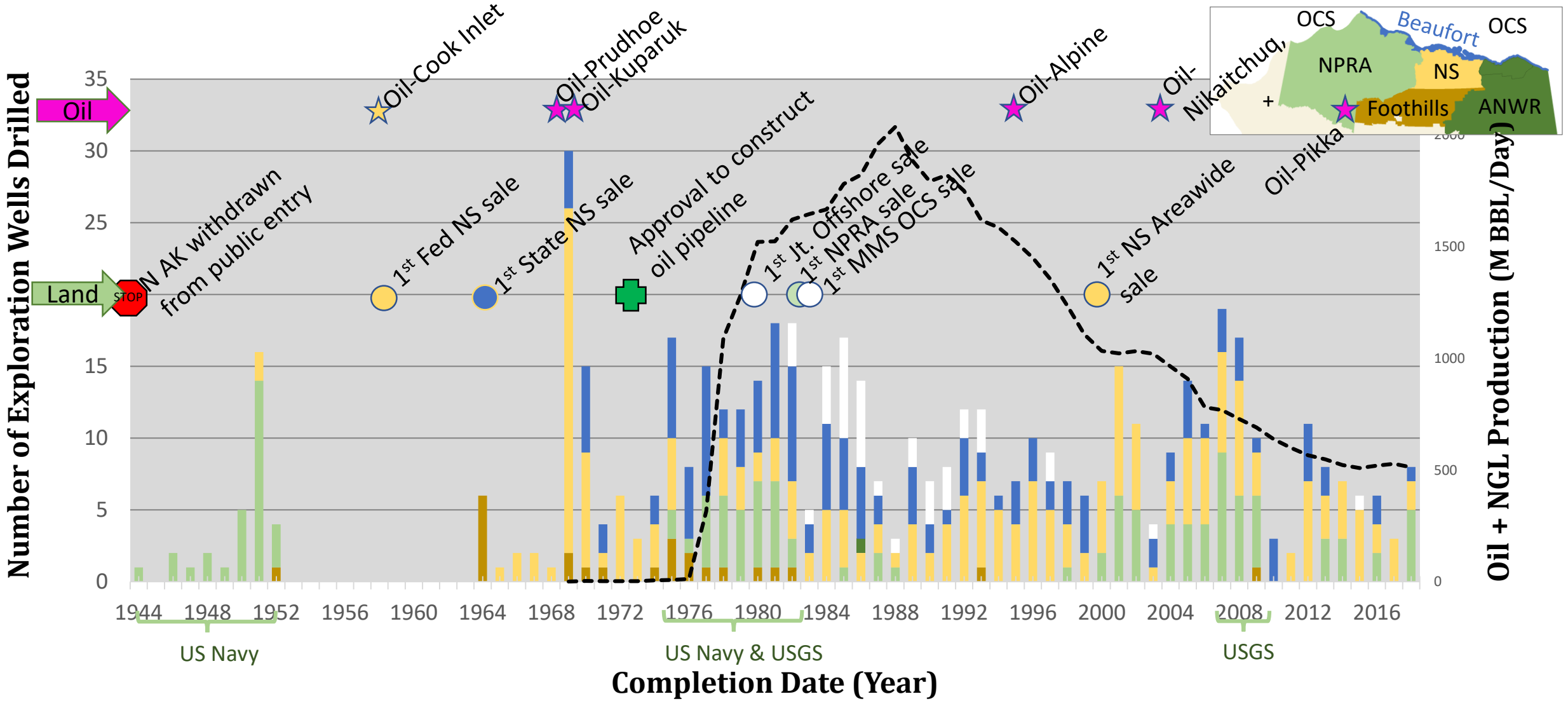
US Navy & USGS

USGS

Completion Date (Year)

Data source: AOGCC; AKDOG Public Decisions; BLM

North Alaska Exploration as Influenced By
- Land Availability, Pipeline Access, and Key Discoveries -



Data source: AOGCC; AKDOG Public Decisions; BLM

WHAT PLAYS ARE THE EXPLORERS TARGETING?
- GENERALIZED STRATIGRAPHIC COLUMN AND CROSS SECTION -

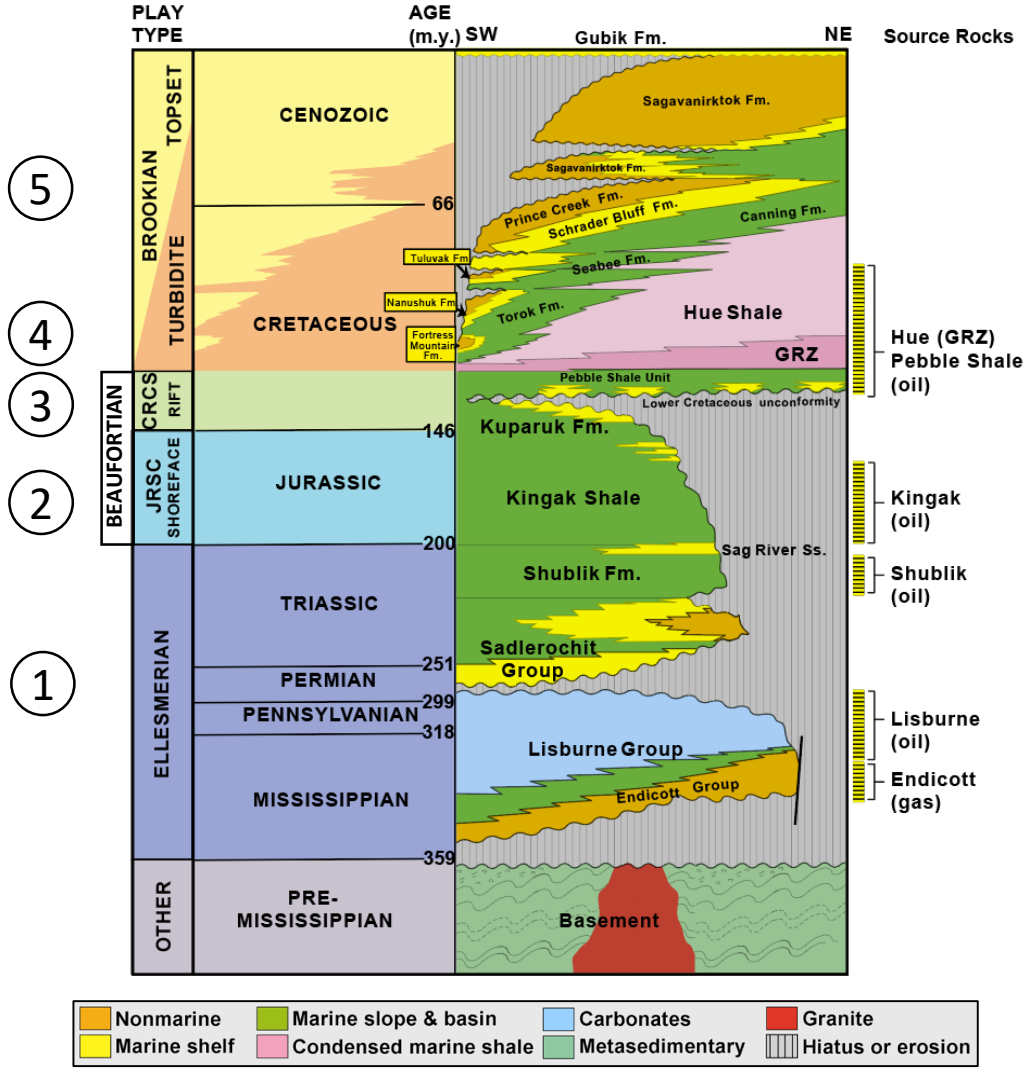


Figure modified from Houseknecht and Bird, 2006; Garrity and others, 2005; and AKDOG.

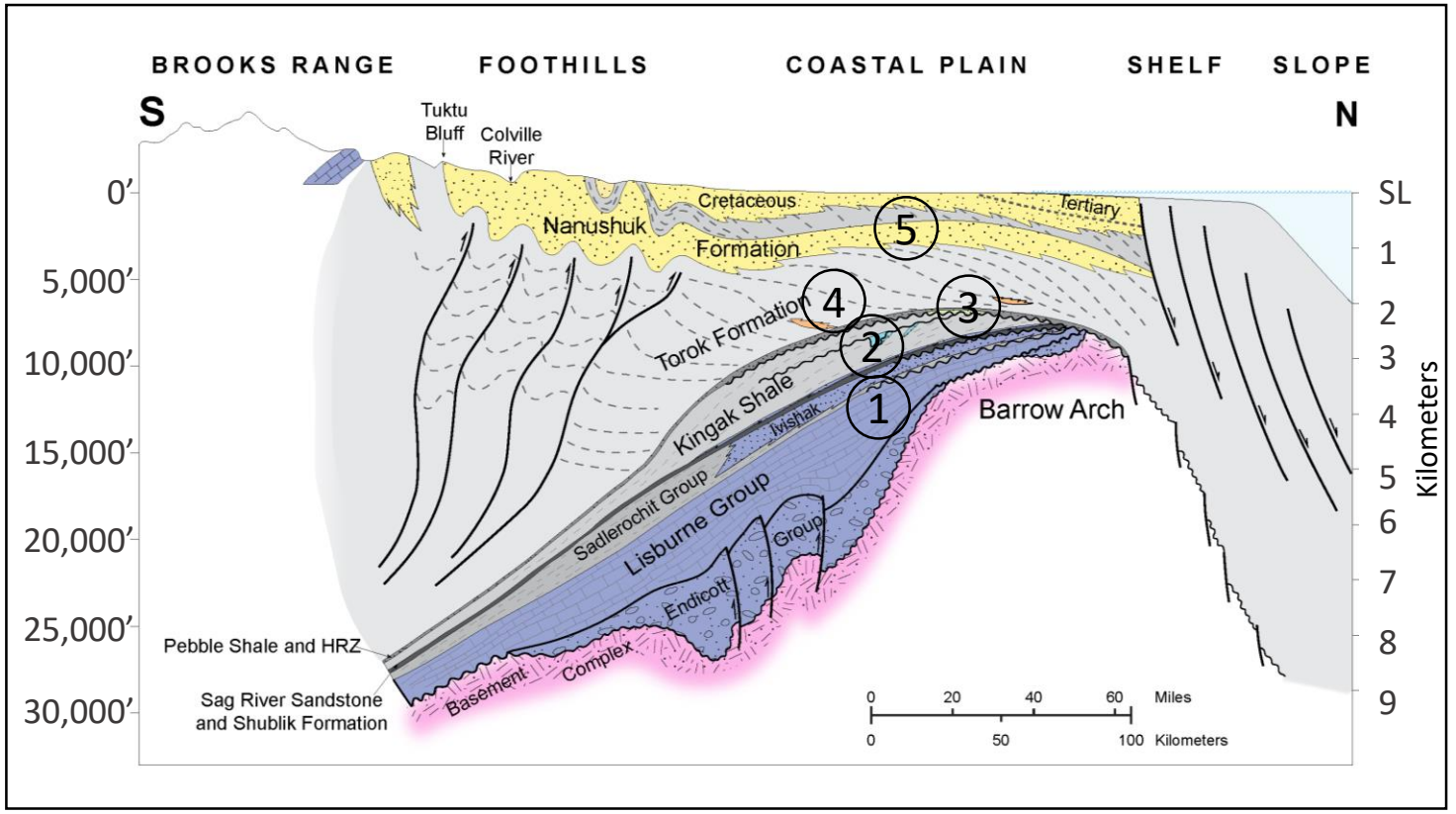


Figure modified from Bird and Molenaar, 1992; AKDOG; DGGS; and P. Decker personal communication.

How do Plays Contribute to Production?
- Throughout Time and Today -

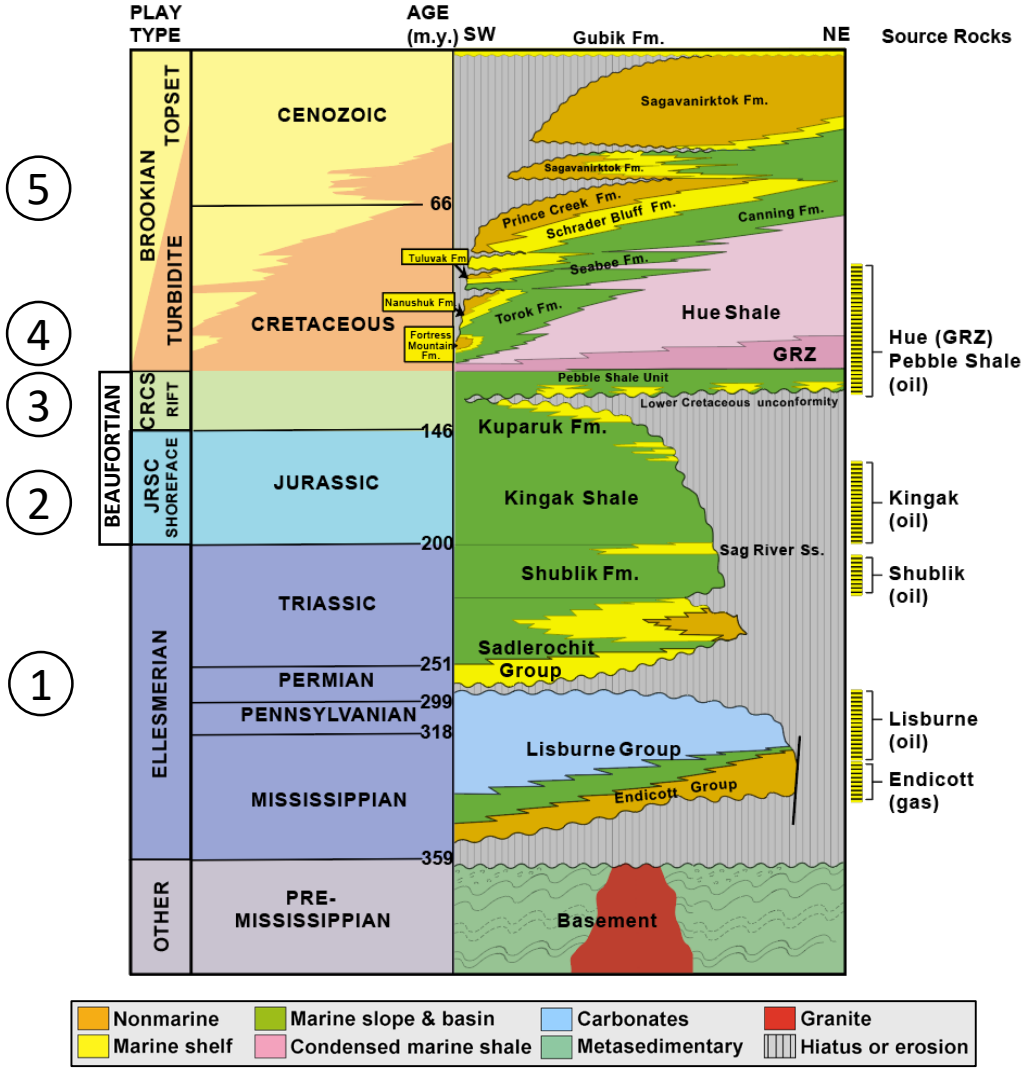
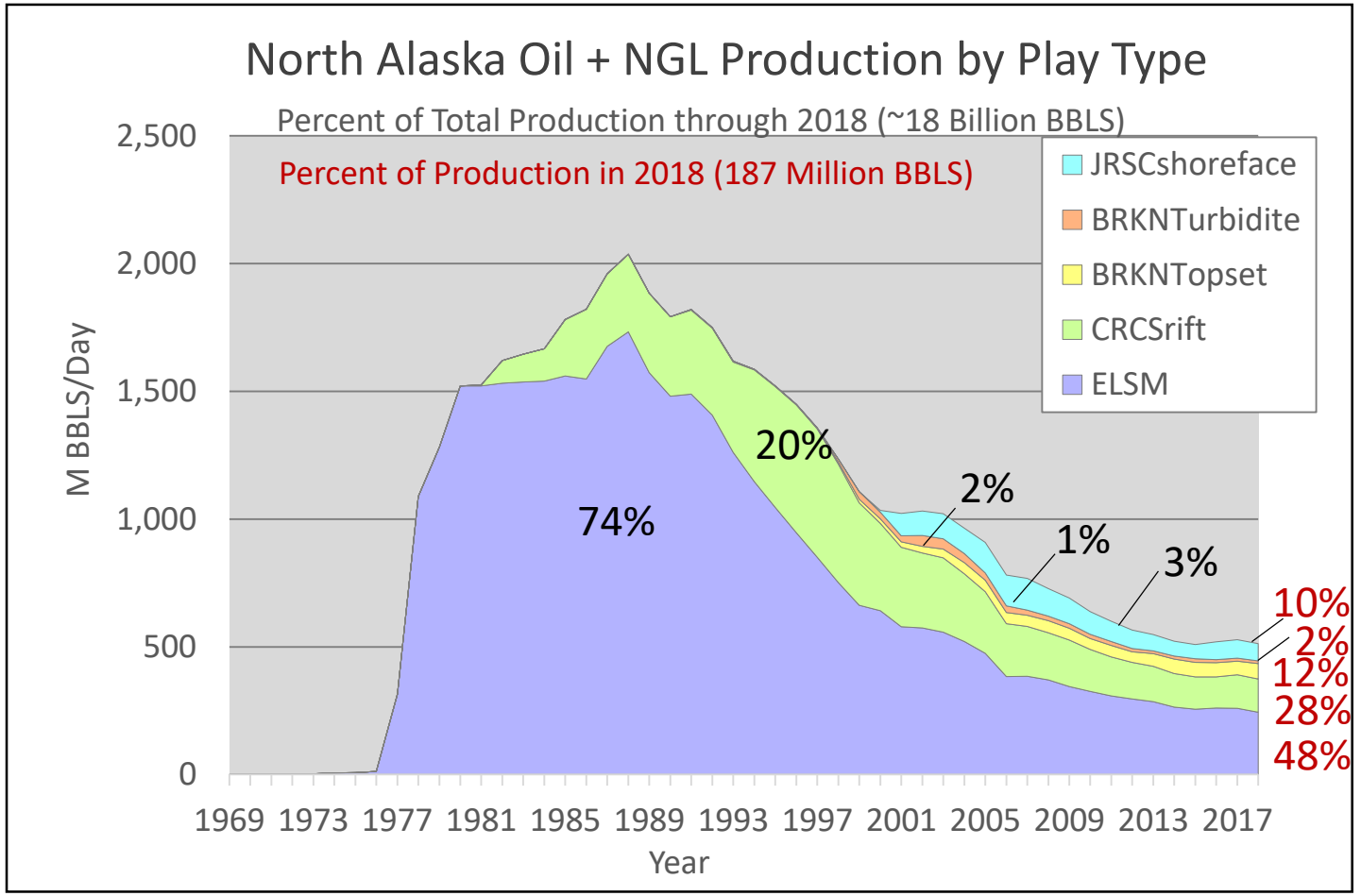
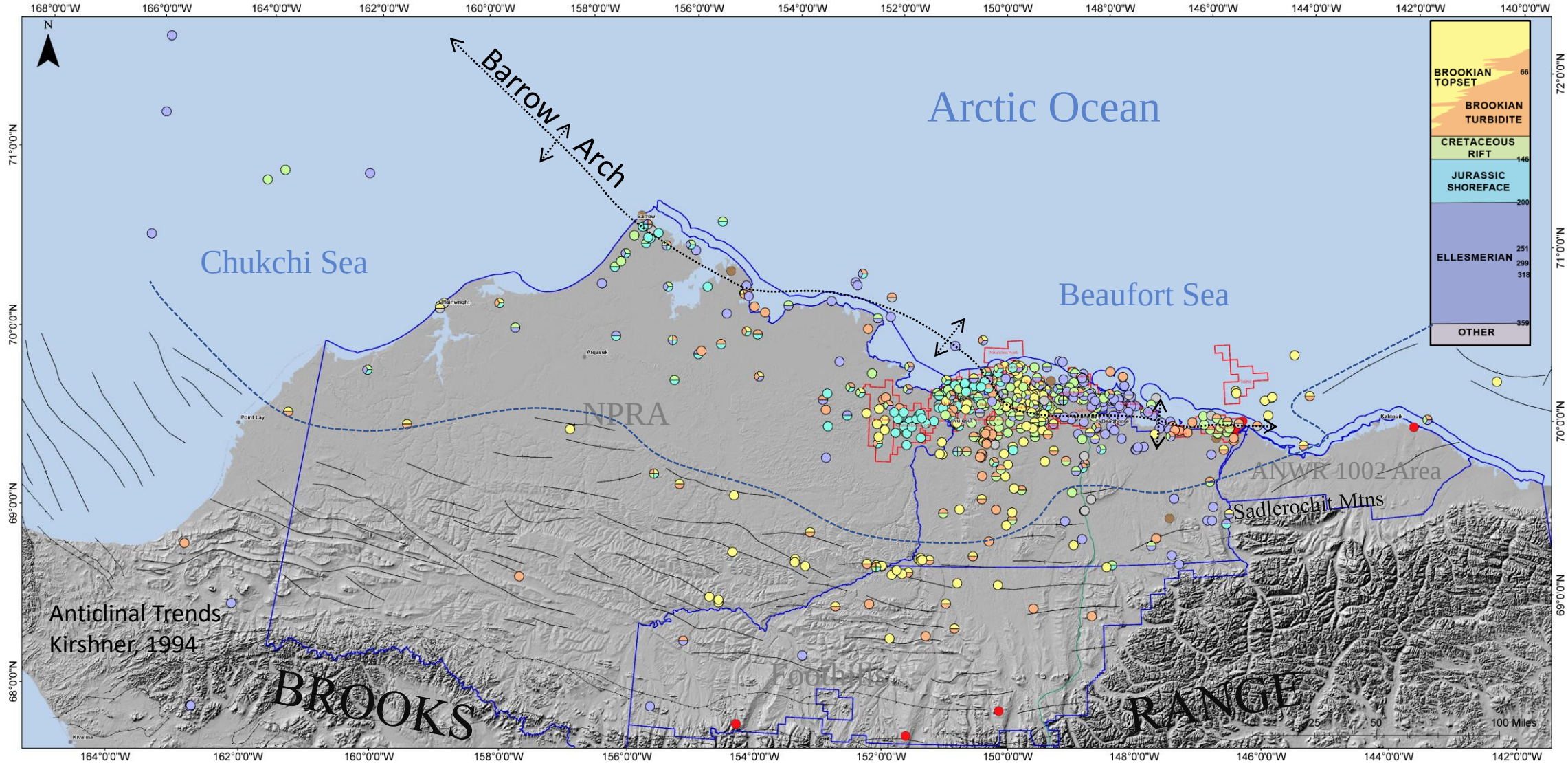


Figure modified from Houseknecht and Bird, 2006; Garrity and others, 2005; and AKDOG.

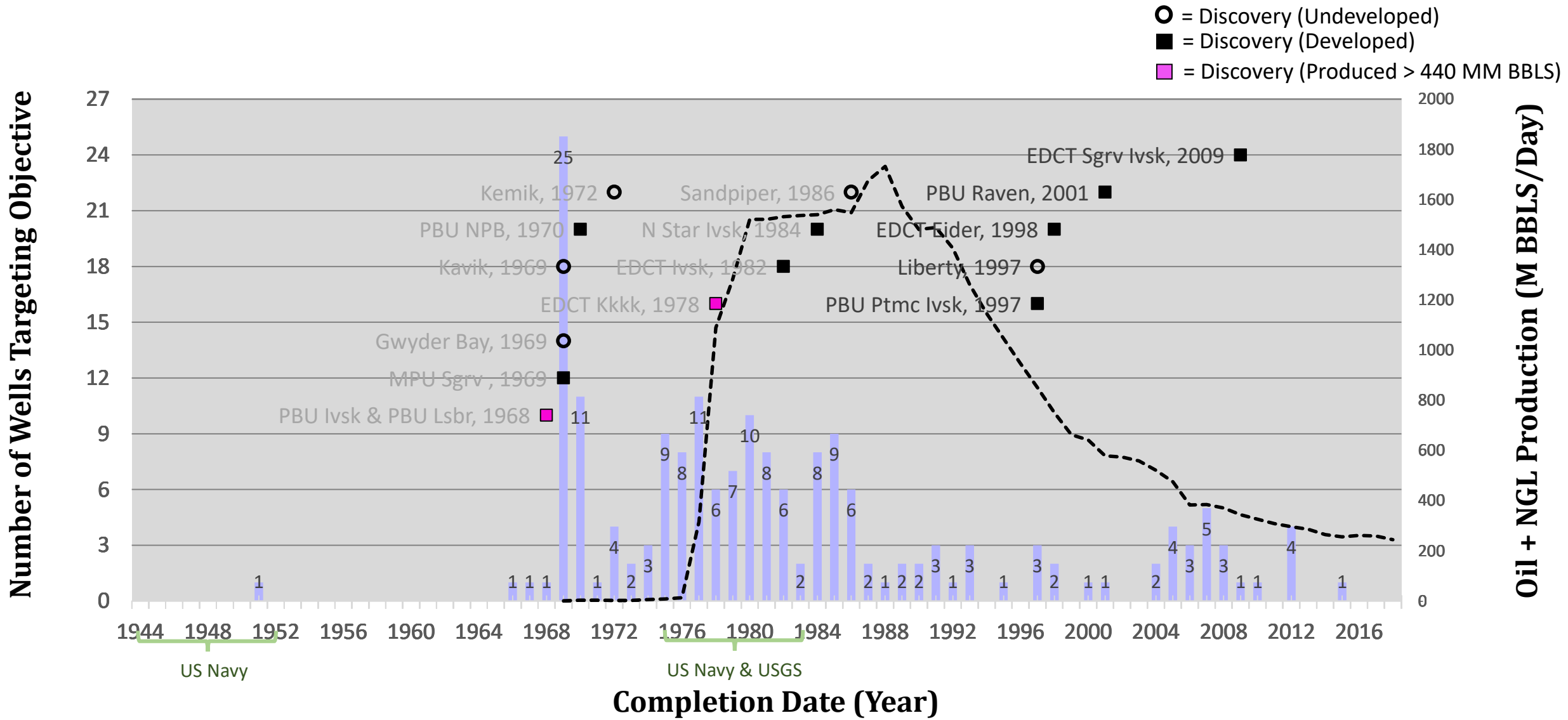


Data source: AOGCC; AKDOG

Exploration Drilling Targets – All Categories
- And Regional Tectonic Elements -

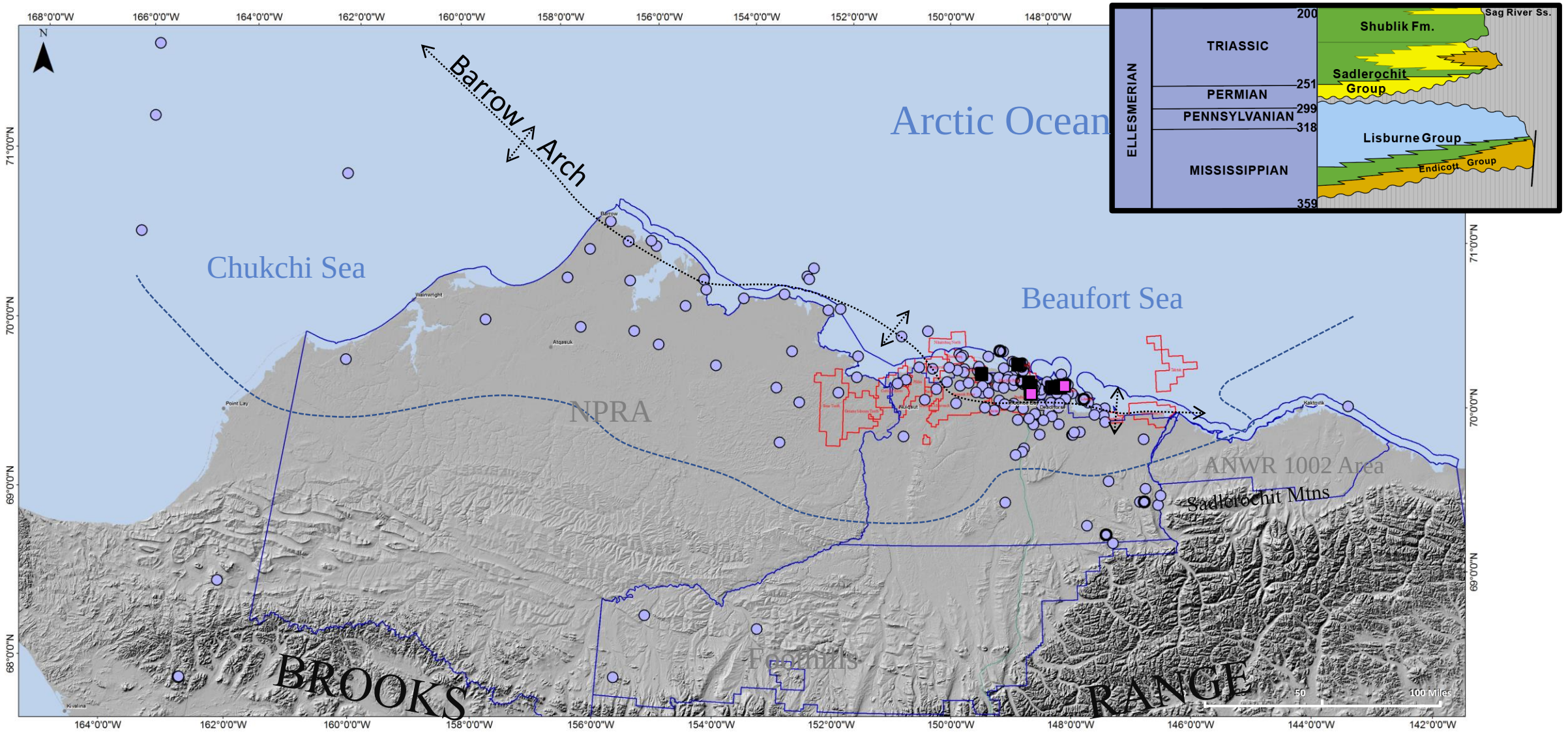


Count of Exploration Targets by Year
- Ellesmerian Clastics and Carbonates -

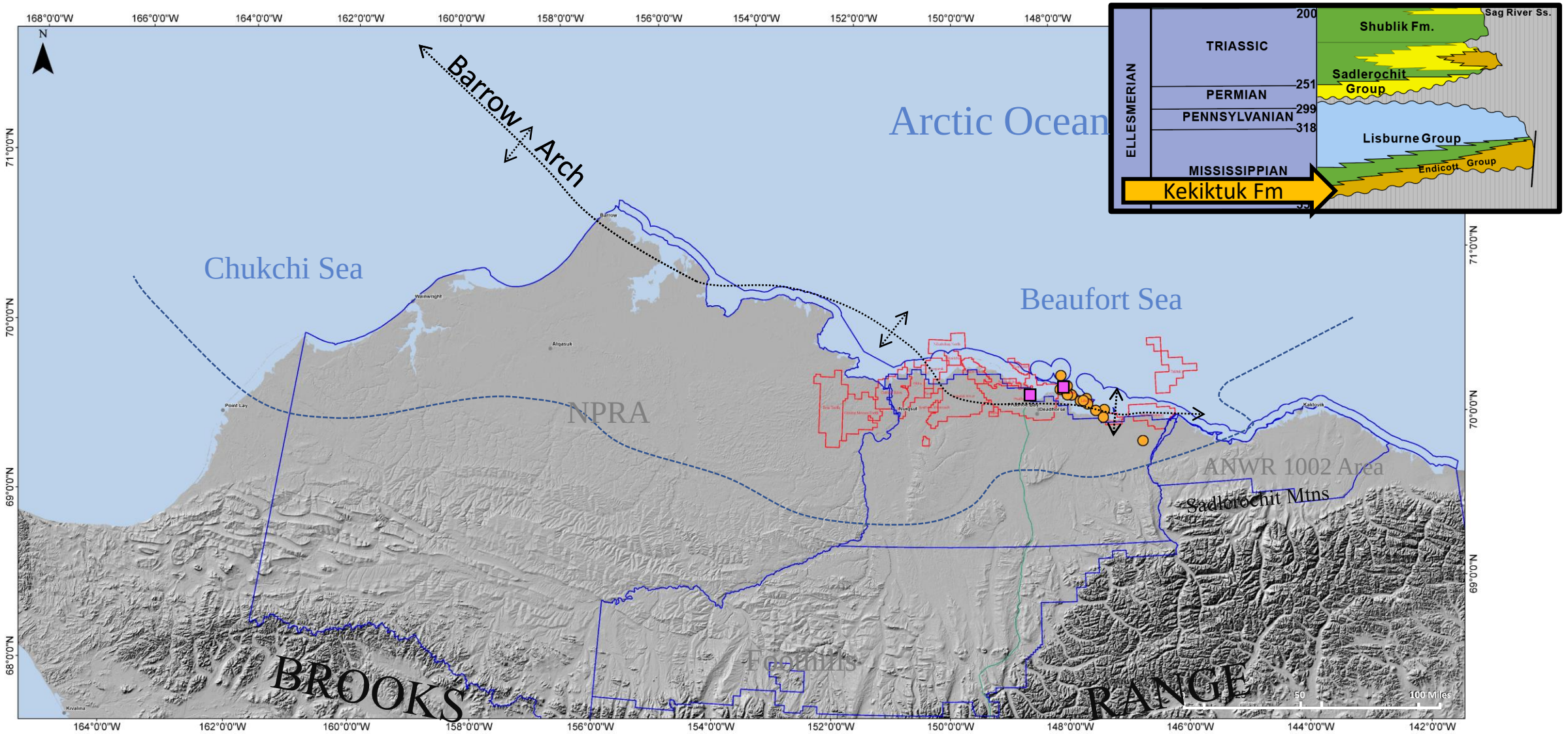


Data sources: AOGCC; AKDOG; USGS; BOEM; DOE/NETL

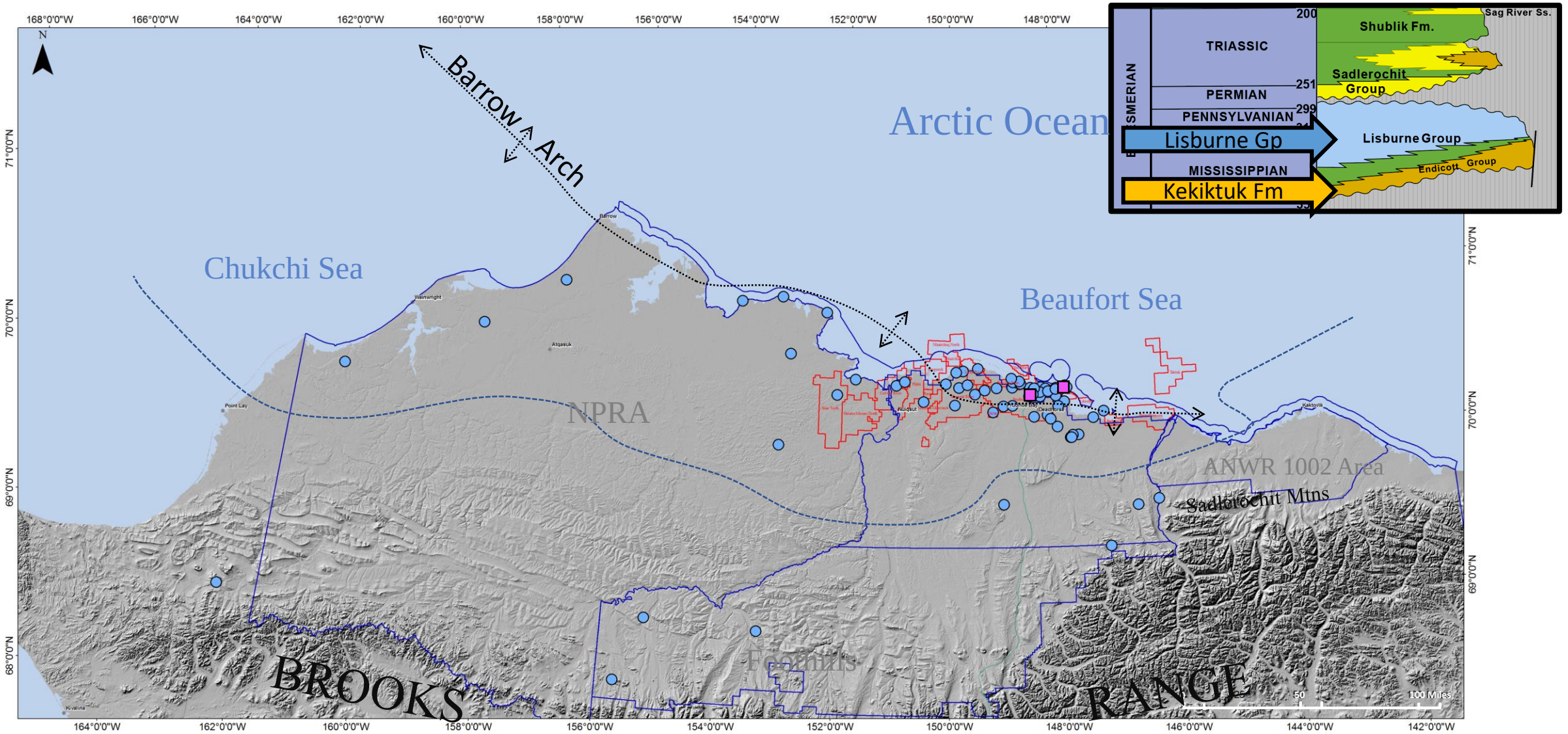
Ellesmerian Exploration Targets
- Clastic and Carbonate Deposition on a Stable Shelf -



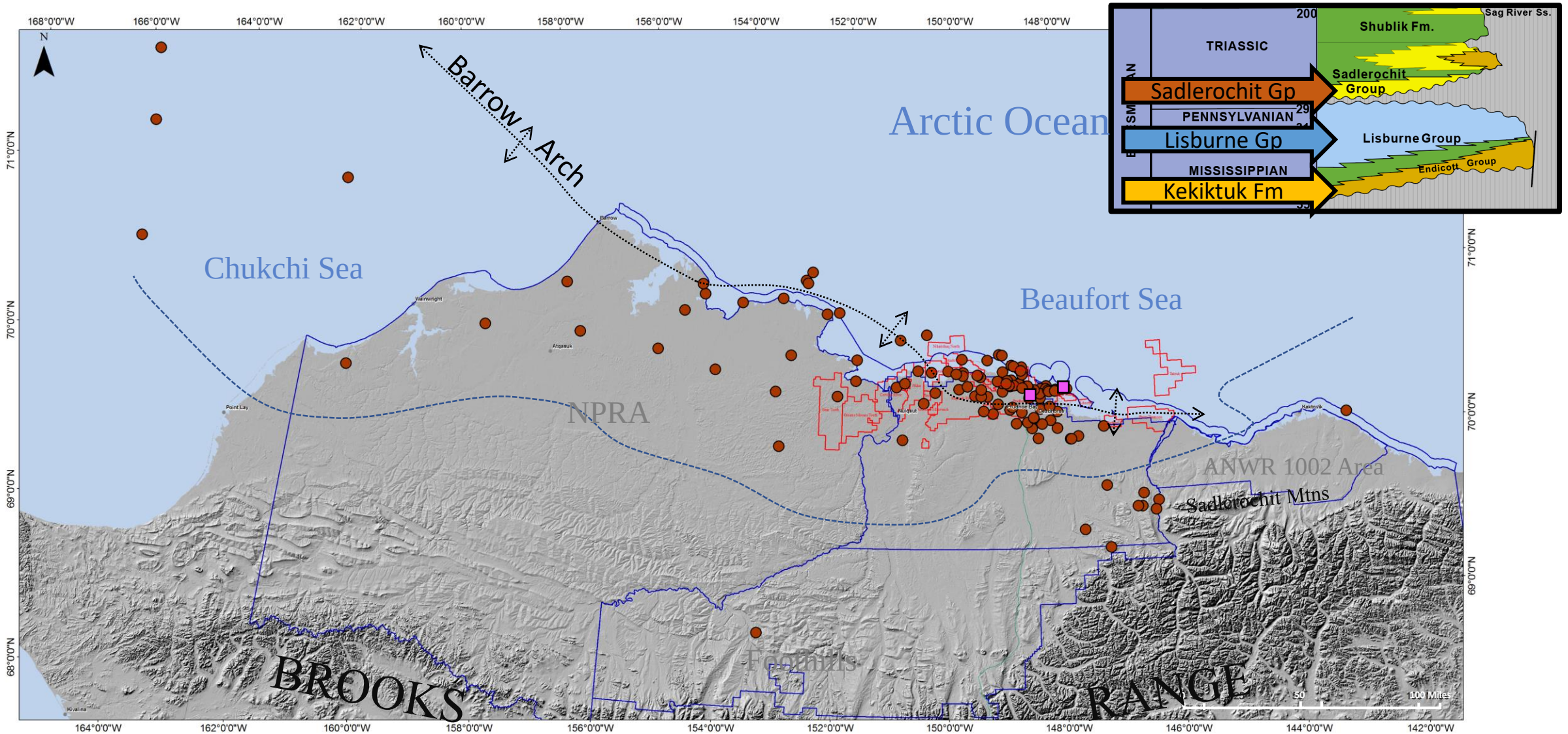
Ellesmerian Exploration Targets
- Kekiktuk Formation: Non-marine -



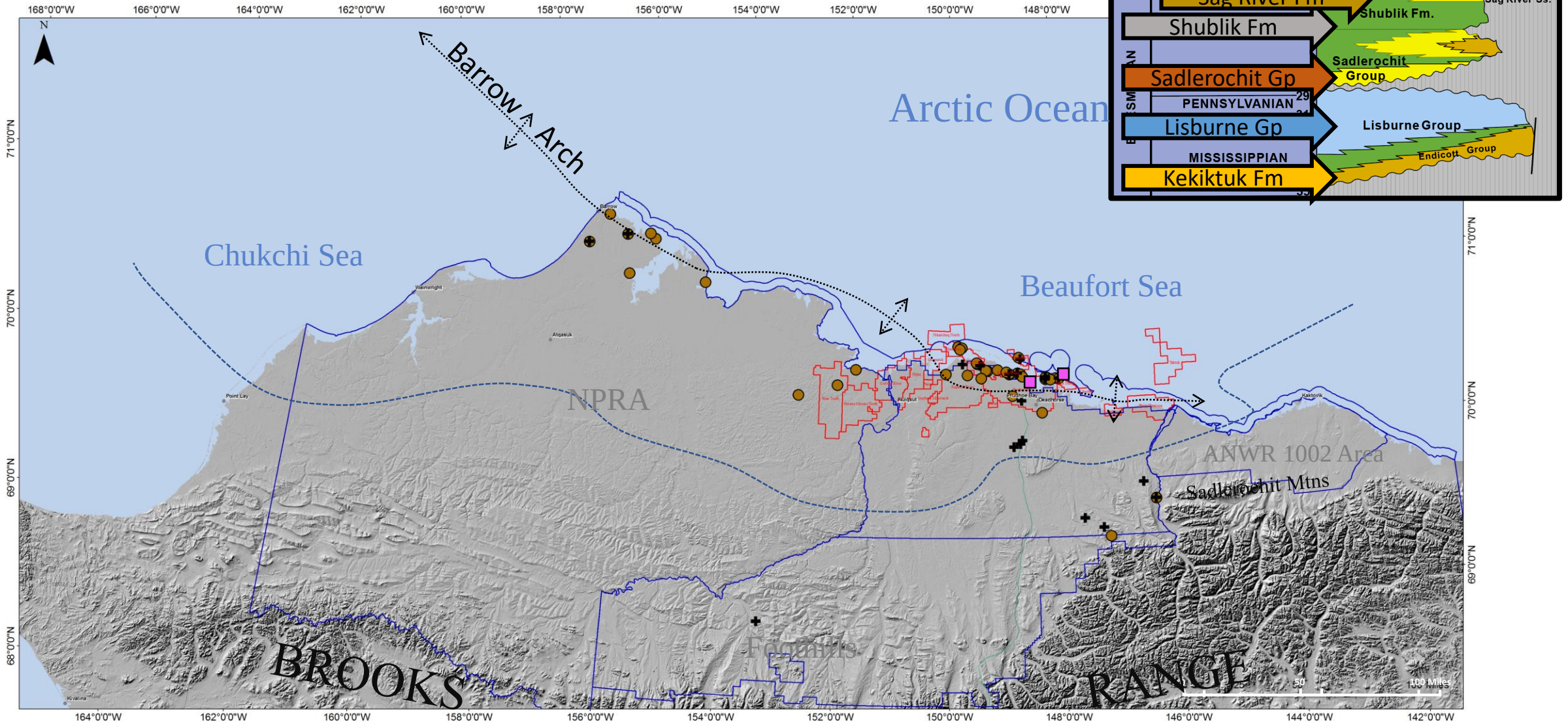
Ellesmerian Exploration Targets
- Lisburne Group: Platform Carbonates -



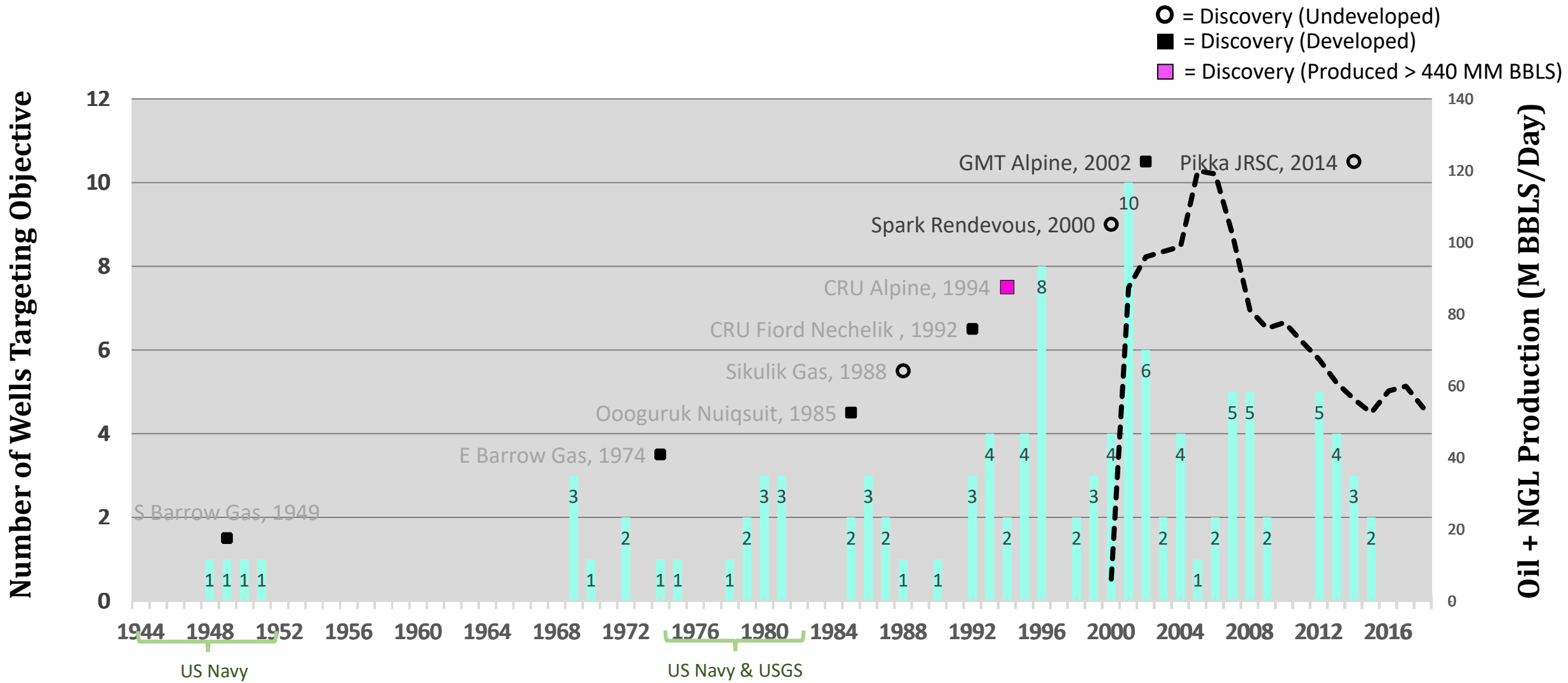
Ellesmerian Exploration Targets
- Sadlerochit Group Non-marine to Shallow Marine -



Ellesmerian Exploration Targets
- Shublik and Sag River Formations: Marine -

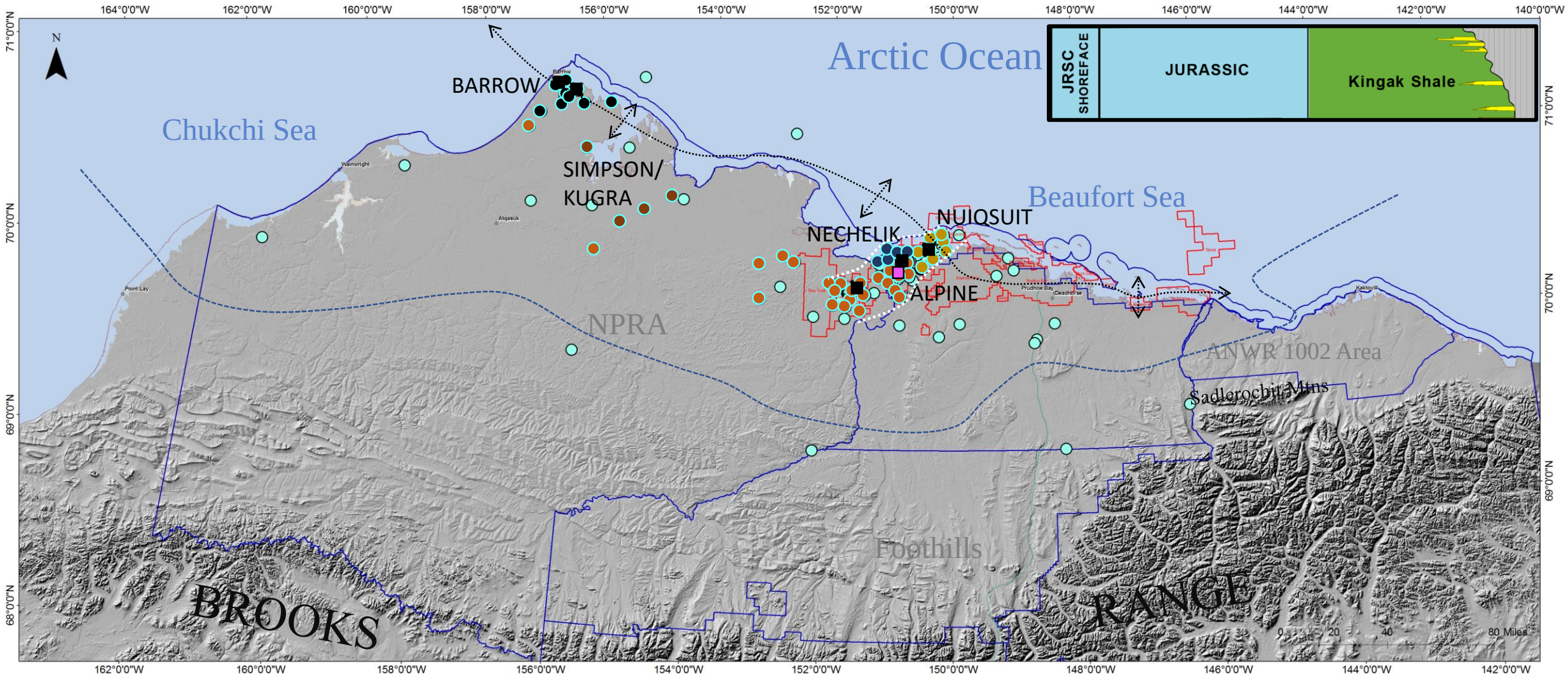


Exploration Targets and Discoveries by Year
- Jurassic Shoreface -

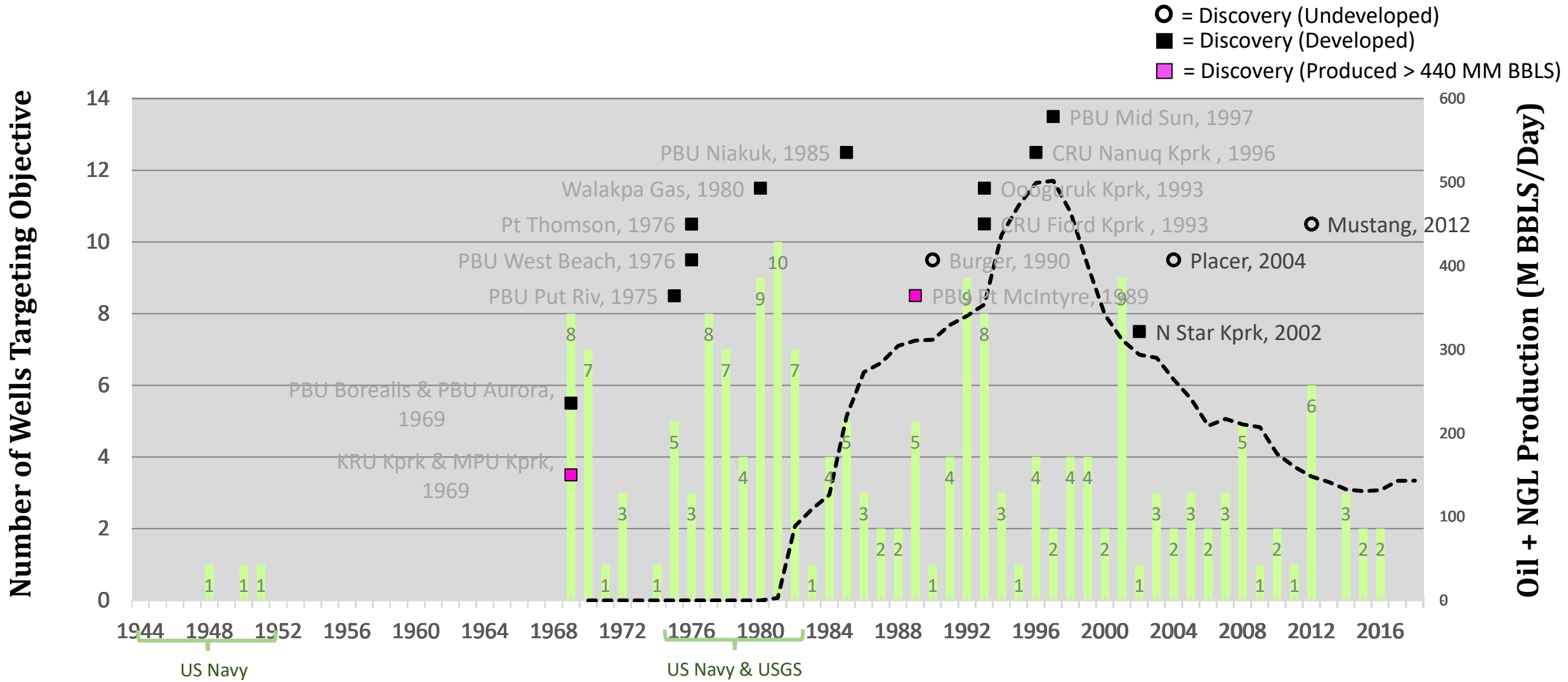


Data sources: AOGCC; AKDOG; USGS; BOEM; DOE/NETL

Jurassic Shoreface Exploration Targets
- Early Rifting: Opening of Arctic Ocean -

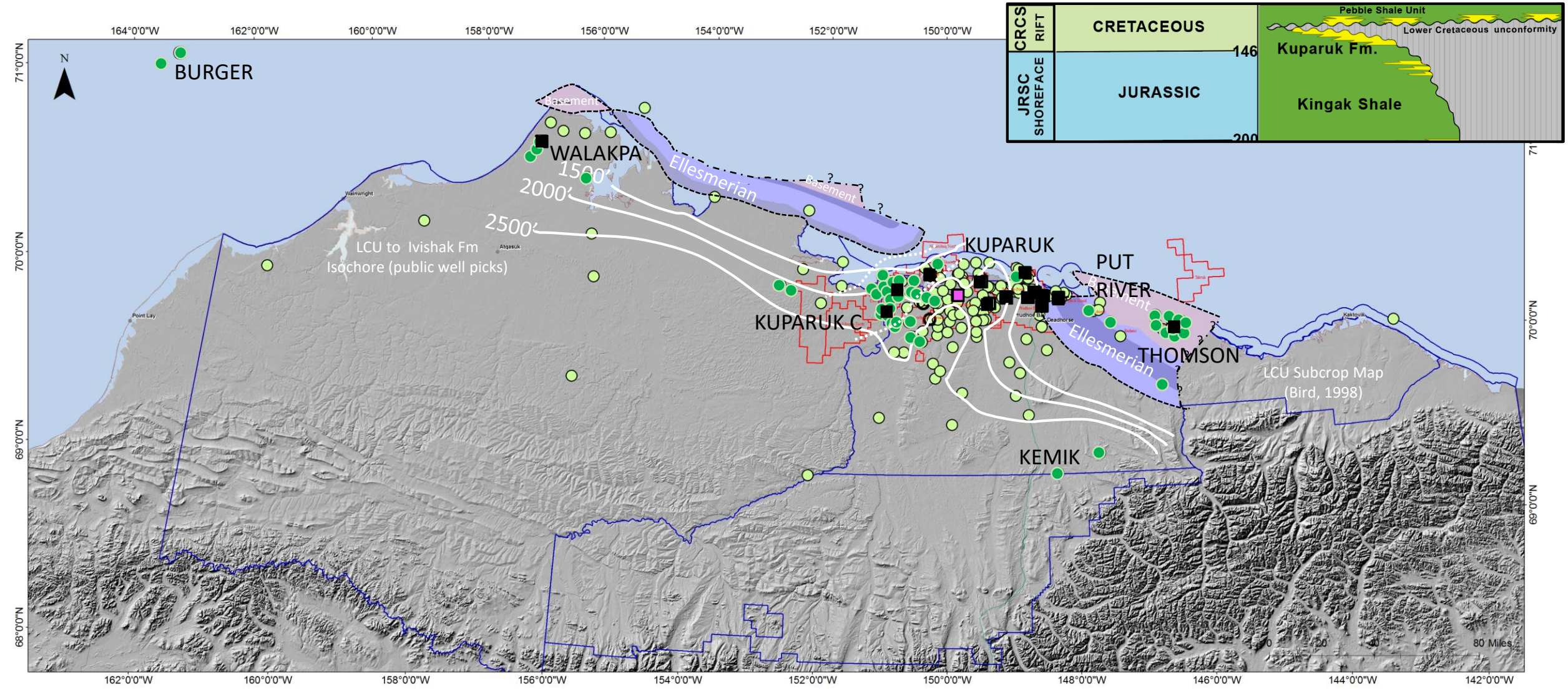


Exploration Targets and Discoveries by Year
- Cretaceous Rift -

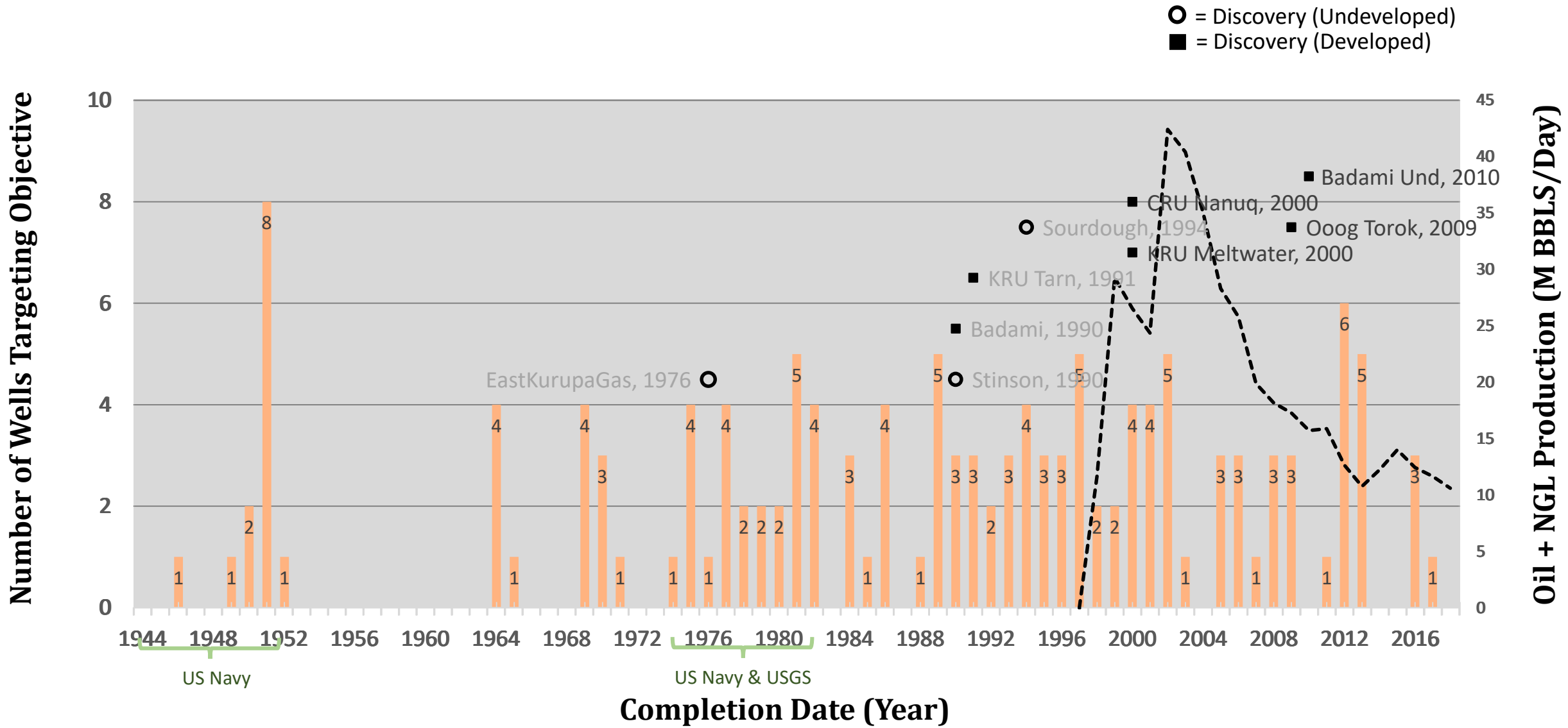


Data sources: AOGCC; AKDOG; USGS; BOEM; DOE/NETL

Cretaceous Rift Exploration Targets
- Continued Rifting and Uplift of Barrow Arch -

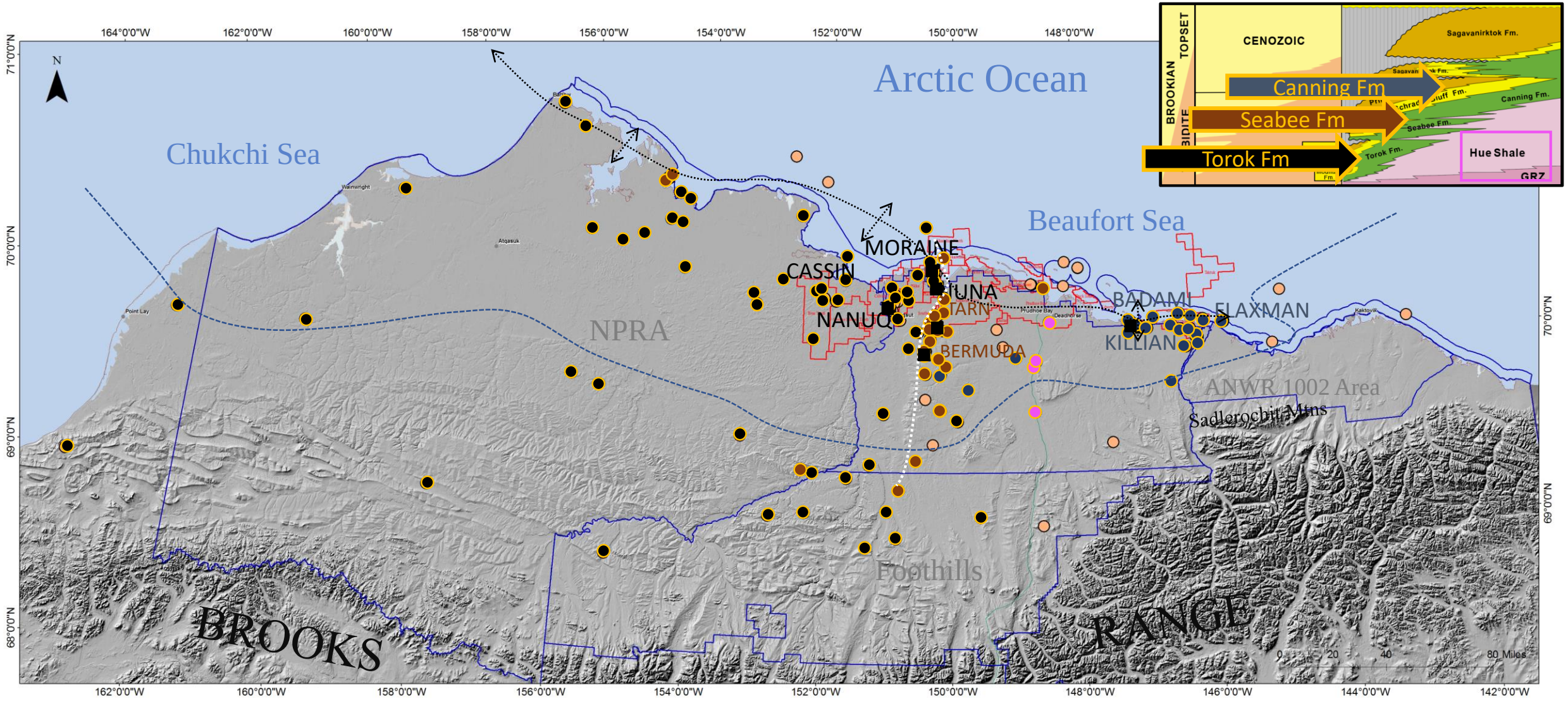


Exploration Targets and Discoveries by Year
- Brookian Turbidite -

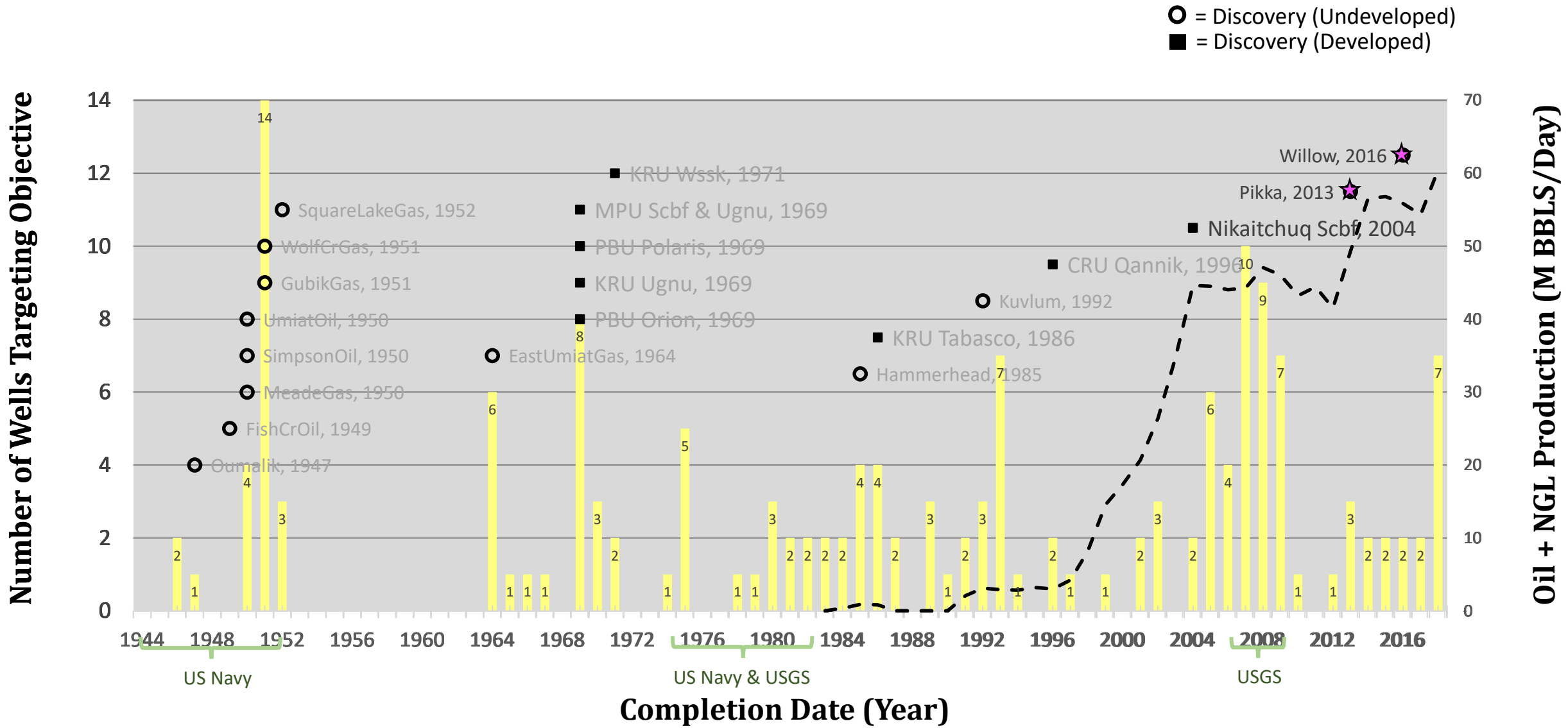


Data sources: AOGCC; AKDOG; USGS; BOEM; DOE/NETL

Brookian Turbidite Exploration Targets
- Filling in Colville Trough: Pro-delta to Deep Marine -

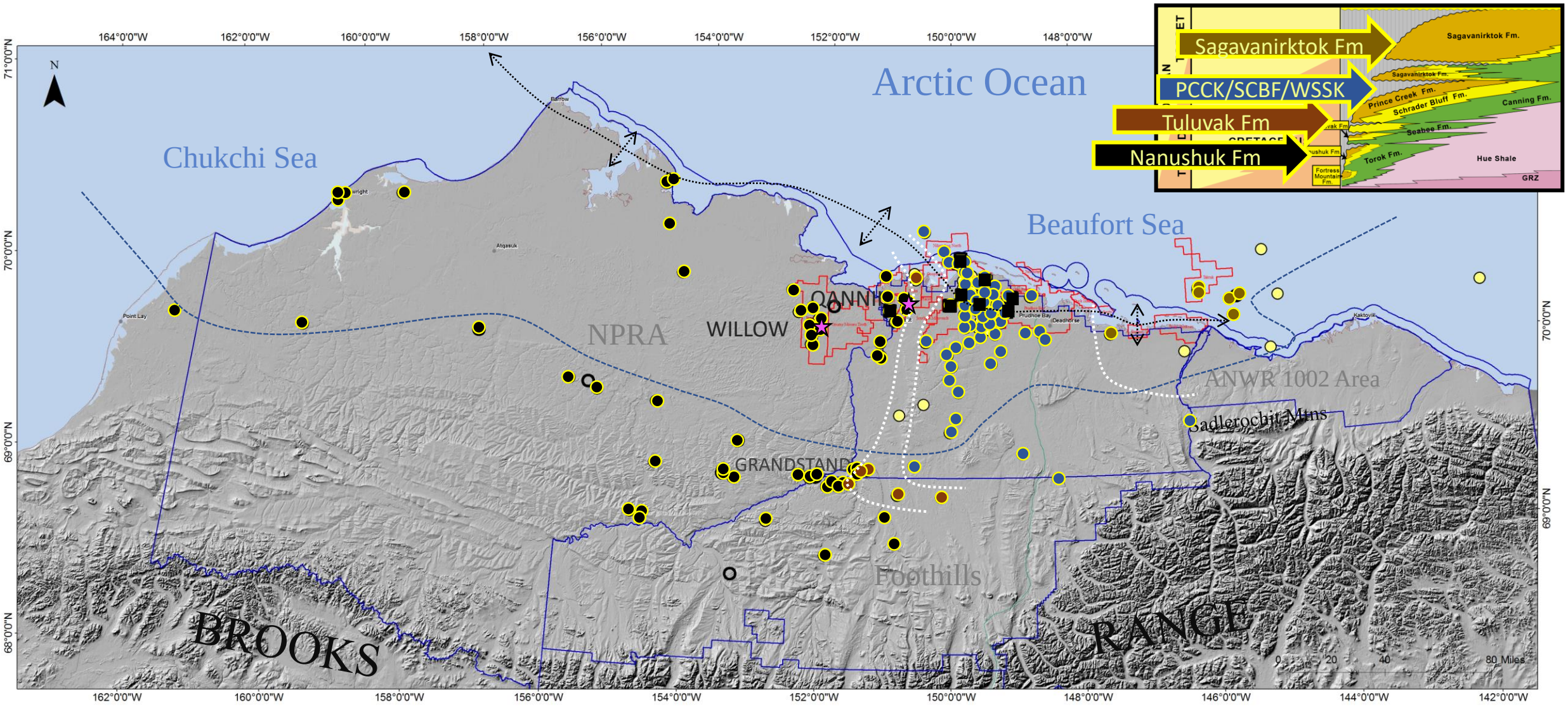


Exploration Targets and Discoveries by Year
- Brookian Topset-

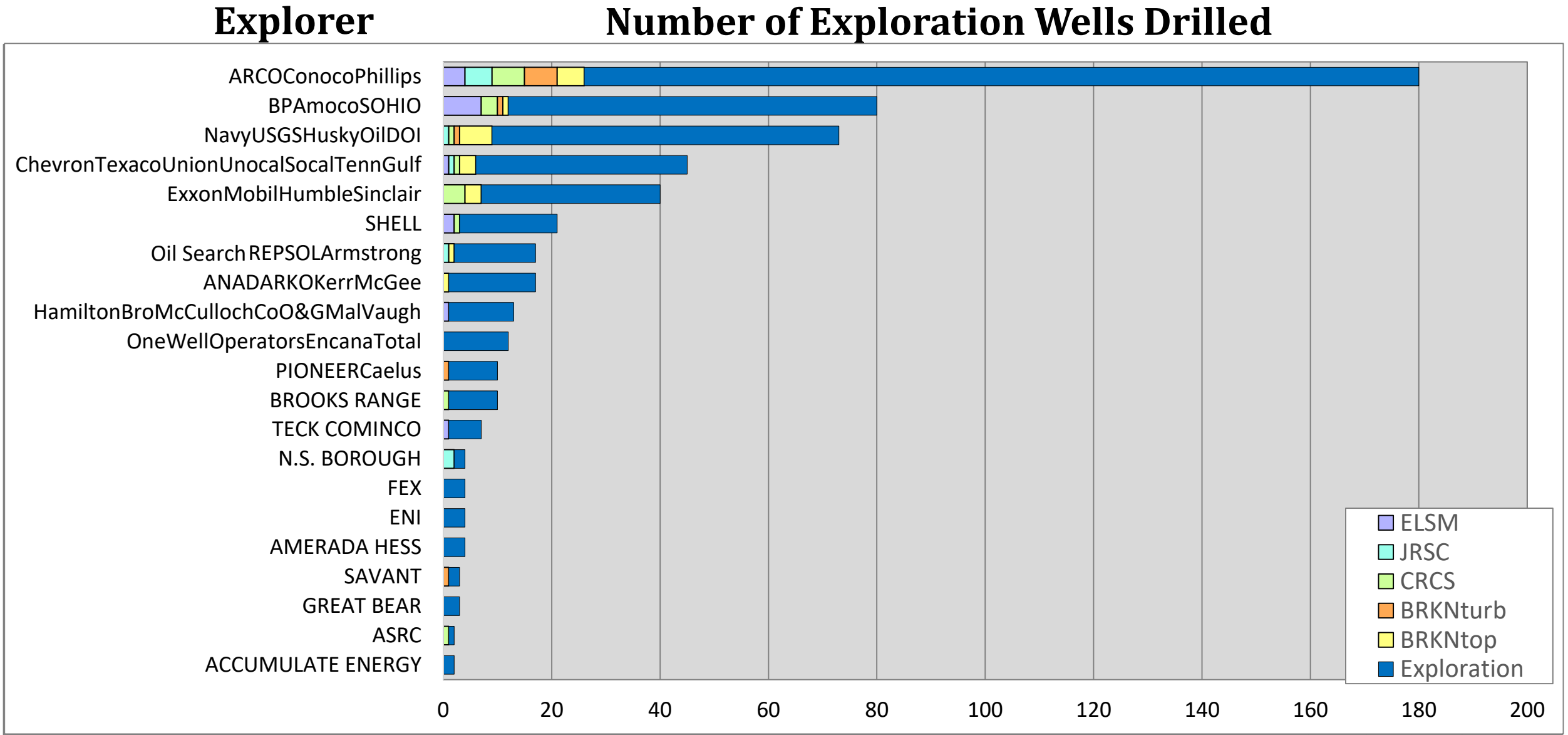


Data sources: AOGCC; AKDOG; USGS; BOEM; DOE/NETL

Brookian Topset Exploration Targets
- Coeval Non-marine, Shallow Marine, and Delta -



Explorers and Discoverers
- Alaska Thanks You -



Map & Database of Exploration Drilling Targets
- Custom Built For Alaska's Explorers -

The Map and Database of Exploration Drilling Targets Categorized by Play Type, North Slope and Offshore Arctic Alaska is available on the Alaska Division of Oil and Gas' website: http://dog.dnr.alaska.gov/Information/Studies

- Sheet 1 - Map of all Exploration Drilling Targets Categorized by Play Type
- Sheet 2 - Map of Ellesmerian Exploration Drilling targets (Kekiktuk Formation, Lisburne Group, Sadlerochit Group, Shublik Formation, and Sag River Sandstone)
- Sheet 3 - Map of Beaufortian Exploration Drilling targets (Jurassic Shoreface and Cretaceous Rift)
- Sheet 4 - Map of Brookian Exploration Drilling Targets (Brookian Turbidite and Brookian Topset)
- Database of Exploration Drilling Targets Categorized by Play Type (Excel)

Map & Database of Exploration Drilling Targets
- Custom Built For Alaska's Explorers -

Inside Look at the Database:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1		General Well Information															Resource Tar
2	Map #	API #	Well Name	Operator	Spud Date	Comp Date	MD	TVD	Status	BRKNtop	BRKNturb	CRCSLrift	JRSCshoreface	ELSM	OTHER	Public Source	Public Source Link
3	1	55382000020000	OCS 1275 POPCORN - 1	SHELL	10/14/1989	9/23/1990	10202	10185.9	INF					SDLC ELSM		Petroleum News, 2018	http://www.petroleumnews.com/pnads/347813743.shtml
4	2	55382000030000	OCS 1320 CRACKERJACK - 1	SHELL	9/23/1990	8/31/1991	9573	9569.6	YES					SDLC IVSK		Petroleum News, 2018	http://www.petroleumnews.com/pnads/432447354.shtml
5	3	55352000010000	OCS 1413 BURGER - 1	SHELL	9/22/1989	8/22/1990	8202	8201.21	YES			BURGER				Craig & Sherwood, 2001	https://www.boem.gov/Economic-Study-of-the-Burger-Gas-Discovery/
6	4	55322000010000	OCS 0996 DIAMOND - 1	CHEVRON	9/7/1991	10/5/1991	6745	6741.51	YES					SDLC		BOEM, 2006	https://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Resour
7	5	55352000040000	OCS 2321 BURGER - J	SHELL	7/30/2015		6800	6795	YES			BURGER				BOEM, 2018 FOIA Request	http://dog.dnr.alaska.gov/Information/Studies (End of Well Report)
8	6	55381000010000	OCS 1482 KLONDIKE - 1	SHELL	7/9/1989	9/15/1989	12008	12008	YES					IVSK		Petroleum News, 2018	http://www.petroleumnews.com/pnads/97528211.shtml
9	7	55262000010000	OCS 0742 CABOT - 1	ARCO	11/1/1991	2/26/1992	12230	10432	INF			KPRK	KNGK			BOEM, 2018 FOIA Request	http://dog.dnr.alaska.gov/Information/Studies (Well Comp Rep)
10	8	55232000030000	OCS 0267 FIREWEED - 1	ARCO	10/19/1990	12/25/1990	9650	9650	WTS		BRKN		KNGK	ELSM		BOEM, 2018 FOIA Request	http://dog.dnr.alaska.gov/Information/Studies (Well Summary Report & Well Ab
11	9	55232000010000	OCS 0280 ANTARES - 1	EXXON	11/1/1984	1/18/1985	8450	8447.78	INF					ELSM	BSMT	BOEM, 2018 FOIA Request	http://dog.dnr.alaska.gov/Information/Studies (Well Comp Rep)
12	10	55232000020000	OCS 0280 ANTARES - 2	EXXON	1/19/1985	4/12/1985	11608	8185.42	INF					ELSM		BOEM, 2018 FOIA Request	http://dog.dnr.alaska.gov/Information/Studies (Well Comp Rep)
13	11	55231000030000	OCS 0804 ORION - 1	EXXON	11/10/1985	12/15/1985	7300	7297.81	INF		CRCS				BSMT	BOEM, 1991	https://www.boem.gov/BOEM-Newsroom/Library/Publications/1991/91_0076.as
14	12	55231000040000	OCS 0302 MARS - 1	AMOCO	3/12/1986	4/27/1986	7982	7970.52	INF					SDLC, IVSK		BOEM, 2018 FOIA Request	http://dog.dnr.alaska.gov/Information/Studies (Well Comp Rep)
15	13	55231000050000	OCS 0338 PHOENIX - 1	TENNECO	9/23/1986	12/19/1986	9866	9866	INF	WSSK	TOROK			ELSM		BOEM, 2006	https://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Resour
16	14	55231000010000	OCS 0334 MUKLUK - 1	SOHIO	11/1/1983	1/24/1984	9862	9858.81	YES					IVSK		Craig, Sherwood, Johnson, 198	https://www.boem.gov/BOEM-Newsroom/Library/Publications/1985/85_0111.as
17	15	55171000070000	OCS 1092 GALAHAD - 1	AMOCO	9/14/1991	10/13/1991	9238	9238	INF	MIOCENE						BOEM, 2006	https://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Resour
18	16	55201000070000	OCS 0370 SANDPIPER - 1	SHELL	9/2/1985	1/25/1986	12575	11926.8	YES					IVSK		Petroleum News, 2018	http://www.petroleumnews.com/pnads/227383296.shtml
19	17	55201000080000	OCS 0371 SANDPIPER - 2	AMOCO	2/8/1986	7/12/1986	14983	11753.6	YES					IVSK		Petroleum News, 2018	http://www.petroleumnews.com/pnads/227383296.shtml
20	18	55201000100000	OCS 1578 MCCOVEY - 1	ENCANA	12/6/2002	1/27/2003	12315	12121	YES		BRKN					BOEM, 2006	https://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Resour
21	19	50029212360000	OCS 0180 SEAL 4 ST - 1	SHELL	2/19/1984	7/21/1985	16090	12083.5	YES					IVSK		DOG Document	http://dog.dnr.alaska.gov/Documents/Units/2015/20150224_NS_HooliganPA_

Read Me | Exp Target Information | Exp Target Abbreviations | Oil & Gas Pool Abbreviations | Public References

Ready

OCS Well Histories & Public Exploration Plans are also available on our studies page:

FOIA Request (BOEM-2018-00218)

Outer Continental Shelf (OCS) Well Dataset (BOEM-2018-00218)

- Miscellaneous Well Data (zip file)
- Exploration Plans (zip file)

Exploration Target Abbreviations
- Color Coded By Play Type: Brookian Sequence -

SVKK	**Sagavanirktok Formation**
CNNG	**Canning Formation**
FLAX	Flaxman Sandstone
BDAM	Badami Sandstone
KILLIAN	Killian Sandstone
PCCK	**Prince Creek Formation**
KGKK	Kogosurkruk tongue of Prince Creek abandoned
UGNU	**Ugnu Sandstone**
SCBF	**Schrader Bluff Formation**
SLHL	Sentinel Hill Mbr of Schrader Bluff abandoned
BRTL	Barrow Trail Mbr of Schrader Bluff abandoned
WSSK	West Sak Sandstone
TLVK	**Tuluvak 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
TOROK	**Torok Formation**
ALBN	Albian Top
NANUQ	Nanuq Sandstone
MORAINE	Moraine Sandstone
OMLK	Nuna Sandstone
NUNA	Oumalik Formation abandoned
TPGK	Topogoruk Formation abandoned
FRTR	**Fortress Mountain Formation**
HUE	**Hue Shale**
HRZ	**HRZ**

Exploration Target Abbreviations
- Color Coded By Play Type: Beaufortian, Ellesmerian, & Other -

PBLS	**Pebble Shale**
KLBK	Kalubik Formation
PTRR	Put River Sandstone
THOM	Thomson Sandstone
KEMIK	Kemik Sandstone
KPRK	**Kuparuk Formation**
WLKP	Walakpa Sandstone
KNGK	**Kingak Shale**
ALPN	Alpine Sandstone
NUIQ	Nuiqsut Sandstone
NECH	Nechelik Sandstone
SIMP	Simpson Sandstone
KUGRUA	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
LSBR	**Lisburne Group**
WHOO	Wahoo Limestone
ALPH	Alapah Limestone
EDCT	**Endicott Group**
KAYAK	Kayak Shale
KKKK	Kekiktuk Sandstone
KVLA	Kivalina Mbr of Kuna Formation Red Dog Mine
BSMN	**BASEMENT**
PREMISS	Pre Mississippian
DVNN	Devonian
ARGL	Argillite Basement

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 rift 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 production (22% in 2018).
5. Giant sized oil accumulations are still being discovered in North Alaska (Brookian Topset Play – CPAI & Oil Search/Repsol/Armstrong).
6. The exploration target maps and database are constructed with the explorer in mind: http://dog.dnr.alaska.gov/Information/Studies
7. AK DOG also created a document that highlights public data sources relevant to oil and gas exploration – SALSA: http://dog.dnr.Alaska.gov/Library/SALSA

Acknowledgements & Disclaimer

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