State of Alaska
Areawide Lease Sales

Five Year Schedule Update & Exploration Potential

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Pat Galvin, Petroleum Land Manager
Paul Decker, Petroleum Geologist

Alaska Division of Oil & Gas

PacCom Expo
Anchorage, Alaska
February 23, 2006

ALASKA
DEPARTMENT OF
NATURAL RESOURCES
DIVISION OF OIL & GAS

FIVE-YEAR OIL AND GAS LEASING PROGRAM
PUBLIC NOTIFICATION SCHEDULE

January 2006

Proposed Sale Area & Date		2006	2007	2008	2009	2010
North Slope Areawide 2006	*Mar	S				
Beaufort Sea Areawide 2006	*Mar	S				
North Slope Foothills Areawide 2006	*May	FS, S				
Cook Inlet Areawide 2006	May	FS, S				
North Slope Areawide 2006 A	Oct	C—E, FS, S				
Beaufort Sea Areawide 2006 A	Oct	C—E, FS, S				
Alaska Peninsula Areawide 2007	Feb	C—E, FS	S			
North Slope Foothills Areawide 2007	Feb	C—E, FS	S			
Cook Inlet Areawide 2007	May	C—E	FS, S			
North Slope Areawide 2007	Oct		C—E, FS, S			
Beaufort Sea Areawide 2007	Oct		C—E, FS, S			
Alaska Peninsula Areawide 2008	Feb		C—E, FS	S		
North Slope Foothills Areawide 2008	Feb		C—E, FS	S		
Cook Inlet Areawide 2008	May		C—E	FS, S		
North Slope Areawide 2008	Oct		P—E, F	N, S		
Beaufort Sea Areawide 2008	Oct			C—E, FS, S		
Alaska Peninsula Areawide 2009	Feb			C—E, FS, S		
North Slope Foothills Areawide 2009	Feb			C—E, FS, S		
Cook Inlet Areawide 2009	May		P—E	F, N, S		
North Slope Areawide 2009	Oct			C—E, FS, S		
Beaufort Sea Areawide 2009	Oct			P—E, F, N, S		
Alaska Peninsula Areawide 2010	Feb			C—E, FS, S		
North Slope Foothills Areawide 2010	Feb			C—E, FS, S		
Cook Inlet Areawide 2010	May			C—E, FS, S		
North Slope Areawide 2010	Oct			C—E, FS, S		
Beaufort Sea Areawide 2010	Oct			C—E, FS, S		

C = Call for Comments: Request for New Information Made Available Since Last Finding.
* = 2006 Only

E = End of Comment Period.
P = Preliminary Best Interest Finding / ACMP Consistency Analysis.

F = Final Finding.
FS = Supplement to Final Finding and/or Notice of Sale and Terms.

N = Notice of Sale and Terms
S = Sale.

Public Process

1/20/06

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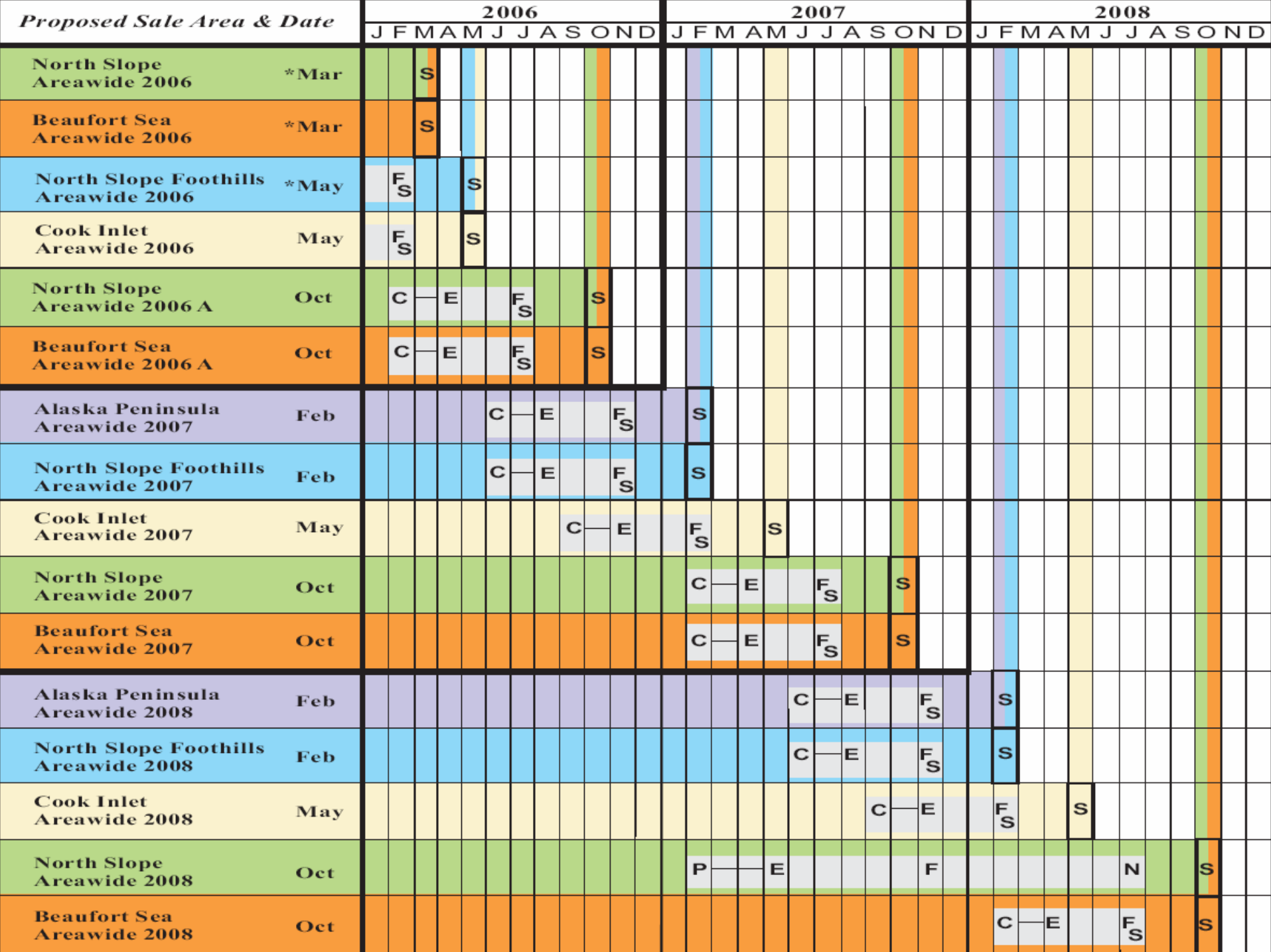
Proposed Sale Area & Date
2006
2007
2008
J F M A M J J A S O N D
North Slope Areawide 2006 *Mar
Beaufort Sea Areawide 2006 *Mar
North Slope Foothills Areawide 2006 *May
Cook Inlet Areawide 2006 May
North Slope Areawide 2006 A Oct
Beaufort Sea Areawide 2006 A Oct
Alaska Peninsula Areawide 2007 Feb
North Slope Foothills Areawide 2007 Feb
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North Slope Areawide 2007 Oct
Beaufort Sea Areawide 2007 Oct
Alaska Peninsula Areawide 2008 Feb
North Slope Foothills Areawide 2008 Feb
Cook Inlet Areawide 2008 May
North Slope Areawide 2008 Oct
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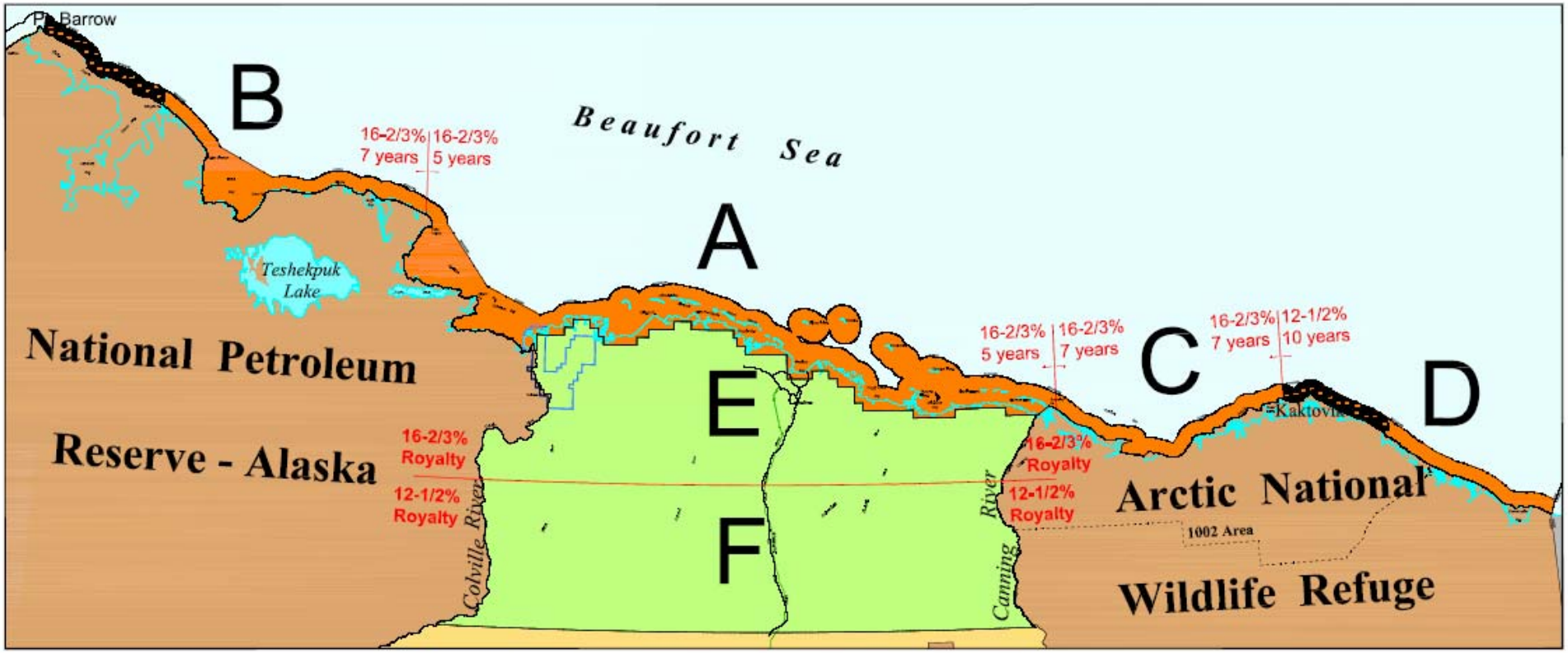
2006 Beaufort Sea and North Slope Areawide Sale Terms



Beaufort Sea Sale Area

North Slope Sale Area

KEY		2006 Sale		2004 Sale	
Area	Sale	Royalty	Term	Royalty	Term
A	BS	16 ⅔	5	16 ⅔	7
B	BS	16 ⅔	7	12 ½	10
C	BS	16 ⅔	7	12 ½	10
D	BS	12 ½	10	12 ½	10
E	NS	16 ⅔	5	16 ⅔	7
F	NS	12 ½	7	12 ½	10

0 Miles 25

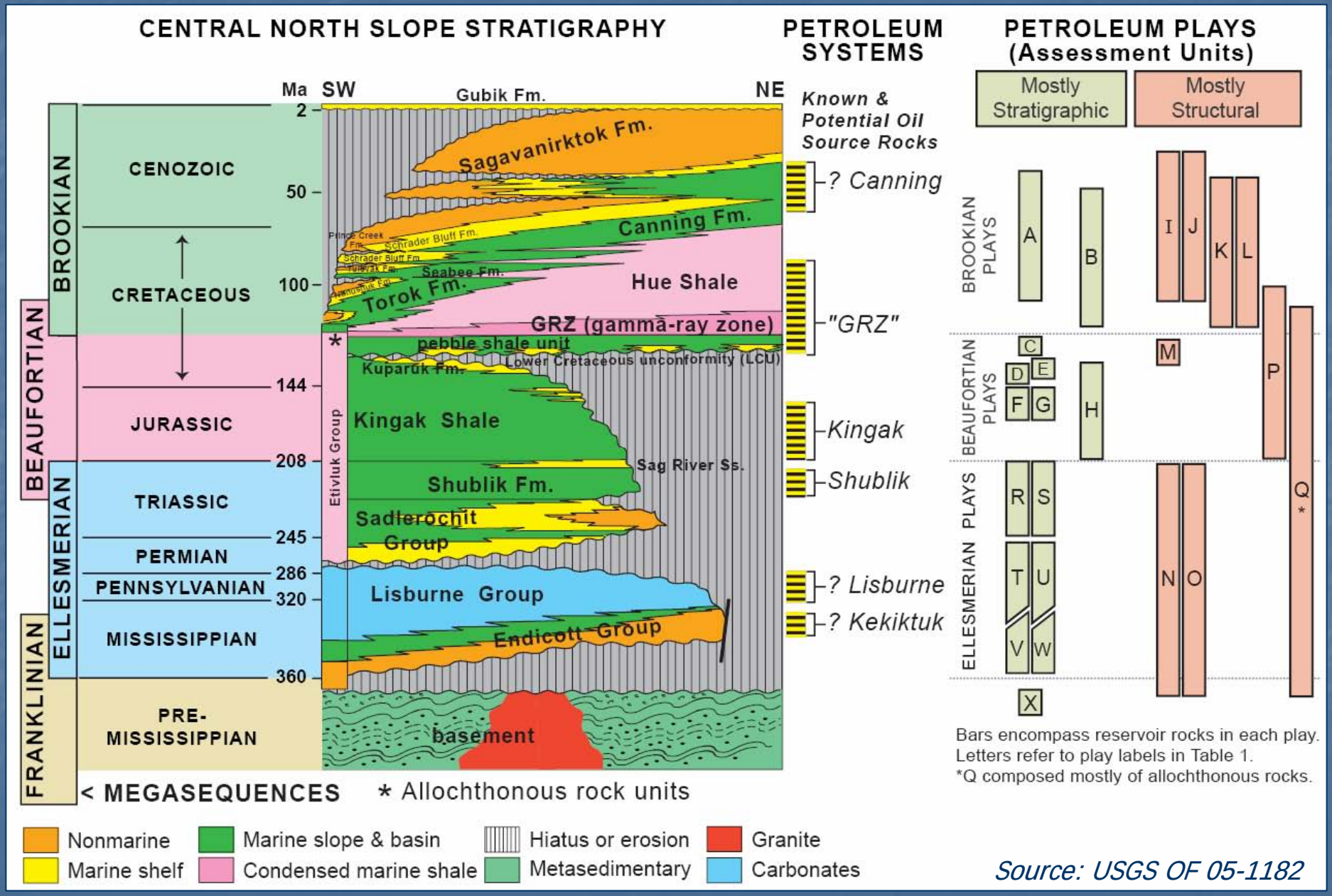
January 2006

ADNRDOG

Areawide Leasing in North Alaska

North Alaska Exploration Plays

USGS Assessments

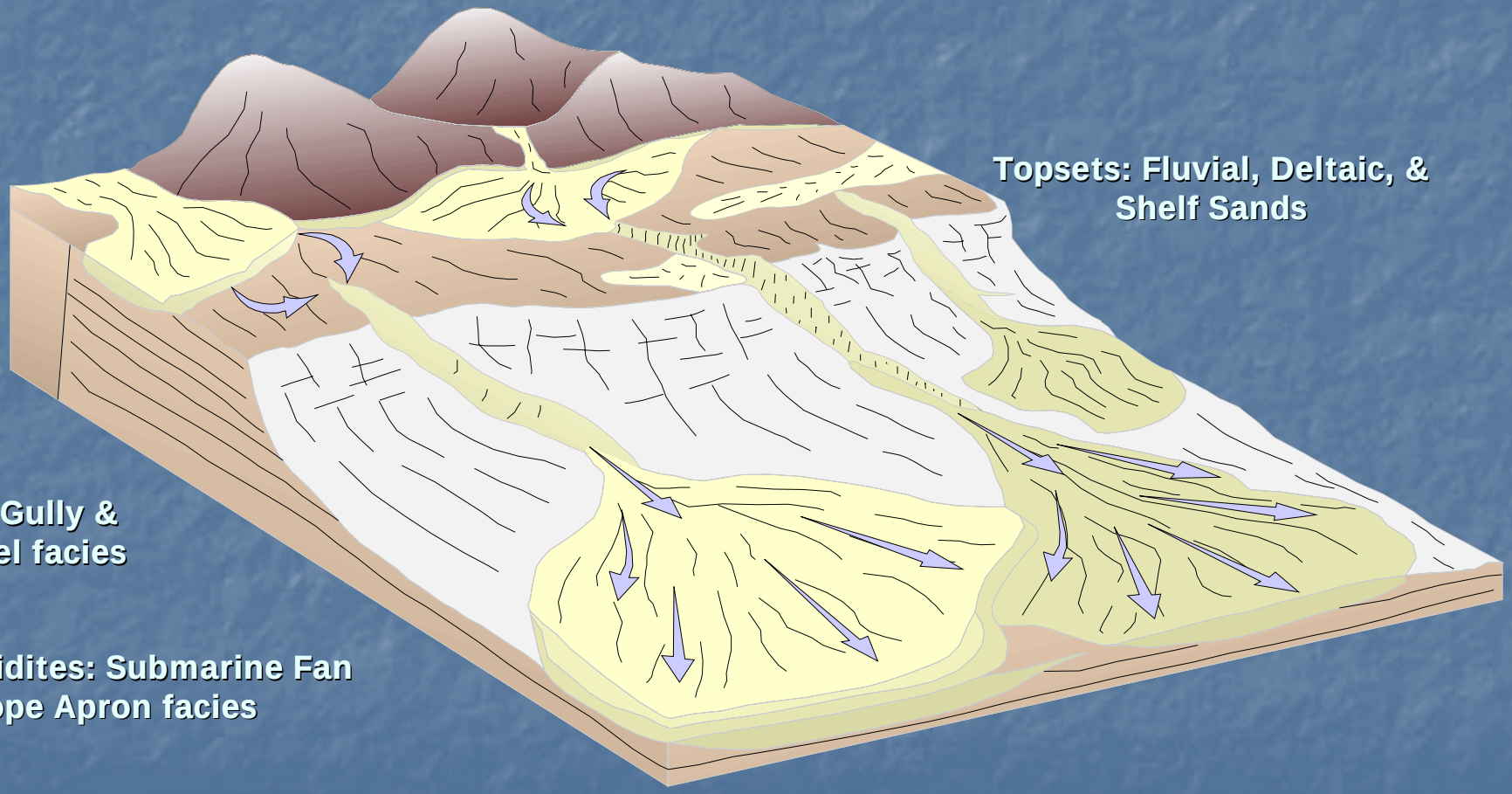


Source: USGS OF 05-1182

Generalized North Alaska Play Types

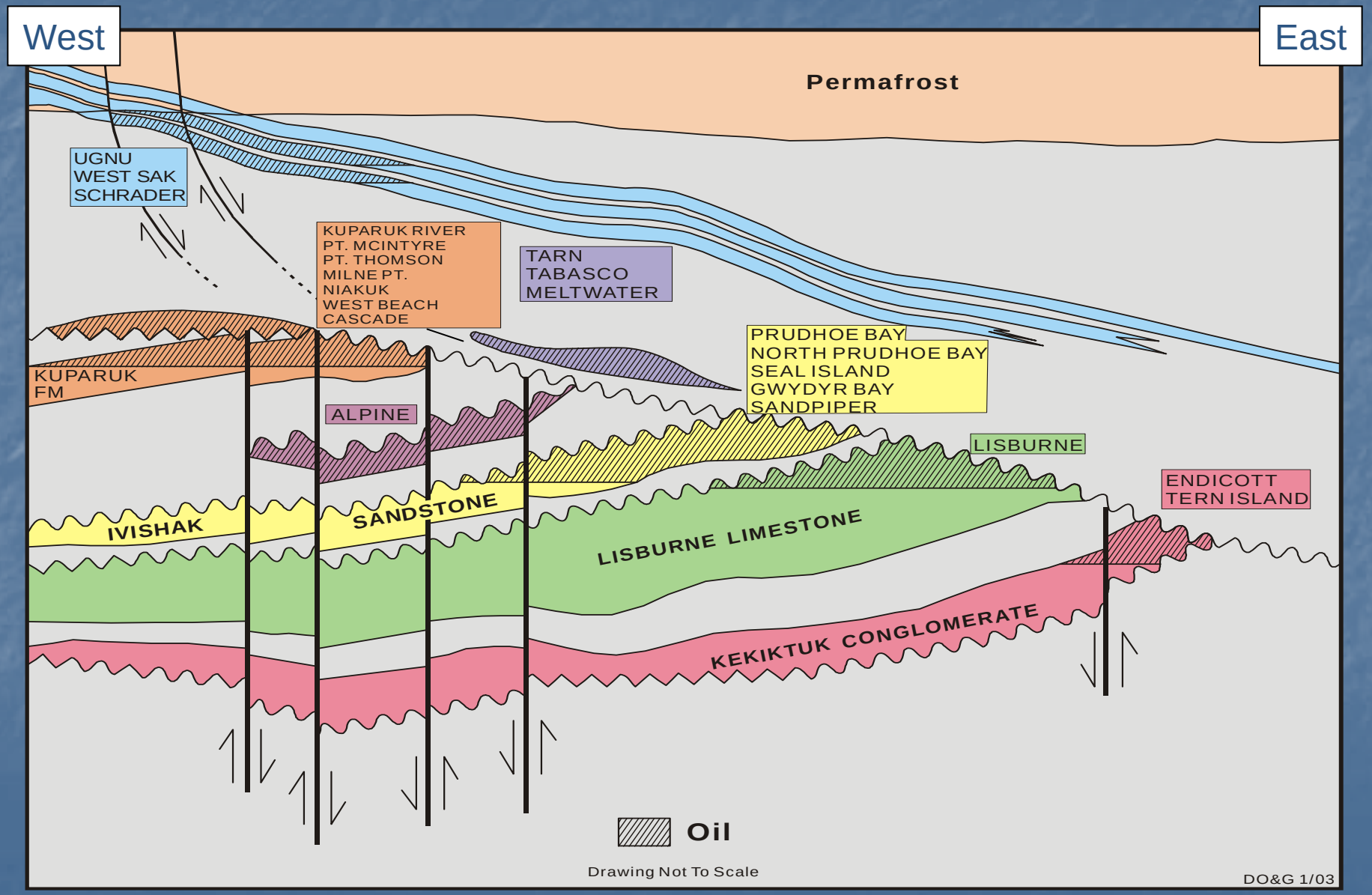
- Cretaceous – Tertiary Brookian Topset Play
  - *Structural and potential strat traps, various shallow marine & non-marine sands*
  - *West Sak, Schrader Bluff, Orion, Polaris, Ugnu, Umiat, Gubik, Kuvlum, Hammerhead, …*
- Cretaceous – Tertiary Brookian Turbidite Play
  - *Strat traps (north), structural traps (foothills), local deepwater sands*
  - *Tarn, Meltwater, Nanuq, Badami, Sourdough, …*
- Early Cretaceous Rift-related Shallow Marine Play
  - *Structural traps, Upper and Lower Kuparuk and loosely equivalent sands*
  - *Kuparuk, Milne Pt , Pt McIntyre, Niakuk, West Beach, Aurora, Borealis, Walakpa, Pt Thomson, …*
- Jurassic Shoreface Play
  - *Strat traps, Kingak Fm shallow marine sands (Alpine, Nuiqusut, Nechelik, Simpson, Barrow sands)*
  - *Alpine, Lookout, Spark, Rendezvous, Fiord, Barrow Gas Field…*
- Ellesmerian Sequence Plays
  - *Structural and unconformity combination traps in Triassic and older sands, carbonates*
  - *Prudhoe Bay, Northstar, Sandpiper (Triassic Ivishak sand), Lisburne (Carboniferous Lisburne carbonates), Endicott, Liberty (Mississippian Kekiktuk sand), …*

Depositional Model – Brookian Reservoirs



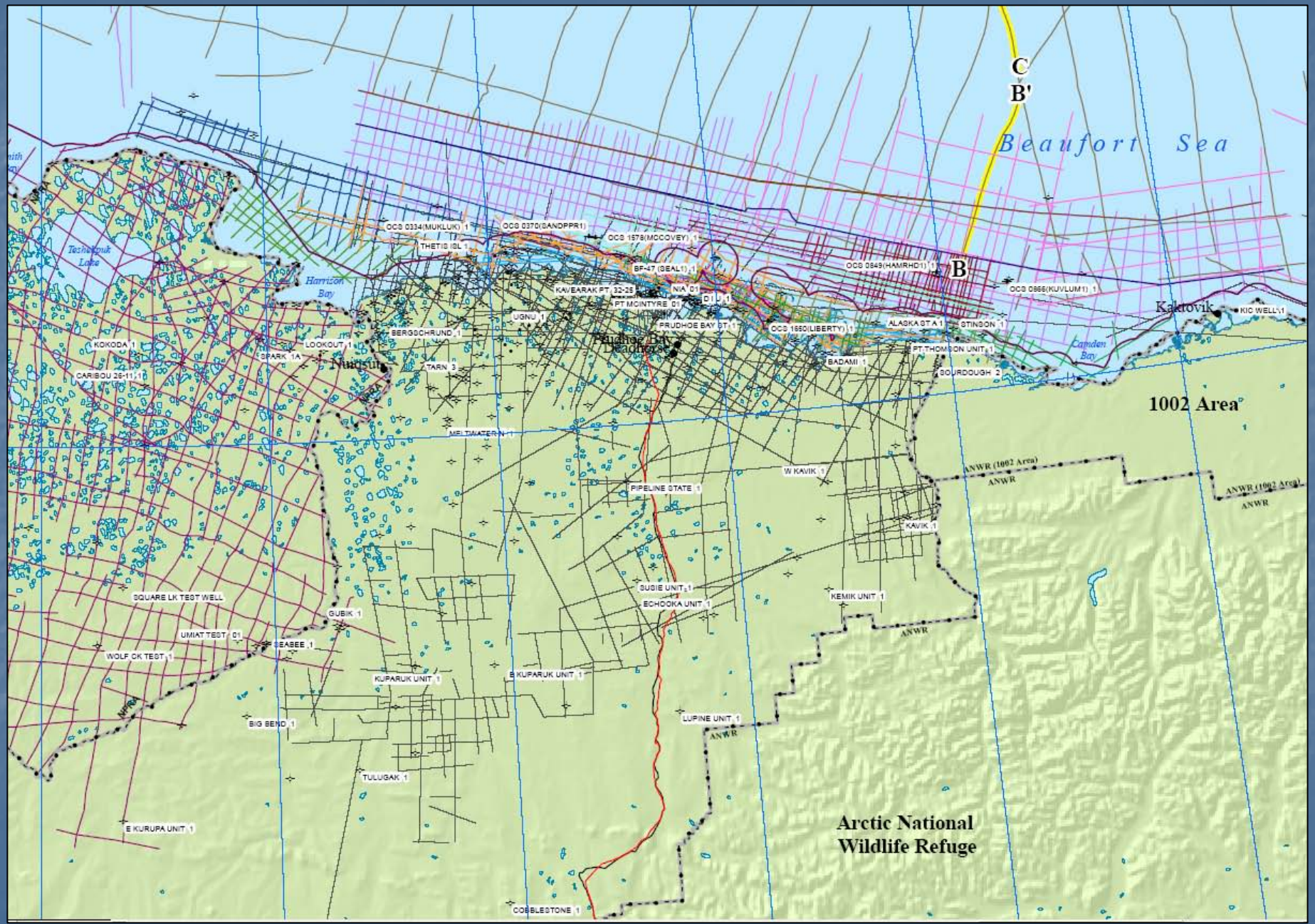
Schematic Geologic Cross Section

Central North Slope – Barrow Arch Province



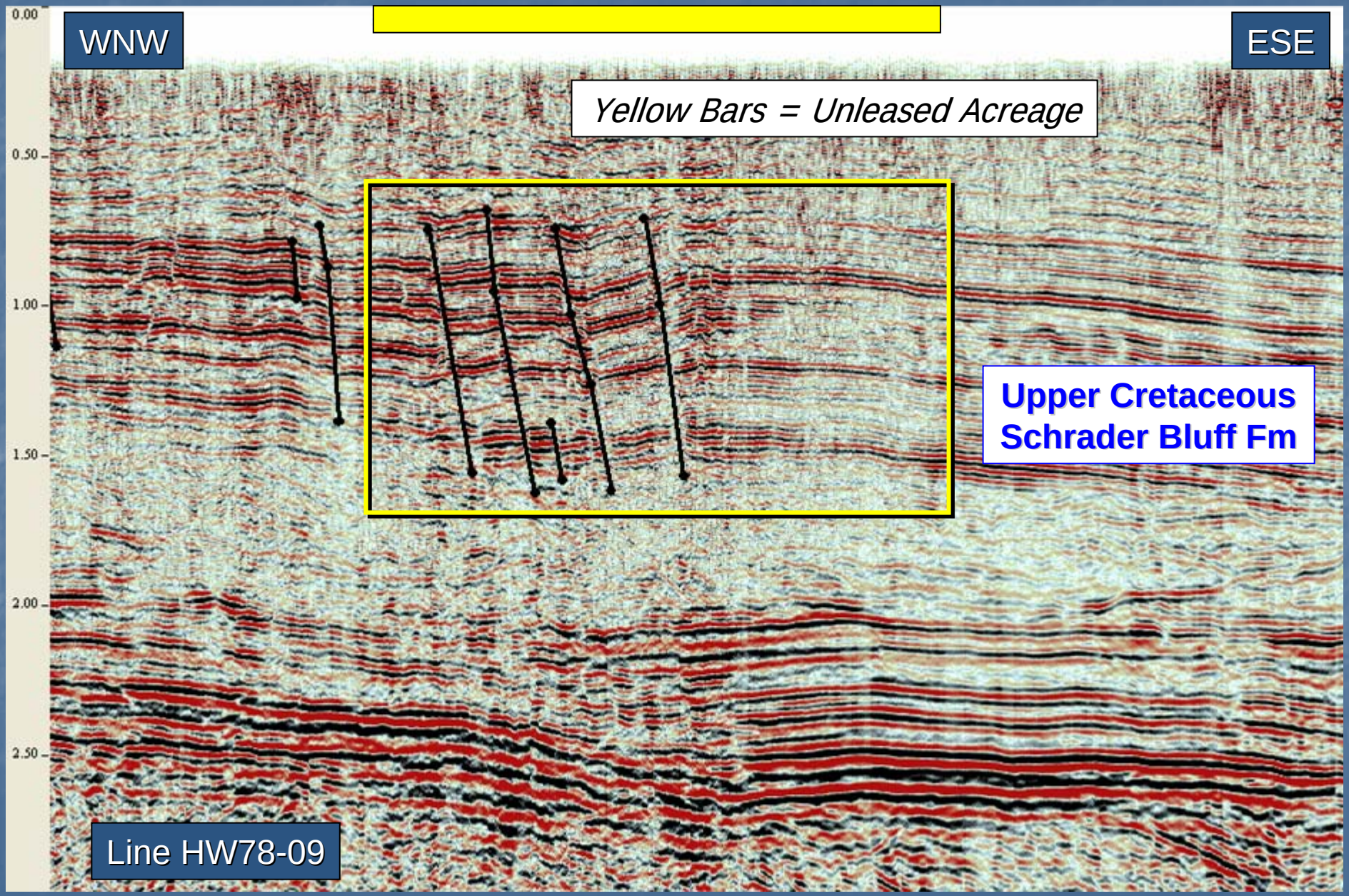
Publicly Available Seismic Data

North Alaska



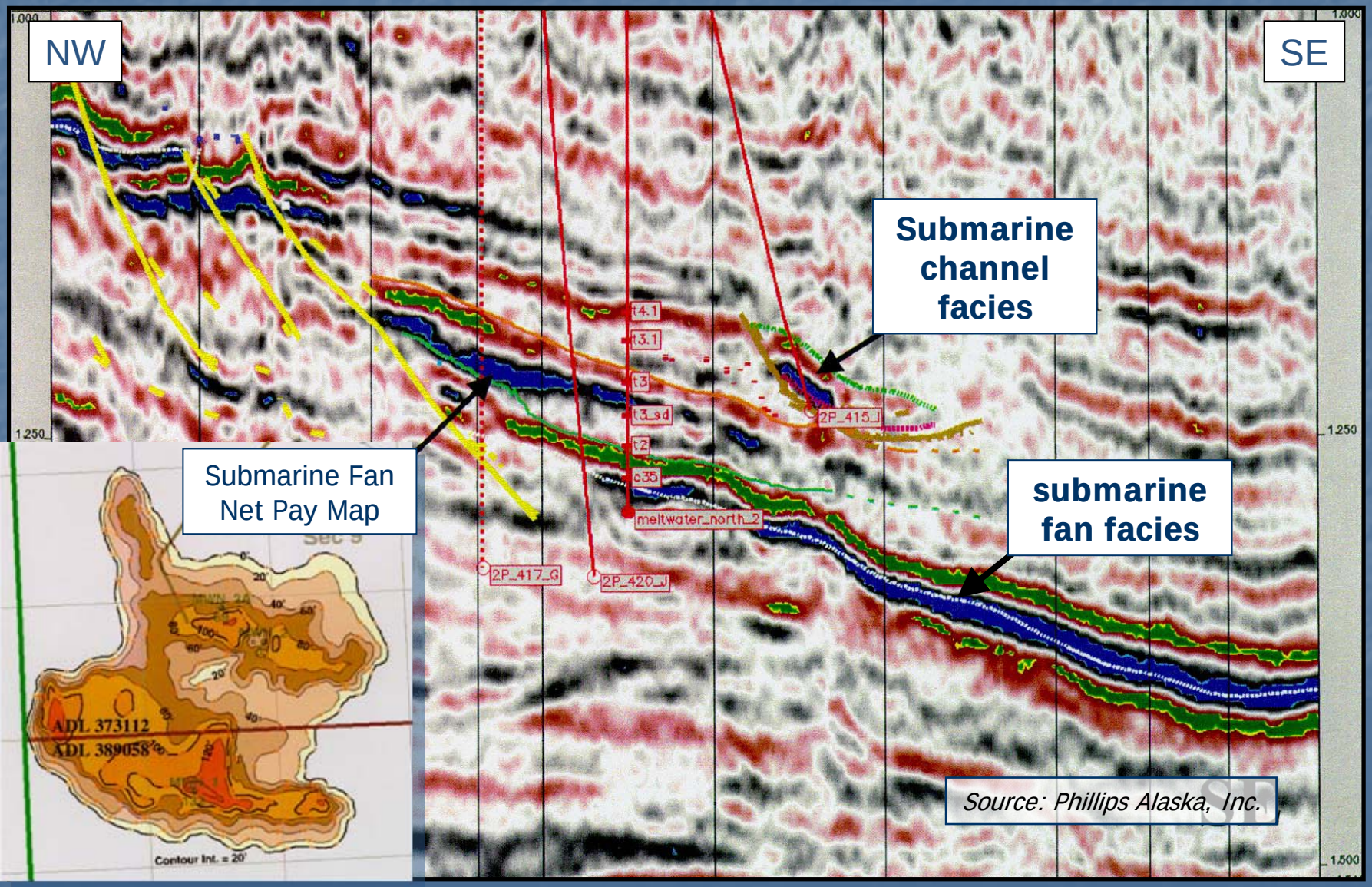
Brookian Topset Play

near Milne Pt



Brookian Turbidite Stratigraphic Play

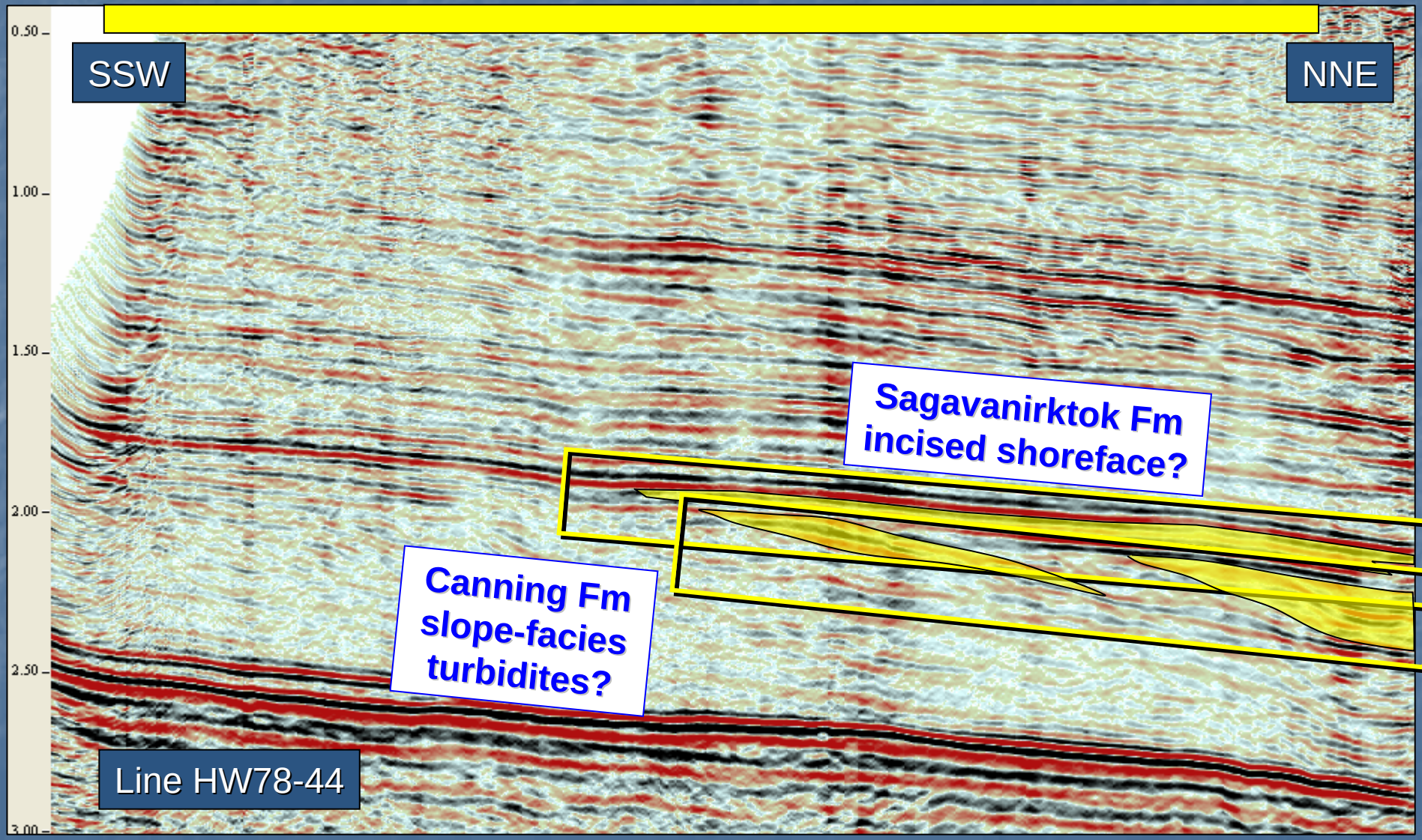
Upper Cretaceous Seabee Fm — Kuparuk River Unit



Source: Phillips Alaska, Inc.

Brookian Turbidite & Topset Plays

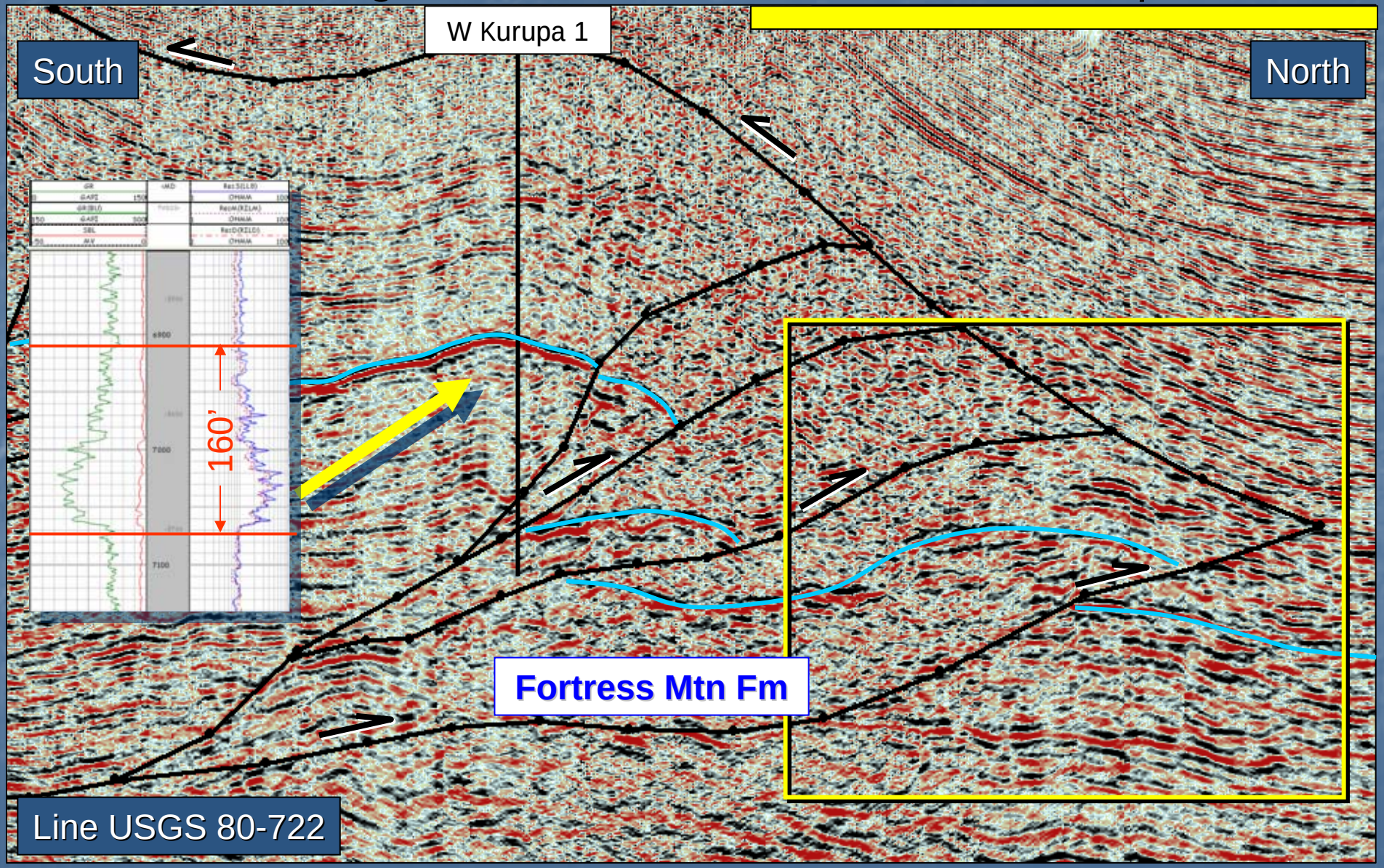
Eastern Beaufort State Waters



Brookian Turbidite Structural Play

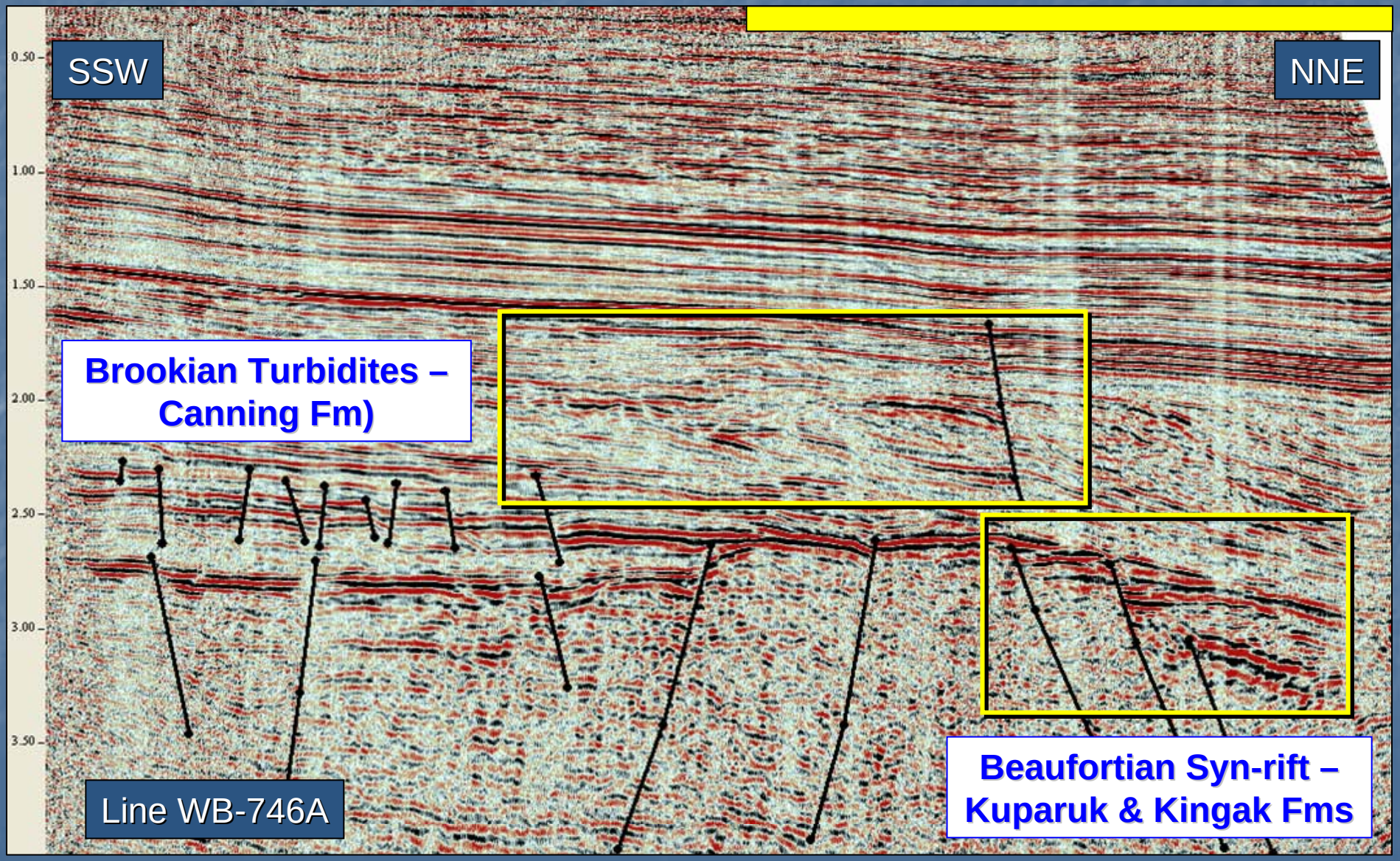
Thrust Belt-Triangle Zone

North Slope Foothills



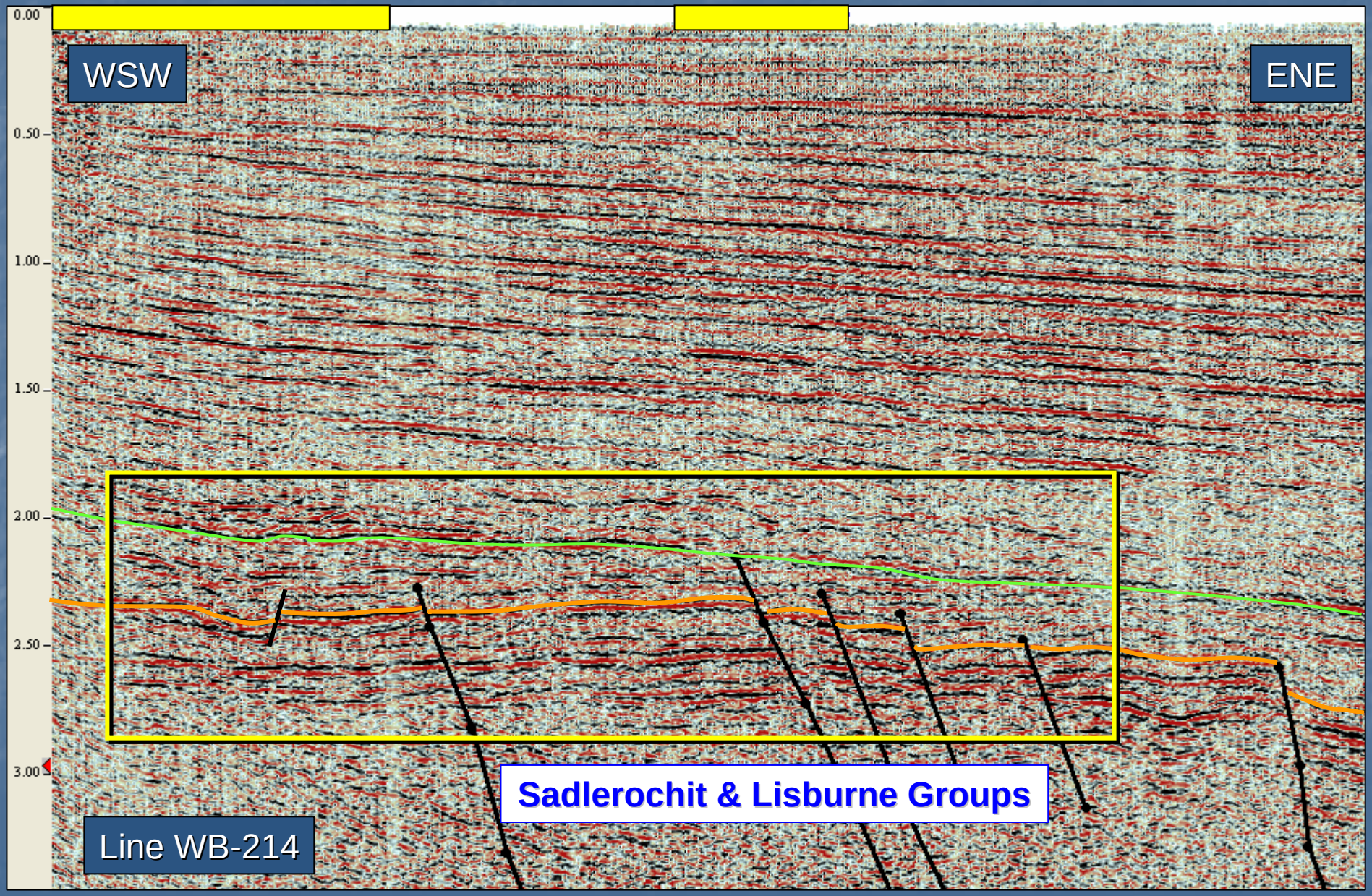
Beaufortian Syn-rift & Brookian Turbidite Plays

Cross Island area



Ellesmerian Barrow Arch Play

Northstar area



Ellesmerian Structural Play

Thrust Belt – Lisburne Carbonates

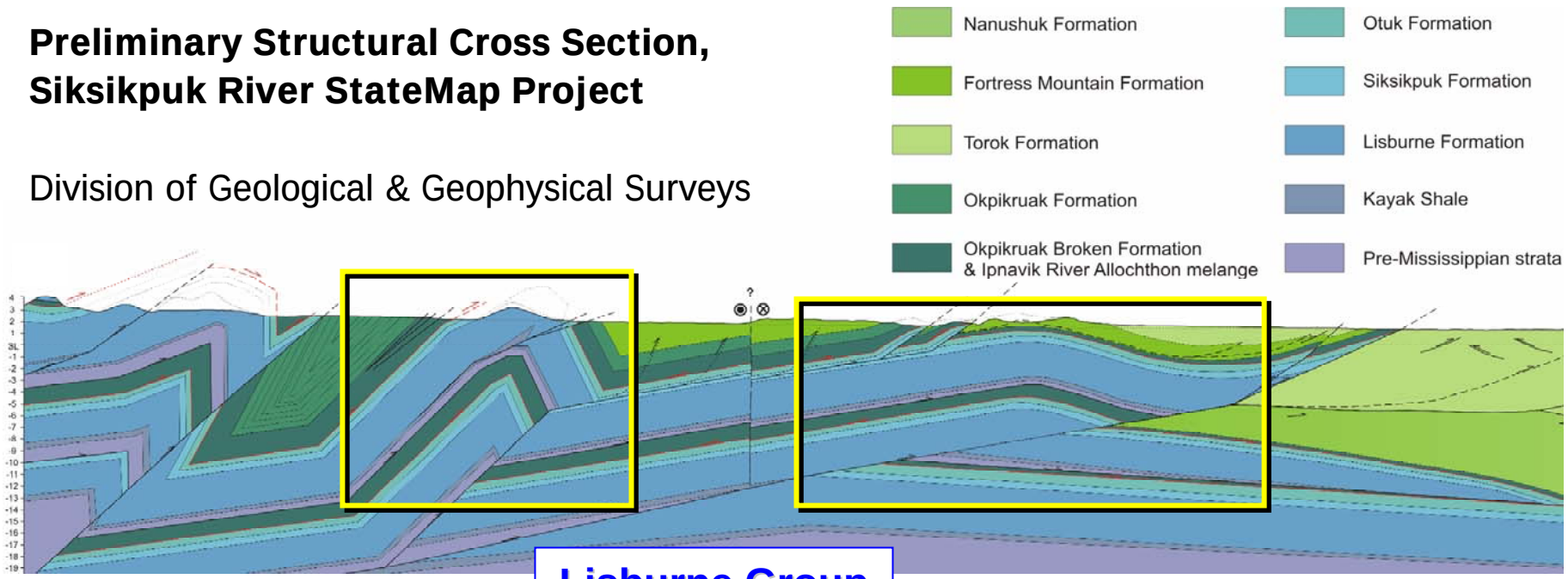
North Slope Foothills

South

North

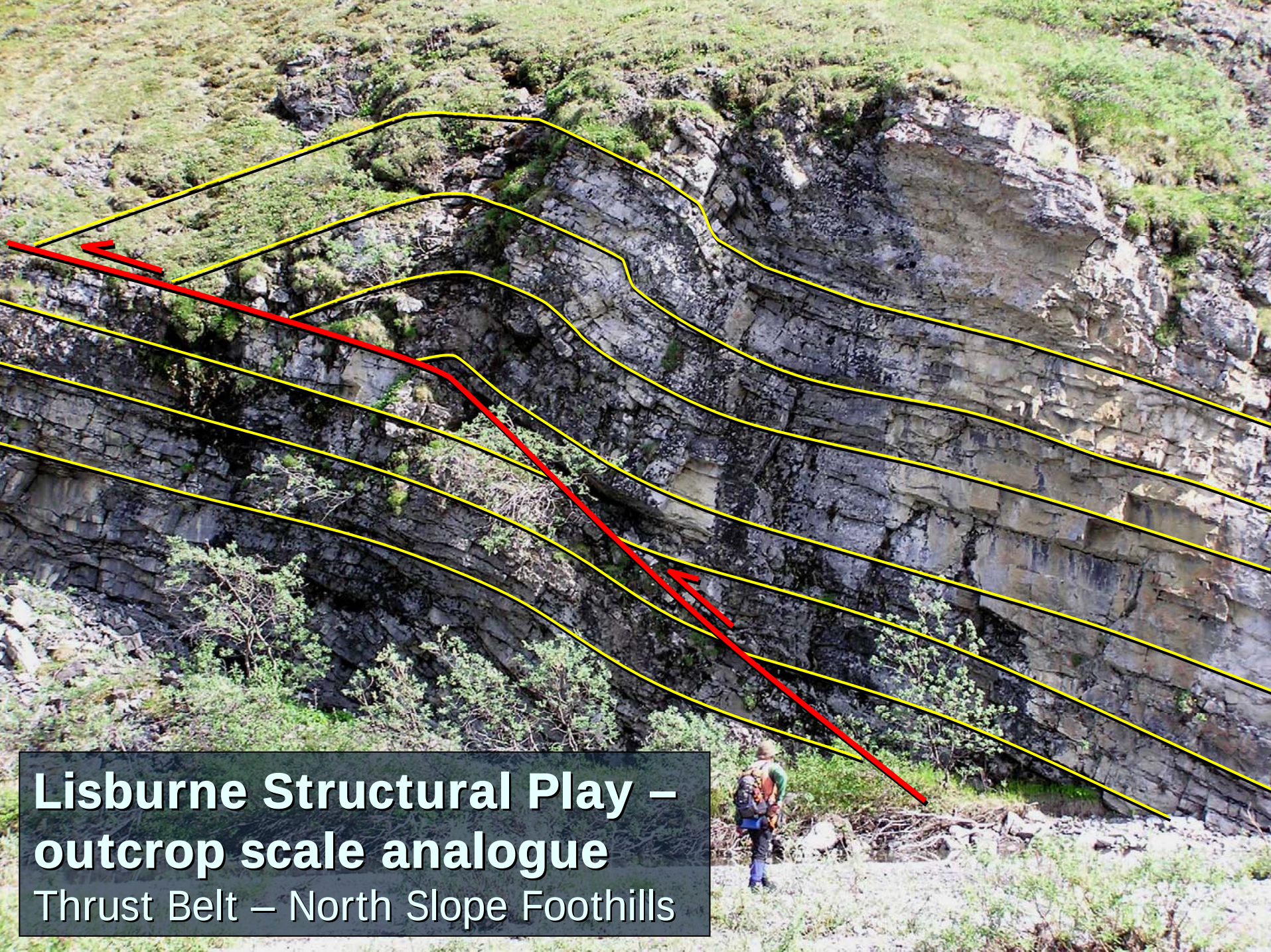
Preliminary Structural Cross Section, Siksikpuk River StateMap Project

Division of Geological & Geophysical Surveys



Lisburne Group anticlinal and subthrust traps

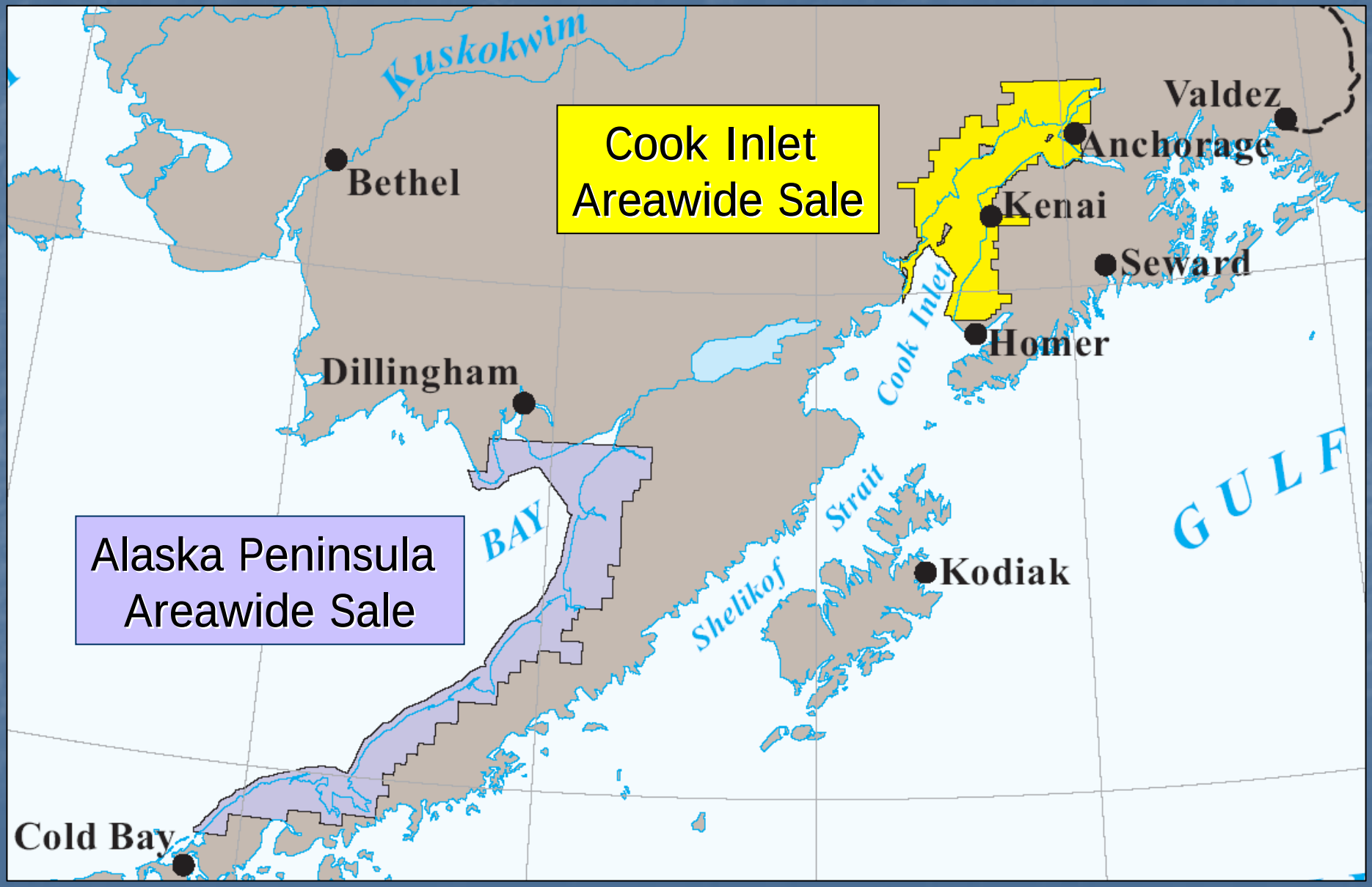
Source: R. Swenson, DGGS



Lisburne Structural Play – outcrop scale analogue

Thrust Belt – North Slope Foothills

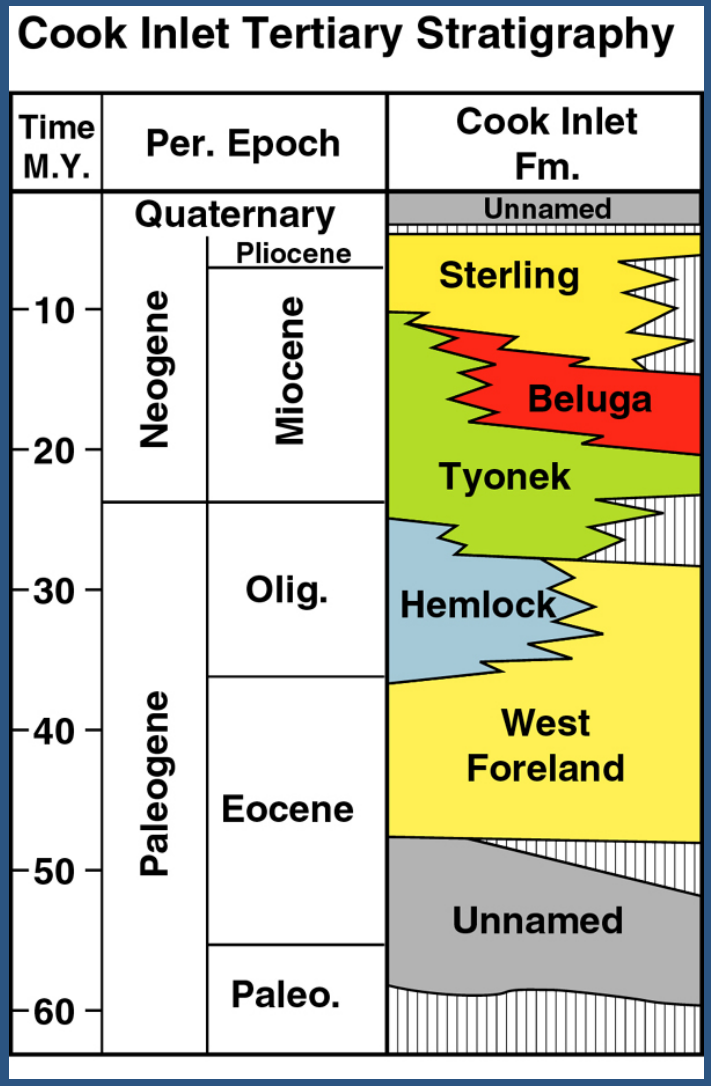
Areawide Leasing in South Alaska

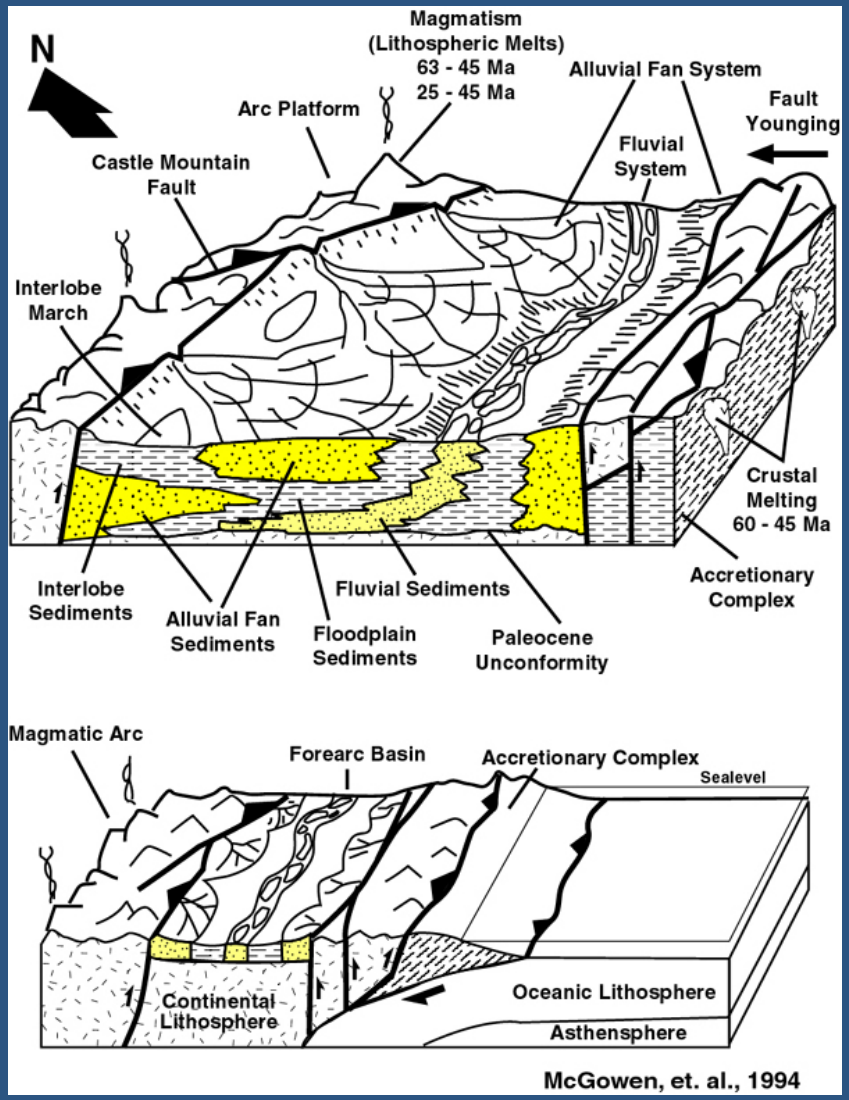


Cook Inlet Activity

Cook Inlet Tertiary Forearc Basin

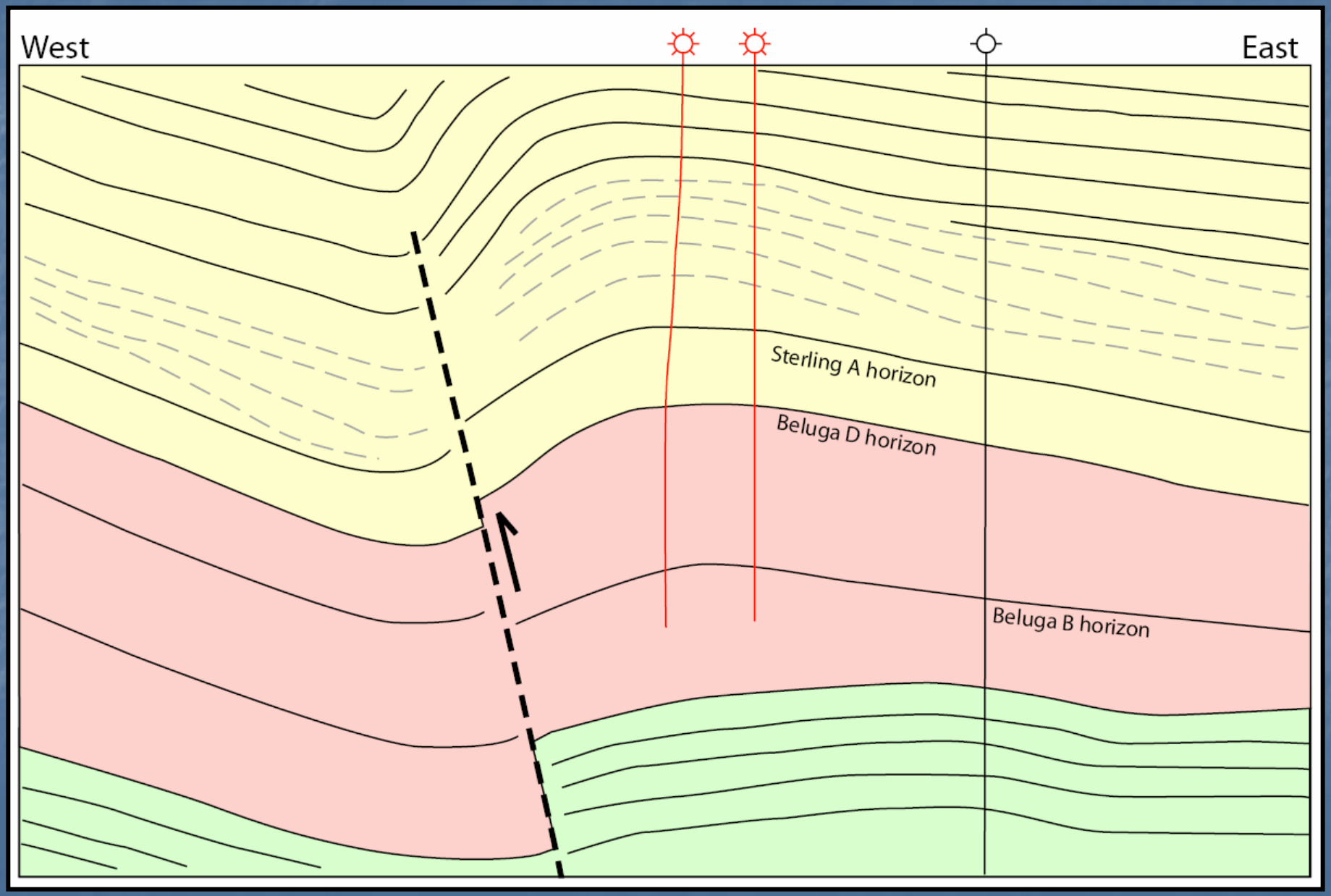
Nonmarine Stratigraphy and Depositional Models





Beluga Gas Field

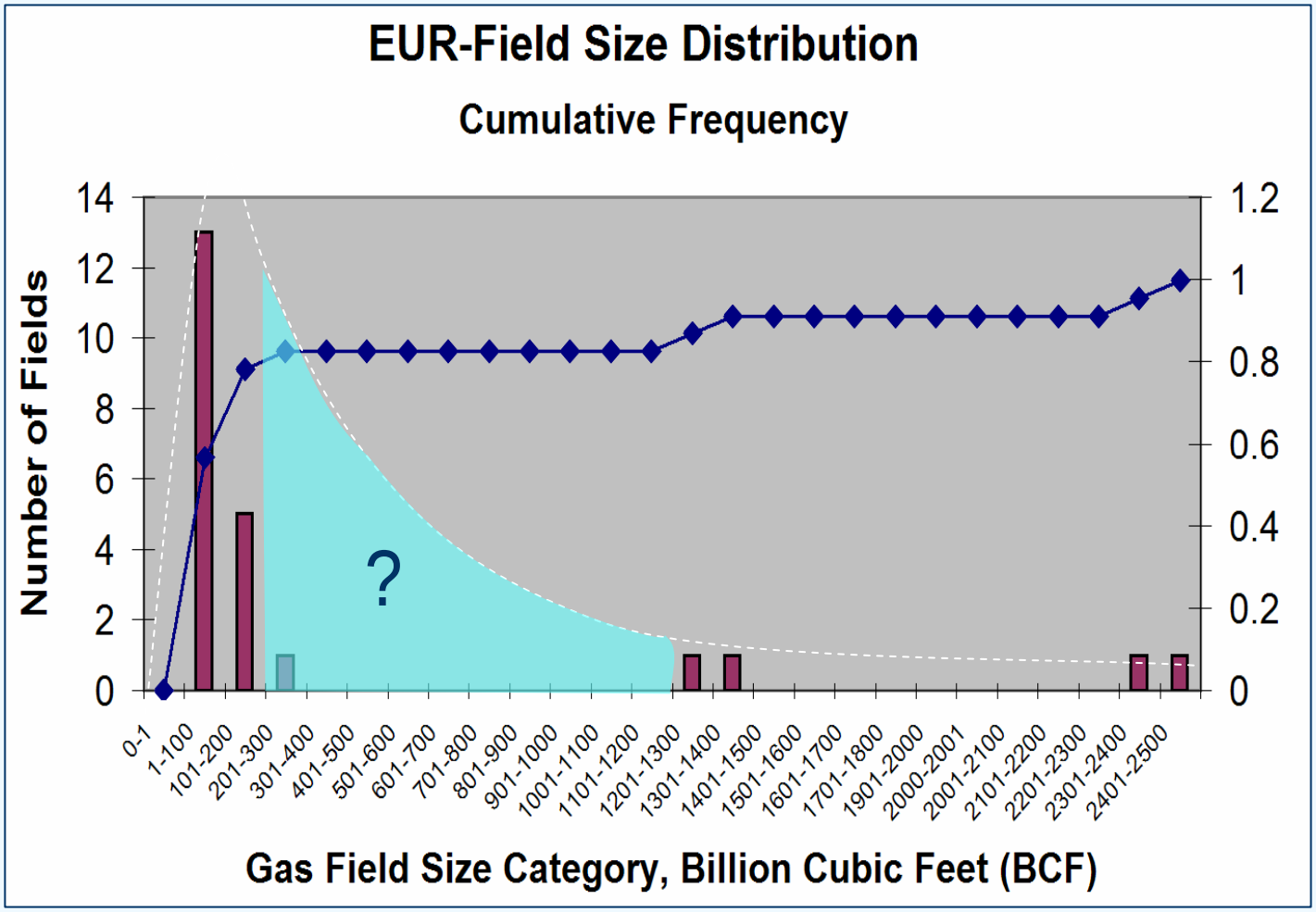
Geoseismic Cartoon



Cook Inlet – Key Geologic Attributes

- Up to 25,000 feet of High N/G Fluvial/Alluvial Stratigraphy
- Ubiquitous Coal (Biogenic Gas Source)
- Low Thermal Gradient Curtails Reservoir Destruction
- Timing of Late Structures Advantageous
- Sealing facies Distributed Throughout Section

Gas Field Size Distribution – Cook Inlet



Nicoli Creek	3
Stump Lake	6
Pretty Creek	6
West Fork	7
Lewis River	9
North Fork	12
Falls Creek	13
Birch Hill	22
Sterling	26
N Trading Bay Ur	30
Moquakie	43
Wolf Lake	50
Trading Bay	90
Ivan River	104
M G S	112
Cannery Loop	116
Granite Point	137
Swanson River	145
Beaver Creek	242
BRU	1266
McAurther River	1384
NCI	2328
Kenai	2425

TOTAL= 8576 bcf

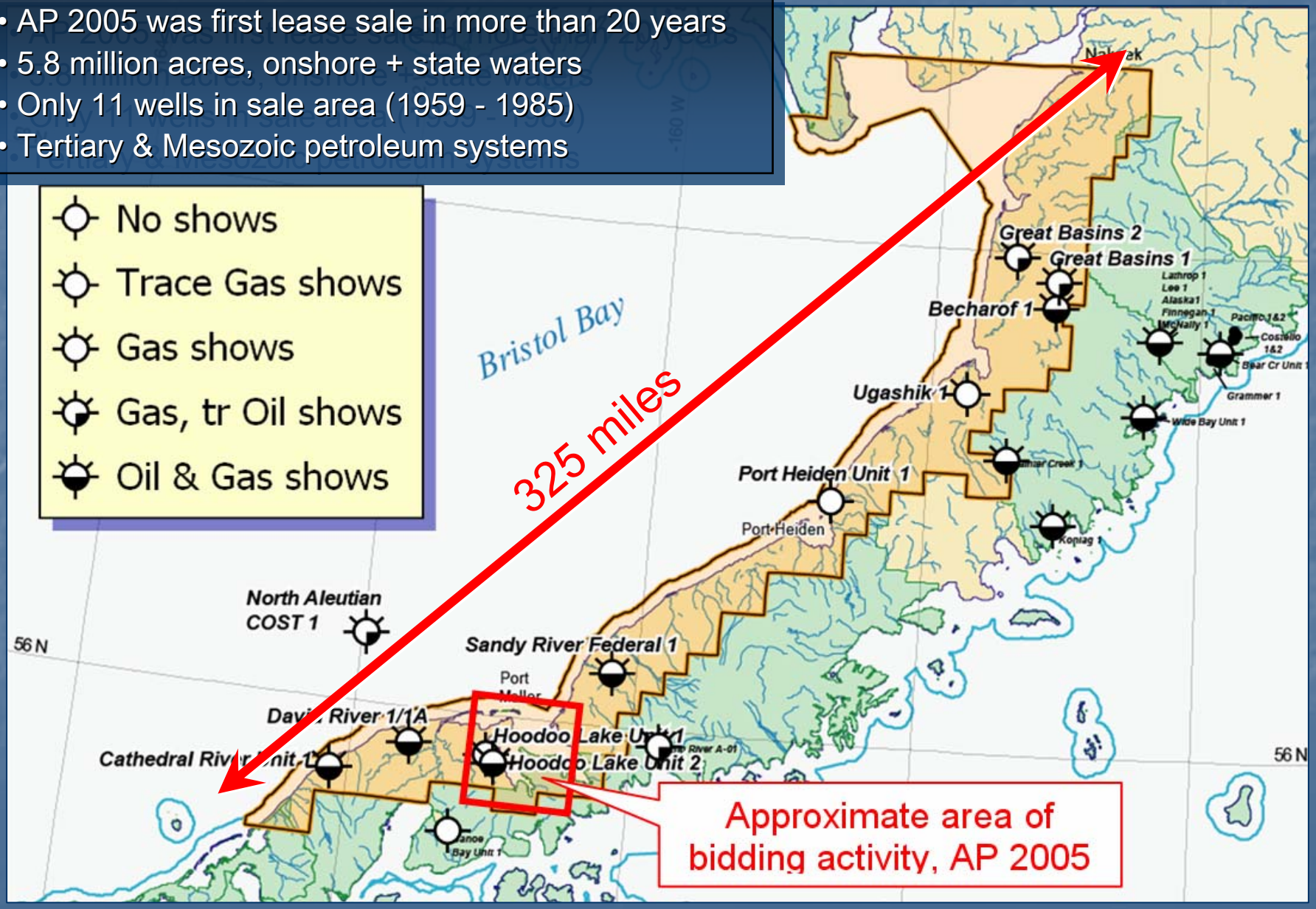
Mean = 373 tcf

Cook Inlet Gas Exploration Potential

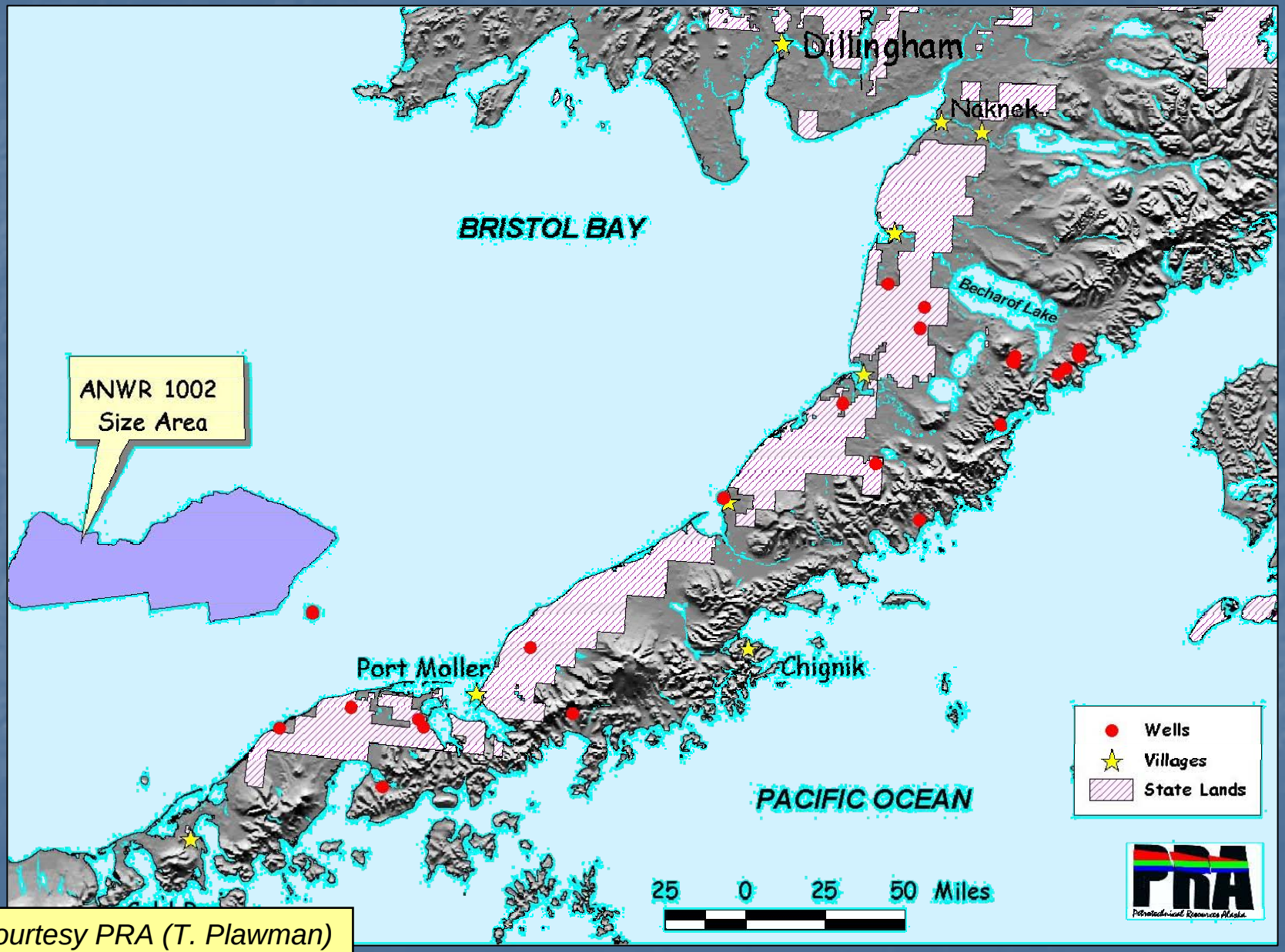
- Only structural traps have been explored for or developed – strat trap potential untapped
- 85% of gas discovered early in exploration cycle while drilling for oil
- Only 30 exploration wells drilled strictly for gas
- Nearly one in ten fields >2 tcf
- 4 largest fields have 86% of reserves
- Field-size distribution lacks discoveries in 300-1300 bcf range → yet to be discovered?

Alaska Peninsula Areawide Sales

- AP 2005 was first lease sale in more than 20 years
- 5.8 million acres, onshore + state waters
- Only 11 wells in sale area (1959 - 1985)
- Tertiary & Mesozoic petroleum systems

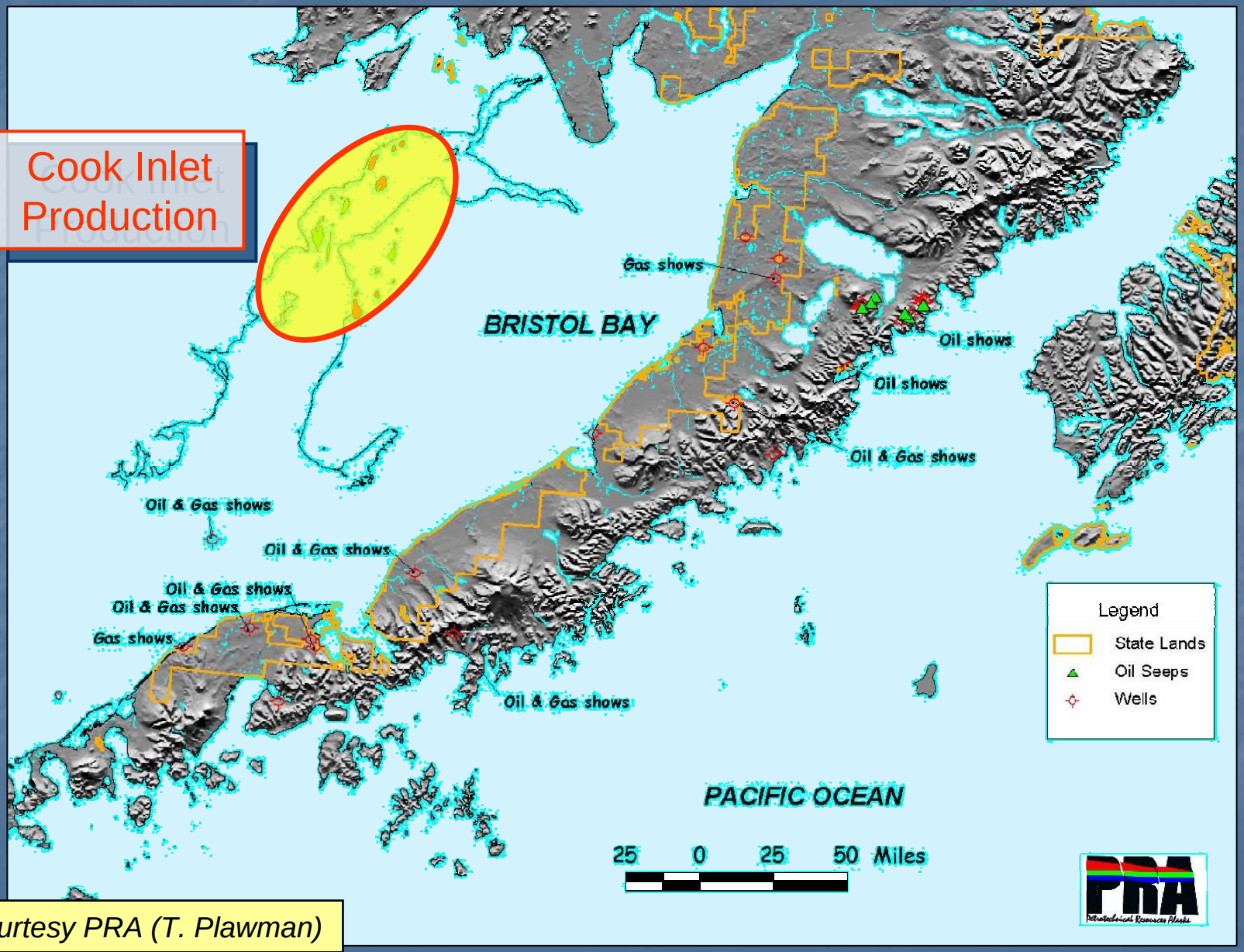


Size Comparison with ANWR 1002



courtesy PRA (T. Plawman)

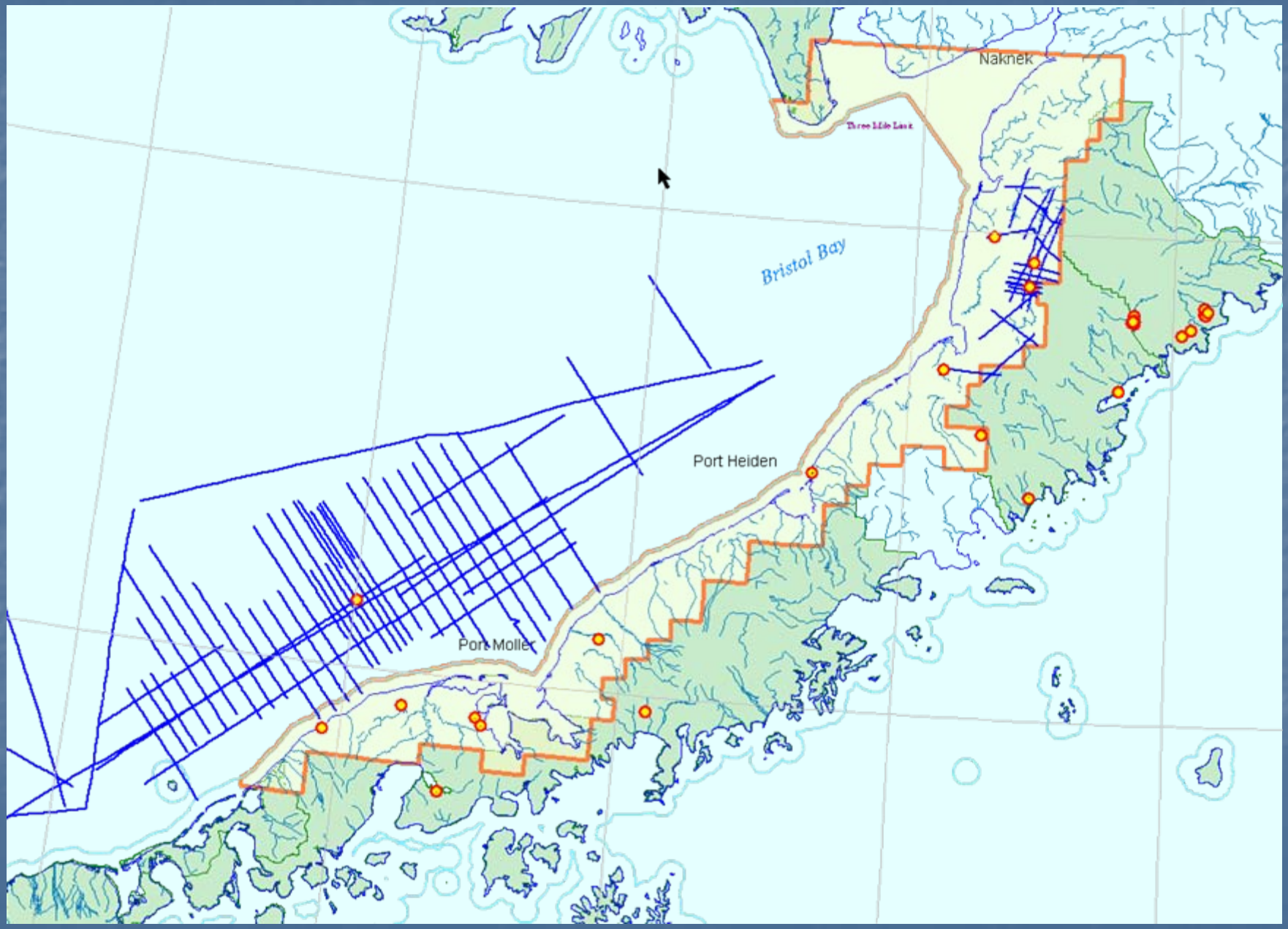
Size Comparison with Cook Inlet



courtesy PRA (T. Plawman)

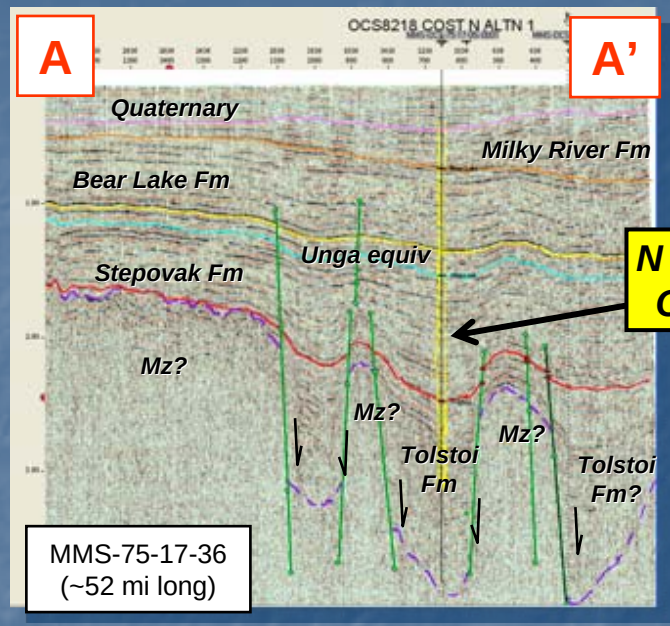
Publicly Available Seismic Data

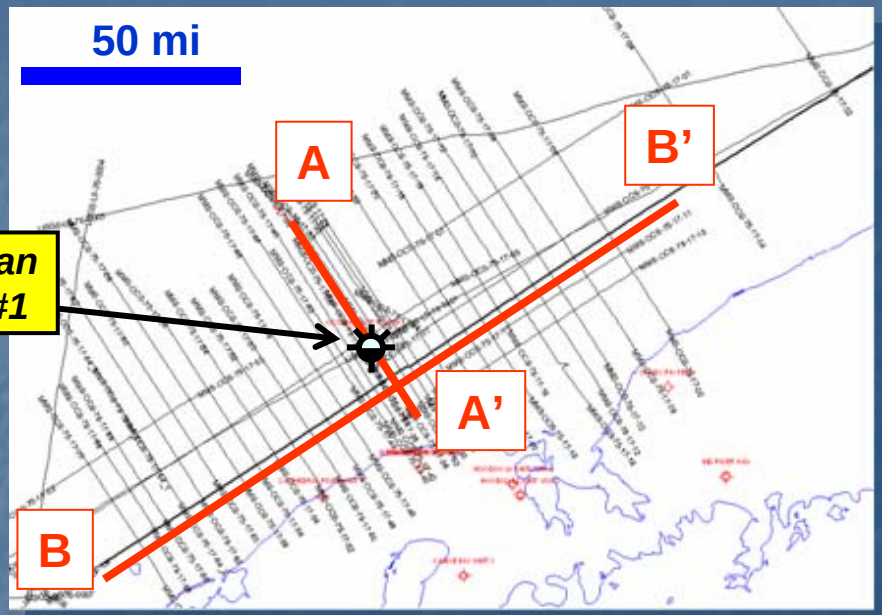
AK Peninsula



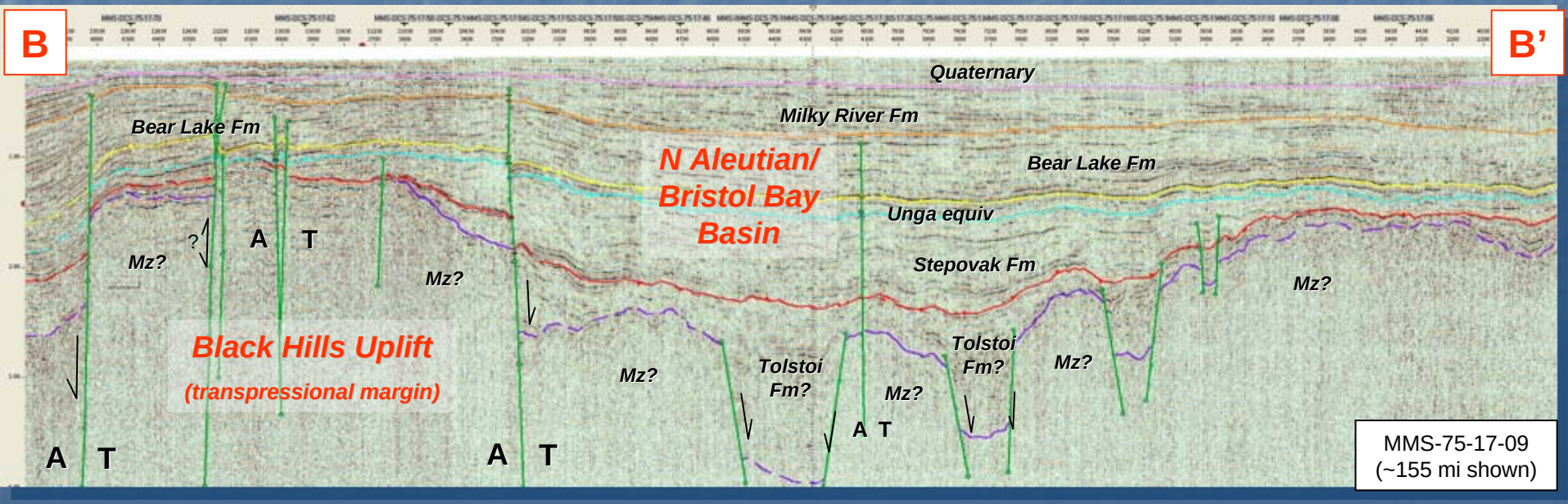
Regional Seismic Interpretation

Bristol Bay offshore



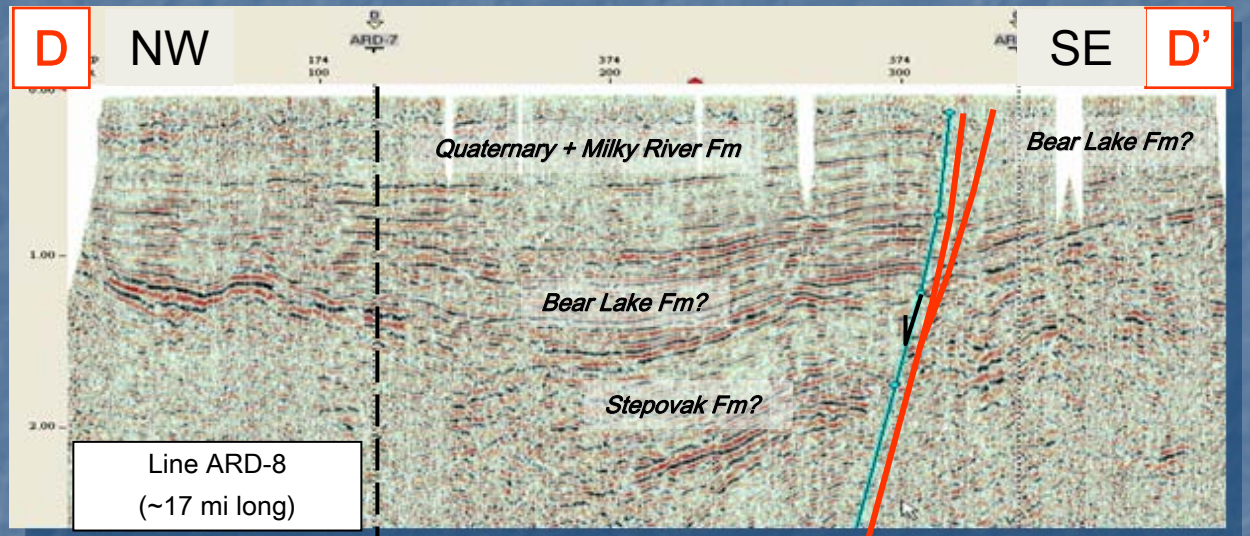


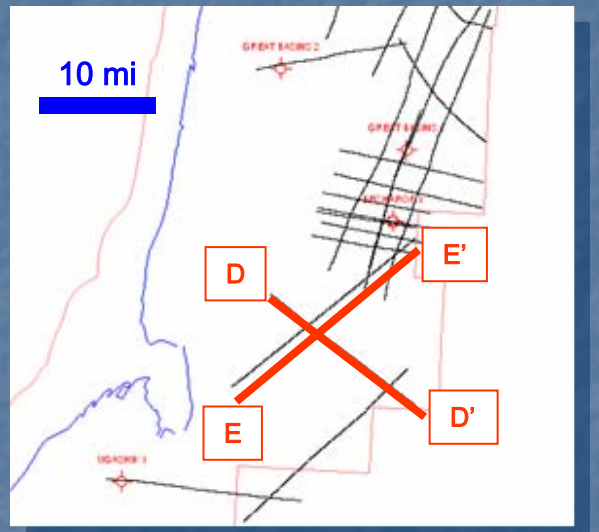
N Aleutian COST #1

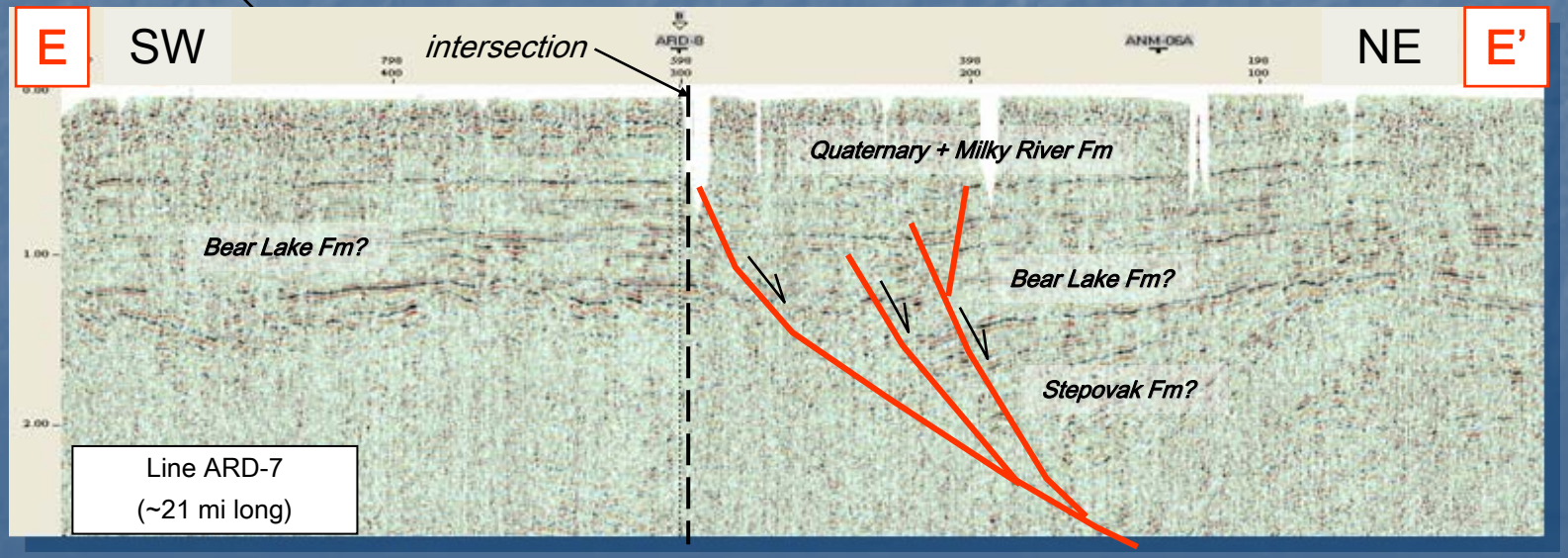


Onshore Structure, AP Areawide Sale

Down-to-basin normal faults, Becharof – Ugashik Lakes area

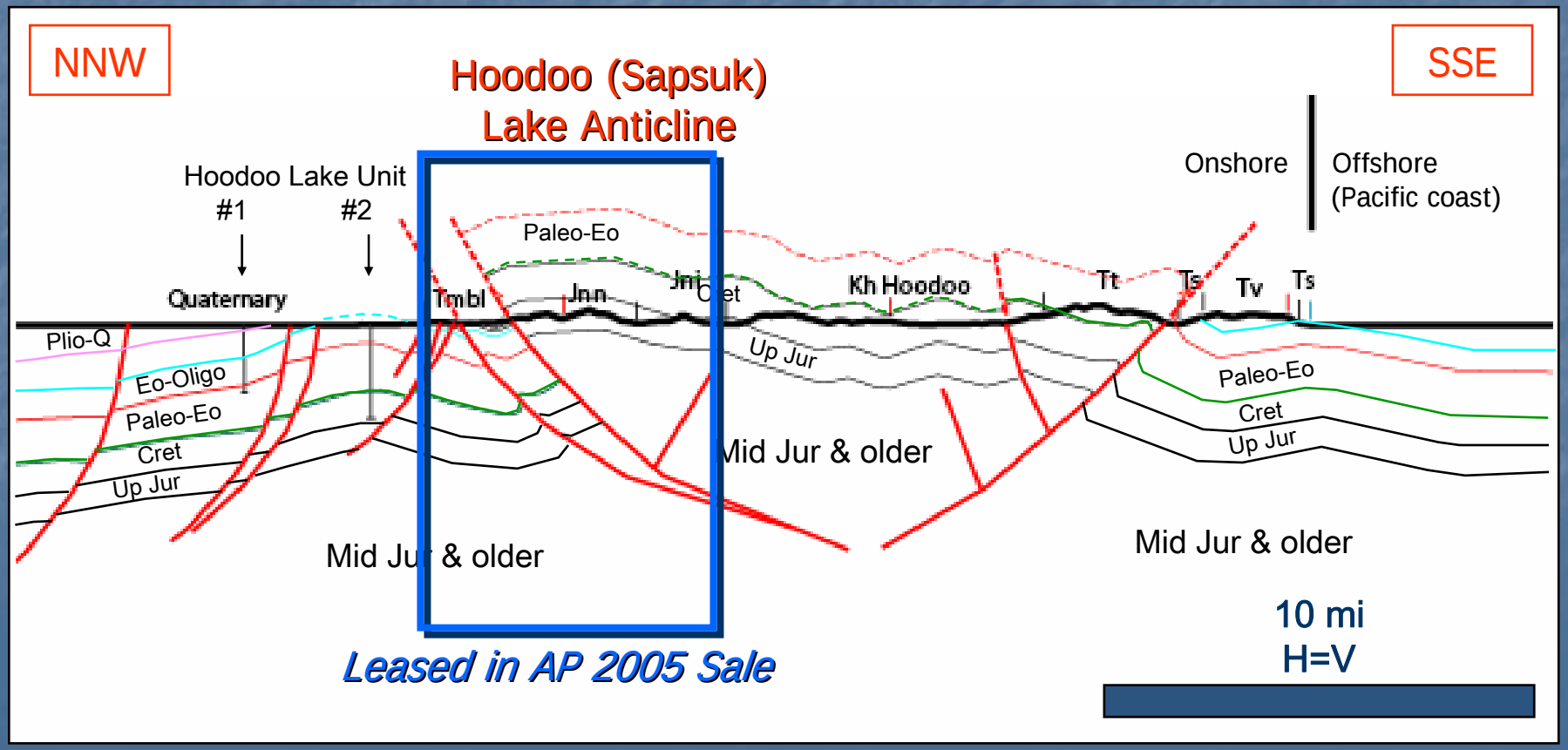






Schematic Structural Cross Section

Hoodoo Lake wells to Pacific Ocean



Alaska Peninsula Petroleum System

- **Hydrocarbon Source**
  - Oil & gas prone Mesozoic shale & limestone source rocks, Gas/condensate prone Tertiary coaly source rocks
  - Shows of oil and gas in most wells
  - Active Oil & Gas Seeps
  - Thermogenic & Biogenic gas generation
  - Direct Hydrocarbon Indications (?) from Seismic data
- **Reservoir & Seal Rocks**
  - Abundant thick sands in Mesozoic & Tertiary
    - Mesozoic sandstones → gas reservoirs?
    - Tertiary sandstones → oil or gas reservoirs
  - Probable sealing mudstones of local extent
- **Traps – structural and stratigraphic**
  - Structural styles: compressional, extensional, and strike-slip
  - Stratigraphic convergence: unconformity truncations, and pinchouts

DNR Bristol Bay Technical Products

Three volume CD-ROM data compilation:

- Digital seismic & well log files
- Scanned well logs, including mudlogs
- Quadrangle maps of Geology, Gravity, and Magnetics
- Regional posters

MicroPaleo Consultants Biostratigraphy Study:

- 10 of 11 wells in sale area + North Aleutian COST 1

Regional Map Series:

- Geology
- Bouger Gravity
- Magnetic Anomaly

www.dog.dnr.state.ak.us/oil

www.dggs.dnr.state.ak.us/publications

Interpretive Reports:

- PIR 2005-1: 2004 field program
- PIR 2005-4: Surface-subsurface interpretations
- PIR 2005-7: 2005 field program
- DOG Reservoir quality report and montage

Summary

- State of Alaska Areawide Leasing: Five large sales encompassing more than 23 million gross acres; Open acreage re-offered annually

- Gas Exploration: New plays emerging and new gas focus on traditional plays

- Publicly released seismic data now available through DNR, MMS/NOAA, and USGS/NAMSS

- New Five-Year Program now available online