Open Water Oil Spill Scenario

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Objectives of the Scenario

- Provide a common framework for discussions by the breakout groups
- Provide common understanding of the oils fate and behavior in the water and on the shorelines
- Describe the shoreline types
- Describe oil response in terms of methods and effectiveness

Open Water Scenario

- Two barges under tow by tug from a refinery in Canada to Barrow
- Barge 1: 385,000 gallons of diesel;
  Barge 2: 350,000 gallons of heavy fuel oil
- During rough weather, the tow line parts and tug becomes entangled with the line

Open Water Scenario

- Barges drift, collide, then ground
- During grounding, 110,000 gallons of fuel from each barge is released
- Use the NOAA oil fate model ADIOS2 to show amount evaporated, dispersed, and remaining for each oil type spilled
- Use the NOAA oil trajectory model GNOME to show the extent of oiling

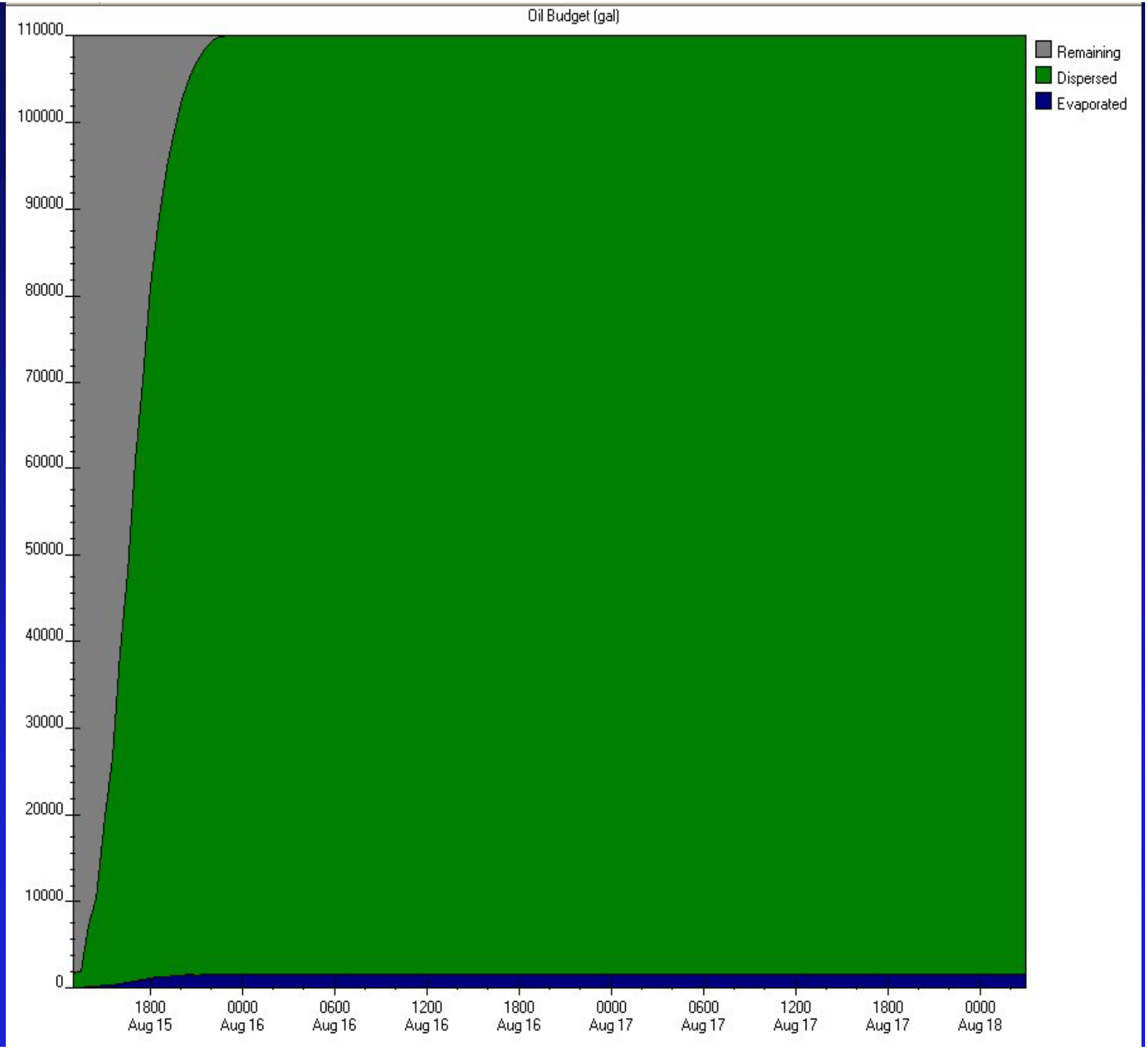
Winds During the Spill

Day	Month	Year	Hour	Speed (mph)	Direction (Degrees from North)
15	8	2010	13	25	90
15	8	2010	19	25	90
16	8	2010	1	27	67.5
16	8	2010	7	28	90
16	8	2010	13	25	67.5
16	8	2010	19	14	270
17	8	2010	1	12	292.5
17	8	2010	7	10	270
17	8	2010	13	10	292.5
17	8	2010	19	15	292.5
18	8	2010	1	12	292.5
18	8	2010	7	14	67.5

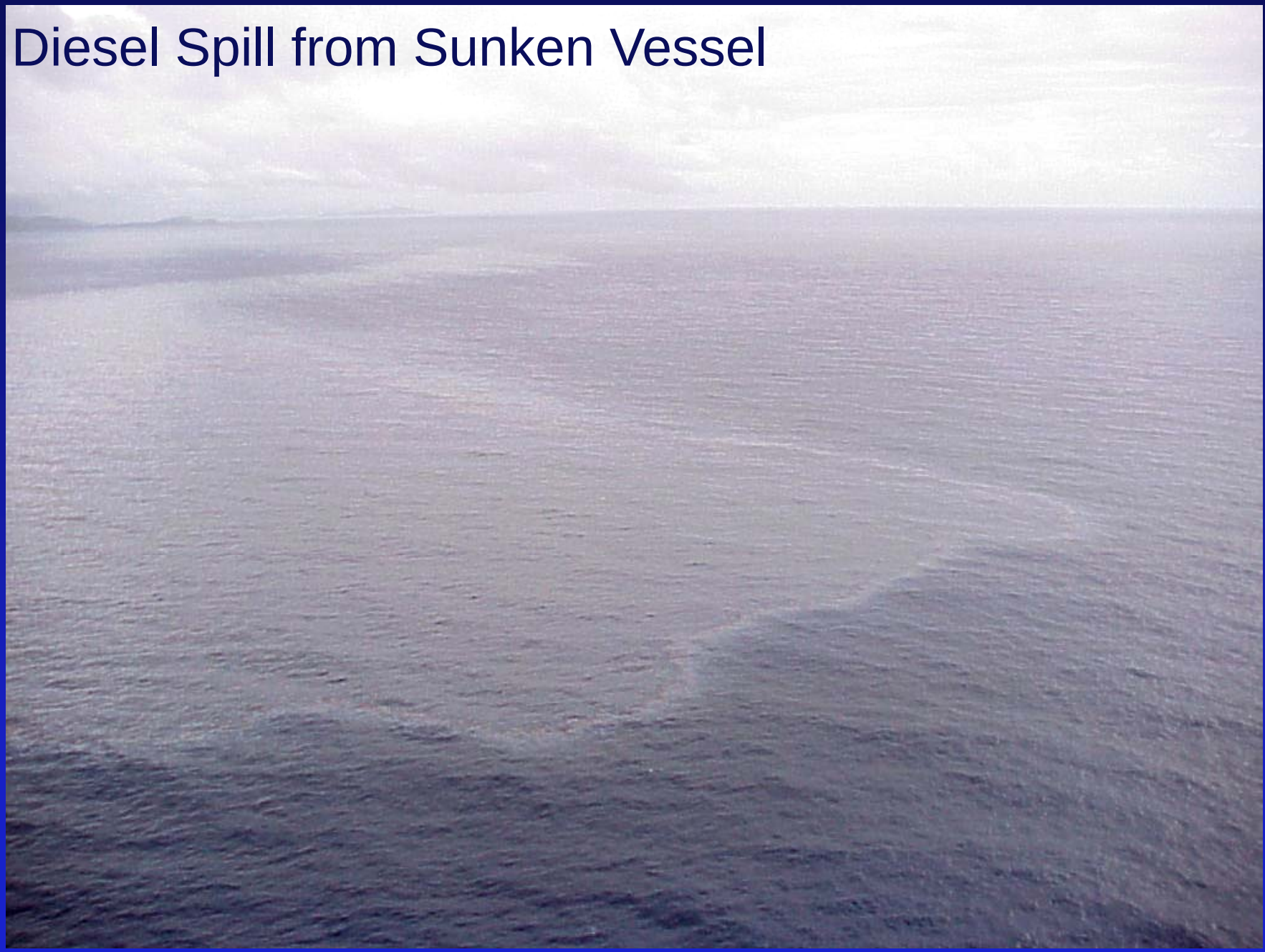
Diesel

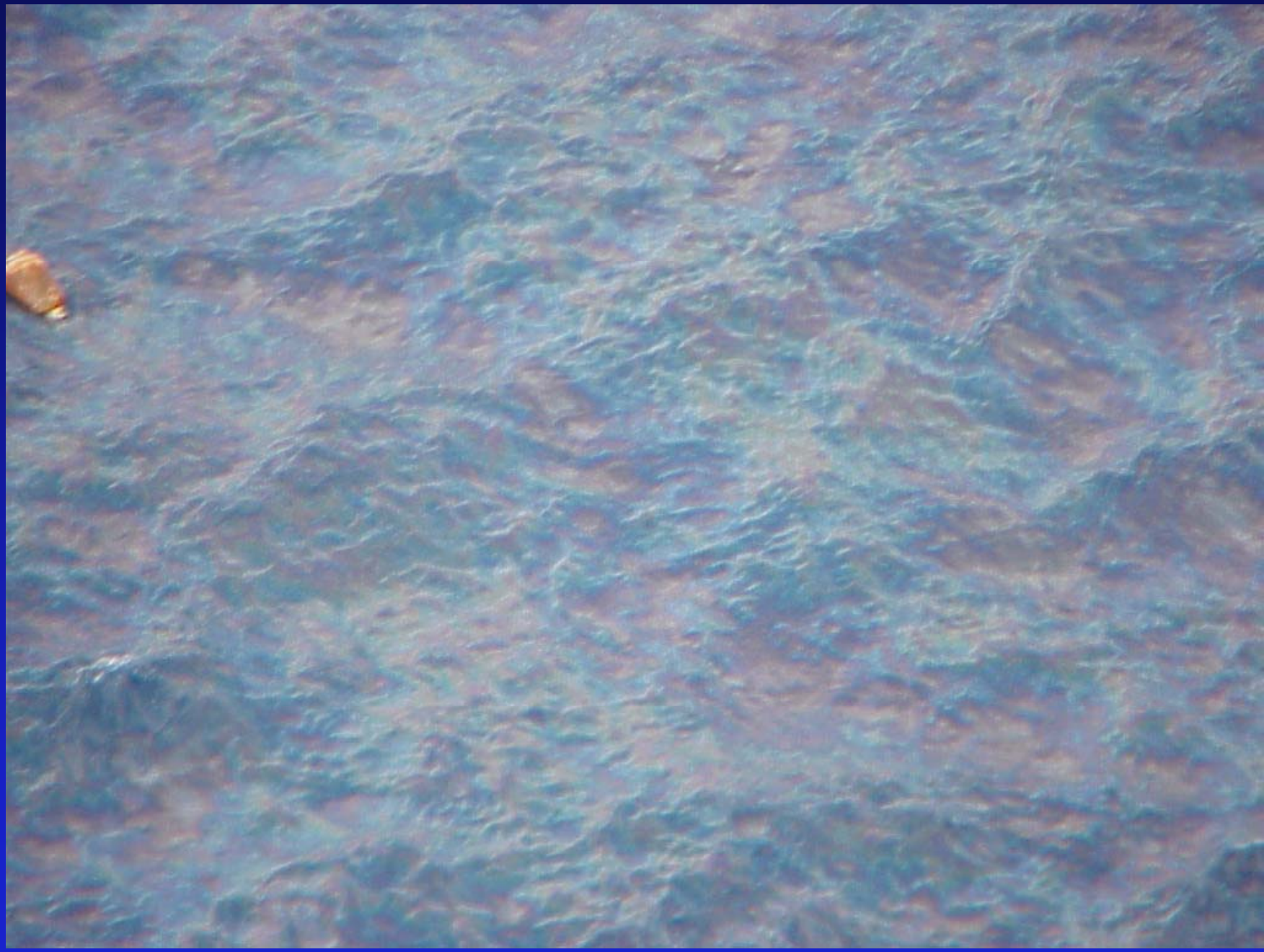
110,000 gallons

Winds:10 - 25 mph



Diesel Spill from Sunken Vessel

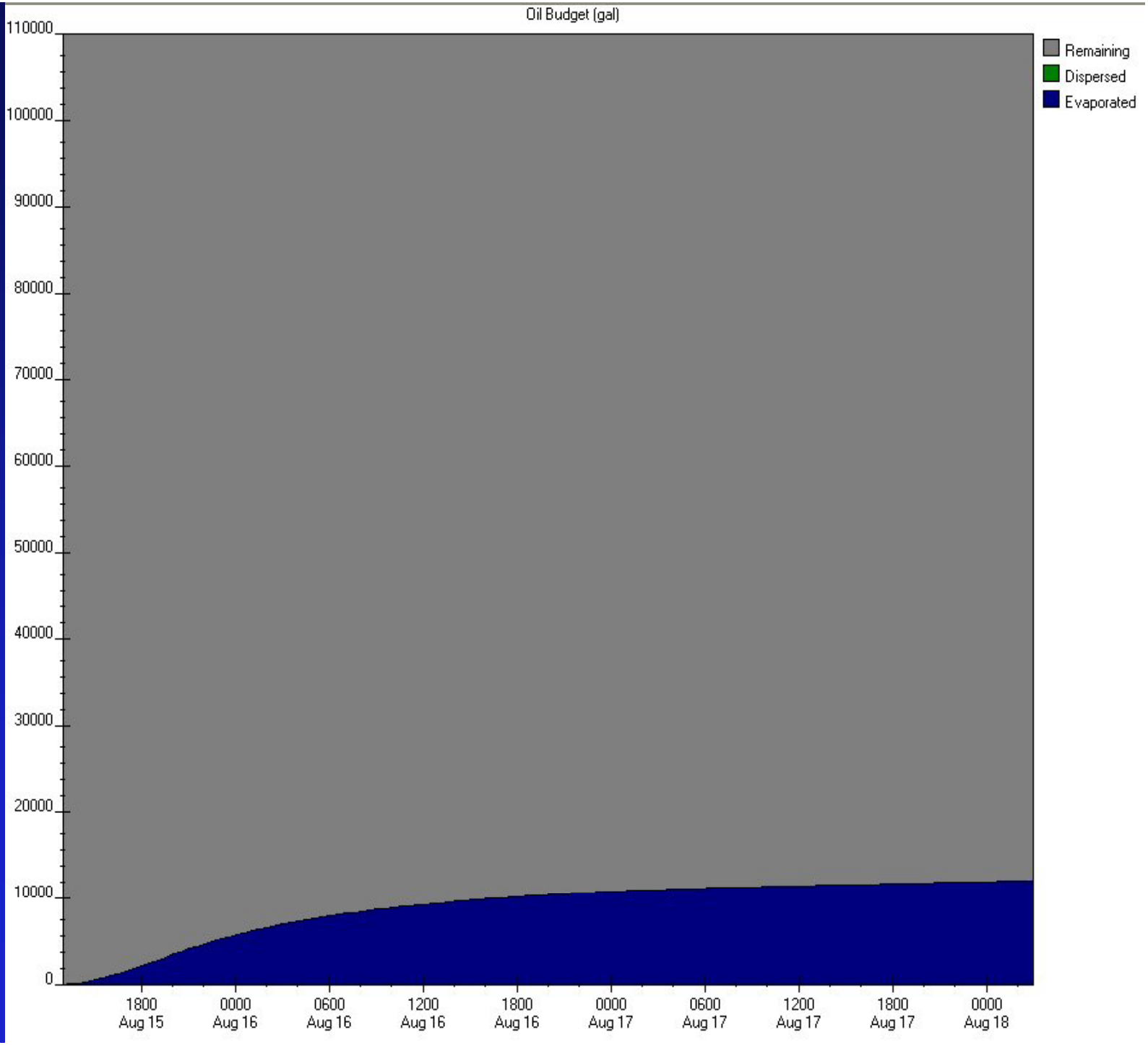




Heavy Fuel Oil

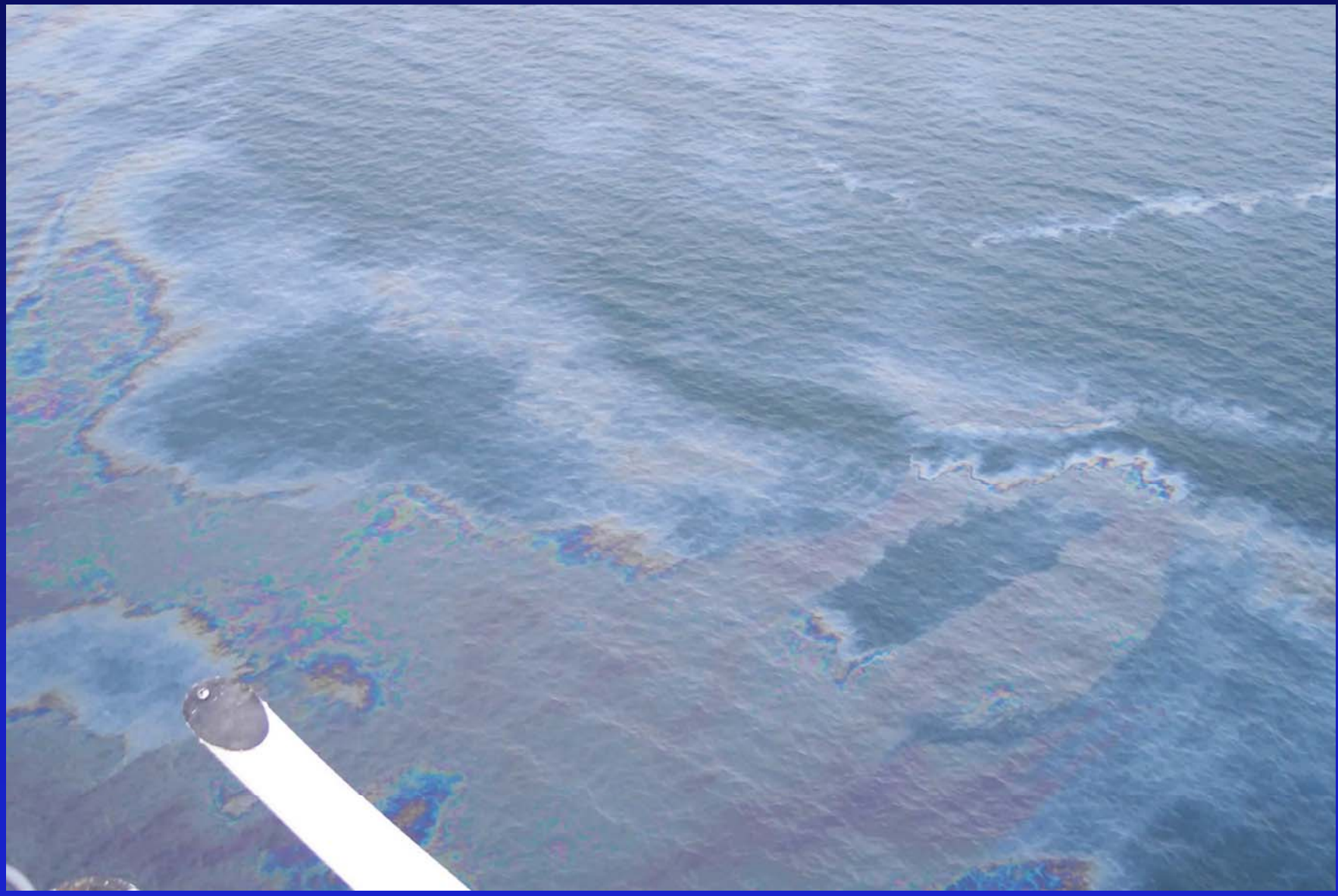
110,000 gallons

Winds: 10-25 mph



Heavy Fuel Oil

Heavy Fuel Oil

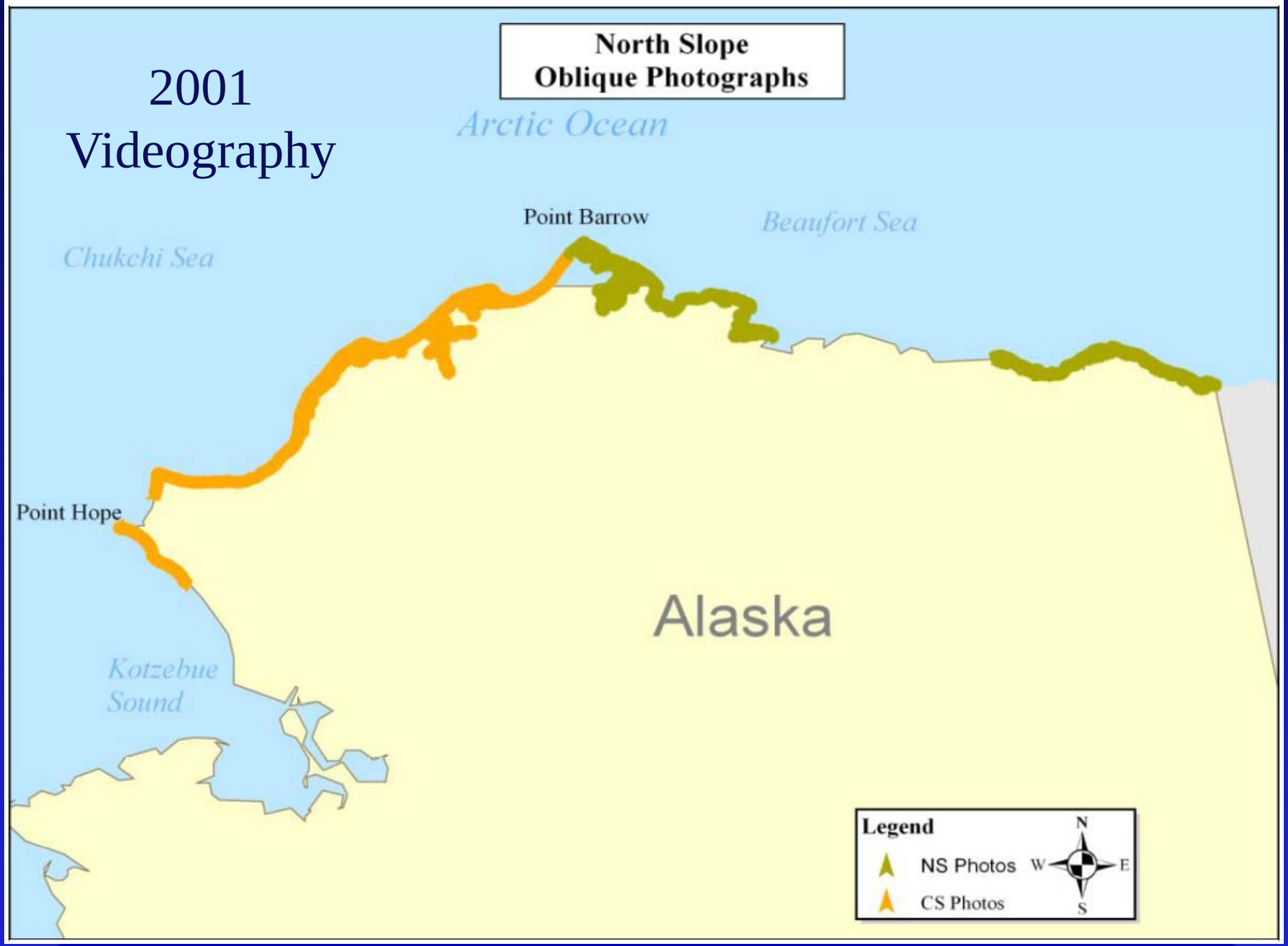


Heavy Fuel Oil

SHORELINE HABITATS (ESI)

1A EXPOSED ROCKY SHORES
1B EXPOSED, SOLID MAN-MADE STRUCTURES
2A EXPOSED WAVE-CUT PLATFORMS IN BEDROCK, MUD, OR CLAY
2B EXPOSED SCARPS AND STEEP SLOPES IN CLAY
3A FINE- TO MEDIUM-GRAINED SAND BEACHES
3B SCARPS AND STEEP SLOPES IN SAND
3C TUNDRA CLIFFS
4 COARSE-GRAINED SAND BEACHES
5 MIXED SAND AND GRAVEL BEACHES
6A GRAVEL BEACHES
6B RIPRAP
7 EXPOSED TIDAL FLATS
8A SHELTERED ROCKY SHORES AND SHELTERED SCARPS IN MUD AND CLAY
8B SHELTERED, SOLID MAN-MADE STRUCTURES
8C SHELTERED RIPRAP
8E PEAT SHORELINES
9A SHELTERED TIDAL FLATS
9B SHELTERED, VEGETATED LOW BANKS
10A SALT- AND BRACKISH-WATER MARSHES
10D SCRUB / SHRUB WETLANDS
10E INUNDATED LOW-LYING TUNDRA

2001 Videography




ESI online
Shoreline Video Capture for:
North Slope, Alaska (2005)
Image © 2010 DigitalGlobe
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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USGS
2006
Photographs
Weller Bank
© 2010 Google
Image © 2010 TerraMetrics
© 2010 Europa Technologies
© 2010 Tele Atlas
70°07'50.68" N 149°01'11.64" W elev 334 ft
Eye alt 339.57 mi
Google


USGS Lat: 70.534930 Lon: -149.283471 UTC: 18:07:10 09 Aug 2006 IMG_9144..


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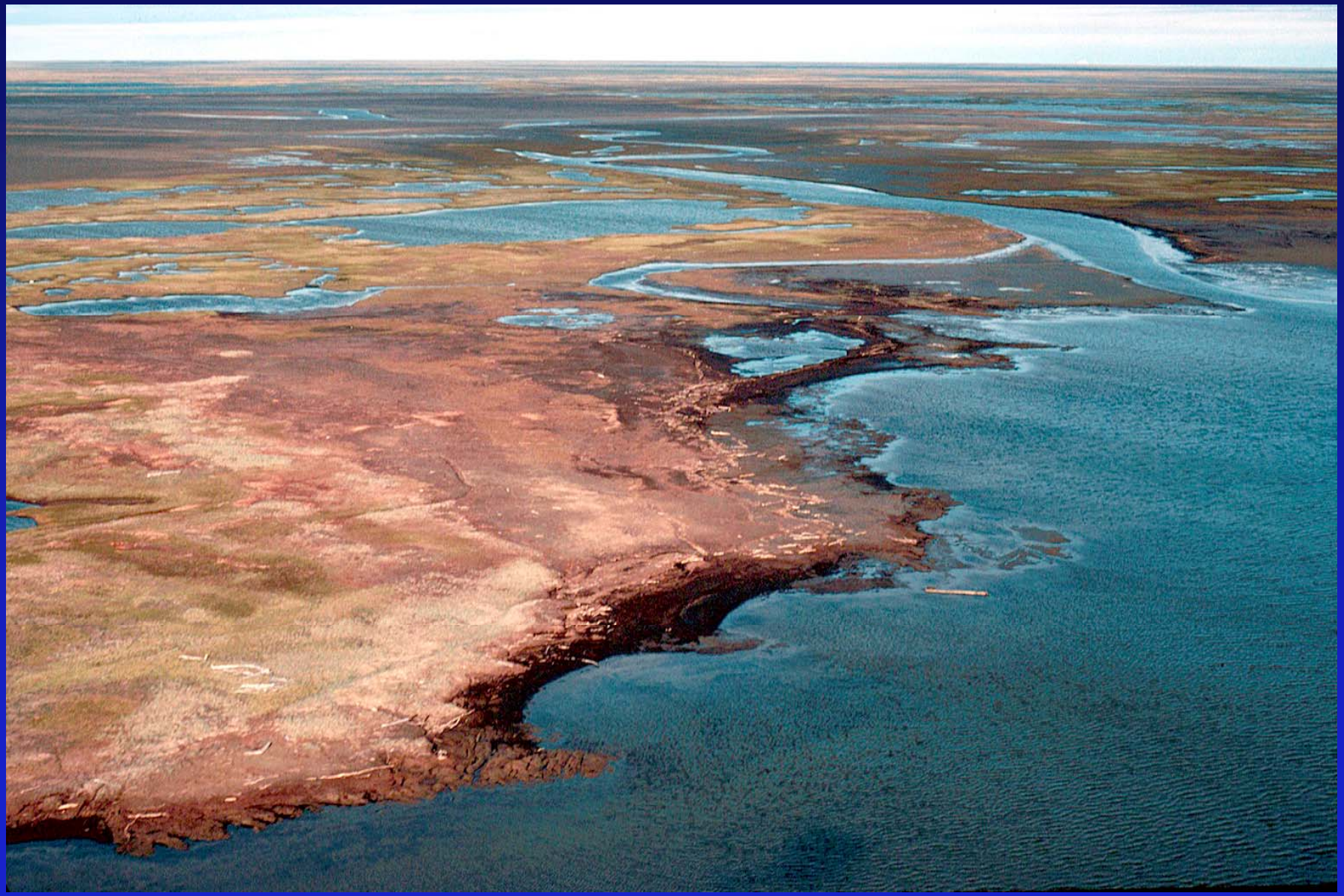
Alaskan Beaufort-Chukchi Coastline

Three shore types make up 54 % of the coast:

- Tundra Cliffs – 15.6%
- Peat Shorelines – 15.5%
- Inundated Lowland Tundra – 22.8%

Ice-Rich Tundra Cliffs (ESI = 3)

Peat Shorelines (ESI = 8)



Inundated Lowland Tundra (ESI = 10)

Heavy Oiling on Sand Beach

Tarballs on Sand Beach

Buried Oil on Sand Beach

Heavy Oil on Sand/Gravel Beach

Heavy Oil on Sand/Gravel Beach

Oil on Wetlands

Tundra Cliffs

Response Method	Oil Category I	II	III	IV
Natural Recovery	A	B	B	B
Barriers/Berms	B	B	B	B
Manual Oil Removal/Cleaning	D	B	B	B
Mechanical Oil Removal	C	C	C	C
Sorbents	–	B	A	A
Vacuum	–	–	B	A
Debris Removal	–	B	B	B
Sediment Reworking/Tilling	D	B	B	B
Vegetation Cutting/Removal	D	D	D	D
Flooding (deluge)	A	A	A	B
Low-pressure, Ambient Water Flushing	C	B	B	B
High-pressure, Ambient Water Flushing	–	–	–	–
Low-pressure, Hot Water Flushing	–	–	–	–
High-pressure, Hot Water Flushing	–	–	–	–
Steam Cleaning	–	–	–	–
Sand Blasting	–	–	–	–
Solidifiers	–	–	B	–
Shoreline Cleaning Agents	–	–	–	–
Nutrient Enrichment	–	B	B	C
Natural Microbe Seeding	–	I	I	I
In-situ Burning	–	–	–	–

Inundated Lowland Tundra

Response Method	Oil Category I	II	III	IV
Natural Recovery	A	A	A	B
Barriers/Berms	–	–	–	–
Manual Oil Removal/Cleaning	D	C	C	C
Mechanical Oil Removal	D	D	C	C
Sorbents	–	C	C	C
Vacuum	–	B	B	B
Debris Removal	–	C	C	C
Sediment Reworking/Tilling	–	–	–	–
Vegetation Cutting/Removal	D	D	D	D
Flooding (deluge)	C	C	C	D
Low-pressure, Ambient Water Flushing	–	D	D	–
High-pressure, Ambient Water Flushing	–	–	–	–
Low-pressure, Hot Water Flushing	–	–	–	–
High-pressure, Hot Water Flushing	–	–	–	–
Steam Cleaning	–	–	–	–
Sand Blasting	–	–	–	–
Solidifiers	–	C	C	–
Shoreline Cleaning Agents	–	–	–	–
Nutrient Enrichment	–	I	I	I
Natural Microbe Seeding	–	I	I	I
In-situ Burning	–	C	C	C

Manual Removal

Manual Removal

Vacuum

Sorbents

Sorbents

Vegetation Cutting

Open Water Scenario Summary

- Diesel is mostly naturally dispersed in the shallow water column/sediments
- Heavy fuel oil contaminates intertidal and supratidal habitats
- Shoreline cleanup is effective on sandy substrates, moderately effective on sand/gravel
- Cleanup options for wetlands, tundra, sheltered tidal flats are limited, mostly natural recovery after gross oil removal