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Proposed Greater Mooses Tooth Two Development Project

Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan



FINAL
Volume 2: Maps



The Bureau of Land Management Today

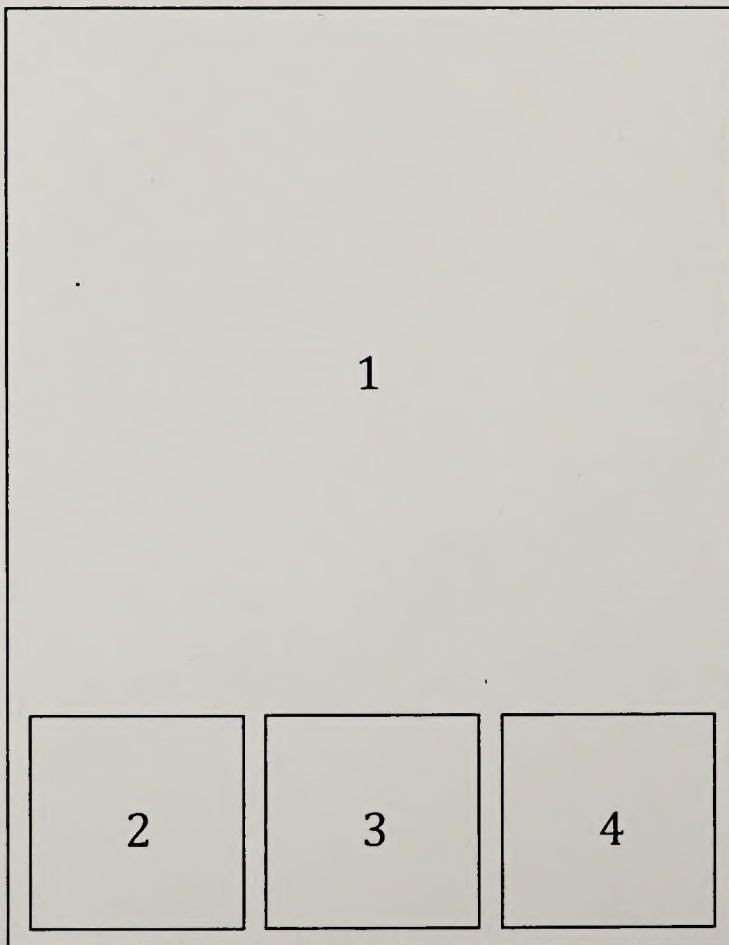
Our Vision

To enhance the quality of life for all citizens through the balanced stewardship of America's public lands and resources.

Our Mission

To sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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BLM Cover Photos

1. Aerial of production pad, North Slope
© ConocoPhillips
2. Caribou, National Petroleum Reserve, Alaska
3. Crea Creek flowing into Lake L9819,
National Petroleum Reserve, Alaska
4. White-fronted goose, National Petroleum
Reserve, Alaska

Alpine Satellite Development Plan for the Proposed Greater Moose Tooth 2 Development Project

Final Supplemental Environmental Impact Statement

Volume 2: Maps

Prepared by:

U.S. Department of the Interior
Bureau of Land Management
Anchorage, AK

In cooperation with:

Native Village of Nuiqsut
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. DOI Fish and Wildlife Service
U.S. DOI Bureau of Ocean Energy Management
State of Alaska
North Slope Borough
Inupiat Community of the Arctic Slope

August 2018

Total Cost of Producing the EIS: \$1.1 Million

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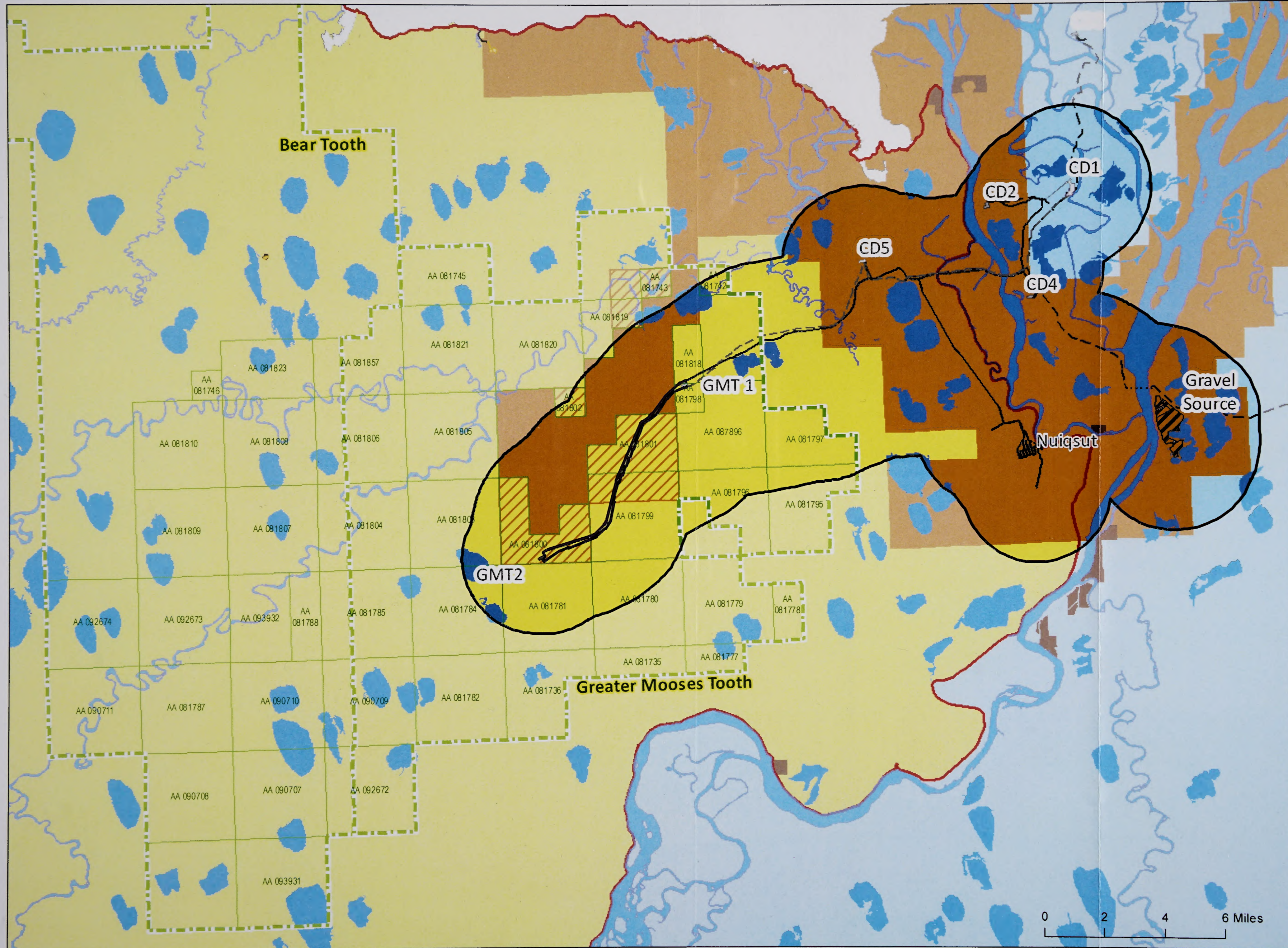
This chapter includes maps referenced throughout this document that are sized to 11x17 inch paper

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GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A Road
- GMT-2 Proposed Pads

Existing & GMT-1 Permitted Infrastructure

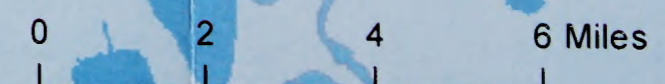
- Road
- Pipeline
- Gravel Source
- Pad

Notional Participating Areas / Oil & Gas Producing Units and Lease Tracts within the NPR-A

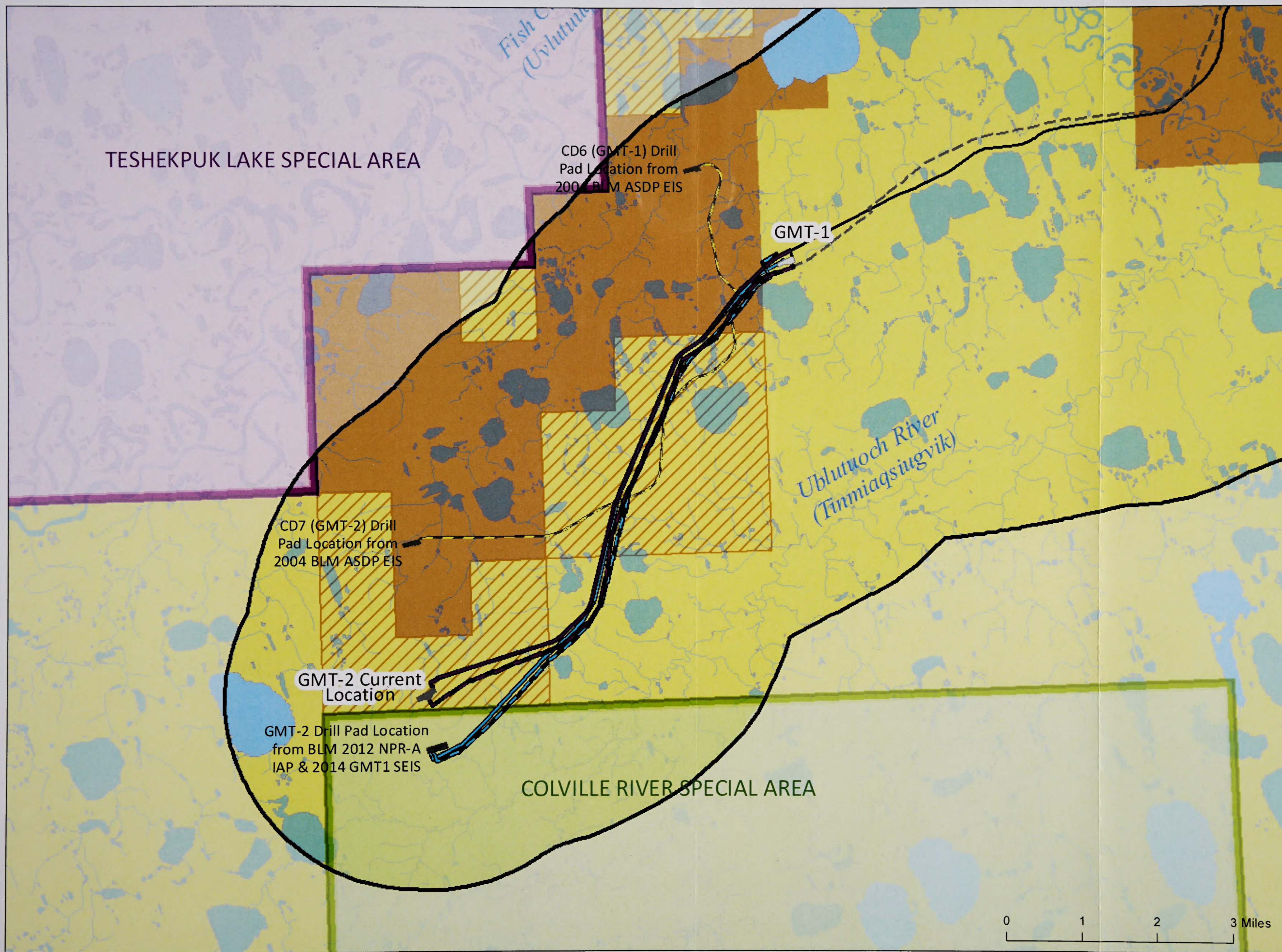
Land Status

- BLM (Native-selected)
- Bureau of Land Management
- Alaska Native Lands Patented or Interim Conveyed
- State of Alaska
- Alaska Native Allotment
- Water
- National Petroleum Reserve in Alaska Boundary
- Project Study Area

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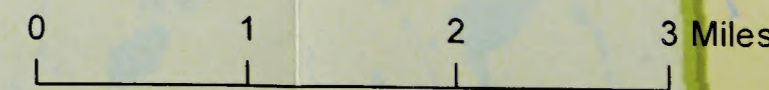
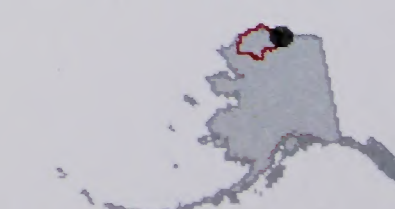


Map 1.1-1

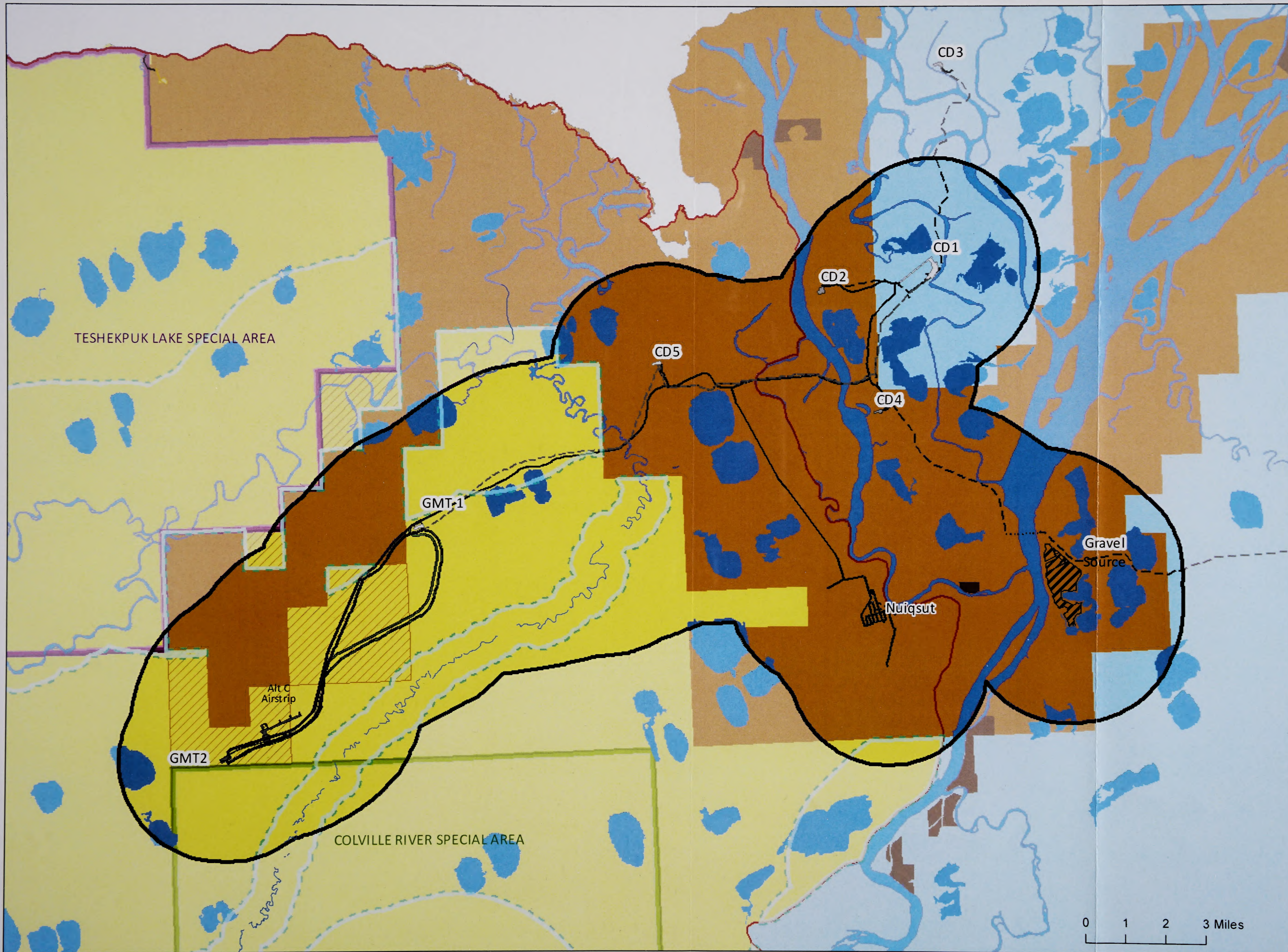


- Current GMT-2 Proposed Infrastructure**
- Alt. A Pipeline
 - Alt. A Road
- Past Proposed Infrastructure**
- 2014 GMT2 SEIS Conceptual Road
 - 2014 GMT2 SEIS Conceptual Pipeline
 - 2004 CD6/CD7 Conceptual Infrastructure Plans
 - GMT-2 Proposed Pad Locations
- GMT-1 Permitted Infrastructure**
- Road
 - Pipeline
 - Pad
- NPR-A IAP Special Areas**
- Colville River Special Area
 - Teshekpuk Lake Special Area
- Land Status**
- BLM (Native-selected)
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Map 2.1-1



GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A. Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

Existing & GMT- 1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad
- Stipulation K1 Area from NPR-A IAP

NPR-A IAP Special Areas

- Colville River Special Area
- Teshekpuk Lake Special Area

Land Status

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Map 2.1-2



GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A Road
- GMT-2 Proposed Pads

Existing & GMT-1 Permitted Infrastructure

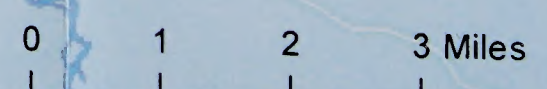
- Road
- Pipeline
- Gravel Source
- Pad

Watershed Boundary Dataset (WBD) - 5th Level

Land Status


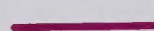
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Map 2.5-1







-  Road Segments within 500ft of Pipeline
-  Infrastructure within 500 ft. of fish-bearing waterbodies

GMT-2 Proposed Infrastructure

-  Alt. A Pipeline
-  Alt. A Road
-  Pad

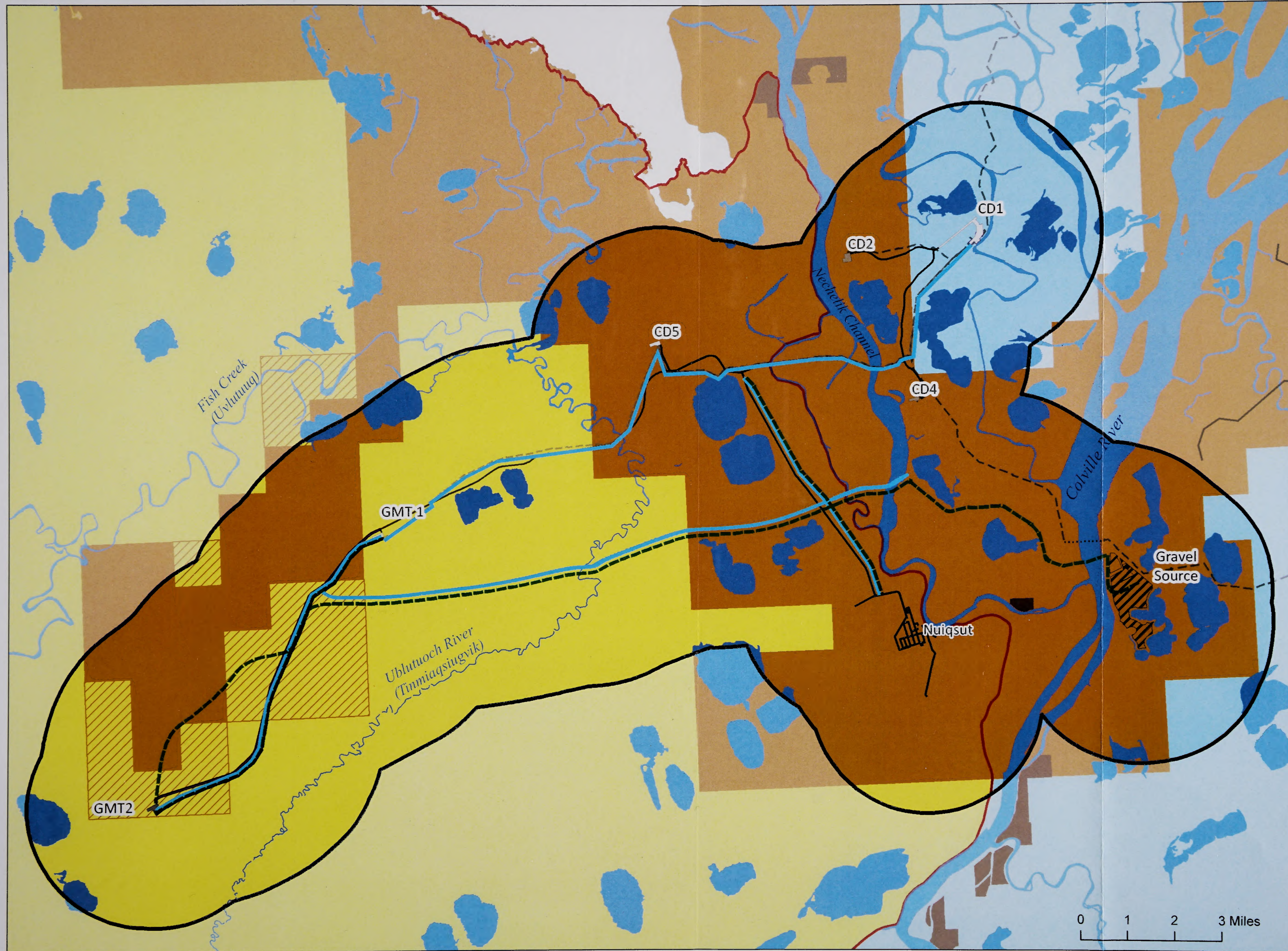
GMT- 1 Permitted Infrastructure

-  Road
-  Pipeline
-  Pad
-  Project Study Area

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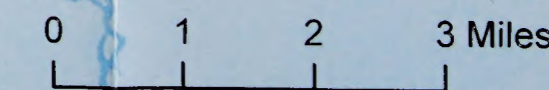


Map 2.5-2

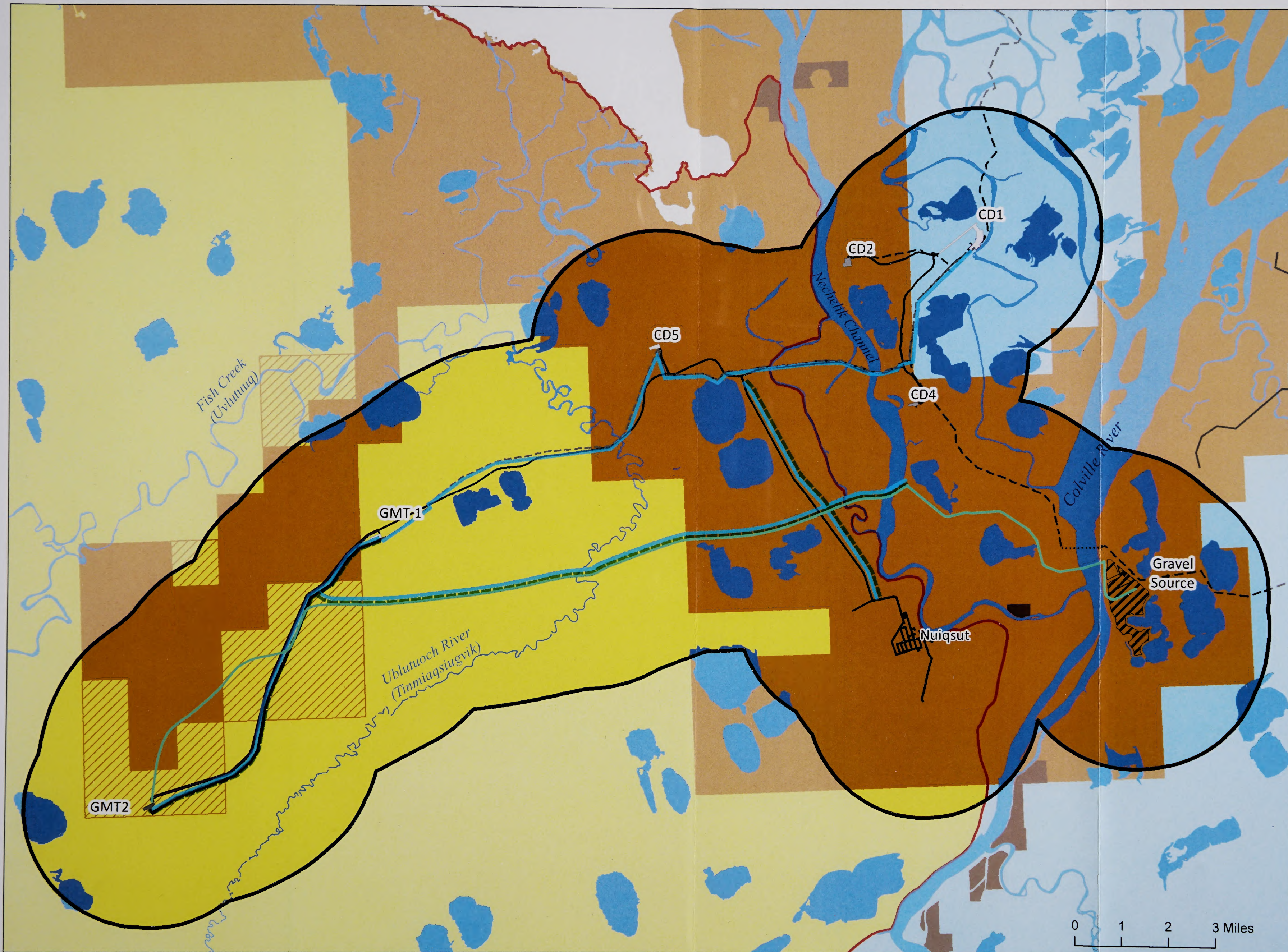


- Ice Road**
- Construction Ice Road - Year 1
 - Construction Ice Road - Year 2 (slight offset applied for visualization purposes)
- GMT-2 Proposed Infrastructure**
- Alt. A. Pipeline
 - Alt. A. Road
 - Alt. A. Pad
- Existing & GMT-1 Permitted Infrastructure**
- Pipeline
 - Road
 - Gravel Source
 - Pad
- Land Status**
- BLM (Native-selected)
 - Bureau of Land Management
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Map 2.5-3



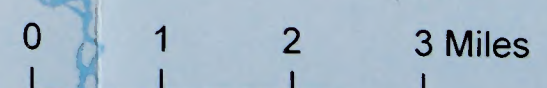
- Ice Road**
- Construction Ice Road - Year 0
 - Construction Ice Road - Year 1
 - Construction Ice Road - Year 2
(slight offsets applied for visualization purposes)

- GMT-2 Proposed Infrastructure**
- Alt. A. Pipeline
 - Alt. A. Road
 - Alt. A. Pad

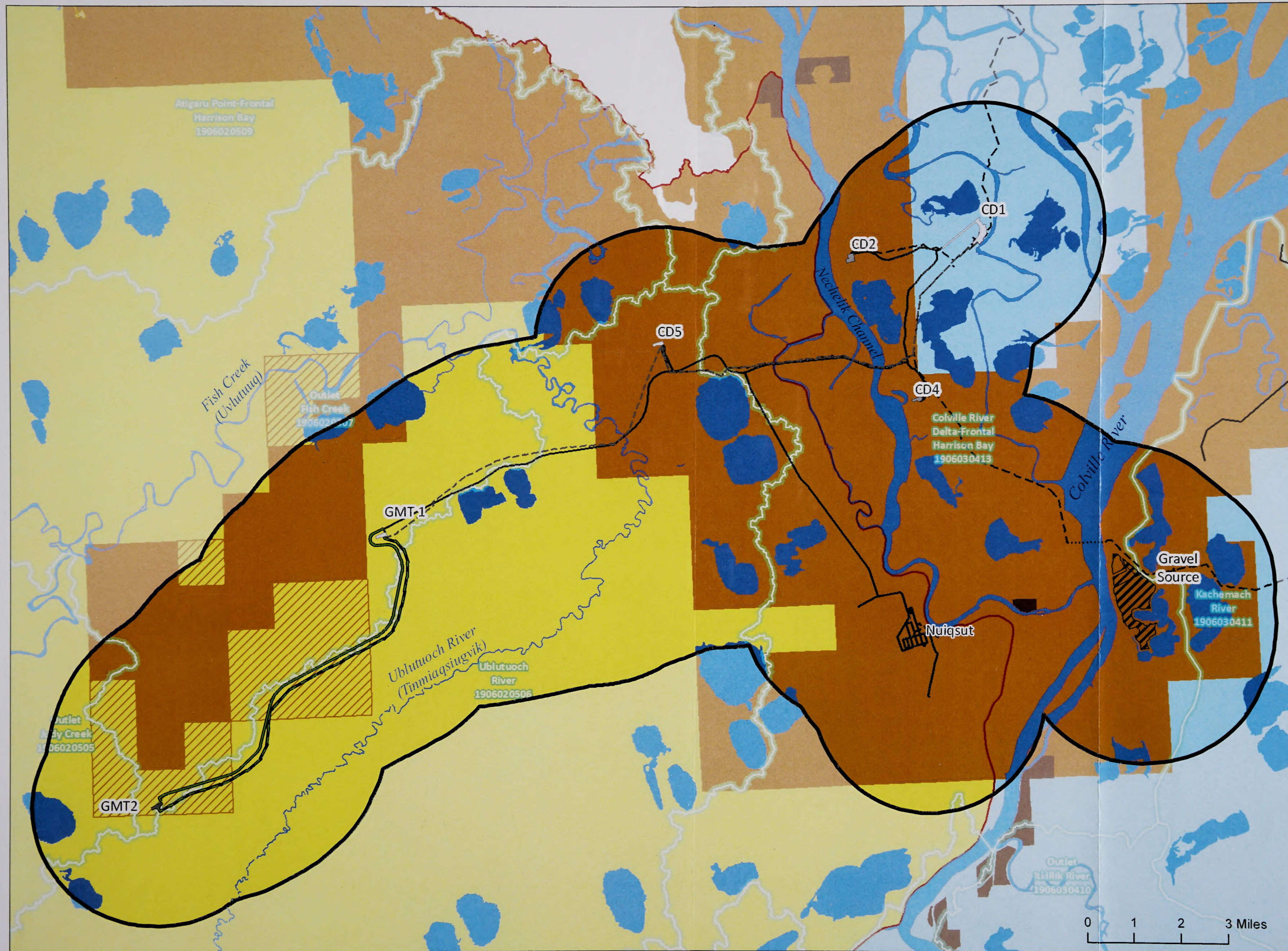
- Existing & GMT-1 Permitted Infrastructure**
- Pipeline
 - Road
 - Gravel Source
 - Pad

- Land Status**
- BLM (Native-selected)
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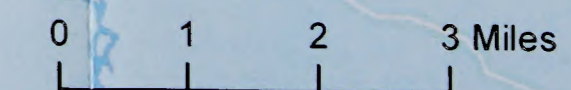


Map 2.5-4













- GMT-2 Proposed Infrastructure**
- Alt B Pipeline
 - Alt B Road
 - Pad
- Existing & GMT-1 Permitted Infrastructure**
- Road
 - Pipeline
 - Gravel Source
 - Pad
- Watershed Boundary Dataset (WBD) - 5th Level**
- Watershed Boundary Dataset (WBD) - 5th Level
- Land Status**
- BLM (Native-selected)
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Map 2.6-1

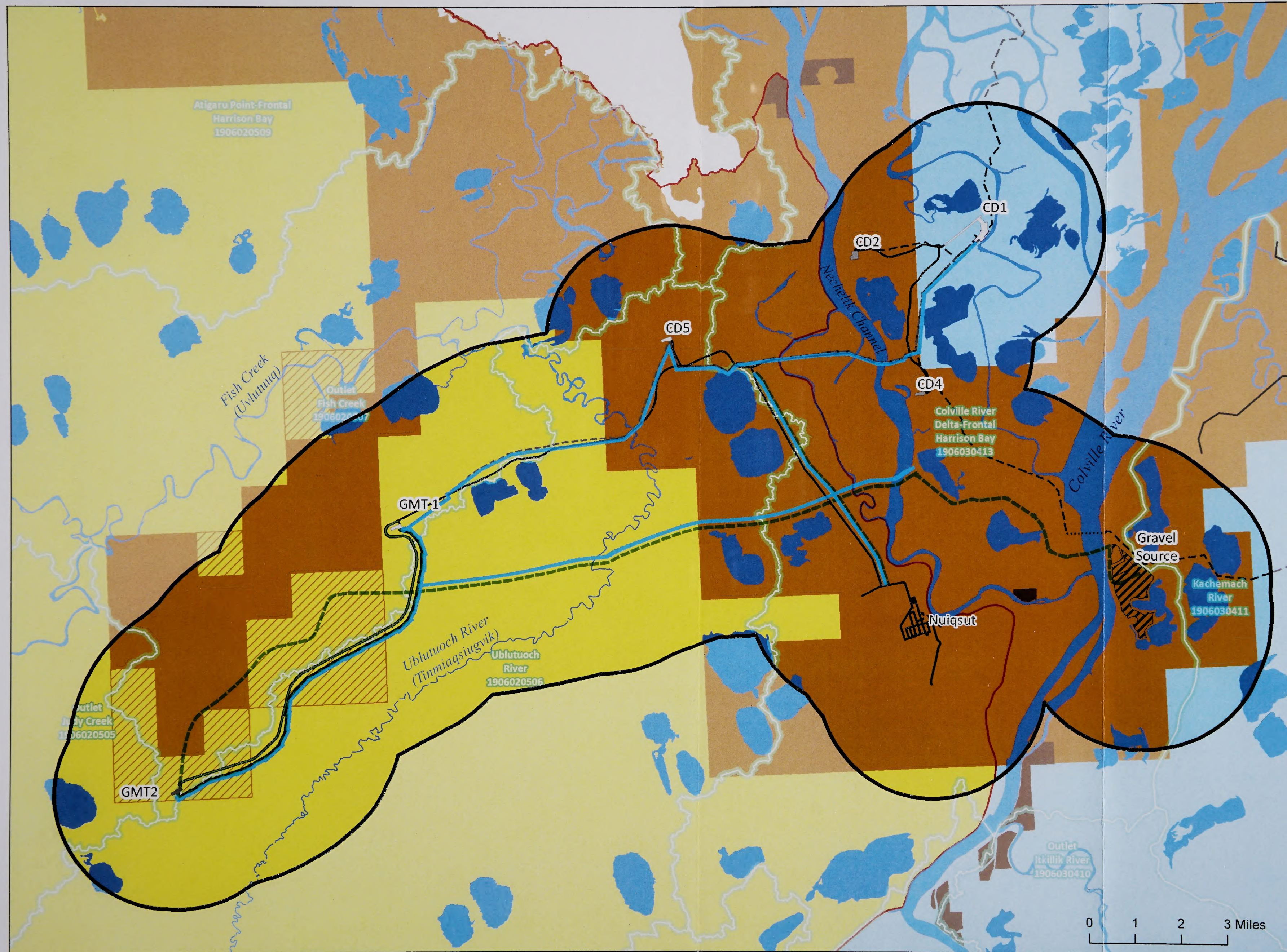


-  Road Segments within 500ft of Pipeline
-  Infrastructure within 500 ft. of fish-bearing waterbodies
- GMT-2 Proposed Infrastructure**
-  Alt B Pipeline
-  Alt B Road
-  Pad
- Existing & GMT-1 Permitted Infrastructure**
-  Road
-  Pipeline
-  Gravel Source
-  Pad
-  Project Study Area

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Map 2.6-2



Ice Road

- Construction Ice Road - Year 1
- Construction Ice Road - Year 2 (slight offset applied for visualization purposes)

GMT-2 Proposed Infrastructure

- Alt B Pipeline
- Alt B Road
- Pad

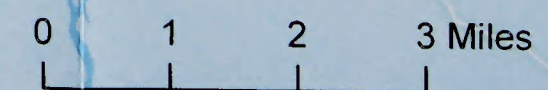
Existing & GMT-1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

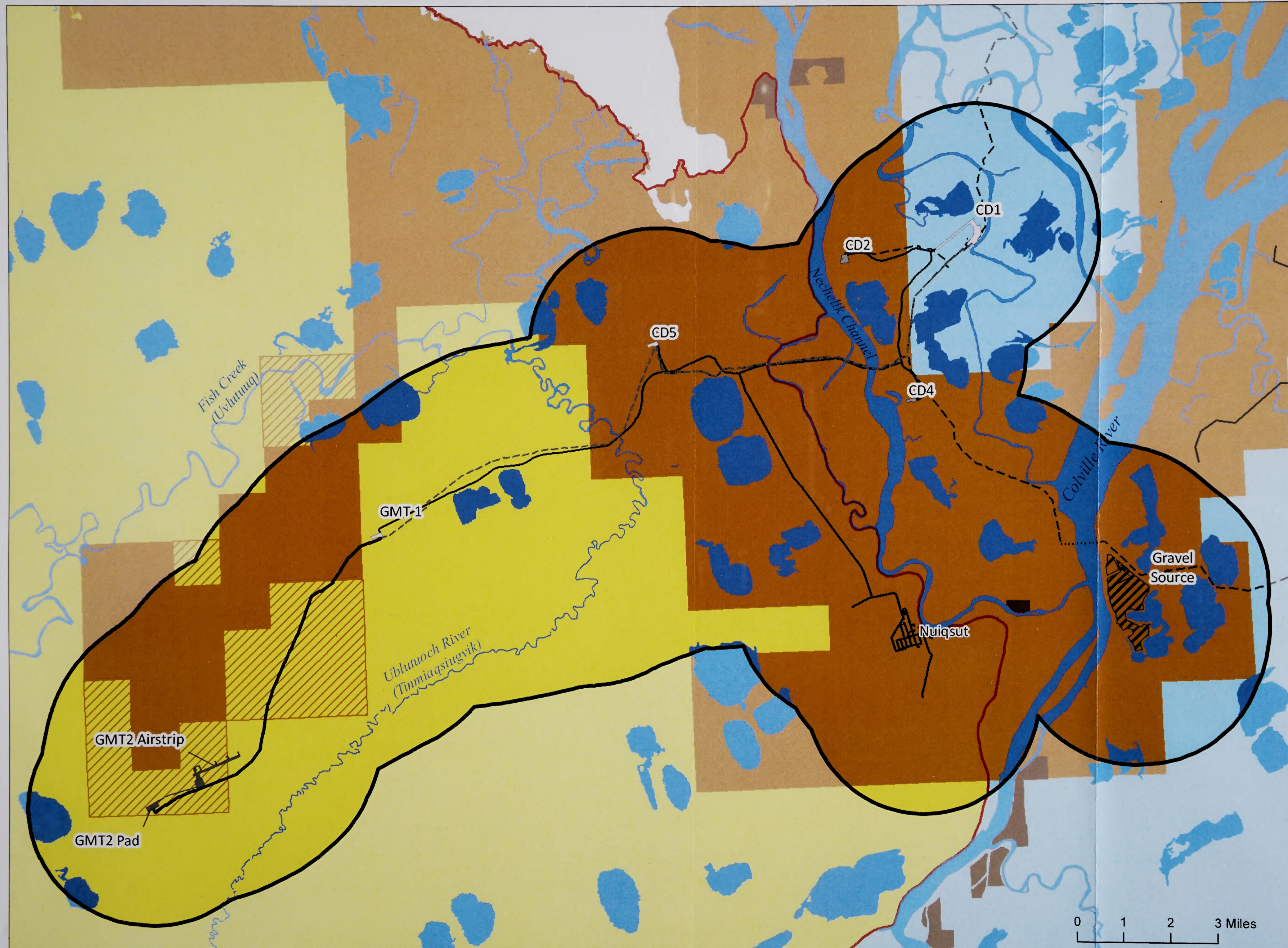
Land Status

- BLM (Native-selected)
- Bureau of Land Management
- Alaska Native Lands Patented or Interim Conveyed
- State of Alaska
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Map 2.6-3



GMT-2 Proposed Infrastructure

- Alt. C Pipeline
- Alt. C Pad and Facilities

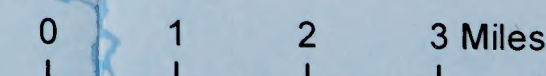
Existing & GMT-1 Permitted Infrastructure

- Pipeline
- Road
- Gravel Source
- Pad

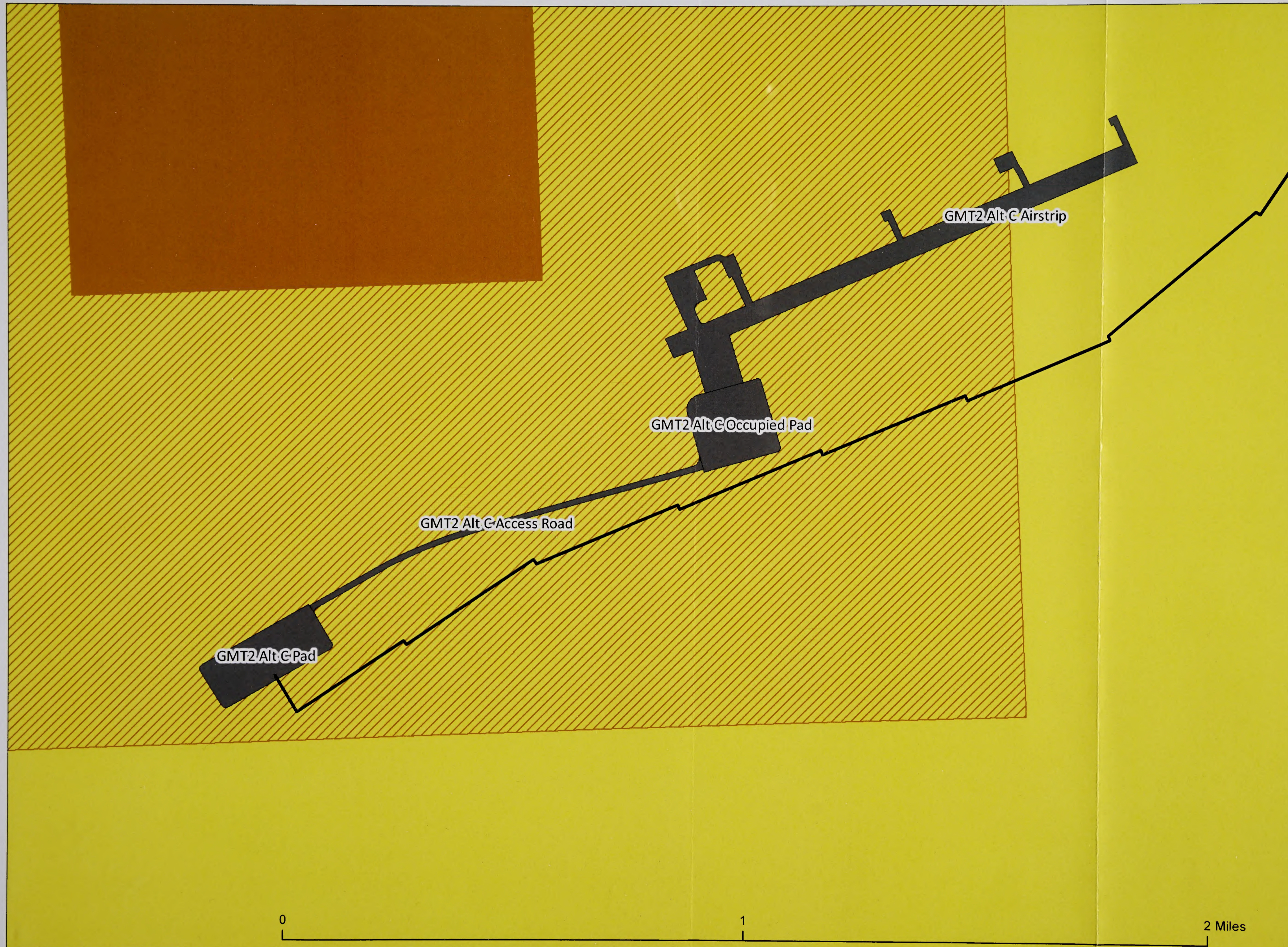
Land Status

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Map 2.7-1



GMT-2 Proposed Infrastructure

- Alt C. Pipeline
- Alt. C Pad and Facilities

Existing & GMT-1 Permitted Infrastructure

- Pipeline
- Road
- Gravel Source
- Pad

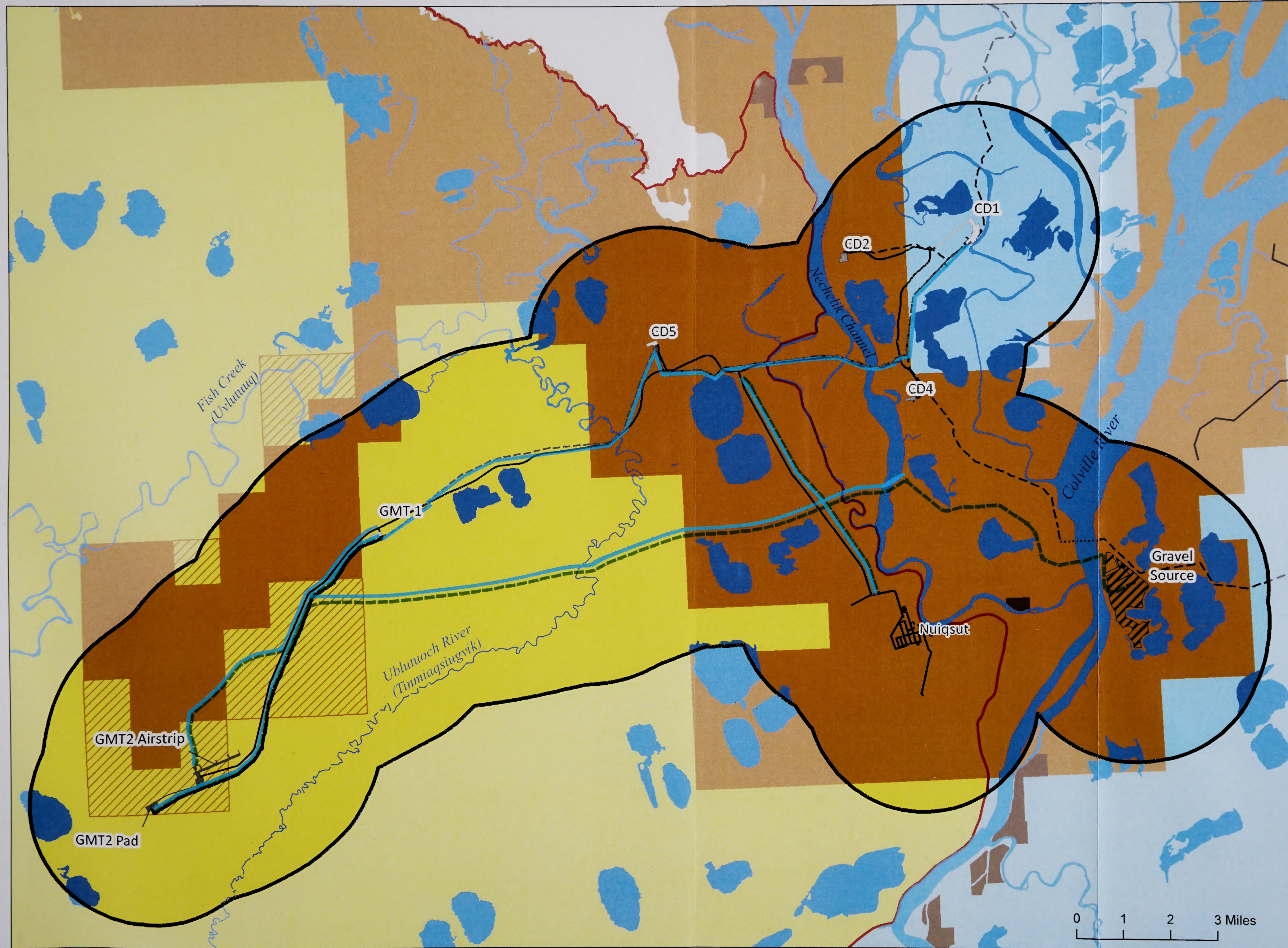
Land Status

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Map 2.7-2



Ice Road

- Construction Ice Road - Year 1
- Construction Ice Road - Year 2
- Post-Construction Annual Resupply (slight offset applied for visualization purposes)

GMT-2 Proposed Infrastructure

- Alt. C Pipeline
- Alt. C Pad and Facilities

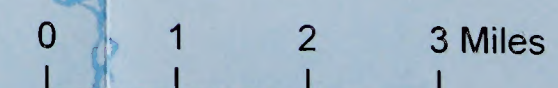
Existing & GMT-1 Permitted Infrastructure

- Pipeline
- Road
- Gravel Source
- Pad

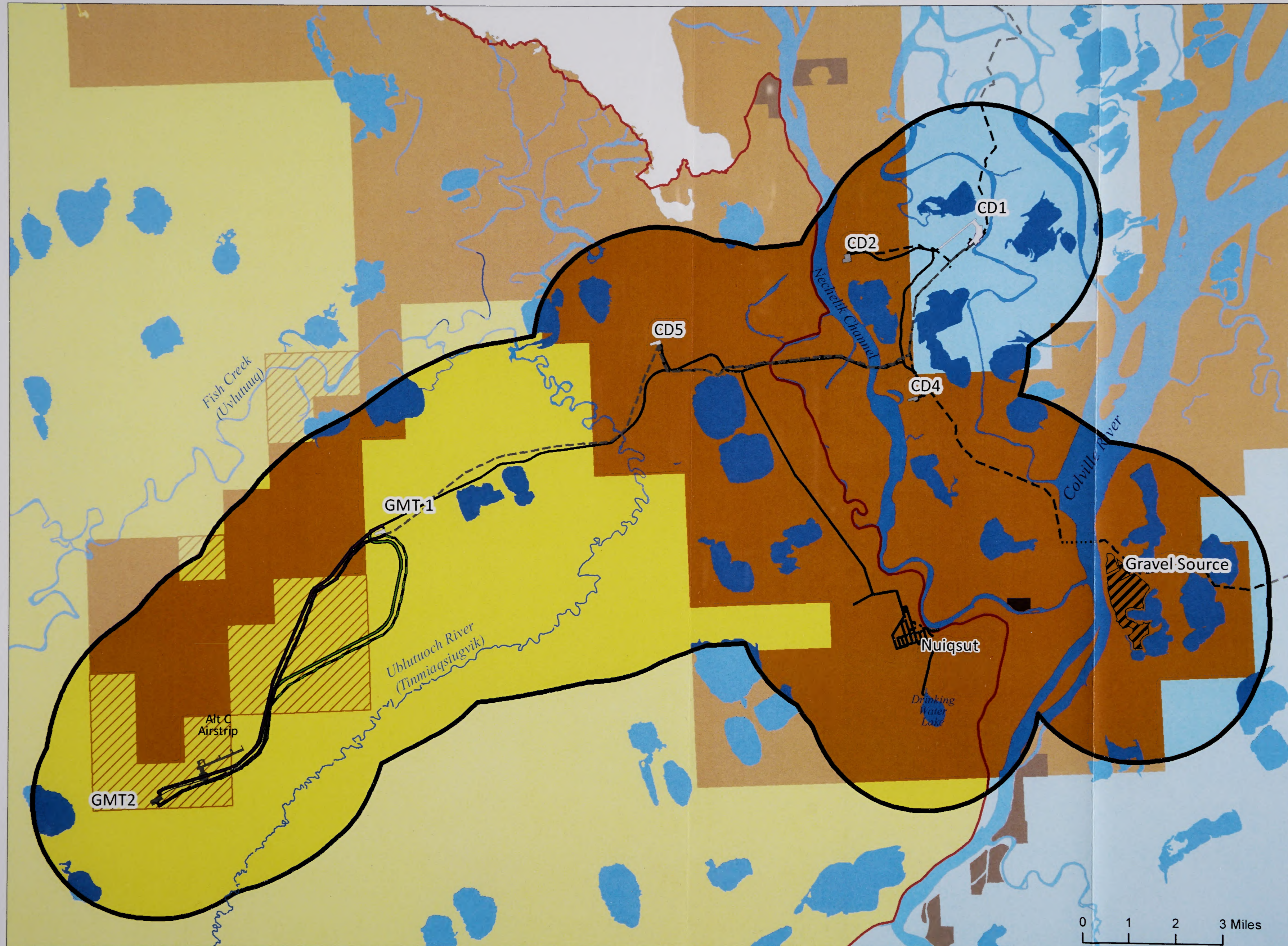
Land Status

- BLM (Native-selected)
- Bureau of Land Management
- Alaska Native Lands Patented or Interim Conveyed
- State of Alaska
- Alaska Native Allotment
- Water
- National Petroleum Reserve in Alaska Boundary
- Project Study Area

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Map 2.7-3



GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A. Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

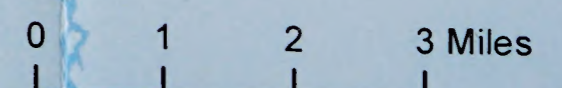
Existing & GMT-1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

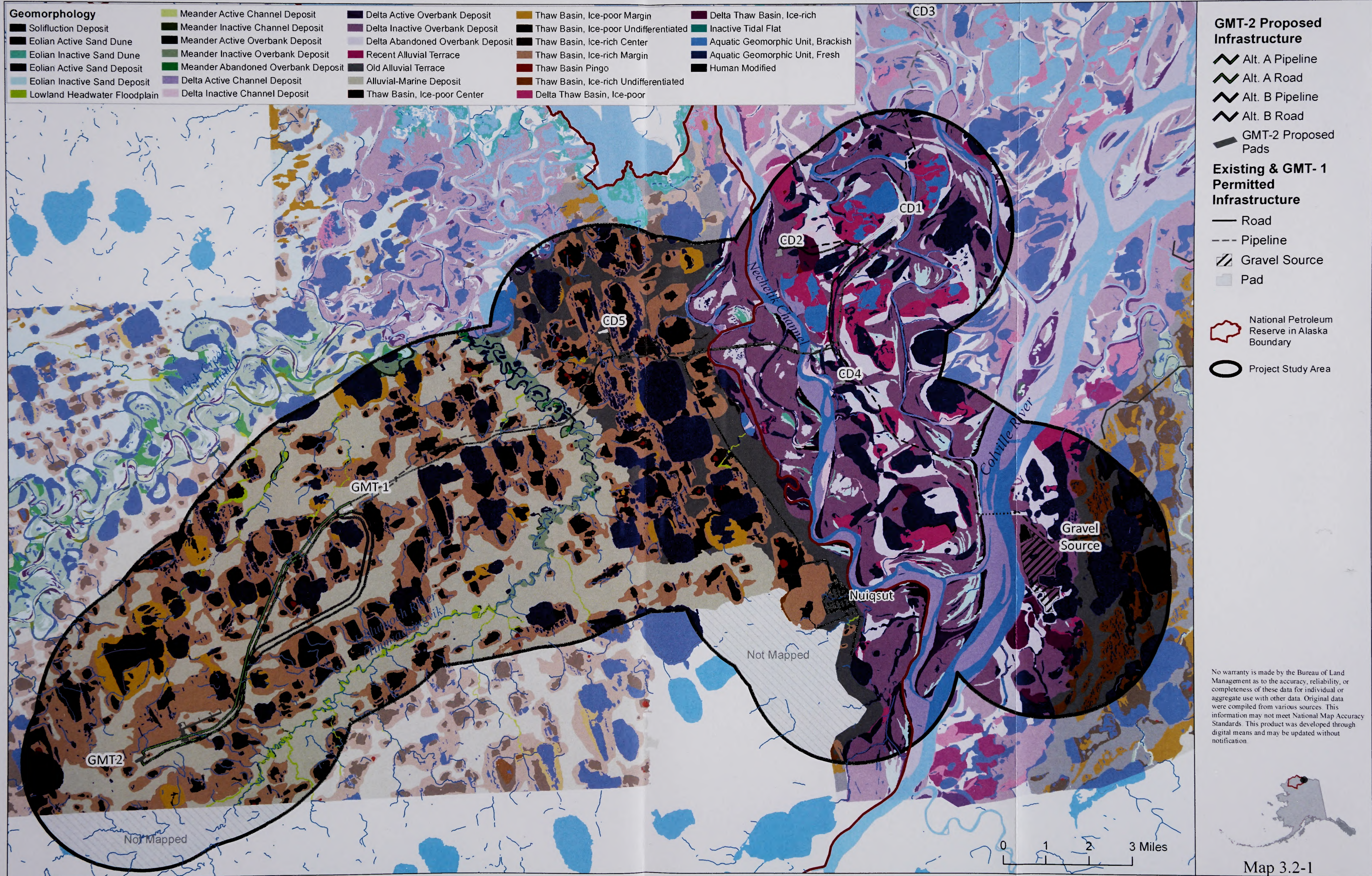
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Map 3.1-1





Surface Waterbodies
Lake Identifier

GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

Existing & GMT-1 Permitted Infrastructure

- Road
- Pipeline

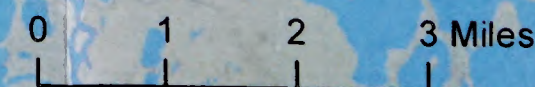
Gravel Pads

- Gravel Source
- Pad

National Petroleum Reserve in Alaska Boundary

Project Study Area

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Map 3.2-3



Vegetation		
Barren	Wet Sedge-Willow Tundra	Halophytic Sedge-Grass Wet Meadow, brackish
Partially Vegetated	Wet Sedge Meadow Tundra	Halophytic Sedge Wet Meadow, saline
Closed Tall Willow	Fresh Grass Marsh	Halophytic Sedge-Grass Wet Meadow, saline
Open Tall Willow	Fresh Sedge Marsh	Moist Salt-killed Meadow
Closed Low Willow	Aquatic Algae	Salt-killed Wet Meadow
Open Low Willow	Brackish Moist Sedge-Shrub Meadow	Dune Complex
Open Low Willow-Sedge Shrub Tundra	Halophytic Willow-Graminoid Dwarf Shrub Tundra	Ice-poor Basin Wetland Complex
Dryas Dwarf Shrub Tundra	Halophytic Sedge Wet Meadow, brackish	Ice-rich Basin Wetland Complex
Cassiope Dwarf Shrub Tundra	Halophytic Grass Wet Meadow, brackish	Riverine Complex
Seral Herbs	Halophytic Sedge Wet Meadow, brackish	Deep Polygon Complex
Elymus	Halophytic Grass Wet Meadow, brackish	Coastal Complex
Moist Sedge-Shrub Tundra	Tussock Tundra	Fresh Water
Tussock Tundra		Brackish Water
		Marine Water
		Not Mapped

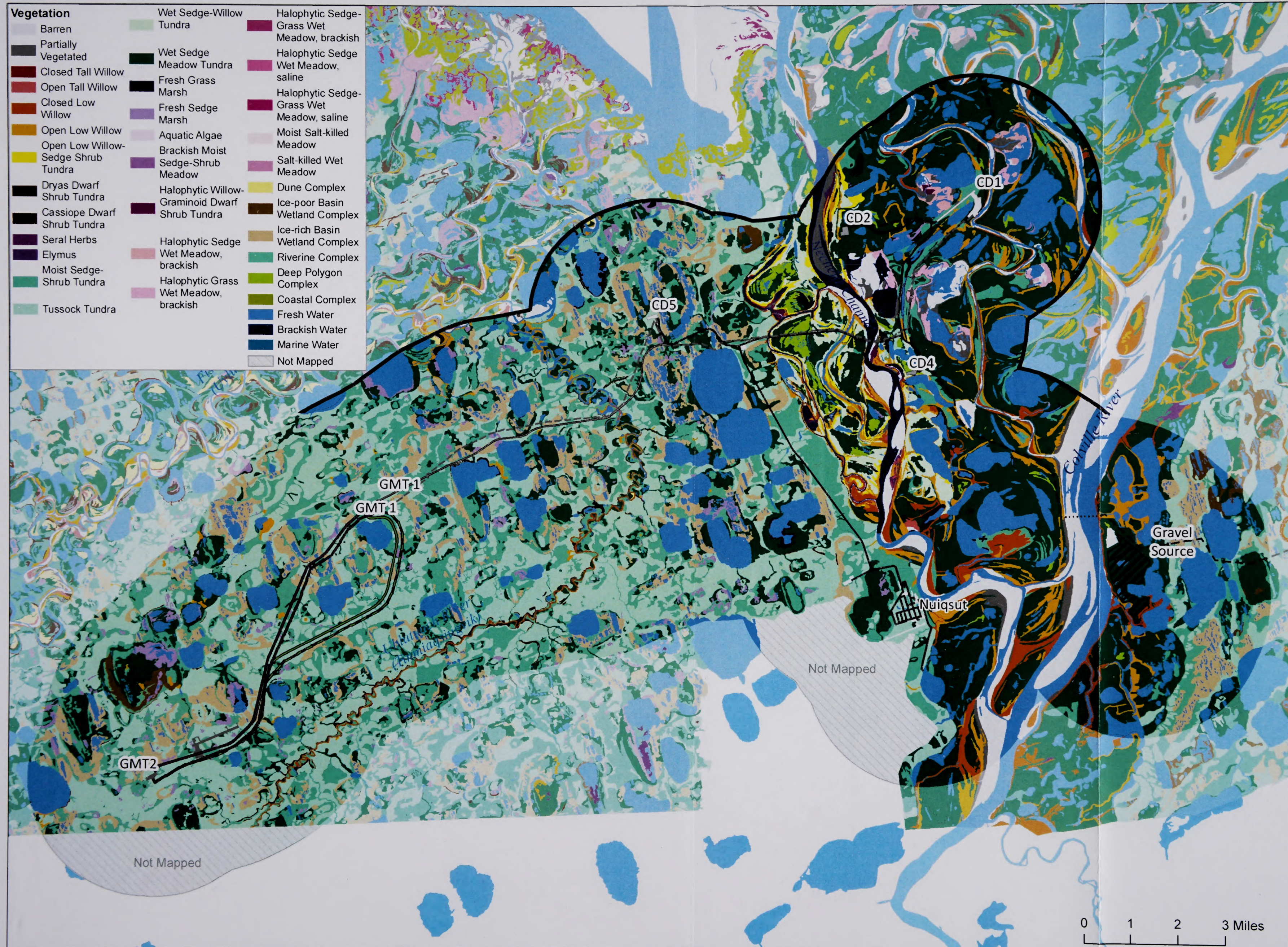
GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

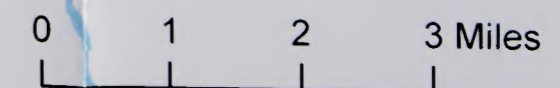
Existing & GMT-1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

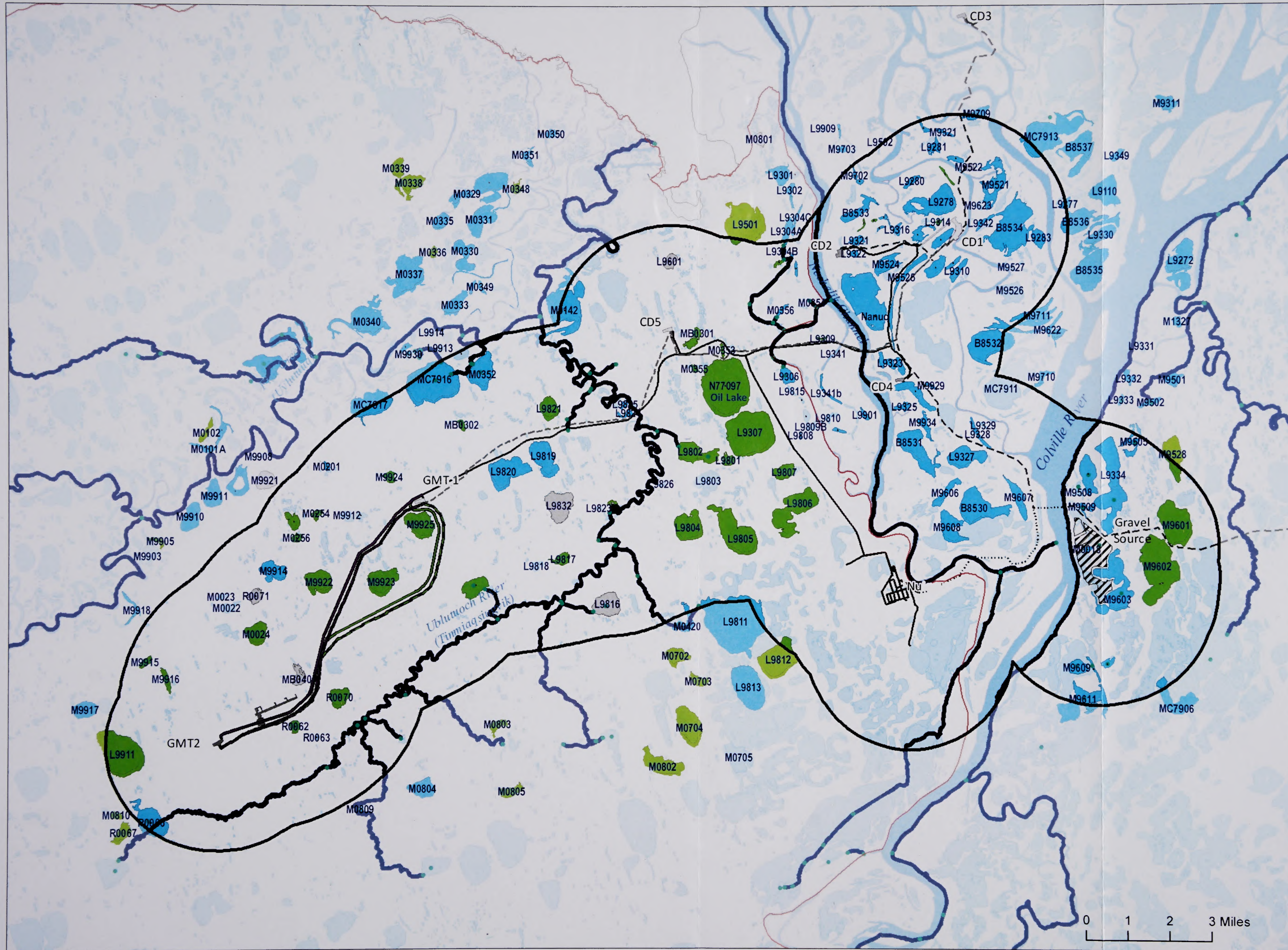
Project Study Area



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Map 3.3-1



Anadromous Waters Catalog (AWC) - Point
 ●

Anadromous Waters Catalog (AWC) - Line
 —

Lakes Sampled for Water Sources

Resistant Fish Species (Ninespine stickleback and Alaska blackfish)
 Lake ID

Sensitive Fish Species Present
 Lake ID

No Fish Captured
 Lake ID

Not Sampled
 Lake ID

GMT-2 Proposed Infrastructure

Alt. A Pipeline
 Alt. A. Road
 Alt. B Pipeline
 Alt. B Road
 GMT-2 Proposed Pads

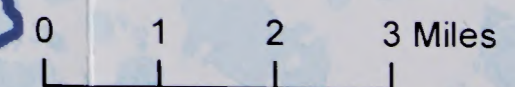
Existing & GMT- 1 Permitted Infrastructure

Road
 Pipeline
 Gravel Source
 Pad

National Petroleum Reserve in Alaska Boundary
 (Red outline)

Project Study Area
 (Thick black outline)

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Map 3.3-2



Ice Regime

- Bedfast Ice Regime
- Transitional Ice Regime
- Floating Ice Regime

Known Fish Overwintering Habitat

GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A. Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

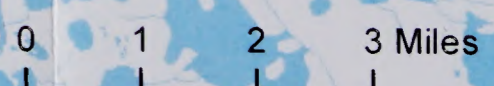
Existing & GMT- 1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

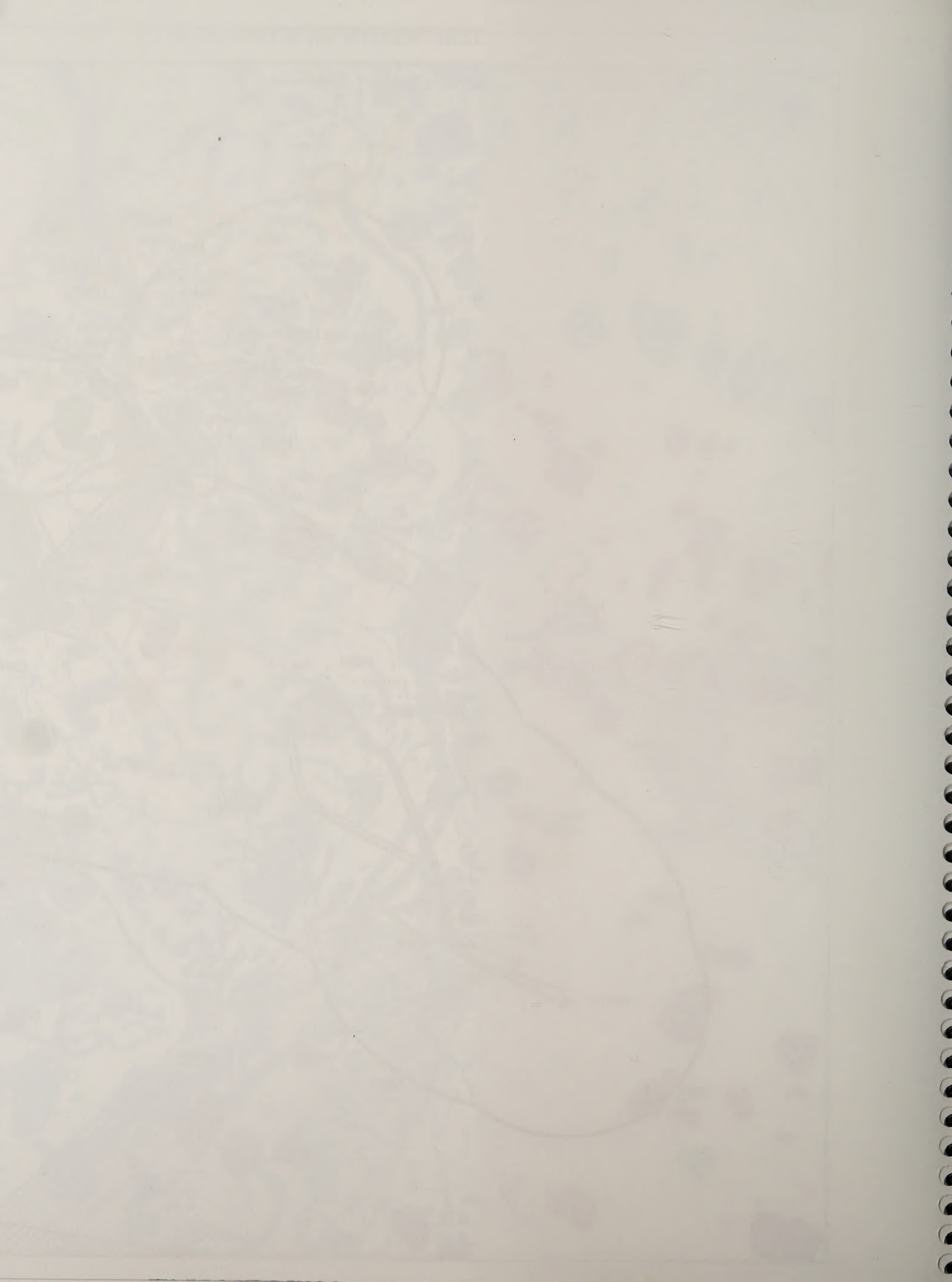
National Petroleum Reserve in Alaska Boundary

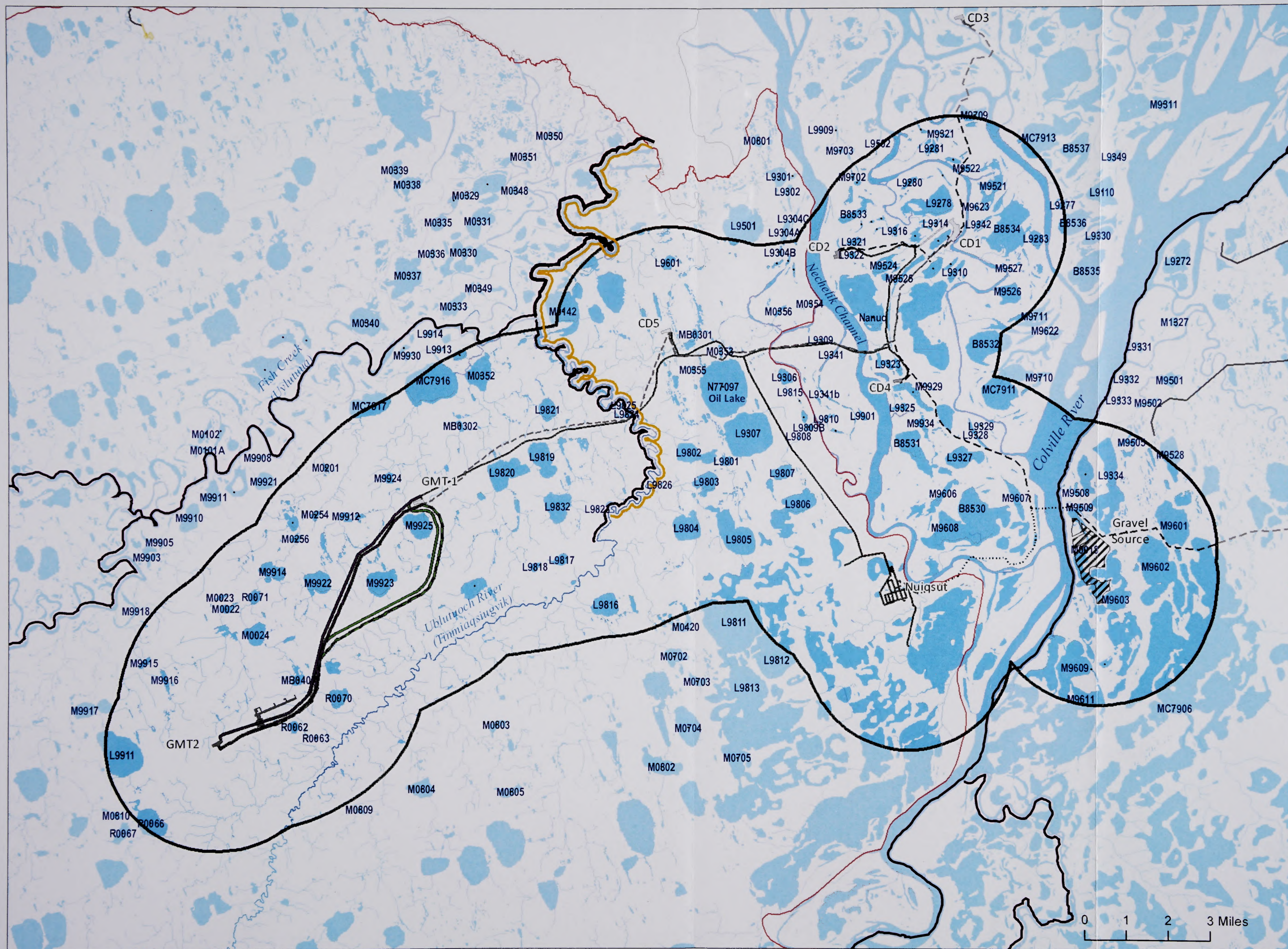
Project Study Area

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.



Map 3.3-3





Essential Fish Habitat

- KSp- King salmon present upstream extent
- CSp- Chum salmon & PSp- Pink salmon present upstream extent

GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A. Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

Existing & GMT-1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

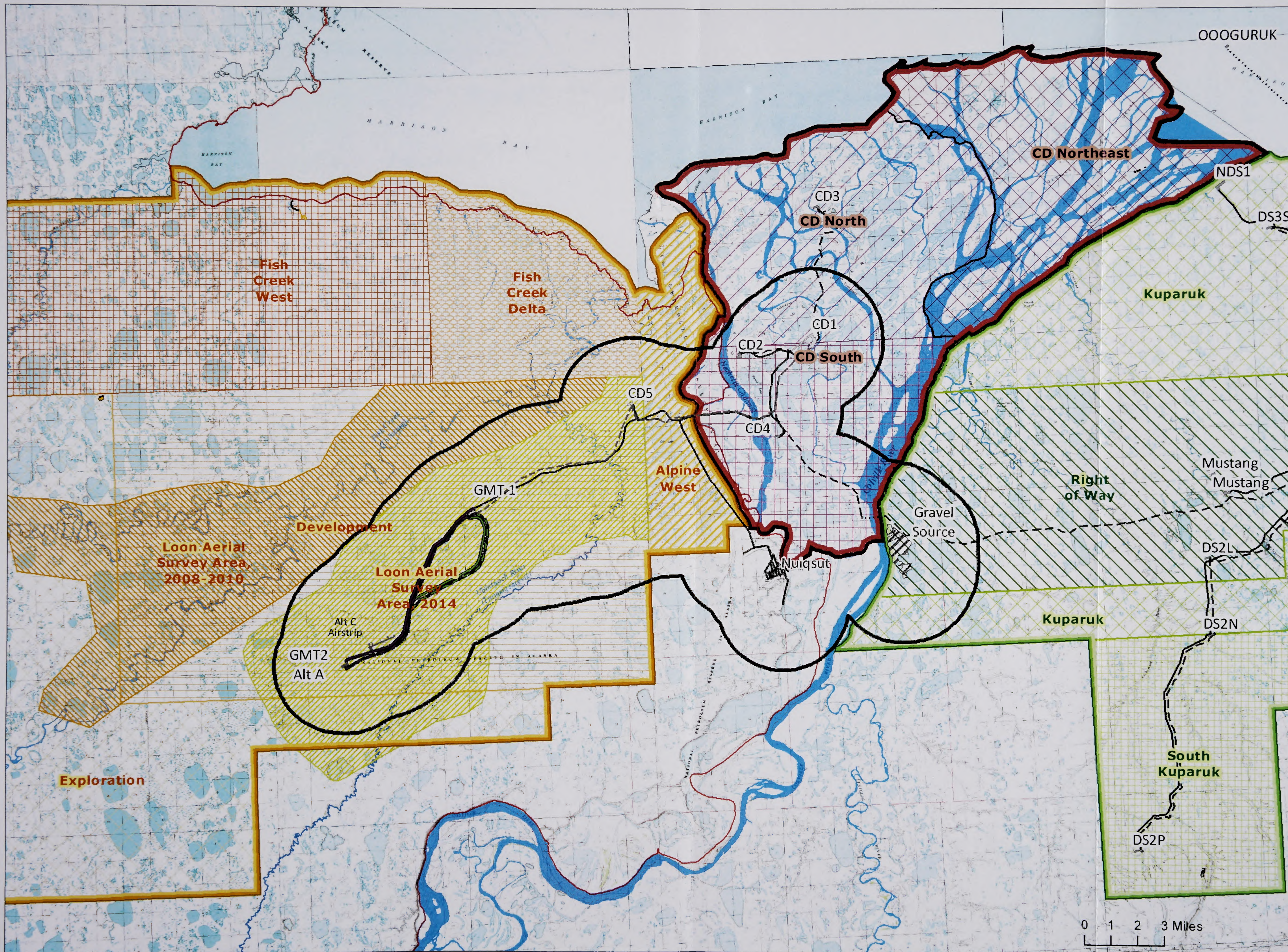
- National Petroleum Reserve in Alaska Boundary
- Project Study Area

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0 1 2 3 Miles

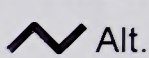
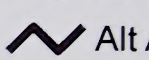
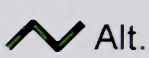

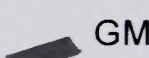
Map 3.3-4



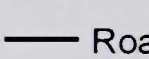
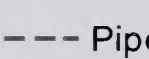
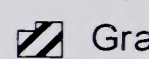
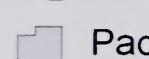
Avian Study Area and Sub-Areas

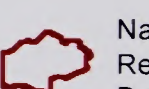
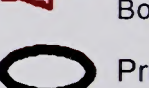
-  **Colville Study Area**
-  **Kuparuk Study Area**
-  **NPRA Study Area**

GMT-2 Proposed Infrastructure

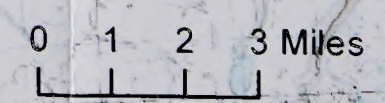
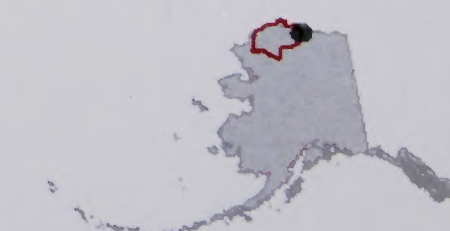
-  Alt. A Pipeline
-  Alt. A. Road
-  Alt. B Pipeline
-  Alt. B Road
-  GMT-2 Proposed Pads

Existing & GMT- 1 Permitted Infrastructure

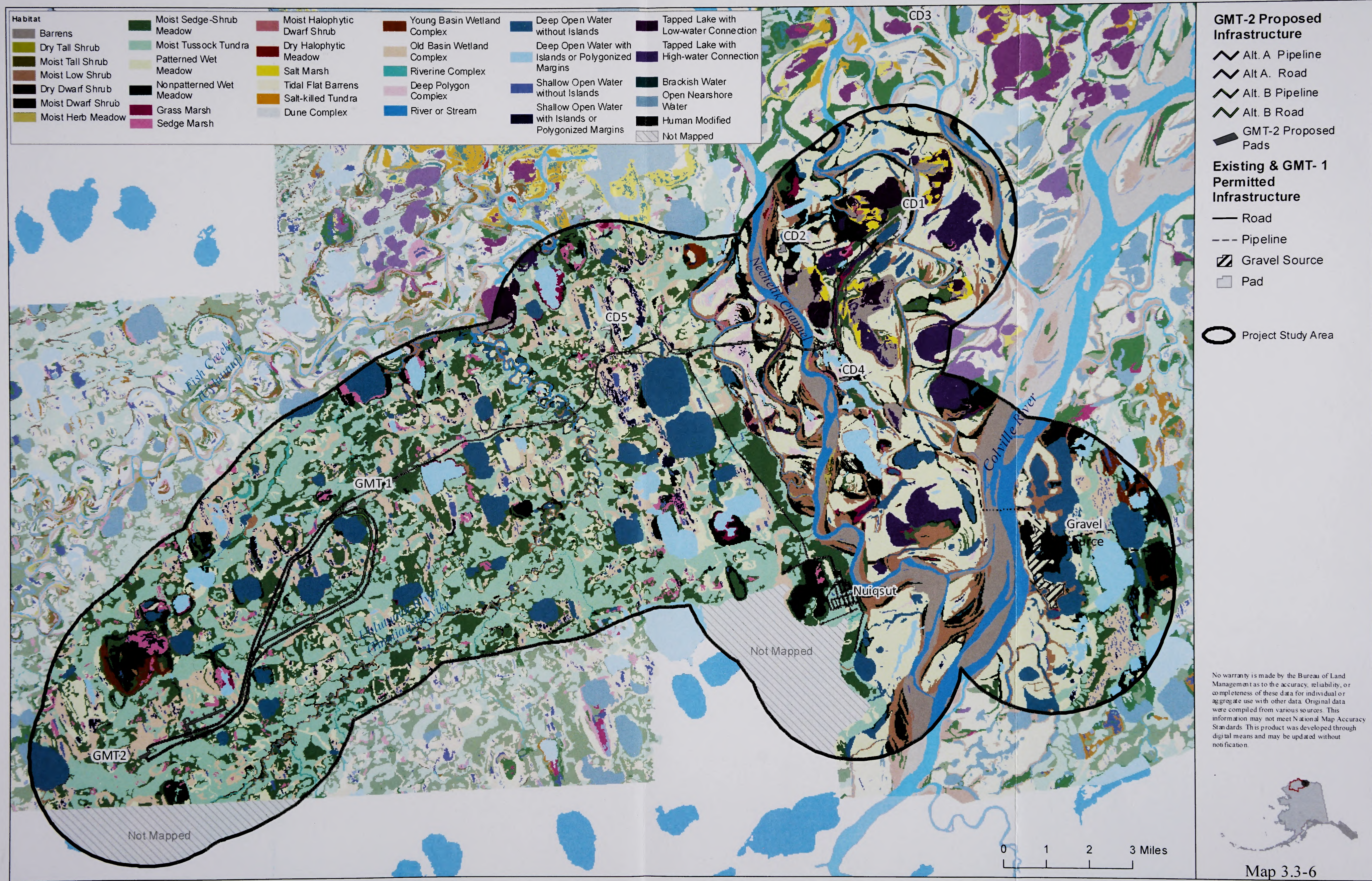
-  Road
-  Pipeline
-  Gravel Source
-  Pad

-  National Petroleum Reserve in Alaska Boundary
-  Project Study Area

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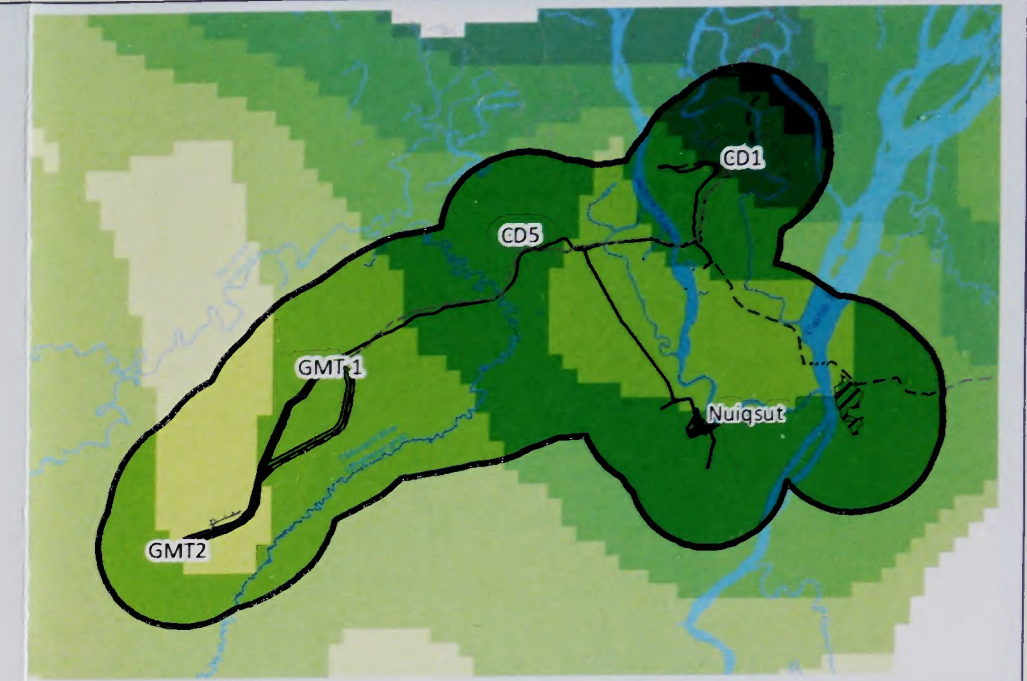
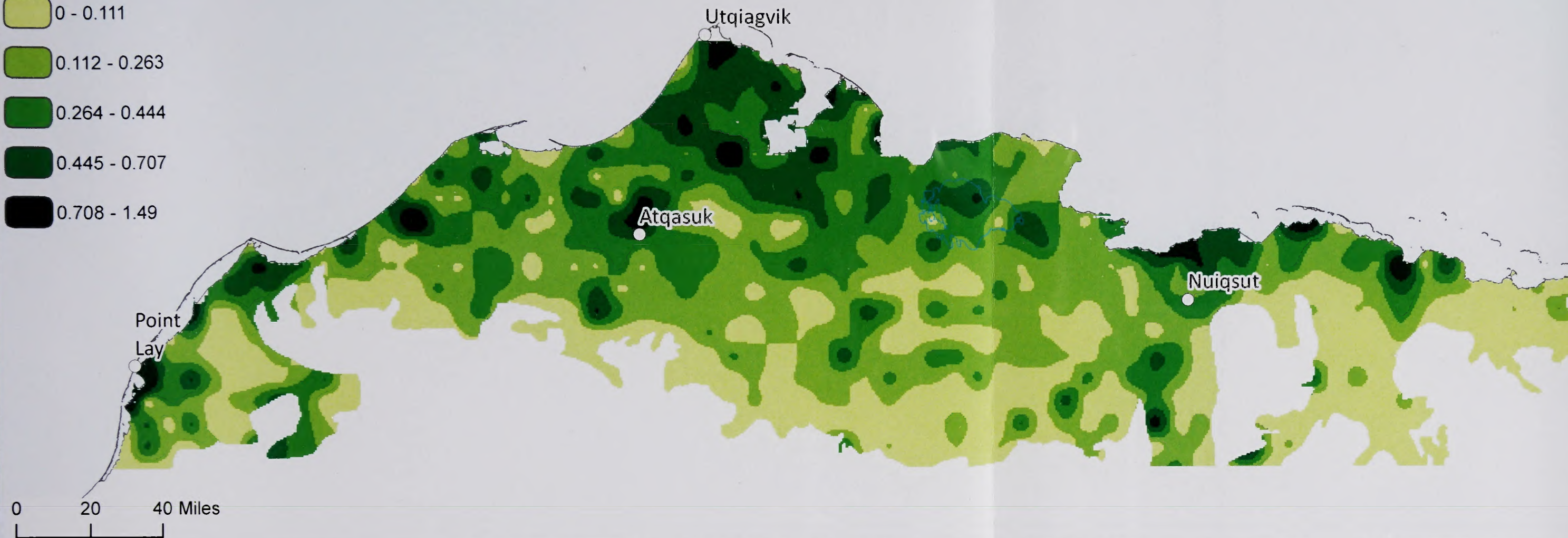
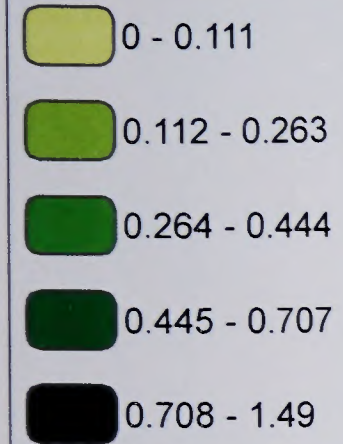
Map 3.3-5





Glaucous gull (GLGU)

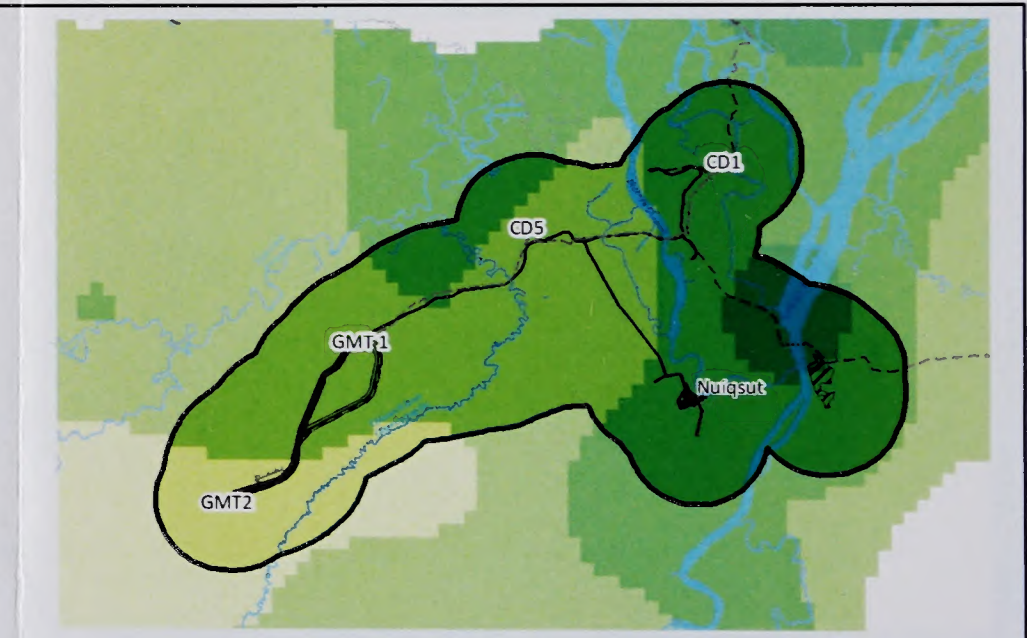
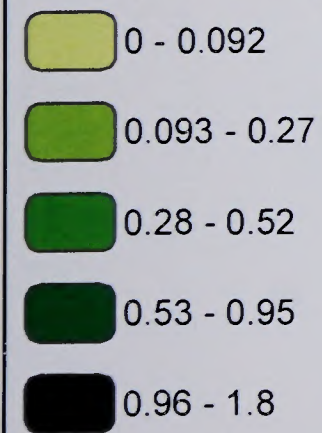
Estimated June
Density (birds/sq. km)



Data Source: U.S. Fish & Wildlife Service- unpublished data, 2017.

Tundra swan (TUSW)

Estimated June
Density (birds/sq. km)



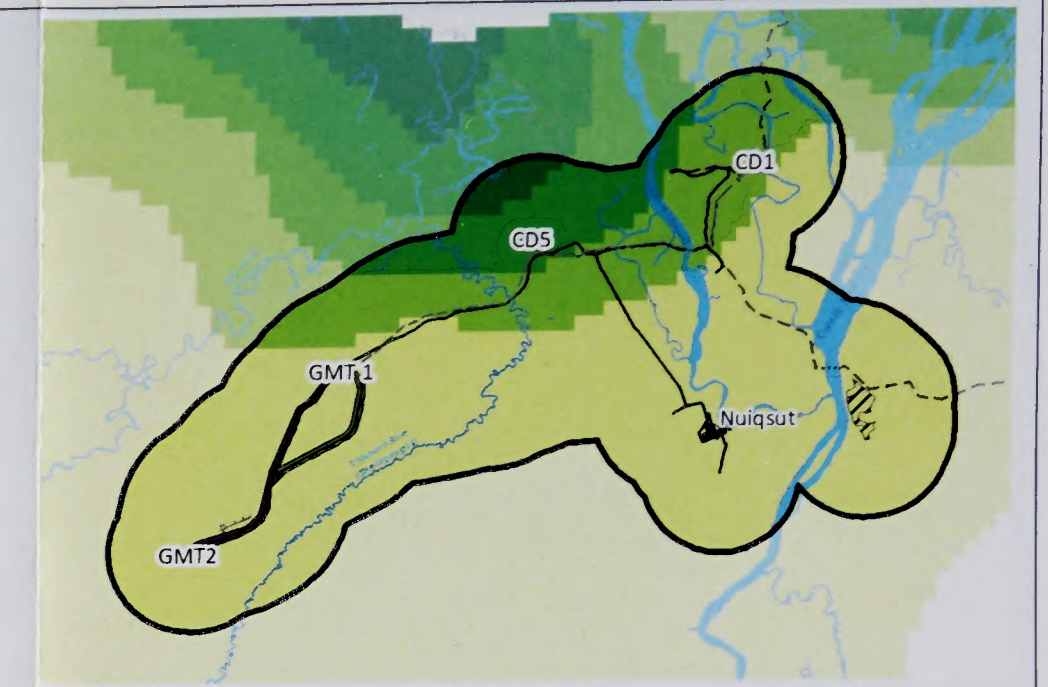
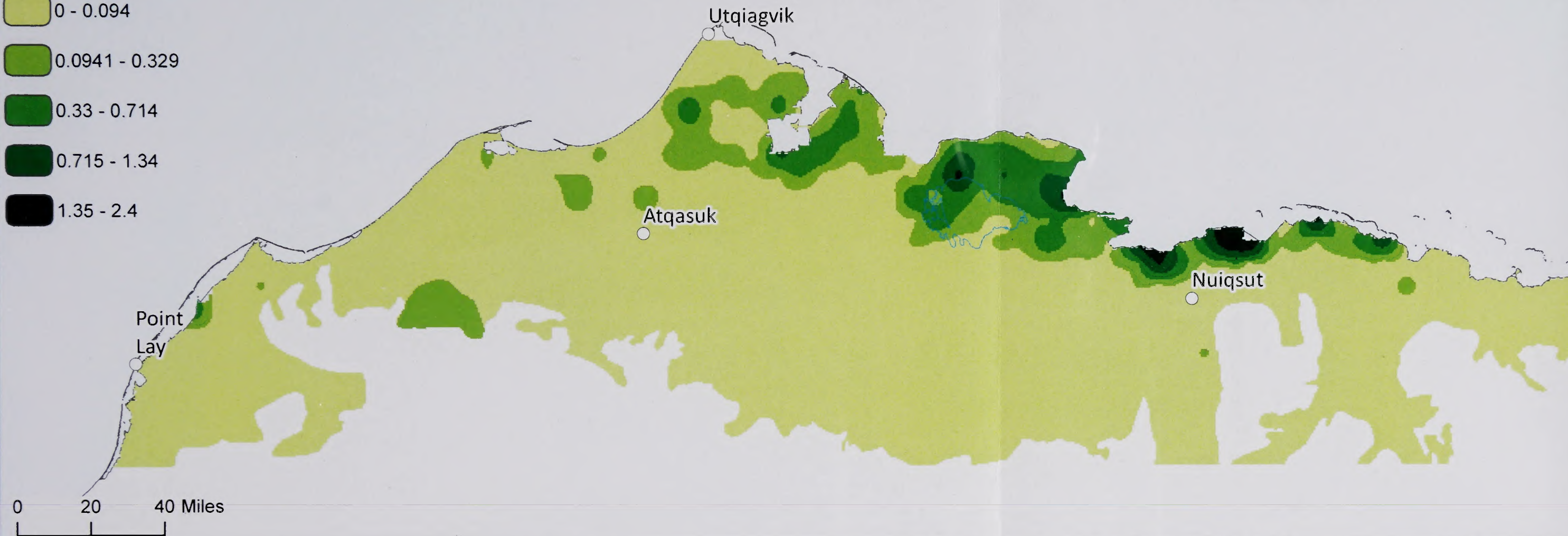
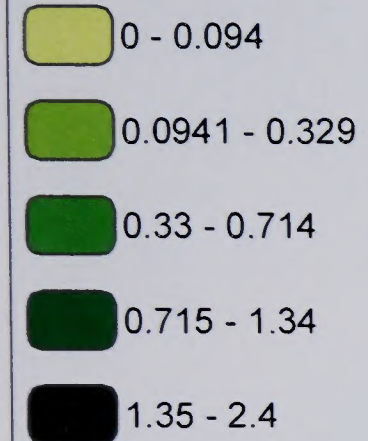
Estimated density based on a 10 x 10 km sample grid from pooled Arctic Coastal Plain aerial breeding waterbird surveys, 2012 - 2015

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Black brant (BLBR)

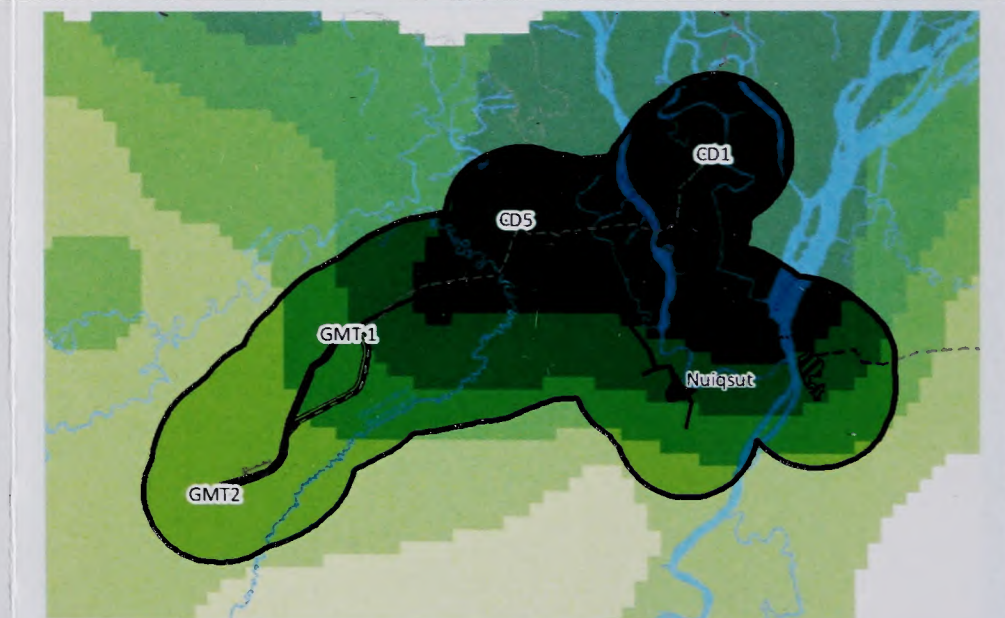
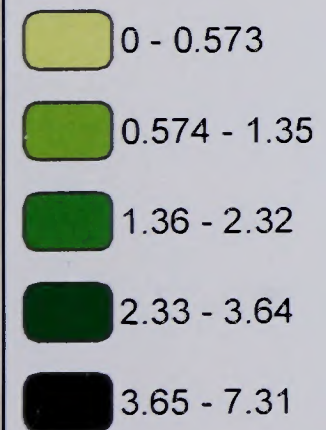
Estimated June Density (birds/sq. km)



Data Source: U.S. Fish & Wildlife Service- unpublished data, 2017.

Greater white-fronted goose (GWFG)

Estimated June Density (birds/sq. km)



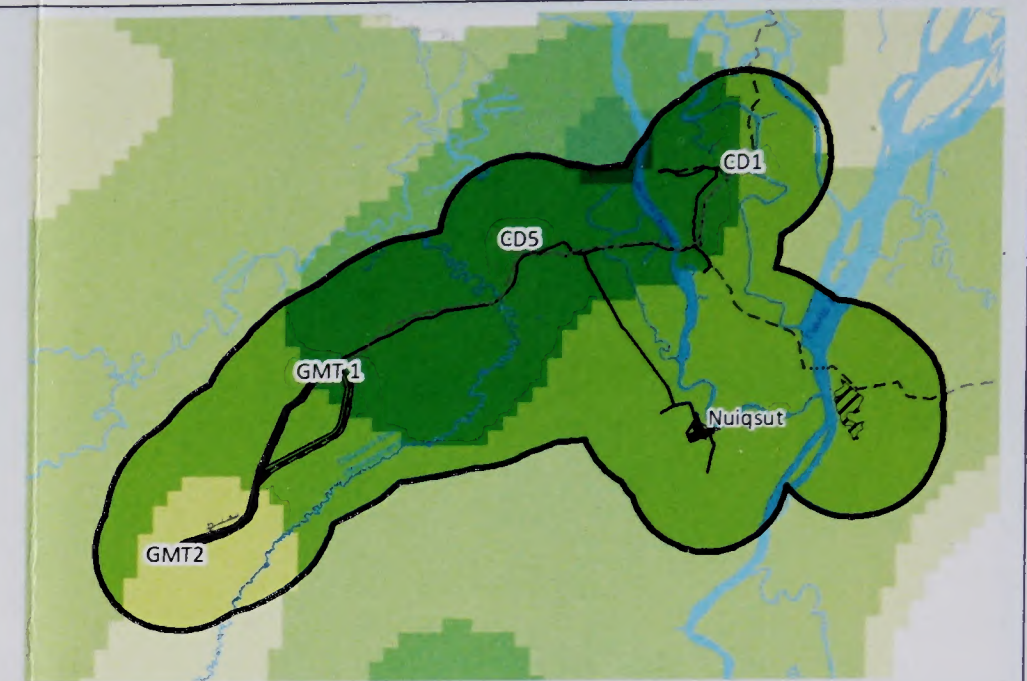
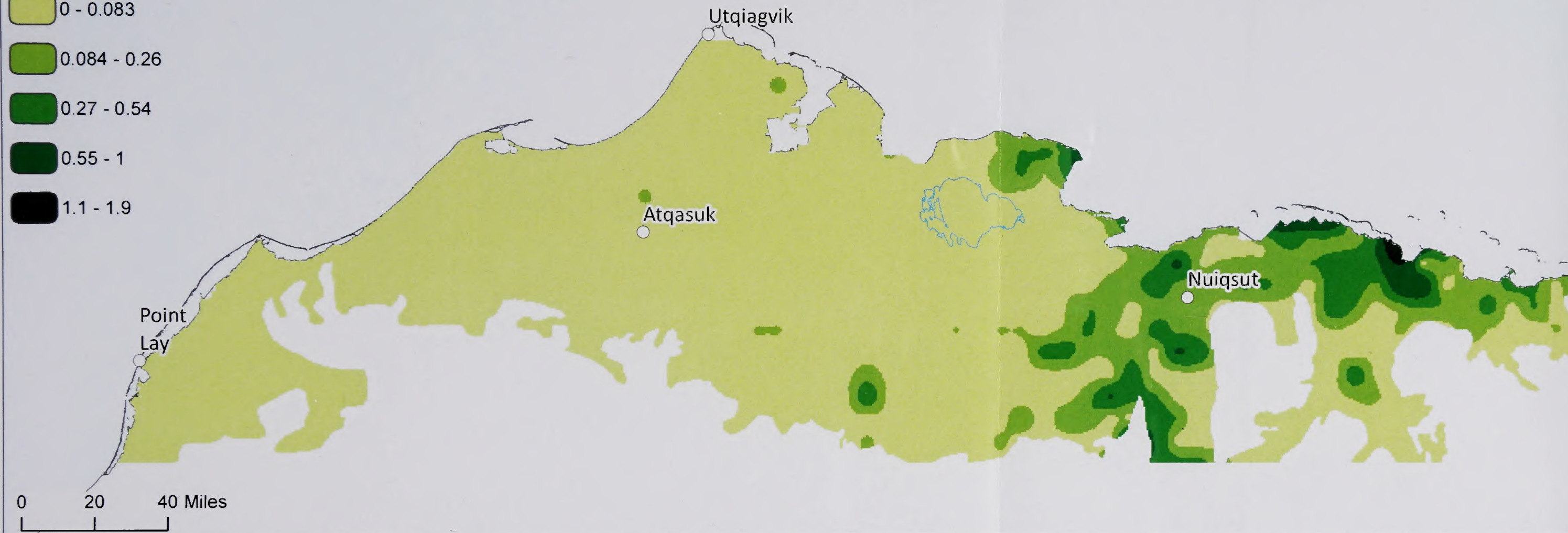
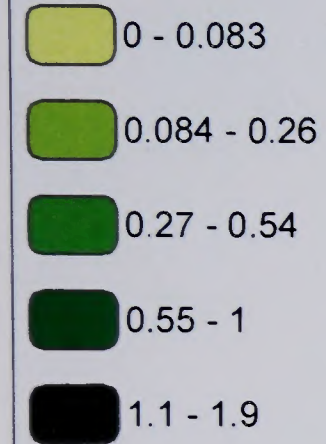
Estimated density based on a 10 x 10 km sample grid from pooled Arctic Coastal Plain aerial breeding waterbird surveys, 2012 - 2015

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Canada goose (CAGO)

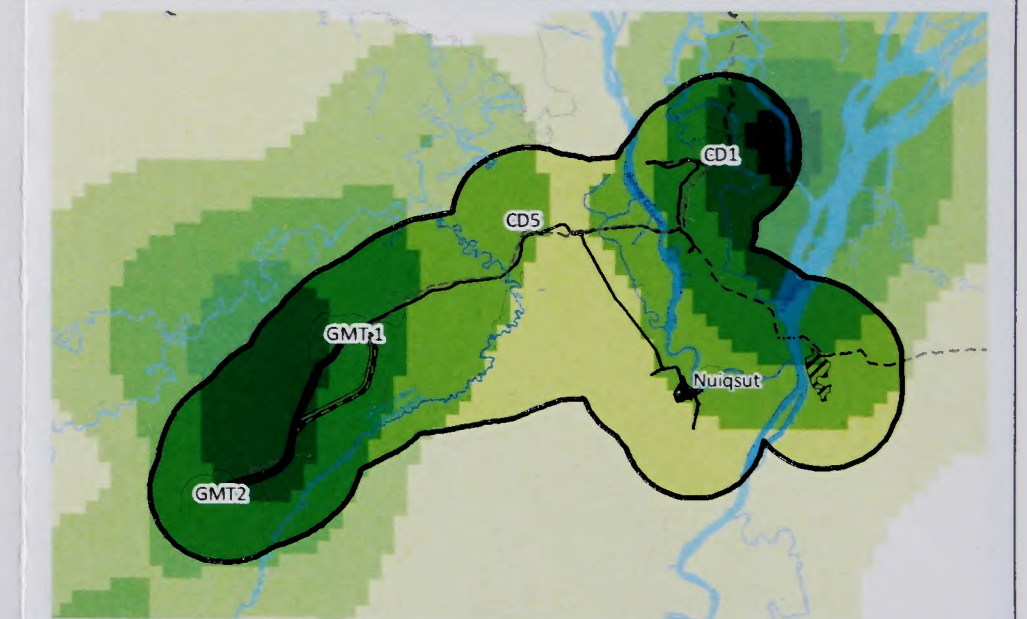
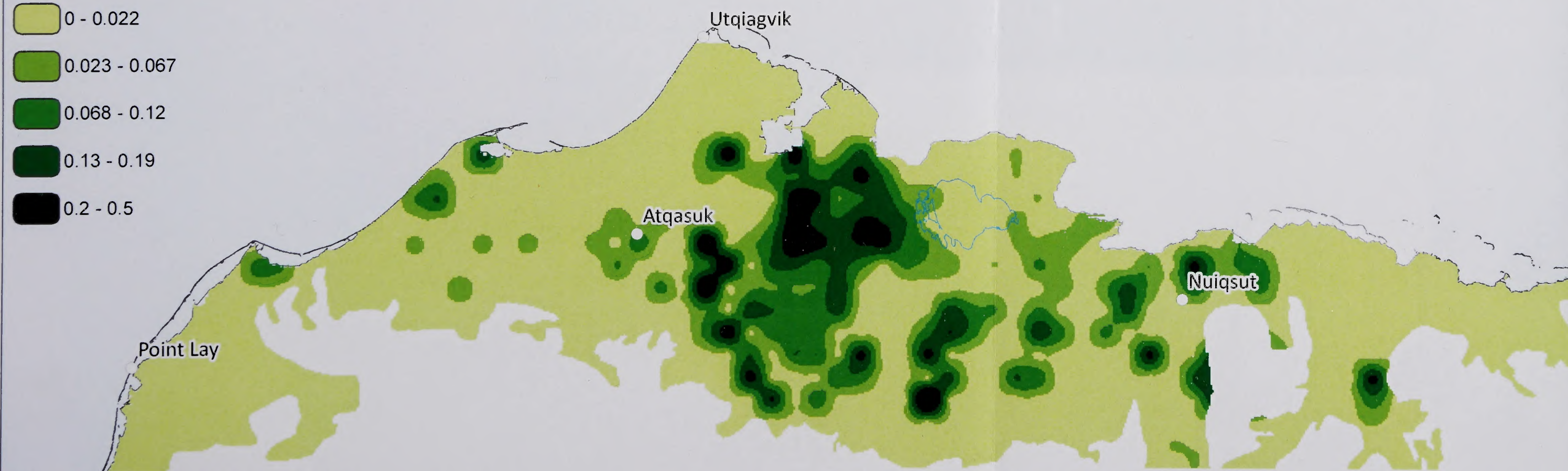
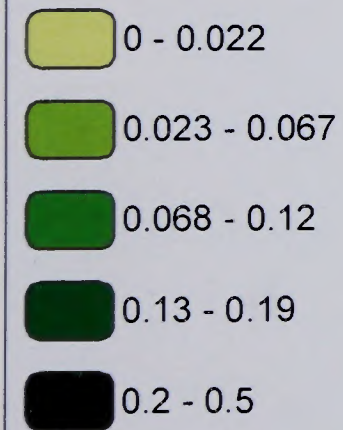
Estimate June Density (birds/sq. km)



Data Source: U.S. Fish & Wildlife Service- unpublished data, 2017.

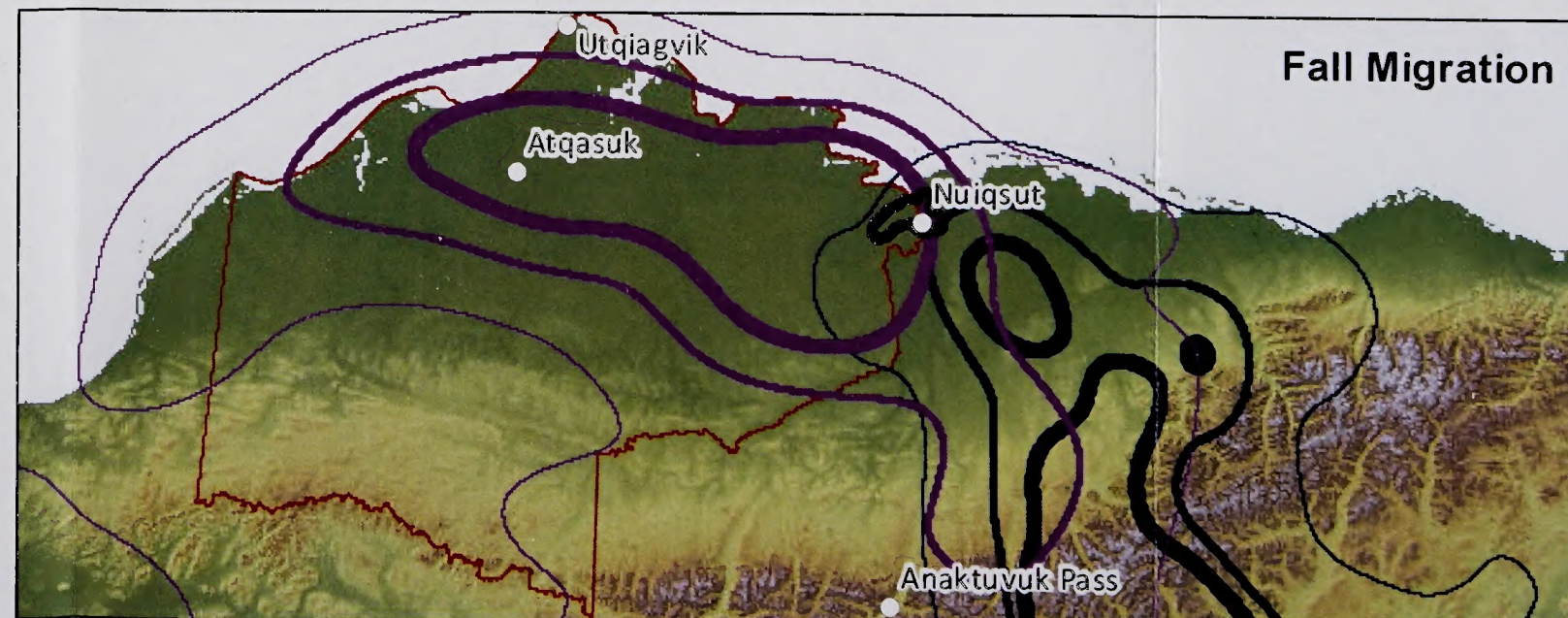
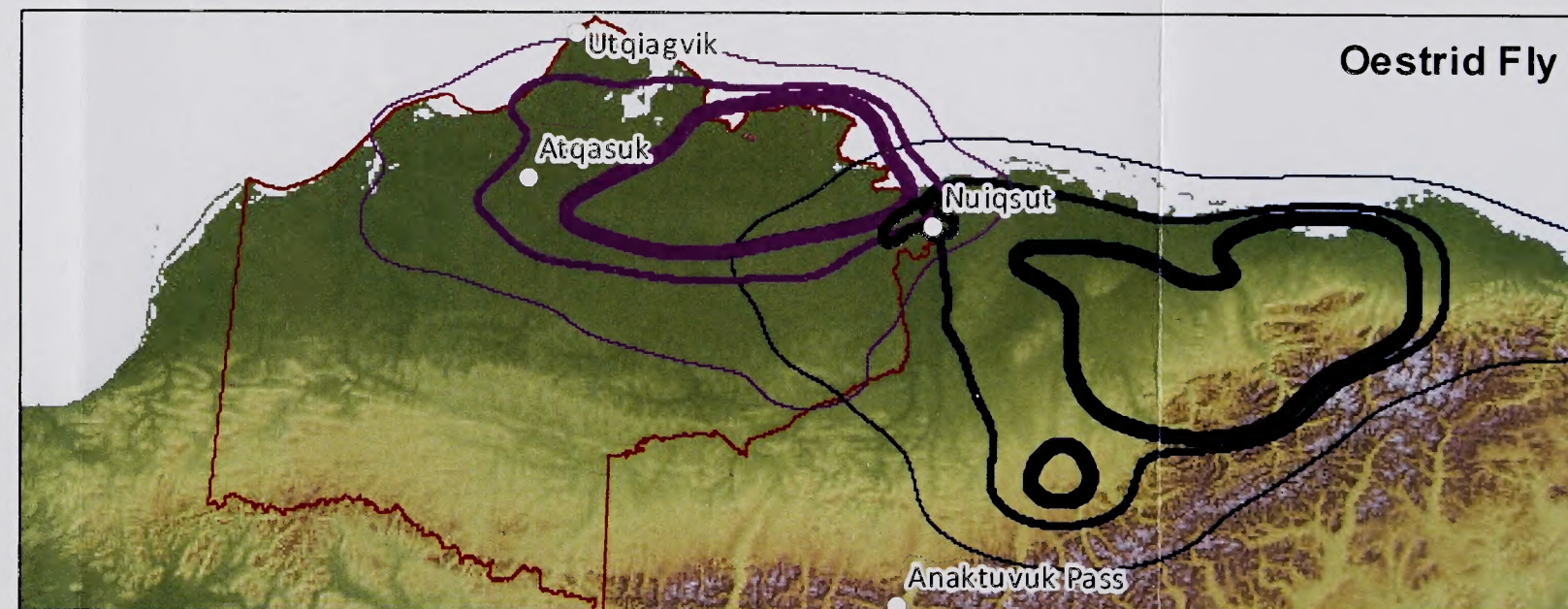
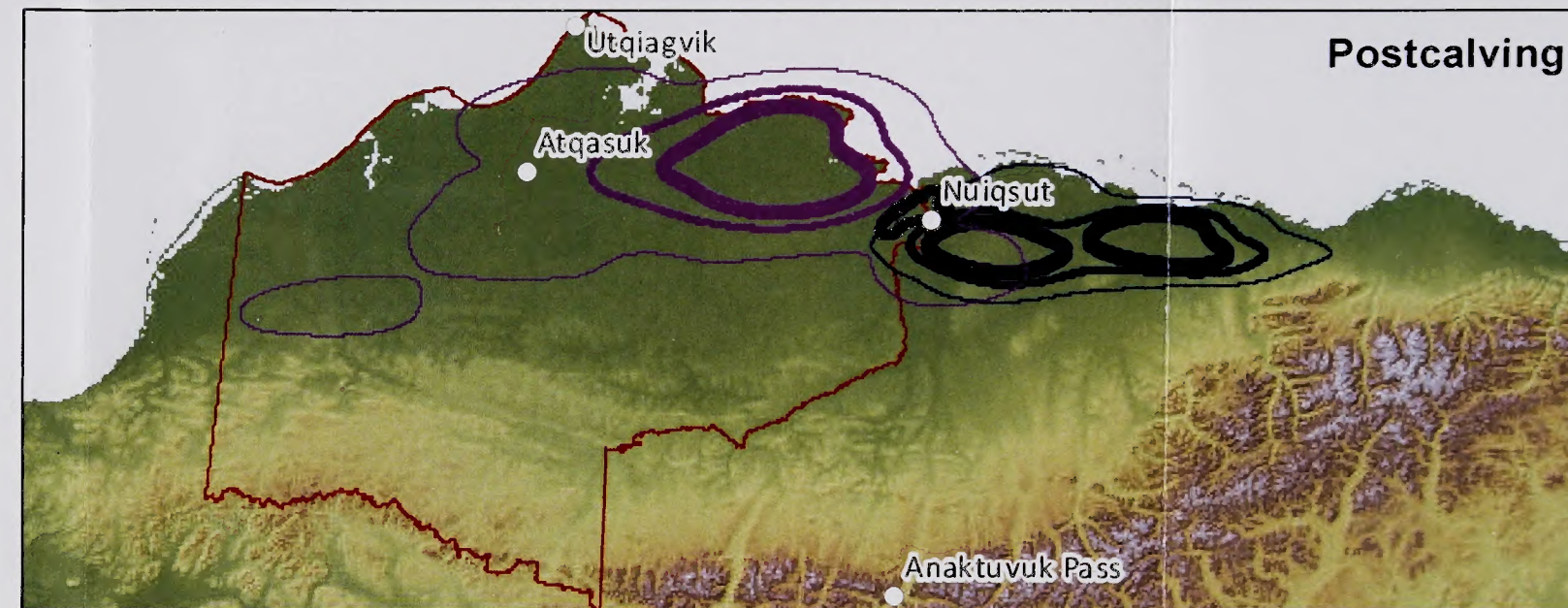
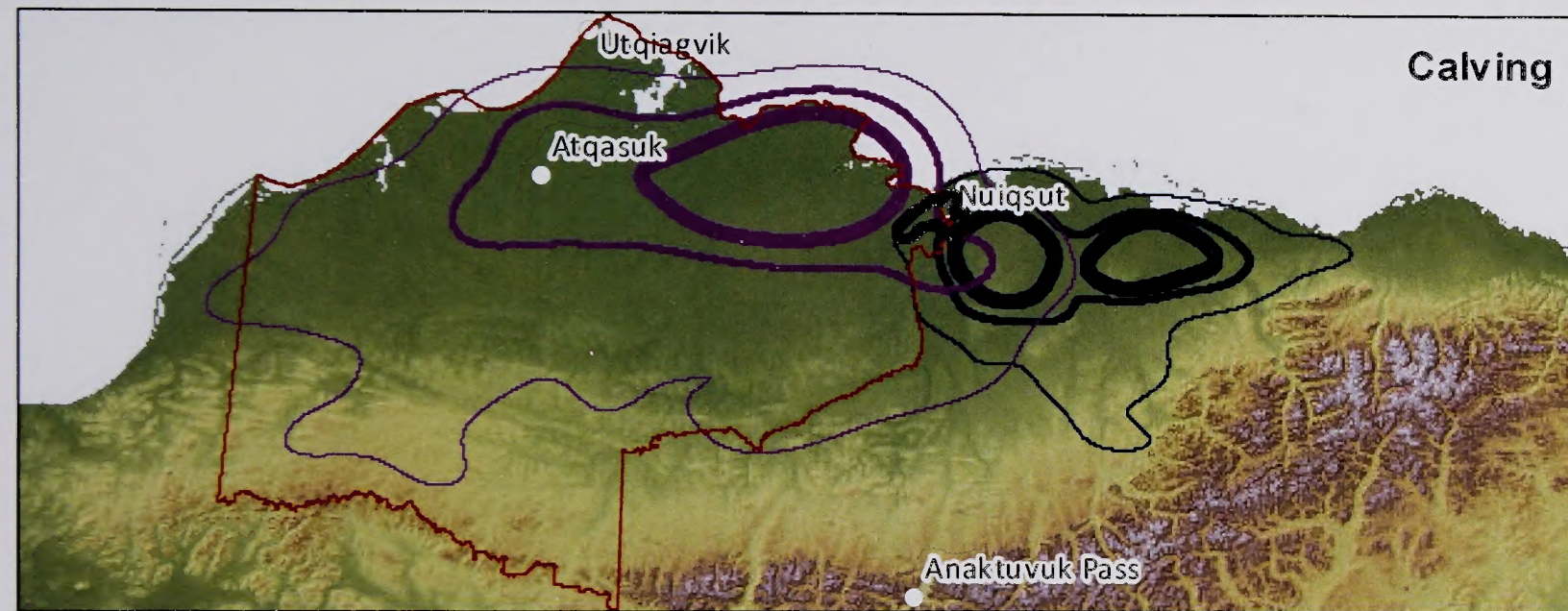
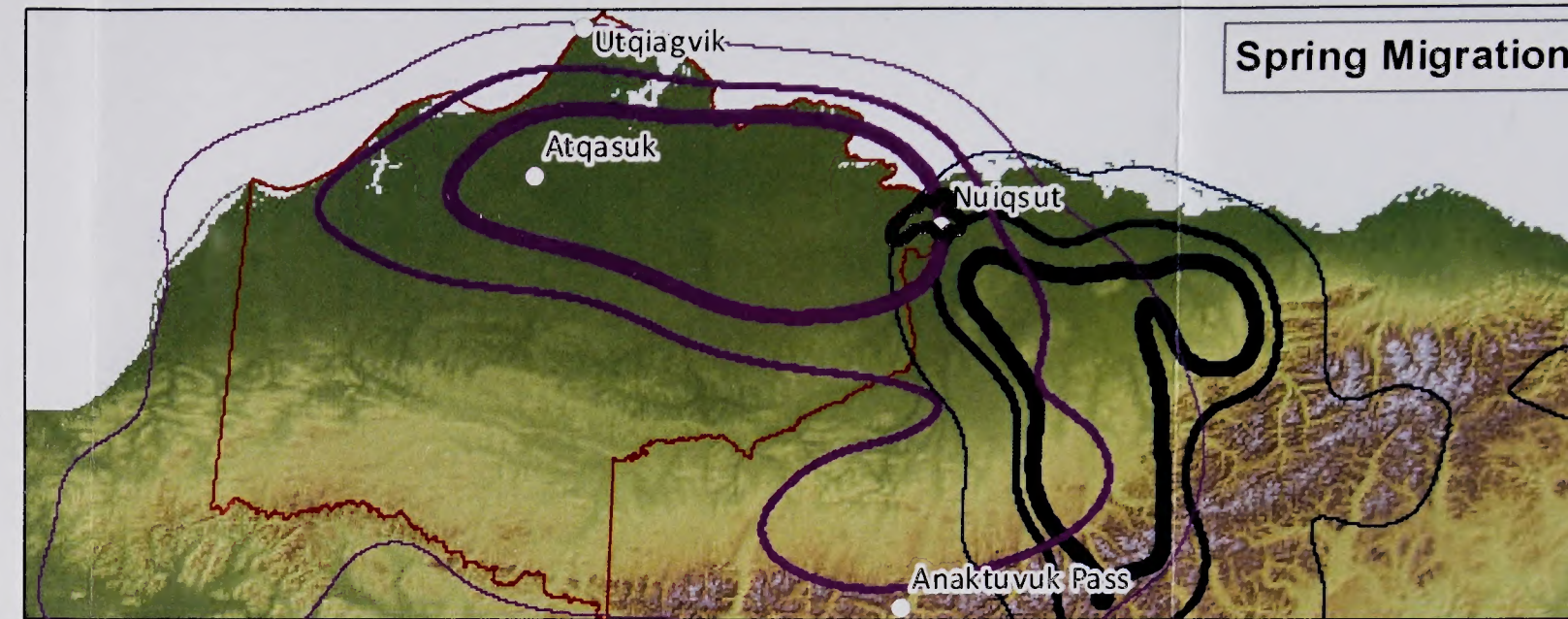
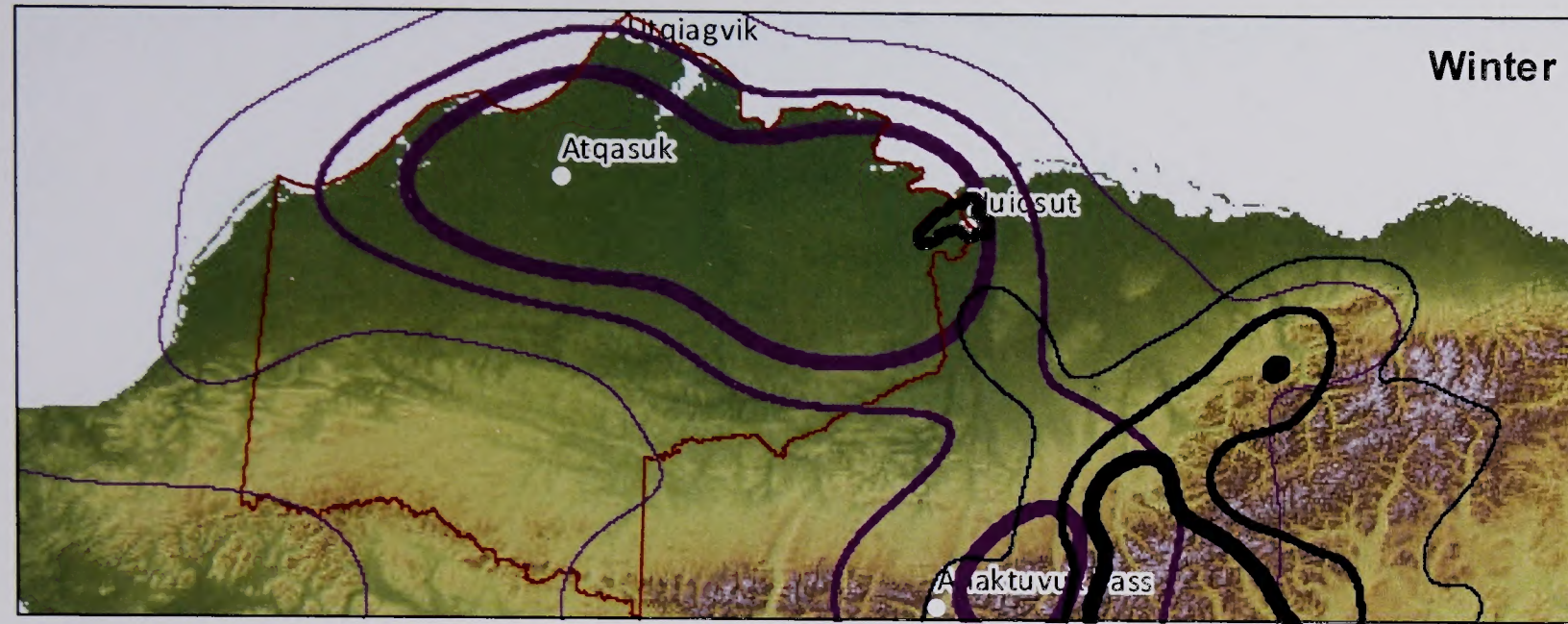
Yellow-billed loon (YBLO)

Estimated June Density (birds/sq. km)



Estimated density based on a 10 x 10 km sample grid from pooled Arctic Coastal Plain aerial breeding waterbird surveys, 2012 - 2015

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Central Arctic Herd Utilization Contour - Females 2001-2016

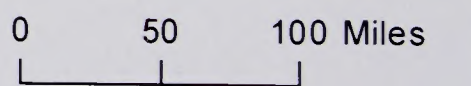
- High
- Medium
- Low

Teshekpuk Lake Herd Utilization Contour - Females 1990-2016

- High
- Medium
- Low

Note: Herd utilization contours from fixed-kernel analysis of locations of radio-collared female caribou. Contours enclose stated percentages of all collar locations. High, medium and low density areas are the 50%, 75% and 95% utilization contours, respectively.

- National Petroleum Reserve in Alaska Boundary
- Project Study Area



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Total Polar Bear Critical Habitat

Denning Habitat Feeding Habitat

Potential Polar Bear Den Habitat

Polar Bear Den

GMT-2 Proposed Infrastructure

Alt. A Pipeline
Alt. A Road
Alt. B Pipeline
Alt. B Road
GMT-2 Proposed Pads

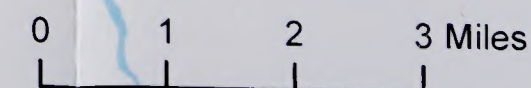
Existing & GMT-1 Permitted Infrastructure

Road
Pipeline
Gravel Source
Pad

National Petroleum Reserve in Alaska Boundary

Project Study Area

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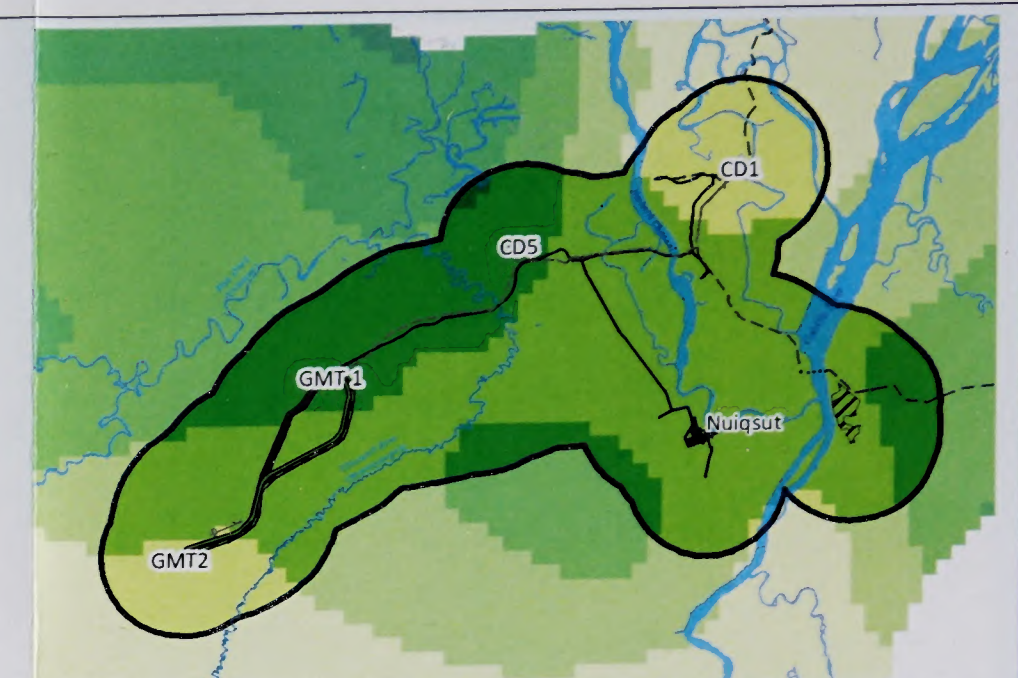
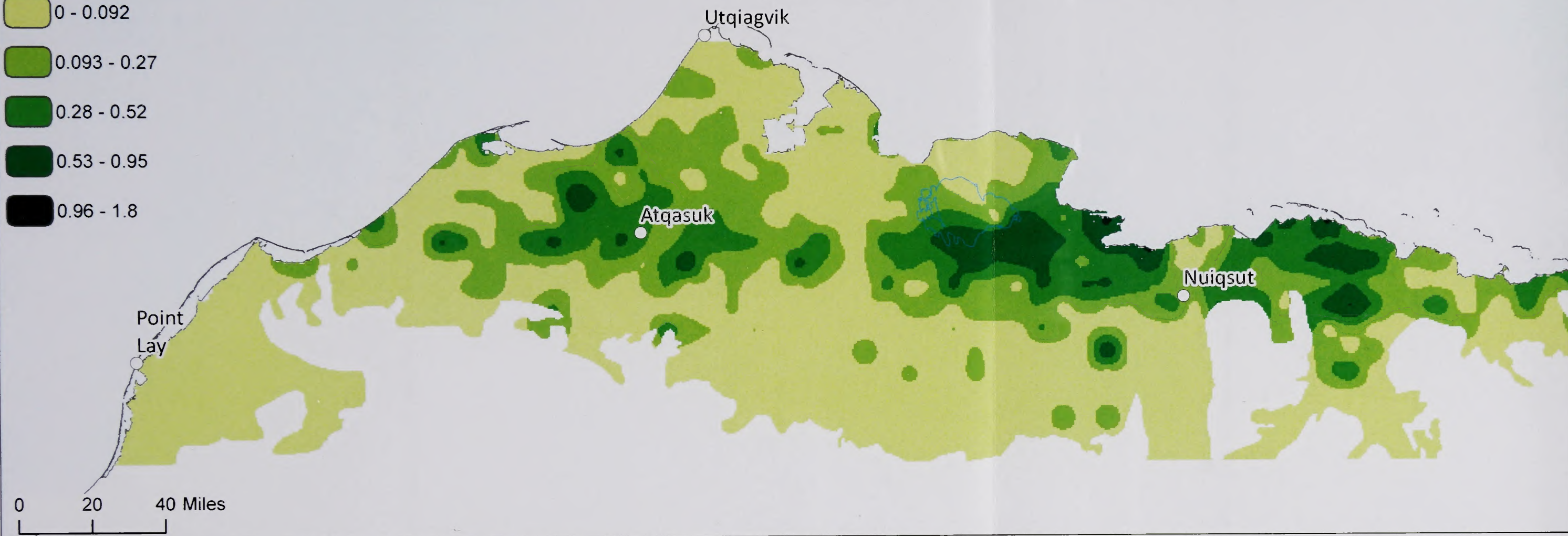
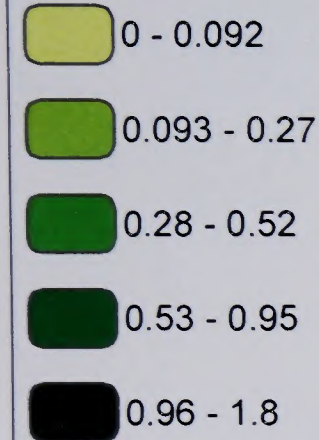


Map 3.3-11



King eider (KIEI)

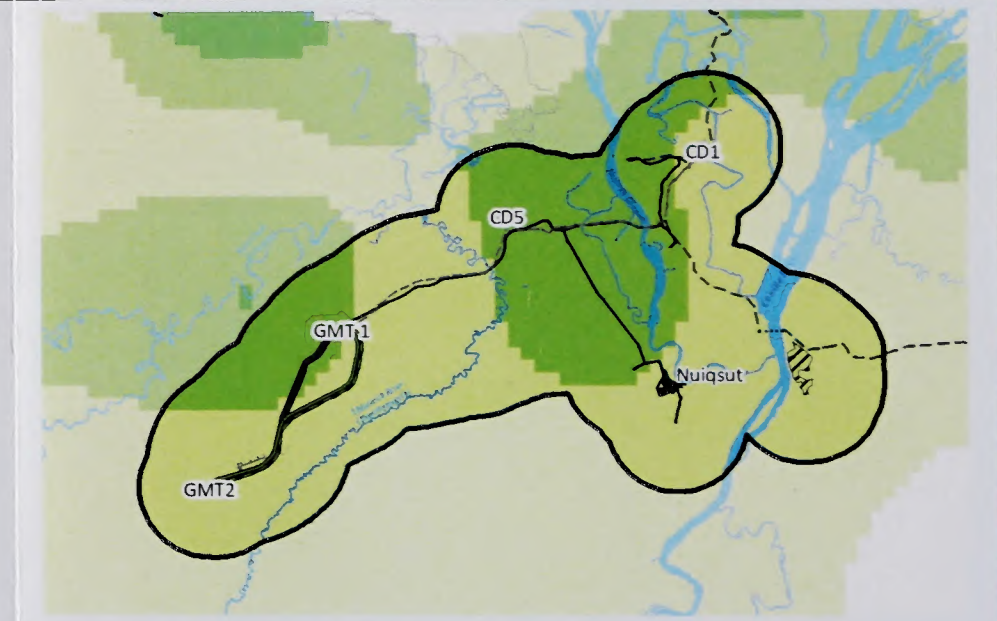
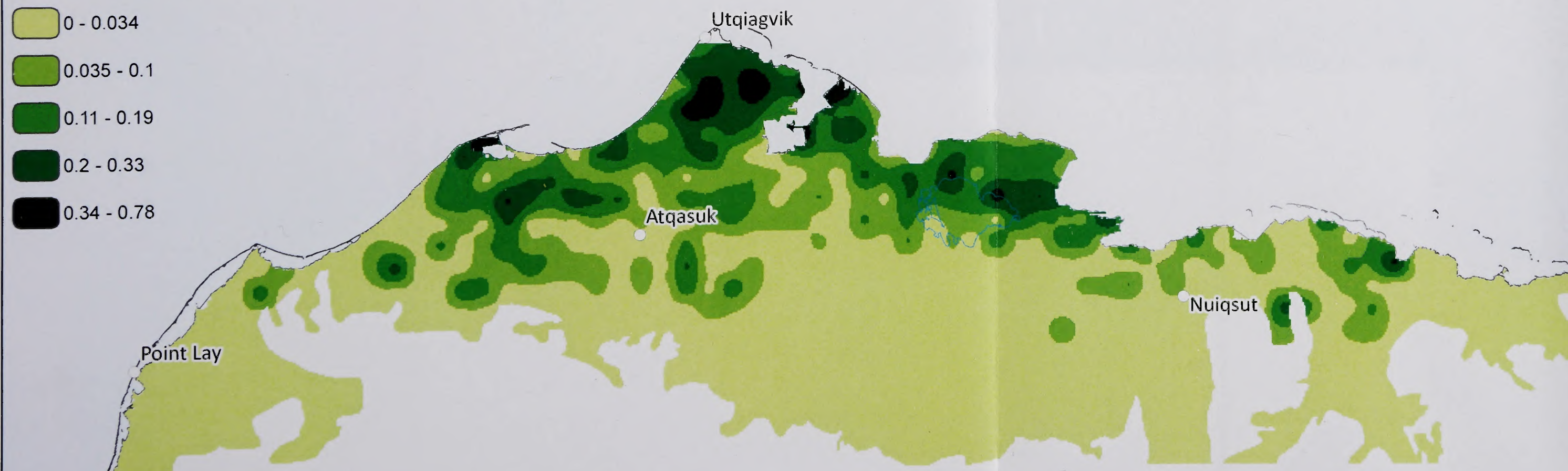
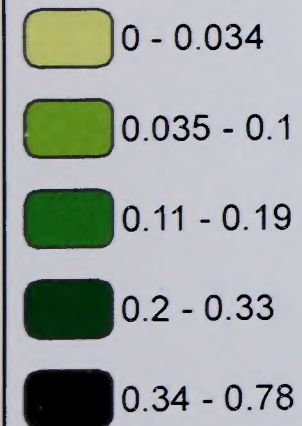
Estimated June
Density (birds/sq. km)



Data Source: U.S. Fish & Wildlife Service- unpublished data, 2017.

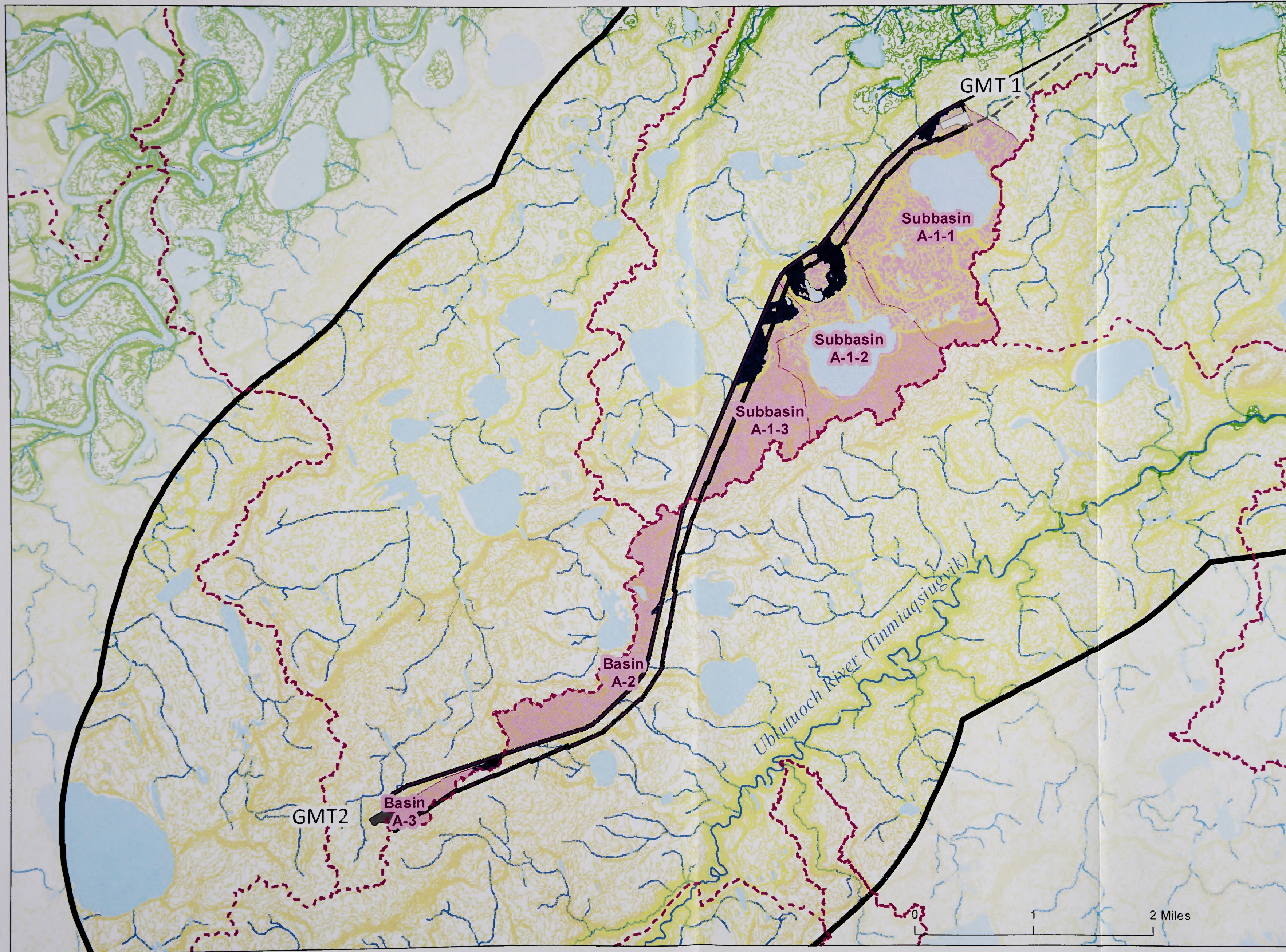
Spectacled eider (SPEI)

Estimated June
Density (birds/sq. km)



Estimated density based on a 10 x 10 km sample grid from pooled Arctic Coastal Plain aerial breeding waterbird surveys, 2012 - 2015

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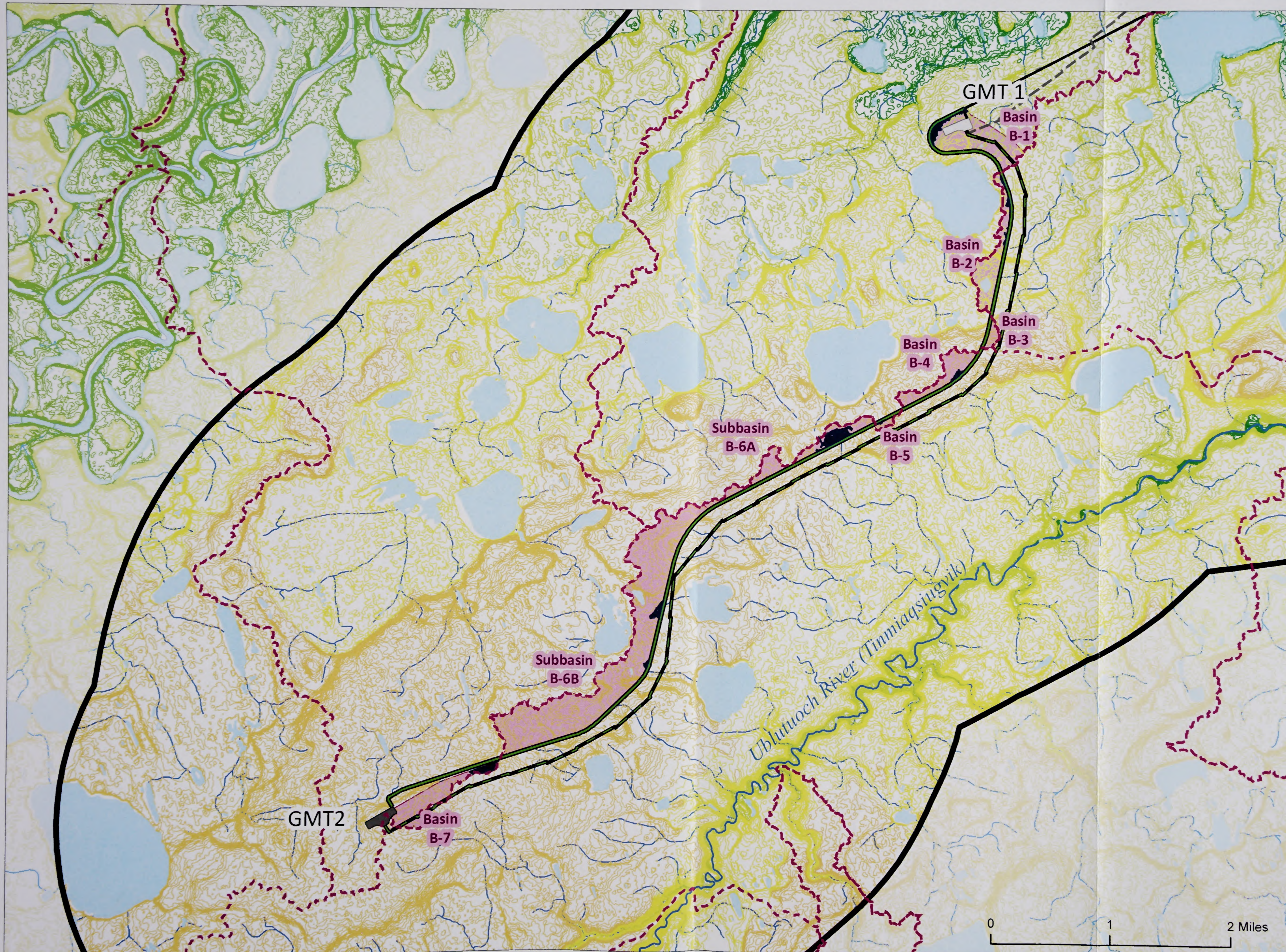
- Watershed Boundary Dataset (WBD) - 6th Level
- Inundation Area
- Contributing Hydrologic Basins
- Elevation Contours, 1 ft. intervals
 - 0- 30 ft.
 - 31- 45 ft.
 - 45- 60 ft.
 - 61 -99 ft.
- GMT-2 Proposed Infrastructure**
 - Alt. A Pipeline
 - Alt. A Road
 - GMT-2 Proposed Pads
- GMT- 1 Permitted Infrastructure**
 - Road
 - Pipeline
 - Pad
 - Project Study Area

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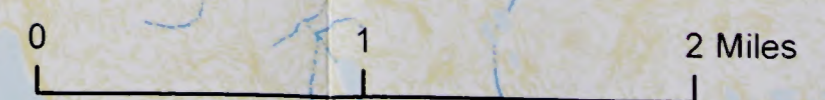
0 1 2 Miles

Map 4.2-2

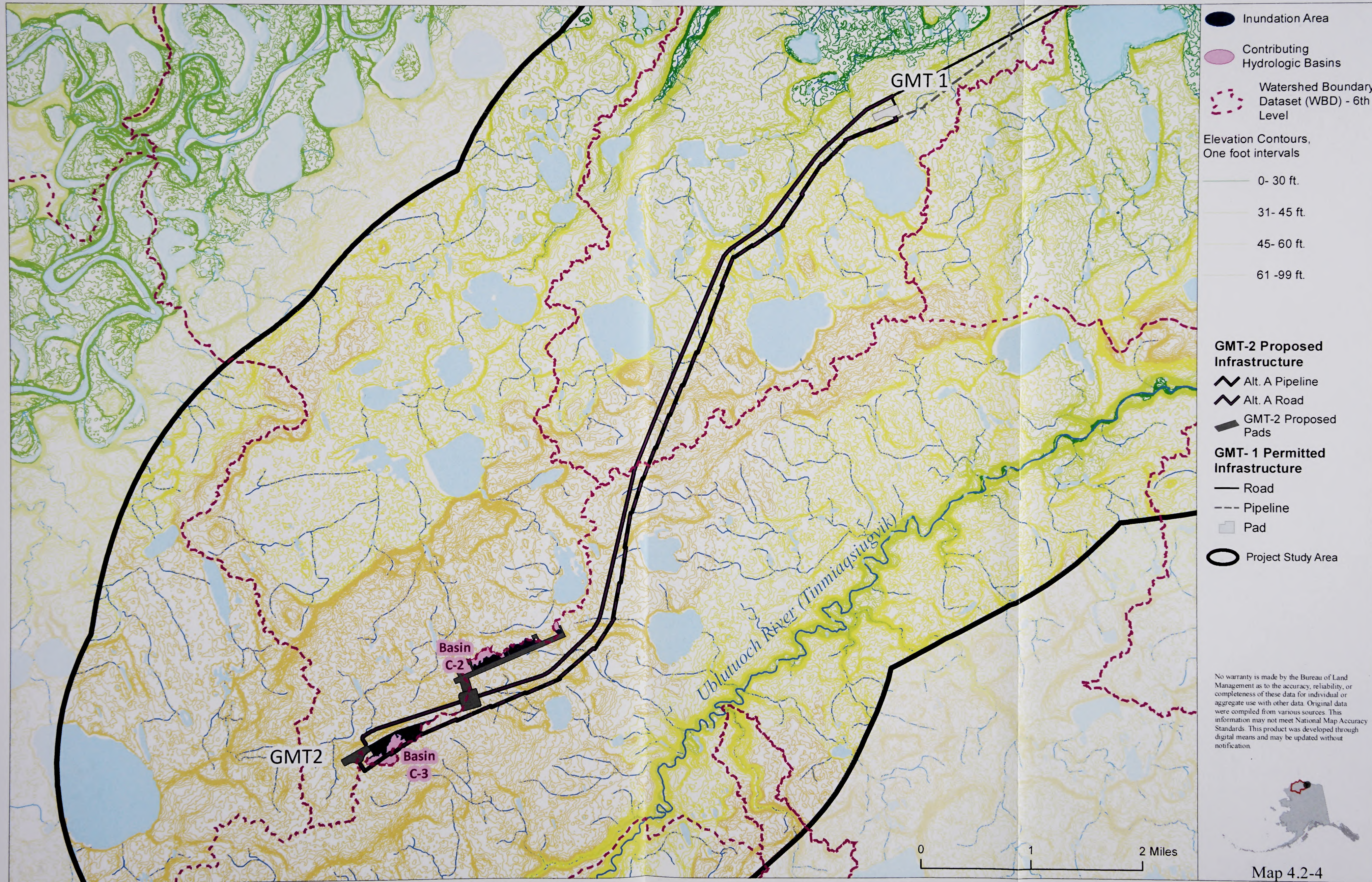


- Inundation Area
- Contributing Hydrologic Basins
- Watershed Boundary Dataset (WBD) - 6th Level
- Elevation Contours, 1 ft. intervals
 - 0- 30 ft.
 - 31- 45 ft.
 - 45- 60 ft.
 - 61 -99 ft.
- GMT-2 Proposed Infrastructure**
 - Alt. B Pipeline
 - Alt. B Road
 - GMT-2 Proposed Pads
- GMT-1 Permitted Infrastructure**
 - Road
 - Pipeline
 - Pad
- Project Study Area

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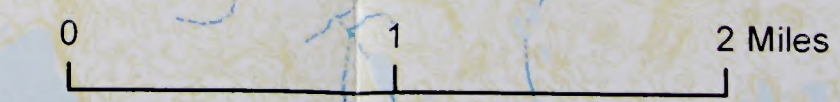


Map 4.2-3



- Inundation Area
- Contributing Hydrologic Basins
- Watershed Boundary Dataset (WBD) - 6th Level
- Elevation Contours, One foot intervals
 - 0- 30 ft.
 - 31- 45 ft.
 - 45- 60 ft.
 - 61 -99 ft.
- GMT-2 Proposed Infrastructure**
 - Alt. A Pipeline
 - Alt. A Road
 - GMT-2 Proposed Pads
- GMT- 1 Permitted Infrastructure**
 - Road
 - Pipeline
 - Pad
- Project Study Area

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Map 4.2-4



Vegetation Types in Indirect Impact Area- 328 ft. beyond gravel infrastructure -pads and roads (see Table 4.3-3)

GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

Existing & GMT-1 Permitted Infrastructure

- Road
- Pipeline
- Pad

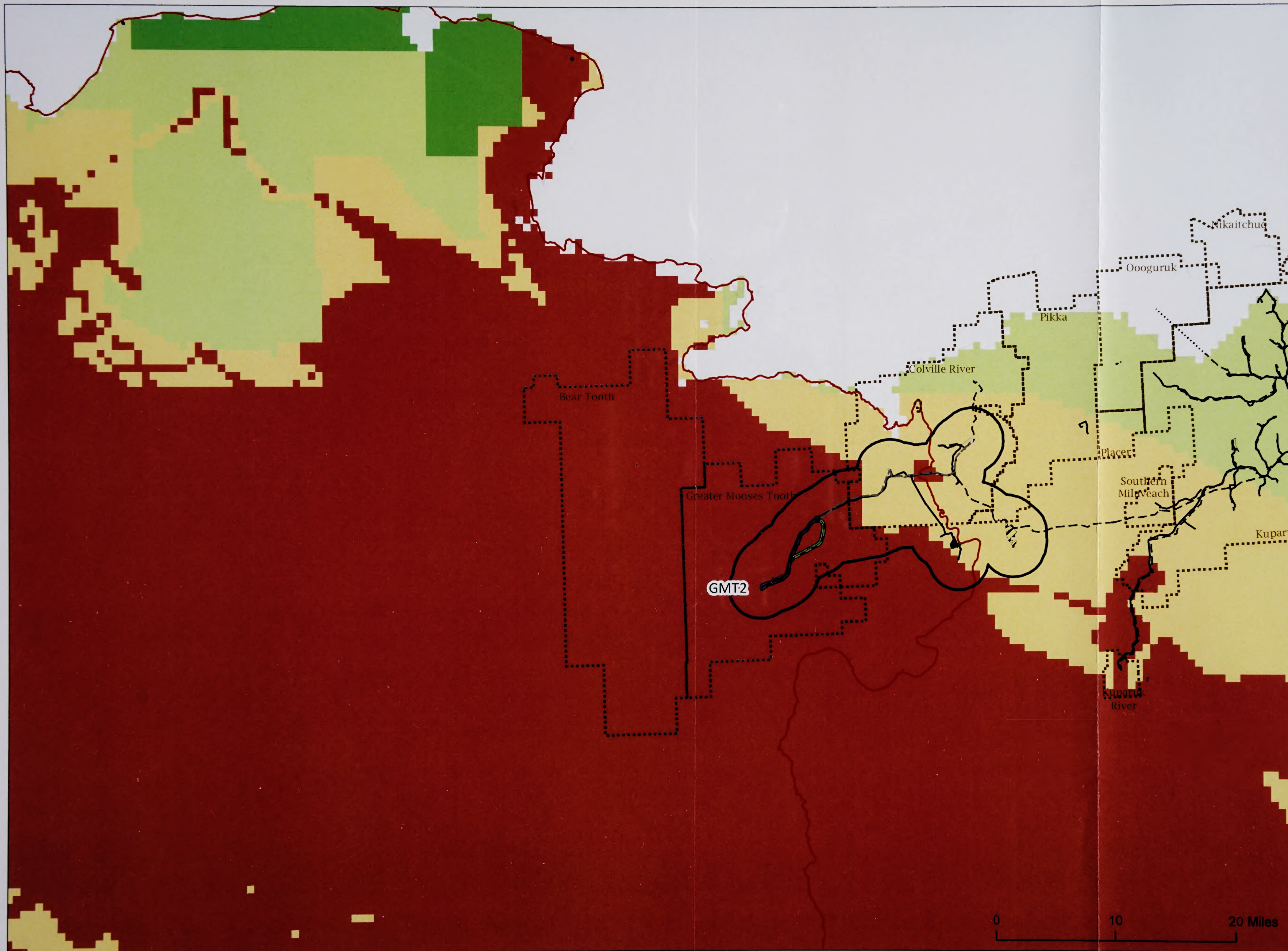
GMT-2 Project Area

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- Vegetation Type**
- Open Low Willow
 - Cassiope Dwarf Shrub Tundra
 - Moist Sedge-Shrub Tundra
 - Tussock Tundra
 - Wet Sedge Meadow Tundra
 - Fresh Sedge Marsh
 - Ice-rich Basin Wetland Complex
 - Fresh Water

Map 4.3-1



Teshkepuk Caribou Herd Females Fall Migration Movements

Brownian Bridge Analysis

- Low use
- Moderately-low use
- Moderately-high use
- High use

Data analysis by Lincoln Parrett of ADF&G
Data gathered cooperatively by ADF&G, NSB, and BLM.

Oil & Gas Producing Unit

GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A. Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

Existing & GMT- 1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

National Petroleum Reserve in Alaska Boundary

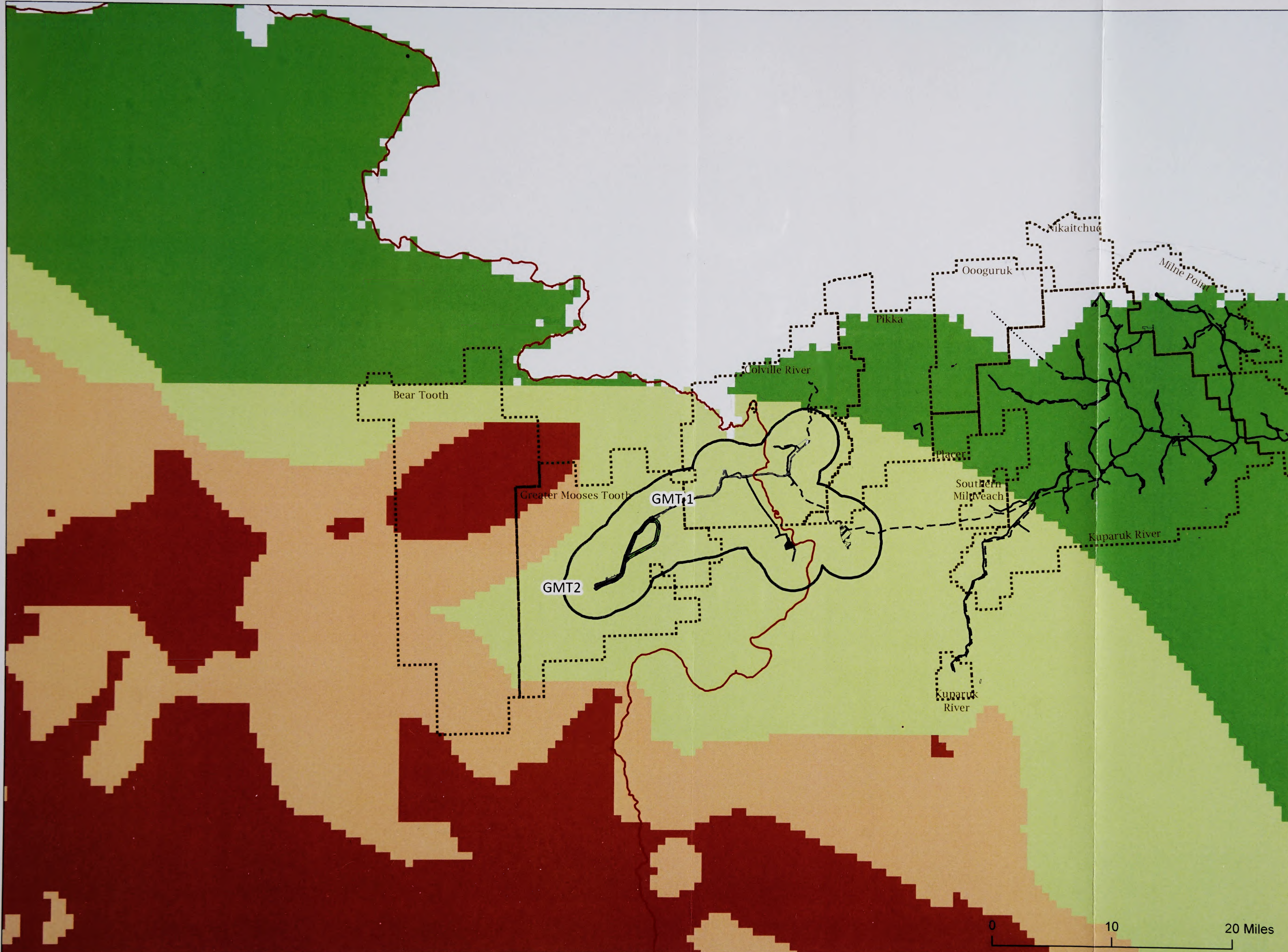
Project Study Area

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0 10 20 Miles

Map 4.3-2



Teshekpuk Caribou Herd Males Fall Migration Movements

Brownian Bridge Analysis

- Low use
- Moderately-low use
- Moderately-high use
- High use

Data analysis by Lincoln Parrett of ADF&G
Data gathered cooperatively by ADF&G, NSB, and BLM.

Oil & Gas Producing Unit

GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A. Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

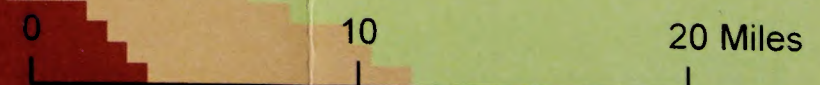
Existing & GMT- 1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

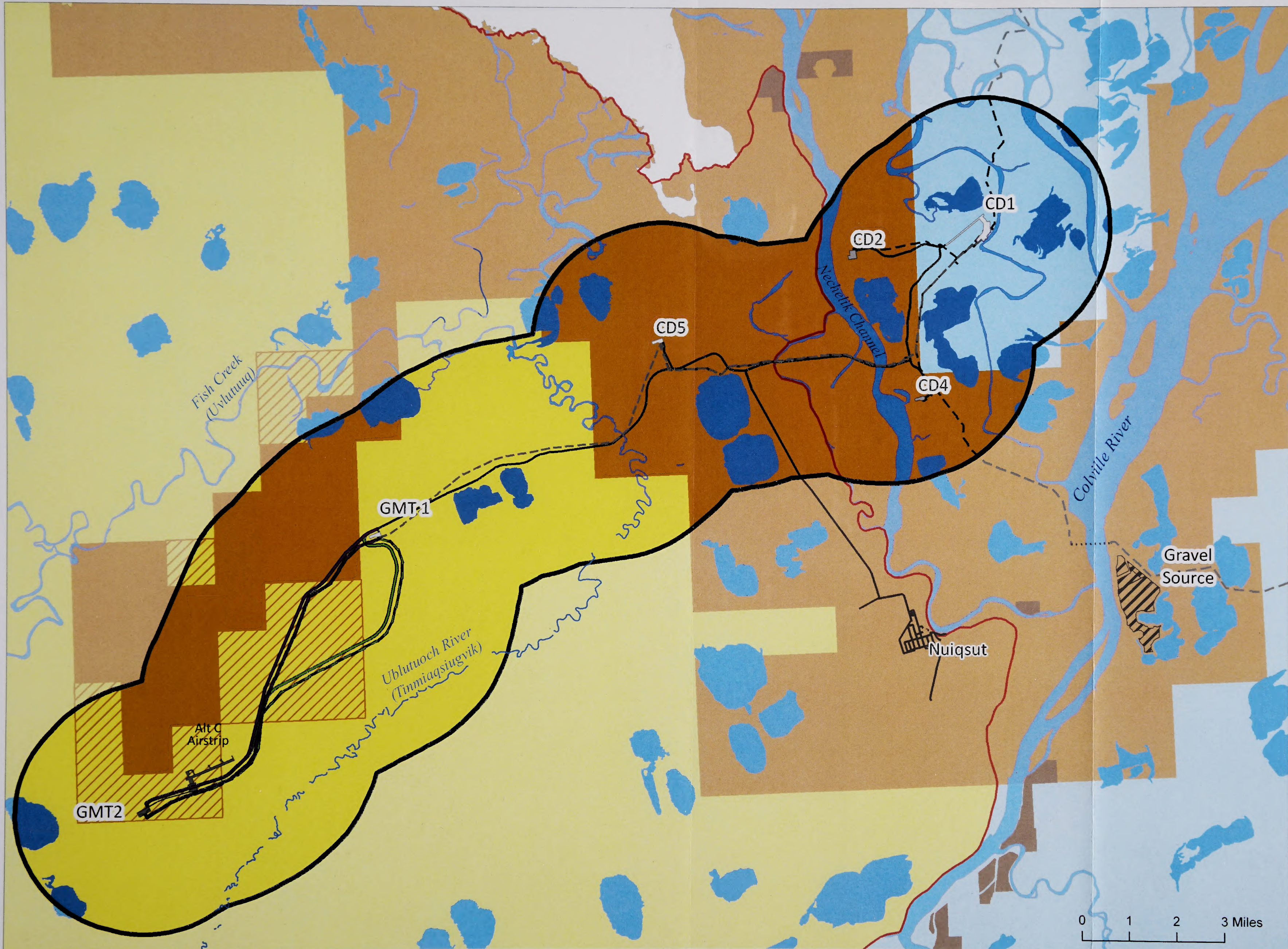
National Petroleum Reserve in Alaska Boundary

Project Study Area

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Map 4.3-3



GMT-2 Proposed Infrastructure

- Alt. A Pipeline
- Alt. A. Road
- Alt. B Pipeline
- Alt. B Road
- GMT-2 Proposed Pads

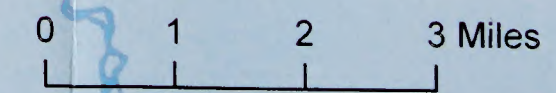
Existing & GMT-1 Permitted Infrastructure

- Road
- Pipeline
- Gravel Source
- Pad

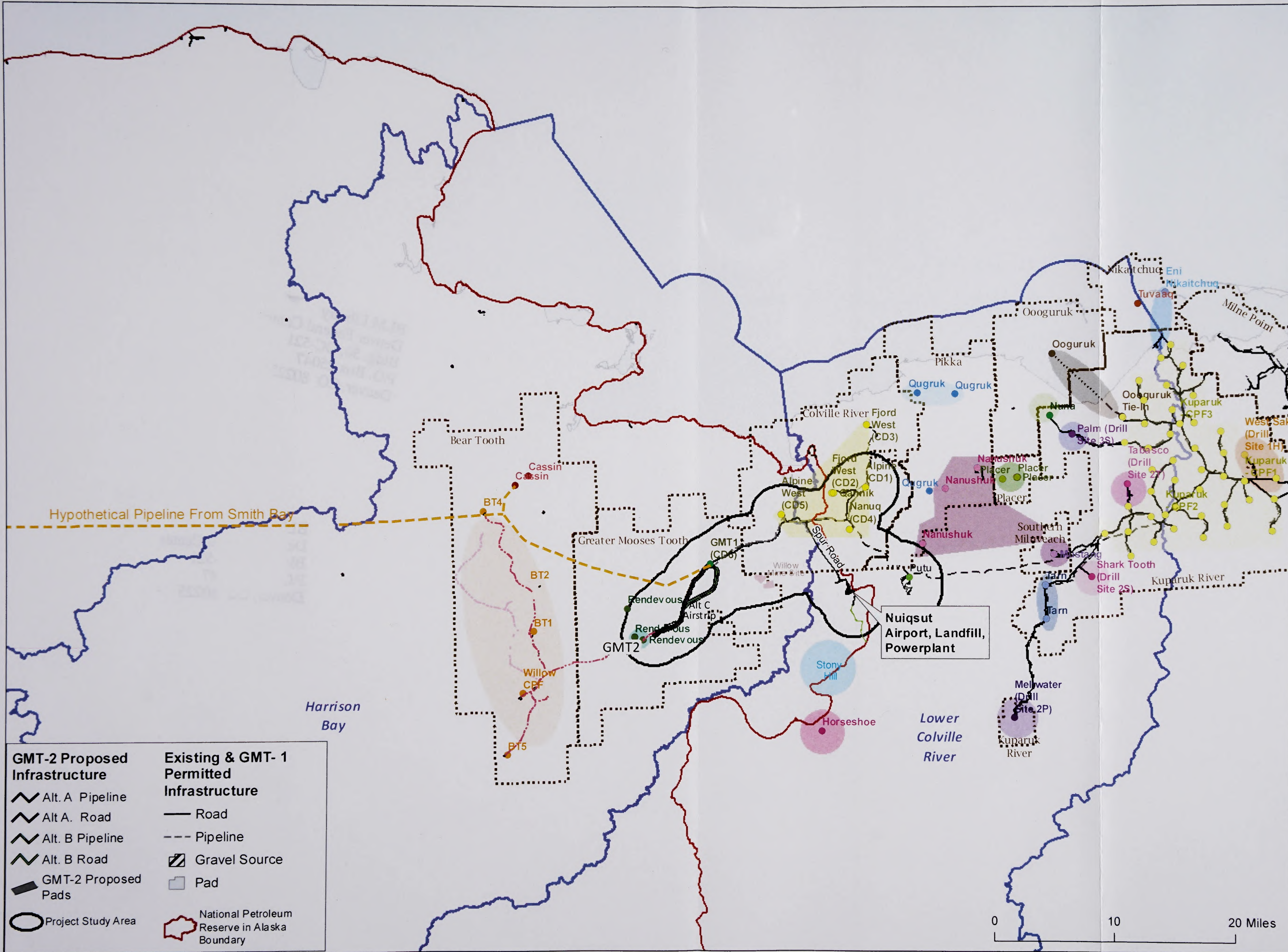
Land Status

- BLM (Native-selected)
- Bureau of Land Management
- Alaska Native Lands Patented or Interim Conveyed
- State of Alaska
- Alaska Native Allotment
- Water
- National Petroleum Reserve in Alaska Boundary
- Drilling & Operations Study Area

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Map 4.4-1



Past, Present or Reasonably Foreseeable Oil and Gas Development

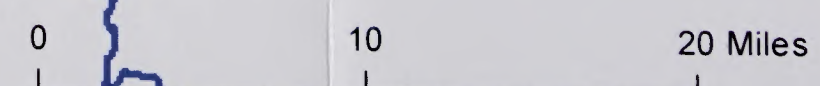
- Oil and Gas Development Area Representation*
- Well Location

*Cartographic representation only. Intended to help indicate project size and scope, not based on ground-truthed or geologic information.

- Colville River Access Road
- Hypothetical Pipeline (Source: NSSI Scenarios)
- Oil & Gas Producing Unit
- Watershed Boundaries
- Proposed Willow Project Infrastructure
 - Road
 - Gravel Mine

- | | |
|--------------------------------------|---|
| GMT-2 Proposed Infrastructure | Existing & GMT- 1 Permitted Infrastructure |
| Alt. A Pipeline | Road |
| Alt. A. Road | Pipeline |
| Alt. B Pipeline | Gravel Source |
| Alt. B Road | Pad |
| GMT-2 Proposed Pads | National Petroleum Reserve in Alaska Boundary |
| Project Study Area | |

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Map 4.6-1

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