



U.S. Department of the Interior  
Bureau of Land Management

# Coastal Plain Oil and Gas Leasing Program

## Environmental Impact Statement

***FINAL***

### Volume II: Appendices A-R

September 2019

Prepared by:

US Department of the Interior  
Bureau of Land Management

In cooperation with:

US Fish and Wildlife Service  
US Environmental Protection Agency  
Native Village of Kaktovik  
Native Village of Venetie Tribal Government  
Venetie Village Council  
Arctic Village Council  
North Slope Borough  
State of Alaska

Estimated Lead Agency Total  
Costs Associated with Developing  
and Producing this EIS: \$3,970,000

## **Mission**

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

Cover Photo: Northward view in central coastal plain area near the Sadlerochit River showing gently rolling topography typical of the area. Natural oil indications are visible of an oil seep that occurs along the coast (Barter Island). Photo by David Houseknecht (USGS).

DOI-BLM-AK-0000-2018-0002-EIS

BLM/AK/PL-19/014+1610+F020

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## APPENDIX A

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## **APPENDIX A**

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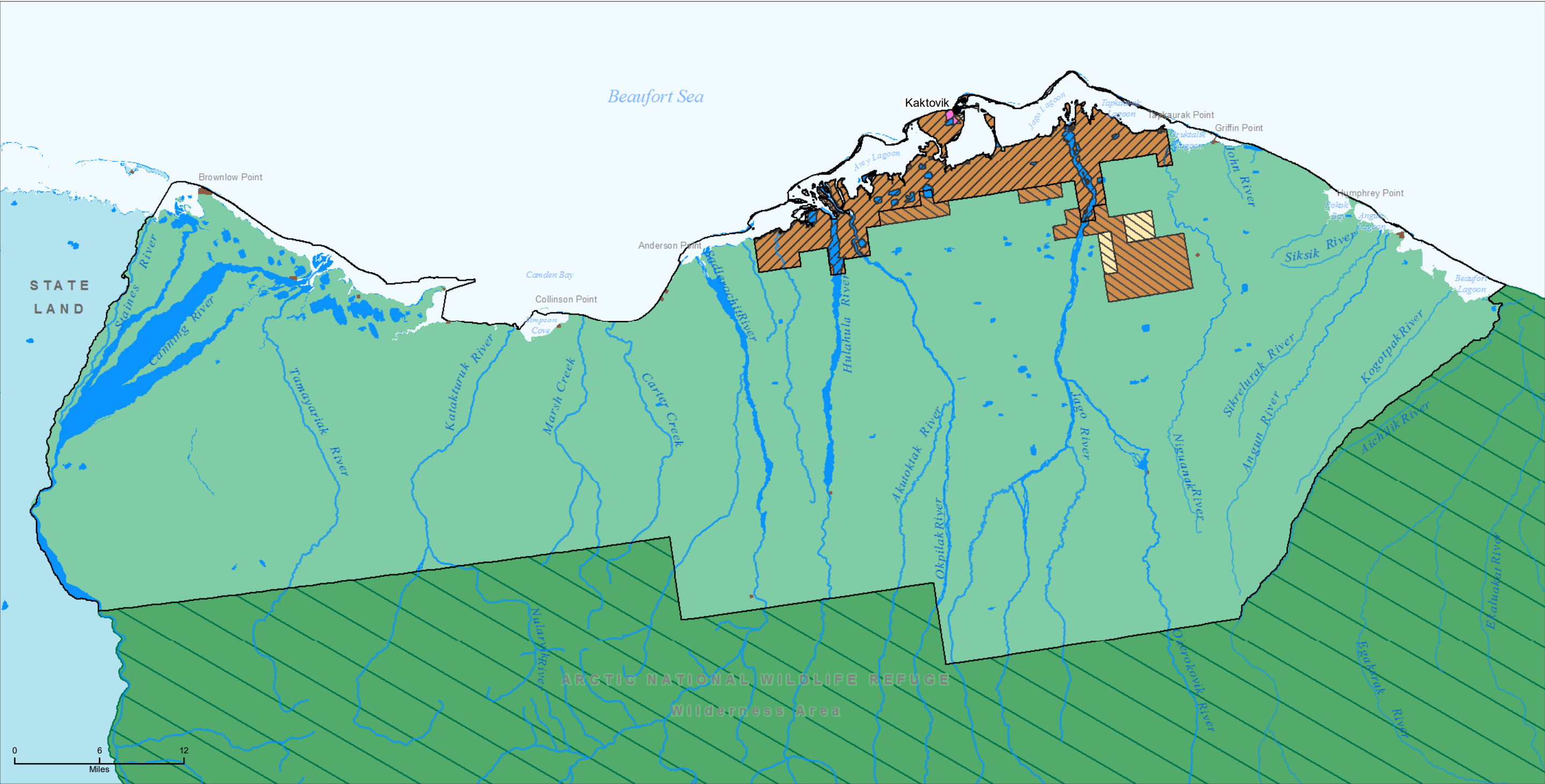
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Data from geographic information systems (GIS) have been used in developing acreage calculations and for generating the maps in this appendix. Calculations are dependent upon the quality and availability of data and most calculations in this EIS are rounded to the nearest one hundred acres. Given the scale of the analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate and serve for comparison and analytic purposes only. Likewise, the maps in this appendix are provided for illustrative purposes and subject to the limitations discussed above. BLM may receive additional GIS data; therefore, acreages may be recalculated and revised later.

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- U.S. Fish and Wildlife Service
- U.S. Fish and Wildlife Service, wilderness area
- Native-conveyed
- Native-selected
- State
- Native allotment
- Air Force

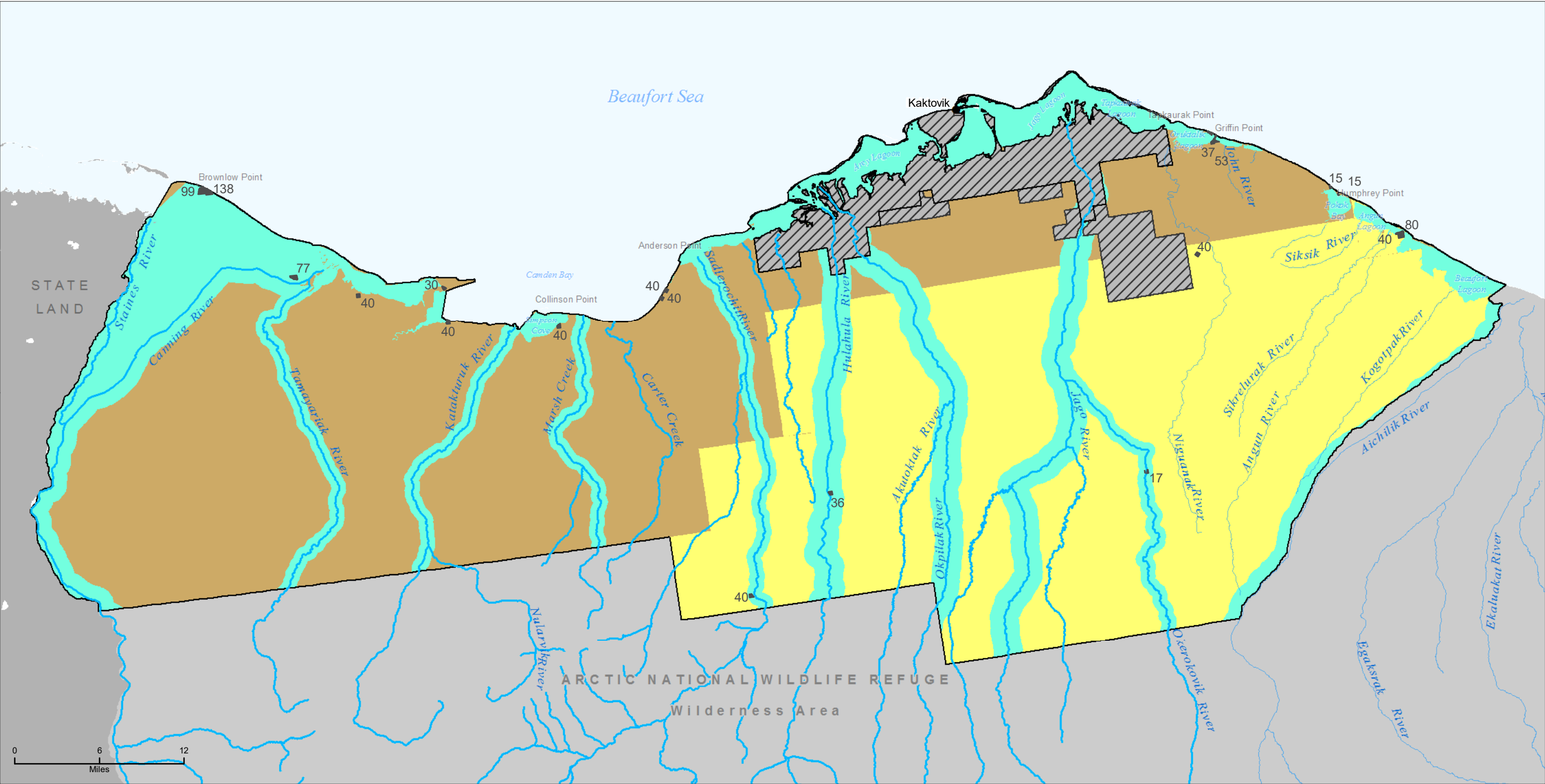
- Public Law 115-97 Coastal Plain
- Outside BLM's oil and gas leasing authority:
  - Excluded from Public Law 115-97 Coastal Plain
  - Native or other mineral ownership



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.

Data Source: BLM GIS 2018  
Print Date: 07/17/2019

Map 1-1



Not offered for lease sale (none)

Available for lease sale:

Native Allotment,  
with acres labeled

Public Law 115-97 Coastal Plain

- Subject to no surface occupancy
- Subject to controlled surface use (none)
- Subject to timing limitations
- Subject to only standard terms and conditions

Excluded from Public Law 115-97  
Coastal Plain or outside the BLM's  
oil and gas leasing authority



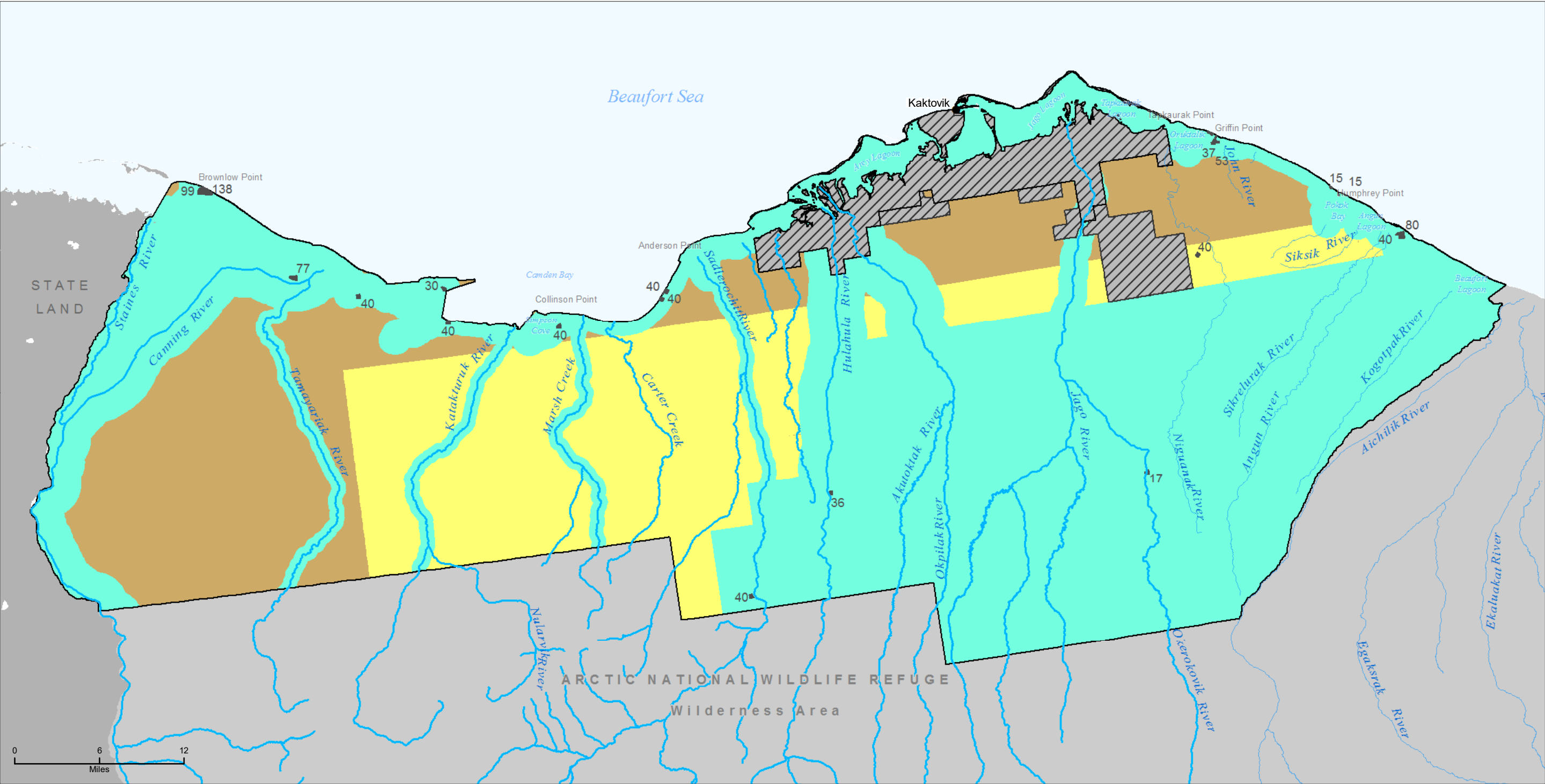
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Map 2-1







- Not offered for lease sale (none)
- Available for lease sale:
  - Subject to no surface occupancy
  - Subject to controlled surface use (none)
  - Subject to timing limitations
  - Subject to only standard terms and conditions

Native Allotment, with acres labeled

- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

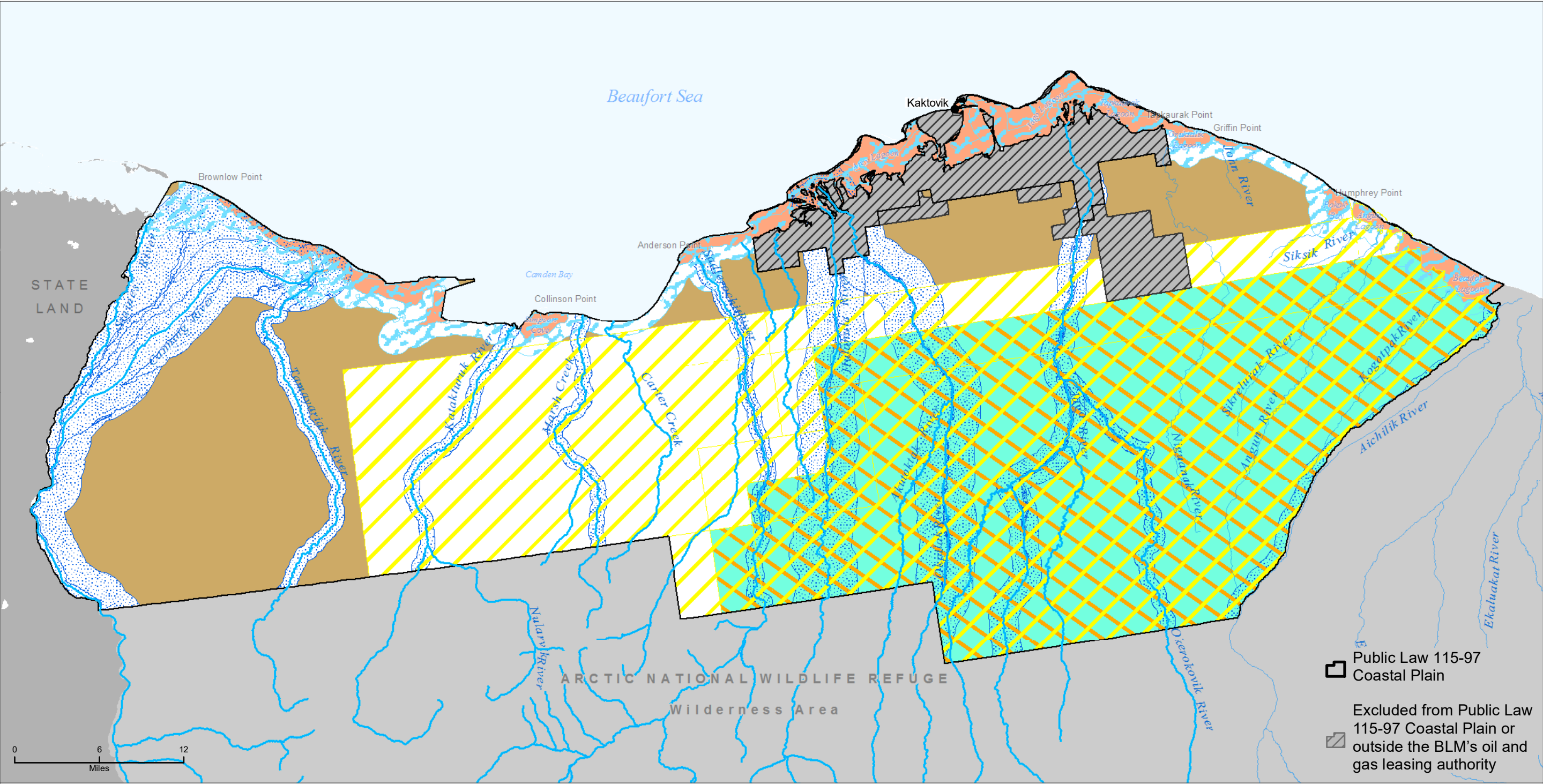


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Data Source: BLM GIS 2018, USFWS GIS 2018a  
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Map 2-3





Available for lease sale, subject to no surface occupancy

- Lease stipulation 1—rivers and streams
- Lease stipulation 4—nearshore marine, lagoon, and barrier island habitat, exploration
- Lease stipulation 7—Porcupine Caribou calving habitat
- Lease stipulation 9—coastal area

Available for lease sale, subject to timing limitations

- Lease stipulation 7—Porcupine Caribou calving habitat
- Lease stipulation 8—Porcupine Caribou post-calving habitat

Available for lease sale

- Subject to only standard terms and conditions

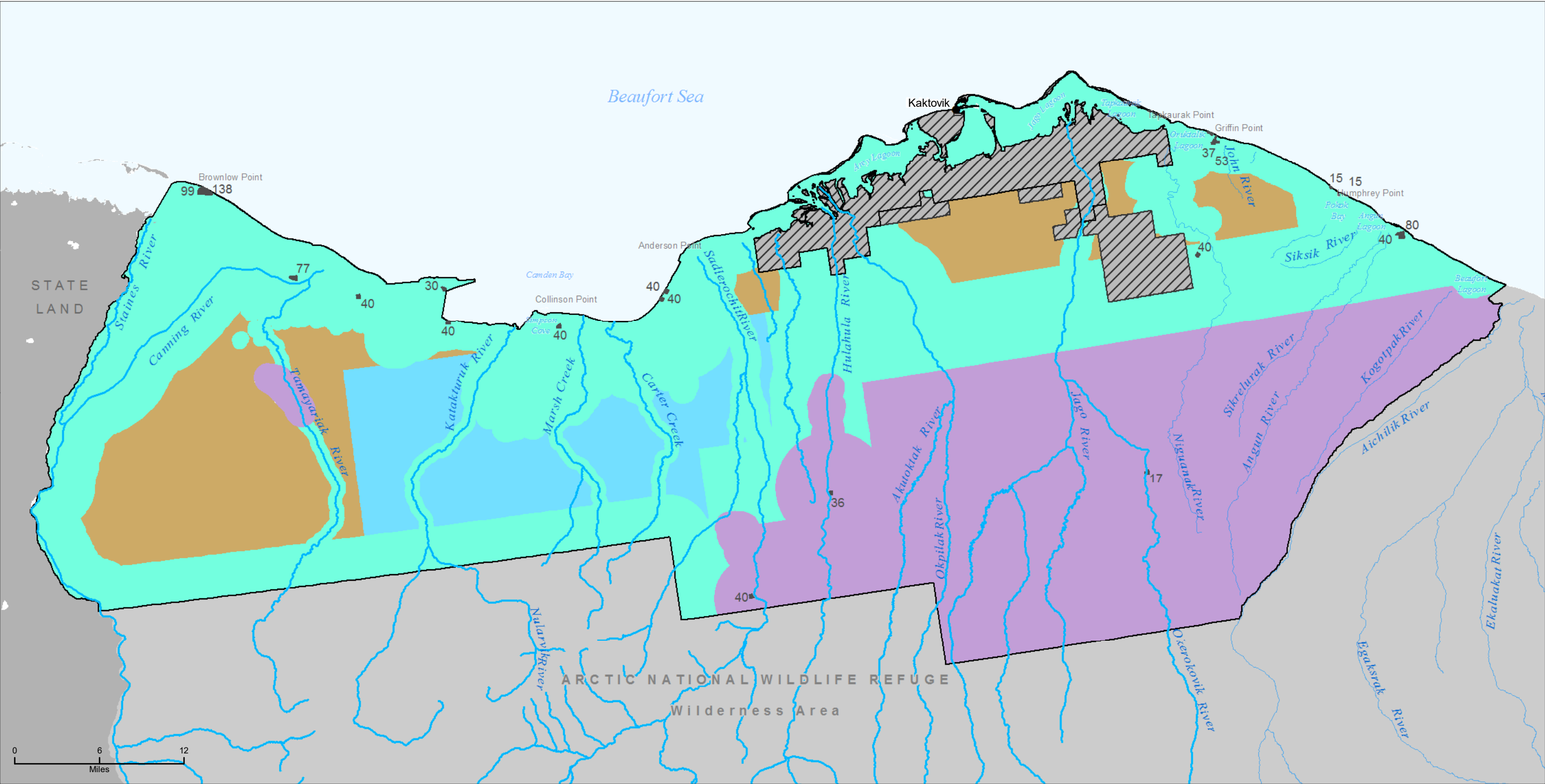
Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



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Print Date: 08/28/2019



Not offered for lease sale

Available for lease sale:

Subject to no surface occupancy

Subject to controlled surface use

Subject to timing limitations

Subject to only standard terms and conditions

Native Allotment, with acres labeled

Public Law 115-97 Coastal Plain

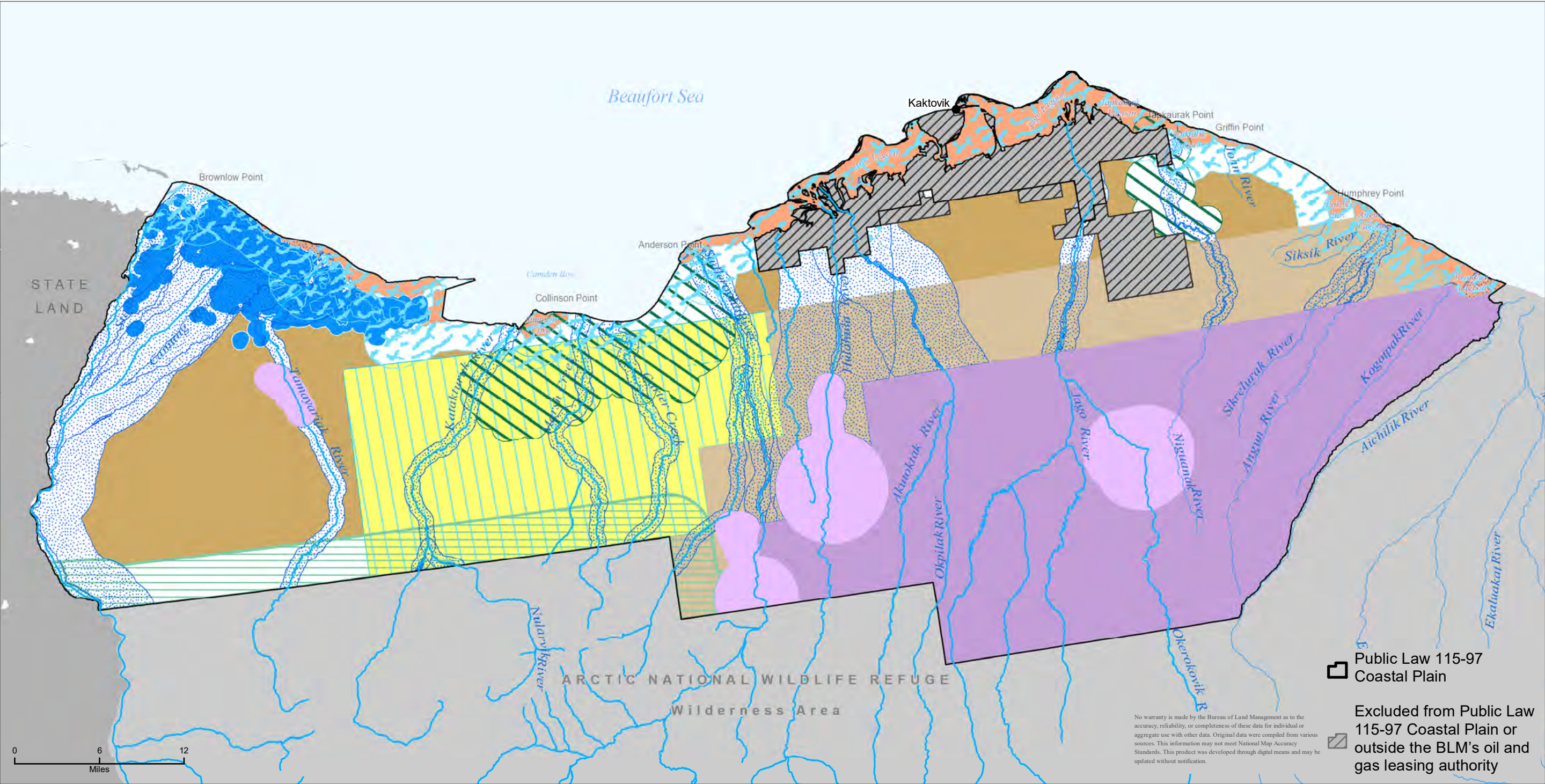
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Data Source: BLM GIS 2018,  
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Print Date: 08/28/2019





Not offered for lease sale and not available for surface occupancy

- Lease stipulation 3—springs/aufeis
- Lease stipulation 7—Porcupine Caribou calving habitat

Available for lease sale, subject to no surface occupancy

- Lease stipulation 1—rivers and streams
- Lease stipulation 2—Canning River delta and lakes
- Lease stipulation 4—nearshore marine, lagoon, and barrier island habitat, exploration
- Lease stipulation 5—coastal polar bear river denning habitat

- Lease stipulation 7—Porcupine Caribou calving habitat
- Lease stipulation 9—coastal area
- Lease stipulation 10—Wilderness boundary

Available for lease sale, subject to timing limitations

- Lease stipulation 4—nearshore marine, lagoon, and barrier island habitat

Available for lease sale, subject to timing limitations

- Lease stipulation 8—Porcupine Caribou post-calving habitat

Available for lease sale

- Subject to only standard terms and conditions

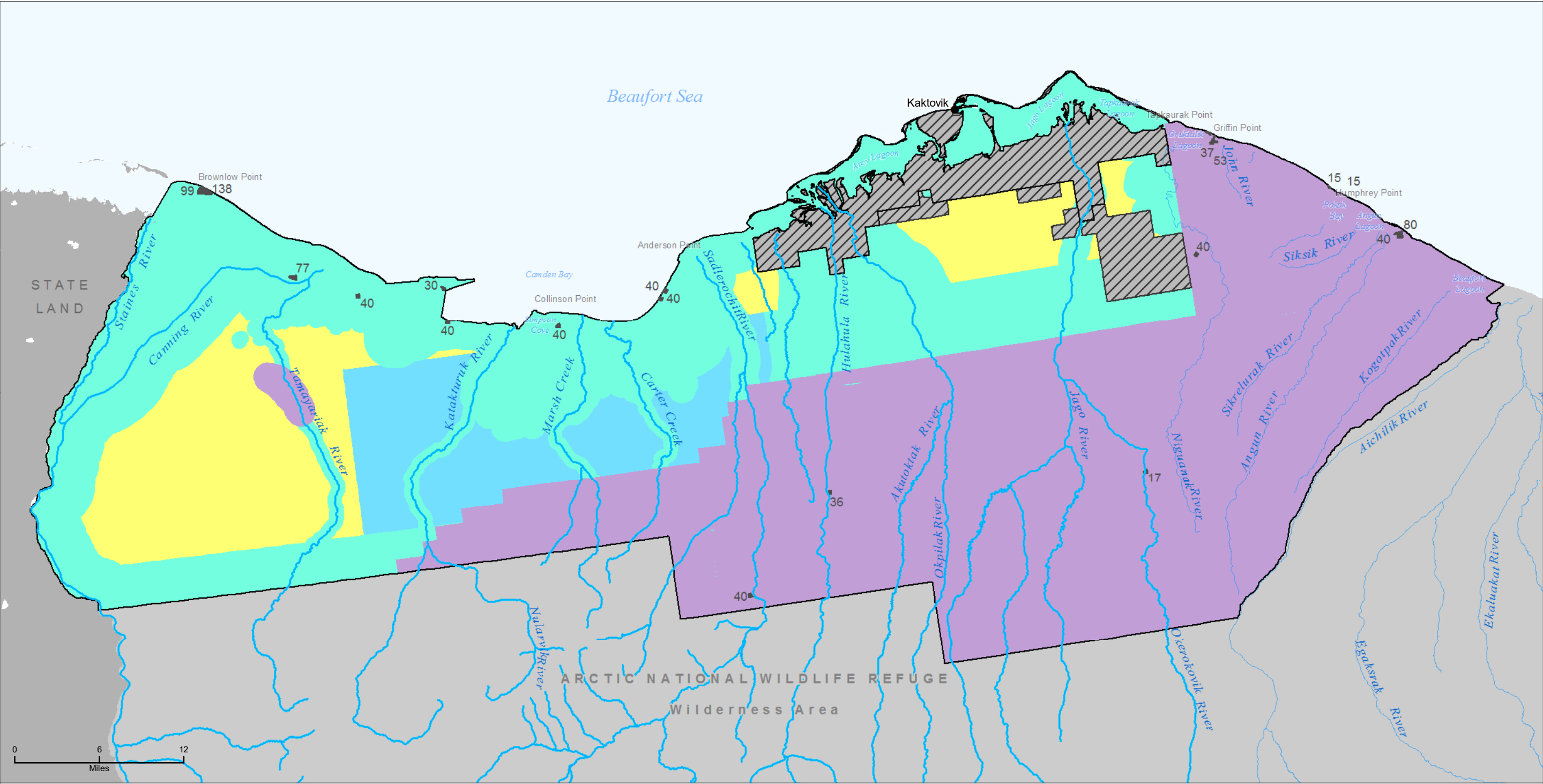
Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

Data Source: BLM GIS 2018, USFWS GIS 2018a  
Print Date: 08/28/2019

Map 2-6





- Not offered for lease sale
- Available for lease sale:
  - Subject to no surface occupancy
  - Subject to controlled surface use
  - Subject to timing limitations
  - Subject to only standard terms and conditions (none)

Native Allotment, with acres labeled

- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

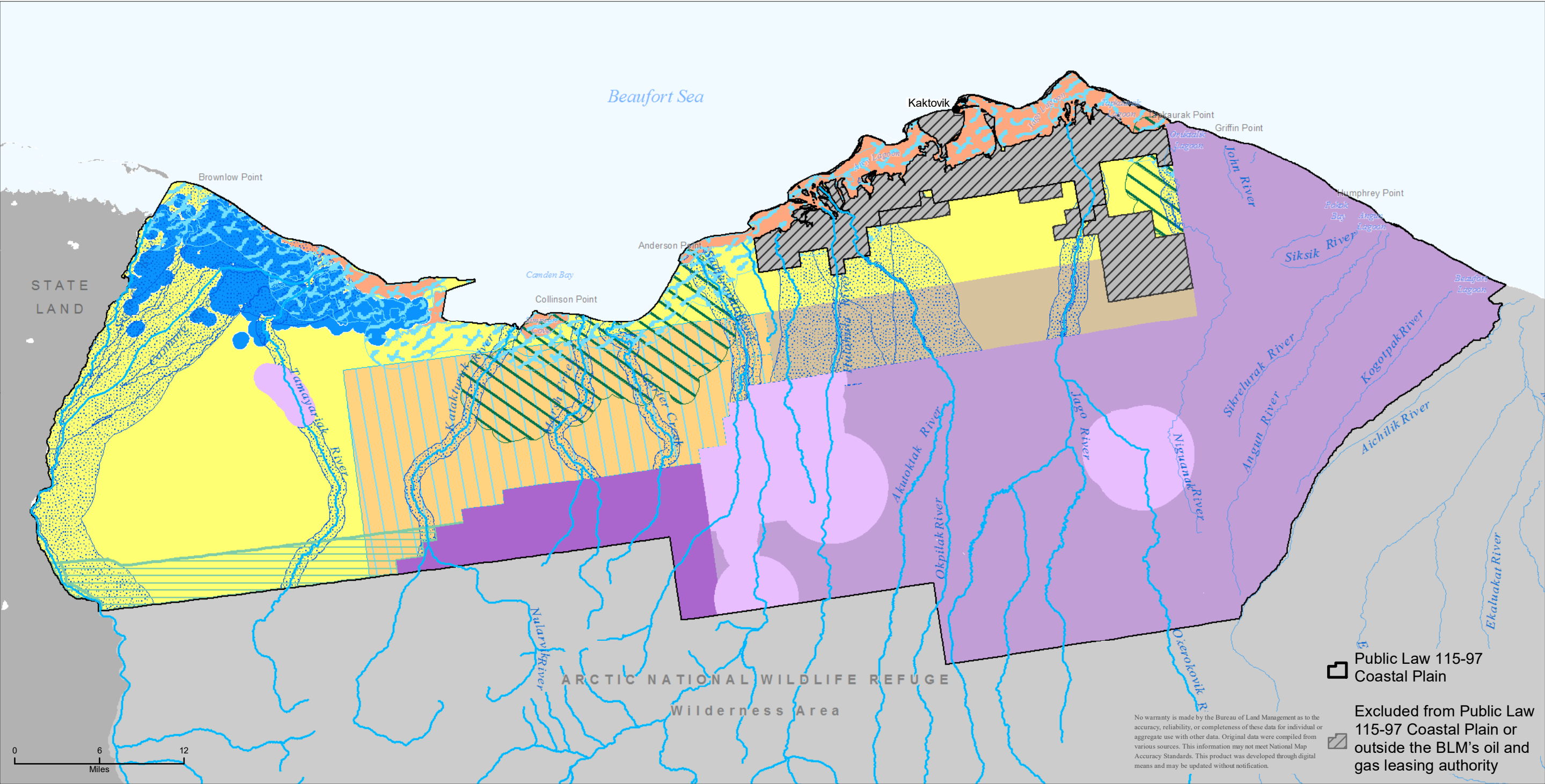


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Map 2-7





Not offered for lease sale and not available for surface occupancy

- Lease stipulation 3—springs/aufeis
- Lease stipulation 7—Porcupine Caribou calving habitat
- Lease stipulation 10—Wilderness boundary

Available for lease sale, subject to no surface occupancy

- Lease stipulation 1—rivers and streams
- Lease stipulation 2—Canning River delta and lakes
- Lease stipulation 4—nearshore marine, lagoon, and barrier island habitat, exploration
- Lease stipulation 5—coastal polar bear river denning habitat

- Lease stipulation 7—Porcupine Caribou calving habitat
- Lease stipulation 9—coastal area
- Lease stipulation 10—Wilderness boundary

Available for lease sale, subject to controlled surface use

- Lease stipulation 8—Porcupine Caribou post-calving habitat

Available for lease sale, subject to timing limitations

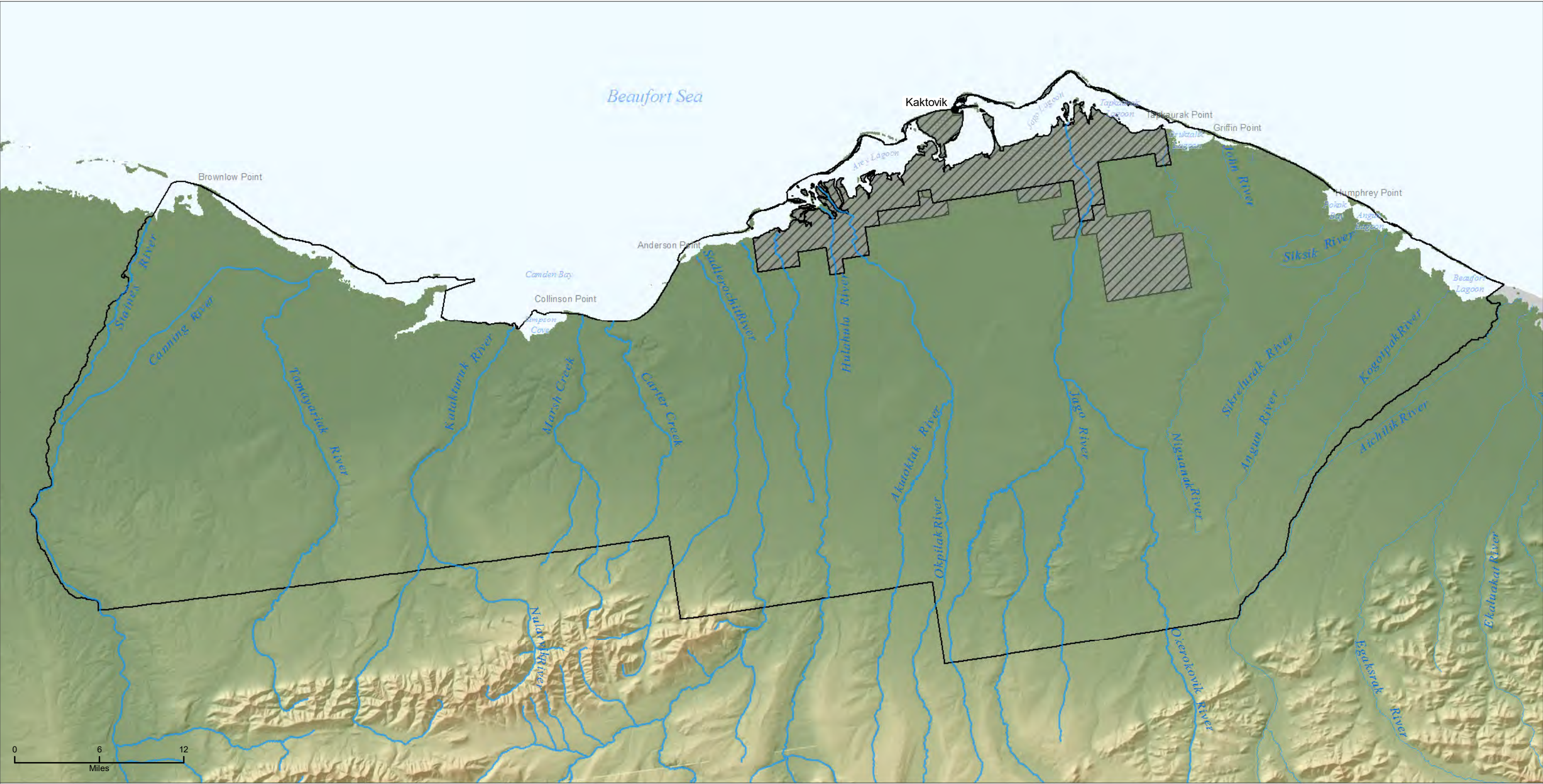
- Lease stipulation 4—nearshore marine, lagoon, and barrier island habitat

Available for lease sale, subject to timing limitations

- Lease stipulation 6—Central Arctic and Porcupine Herds summer habitat
- Lease stipulation 8—Porcupine Caribou post-calving habitat

Data Source: BLM GIS 2018, USFWS GIS 2018a  
Print Date: 08/28/2019





Elevation

High

Low

Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

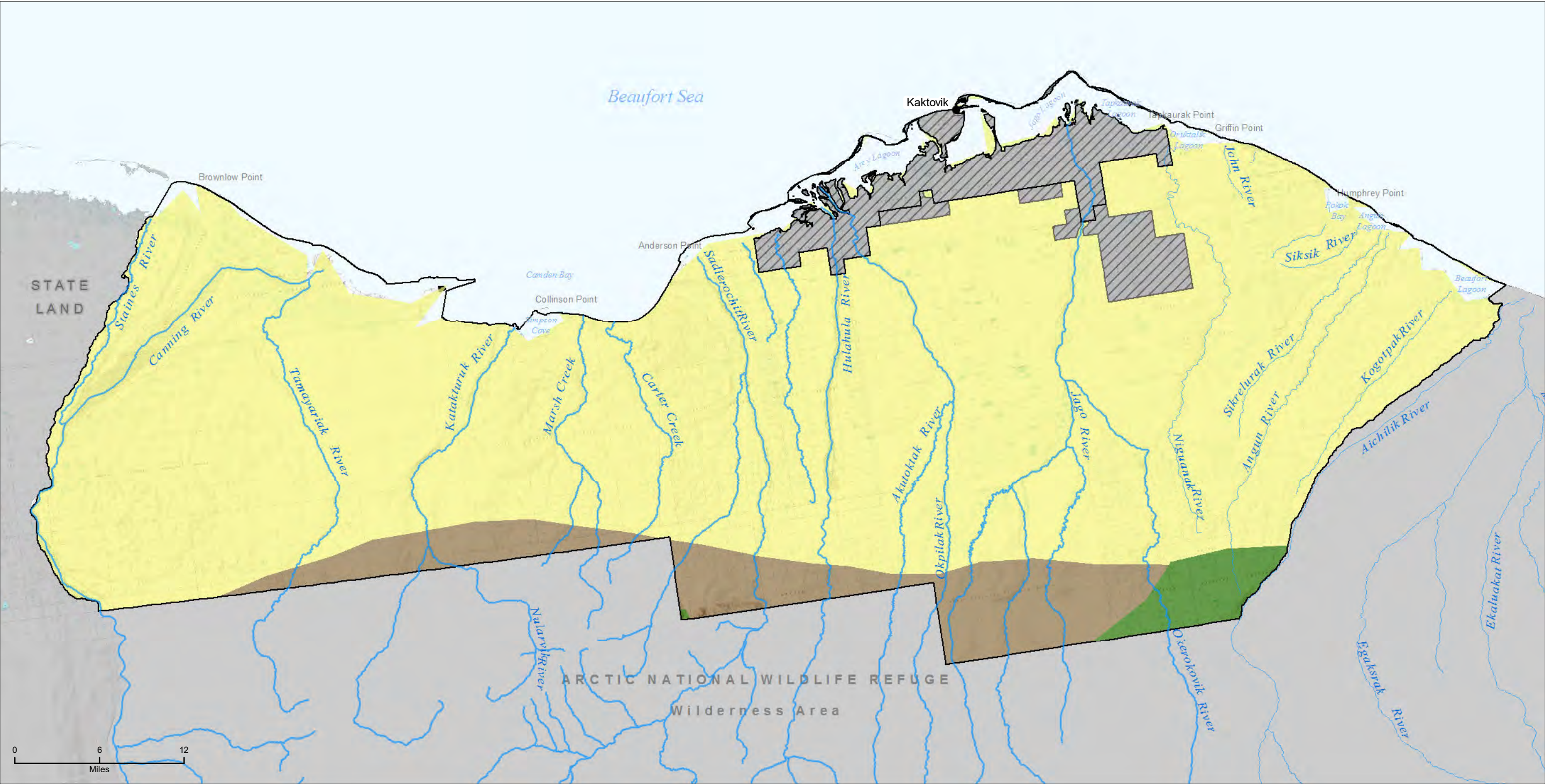


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Data Source: BLM GIS 2018  
Print Date: 08/27/2019

Map 3-1





- Arctic Coastal Plain
- Arctic Foothills
- Arctic Mountains (Ambler-Chandalar Ridge and Lowland)

- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority

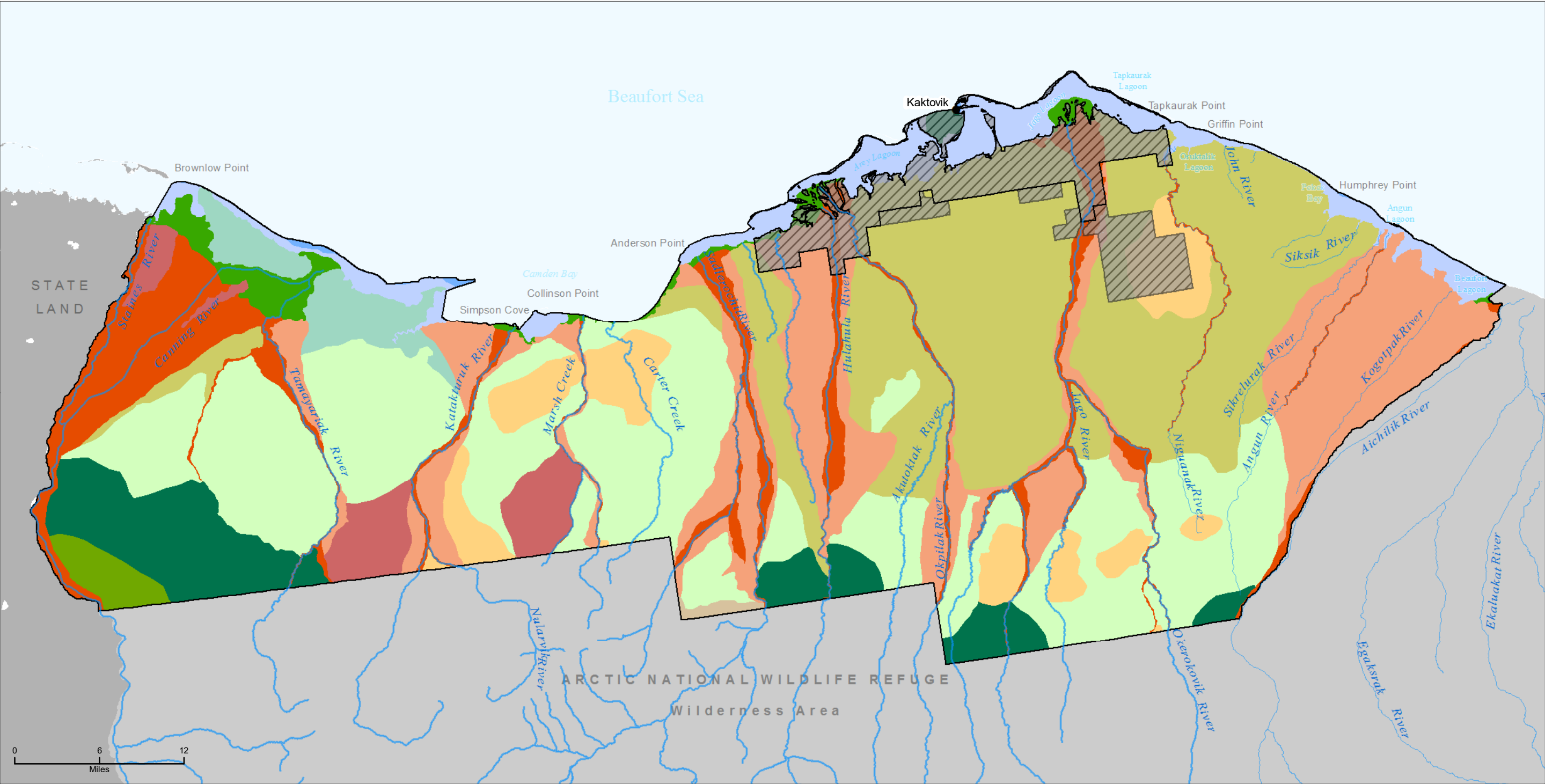


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Data Source: BLM GIS 2018, Wahhaftig GIS 1965  
Print Date: 08/27/2019

Map 3-2





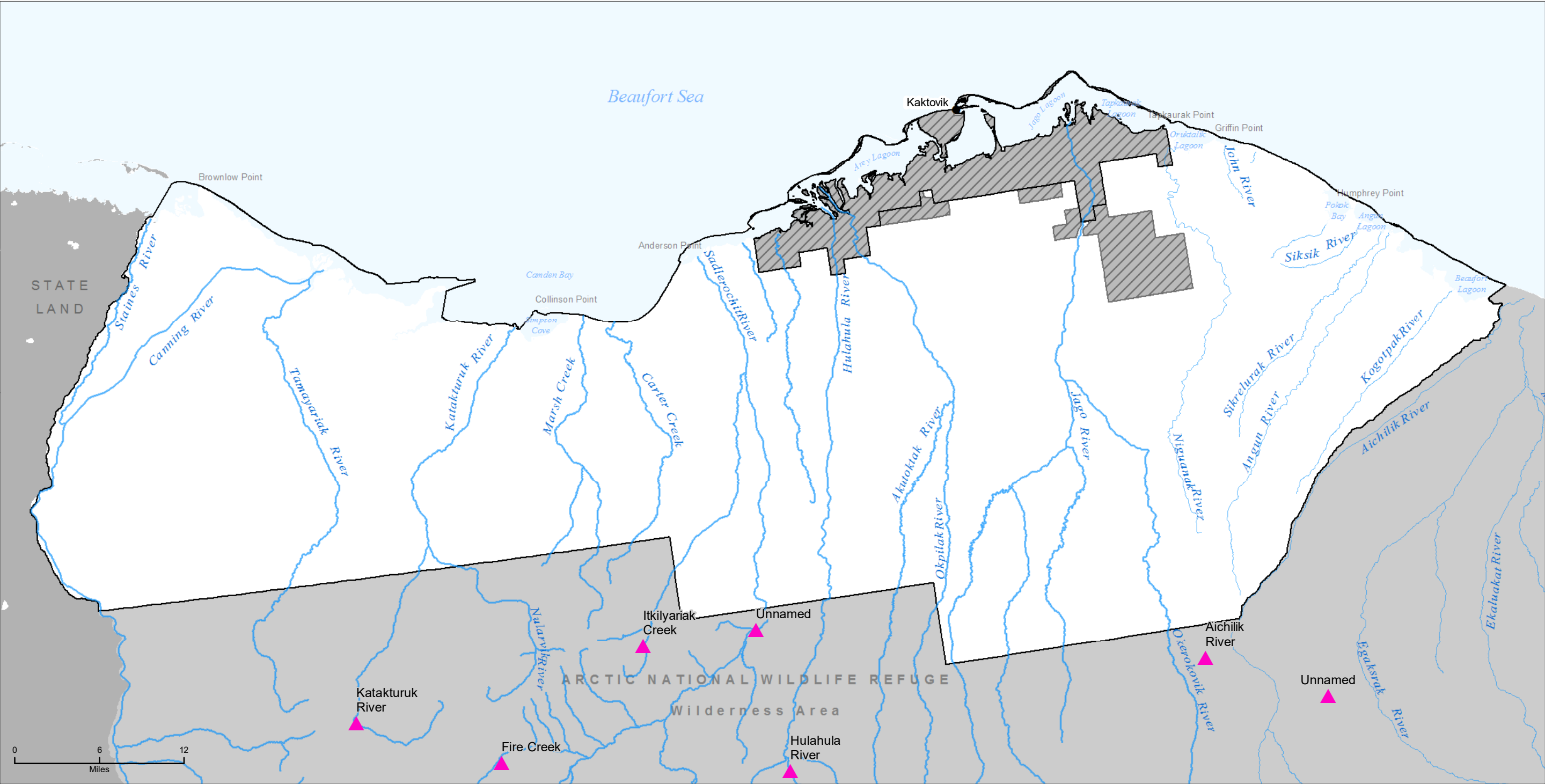
- |                   |                           |
|-------------------|---------------------------|
| Marine water      | Eolian silt               |
| Coastal water     | Glacial, young            |
| Marine, young     | Glacial, old              |
| Coastal plain     | Glaciofluvial, old        |
| Fluvial, young    | Glaciomarine              |
| Fluvial, old      | Sedimentary, noncarbonate |
| Colluvium, upland |                           |

- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018,  
Jorgenson GIS 2014  
Print Date: 08/27/2019



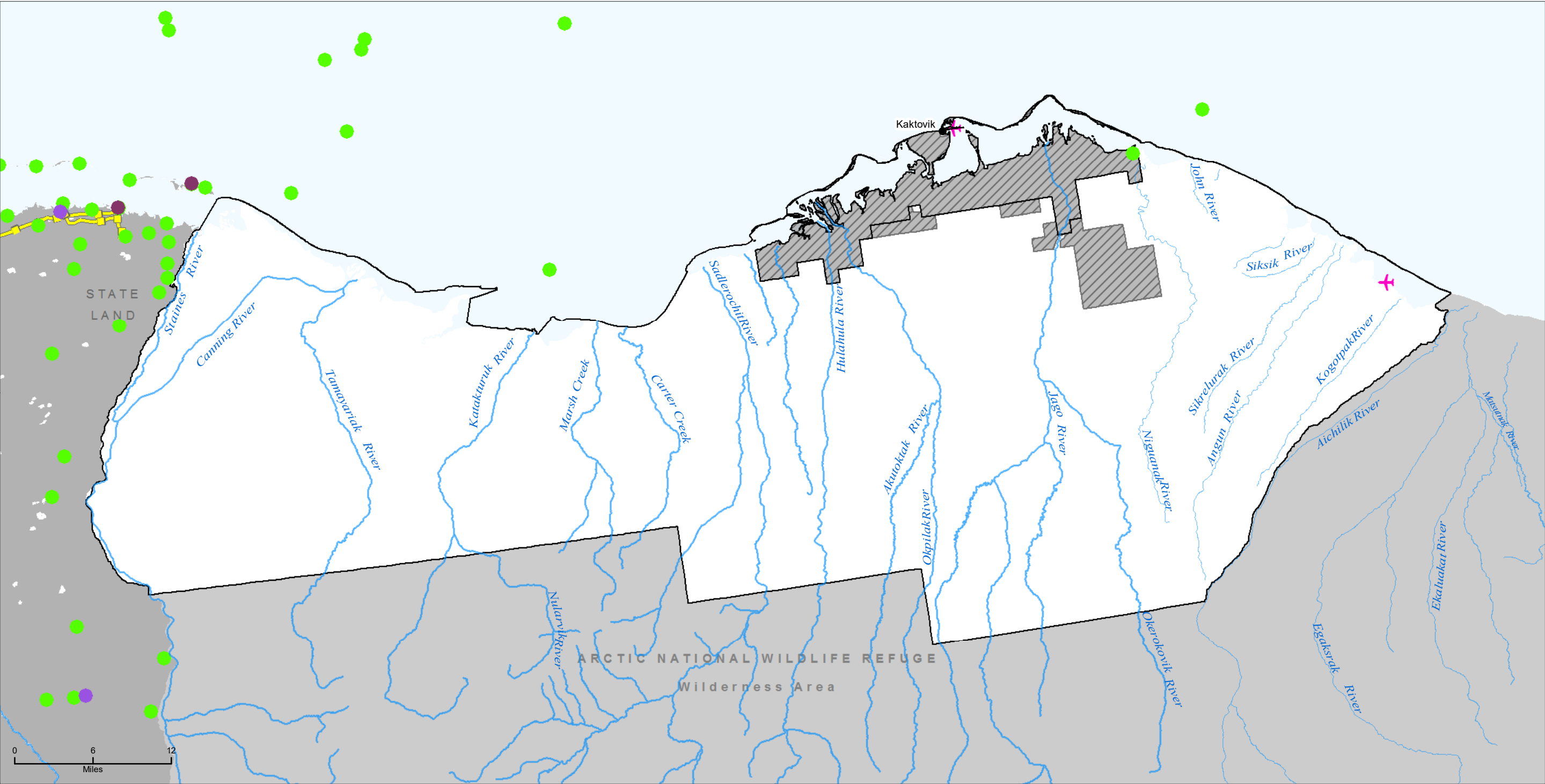
- ▲ Prospects or mineral occurrences
- ▭ Public Law 115-97 Coastal Plain
- ▭ Excluded from Public Law 115-97
- ▨ Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018, ARDF GIS 2018  
Print Date: 08/27/2019

Map 3-4



- Wellheads
- Development
  - Service
  - Exploratory
- Airstrip
- Above-ground pipeline

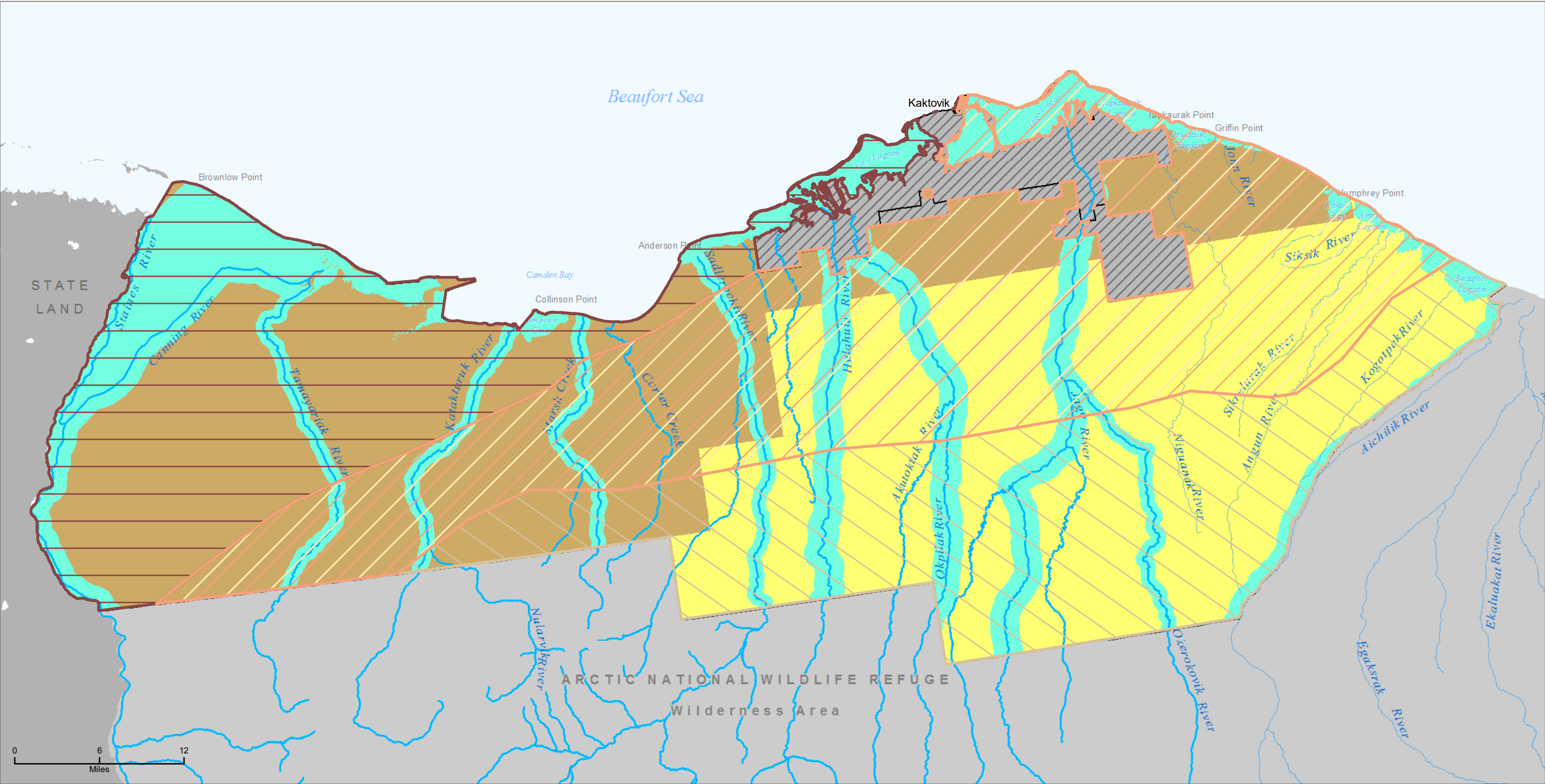
- Public Law 115-97 Coastal Plain Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018, AOGCC GIS 2018  
Print Date: 08/27/2019

Map 3-5



■ Not offered for lease sale (none)

■ Subject to no surface occupancy

■ Subject to controlled surface use (none)

■ Subject to timing limitations

■ Subject to only standard terms and conditions

Hydrocarbon potential

■ High

■ Medium

■ Low

■ Public Law 115-97 Coastal Plain

■ Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

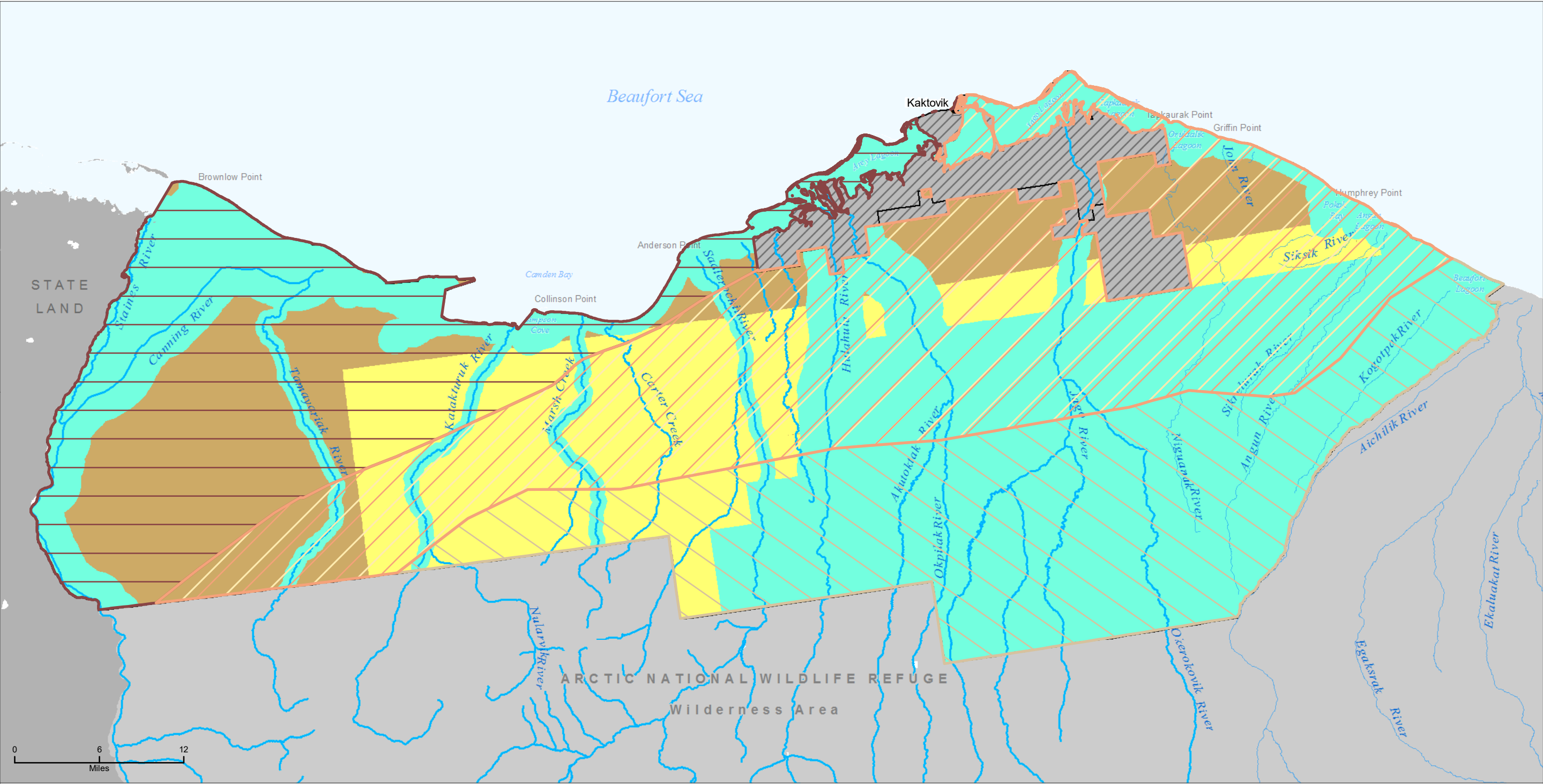


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Data Source: BLM GIS 2018, USFWS GIS 2018a, USGS GIS 1998  
Print Date: 08/27/2019

Map 3-6





- Not offered for lease sale (none)

Available for lease sale:

■ Subject to no surface occupancy

■ Subject to controlled surface use (none)

■ Subject to timing limitations

■ Subject to only standard terms and conditions

- Hydrocarbon potential
- High
- Medium
- Low

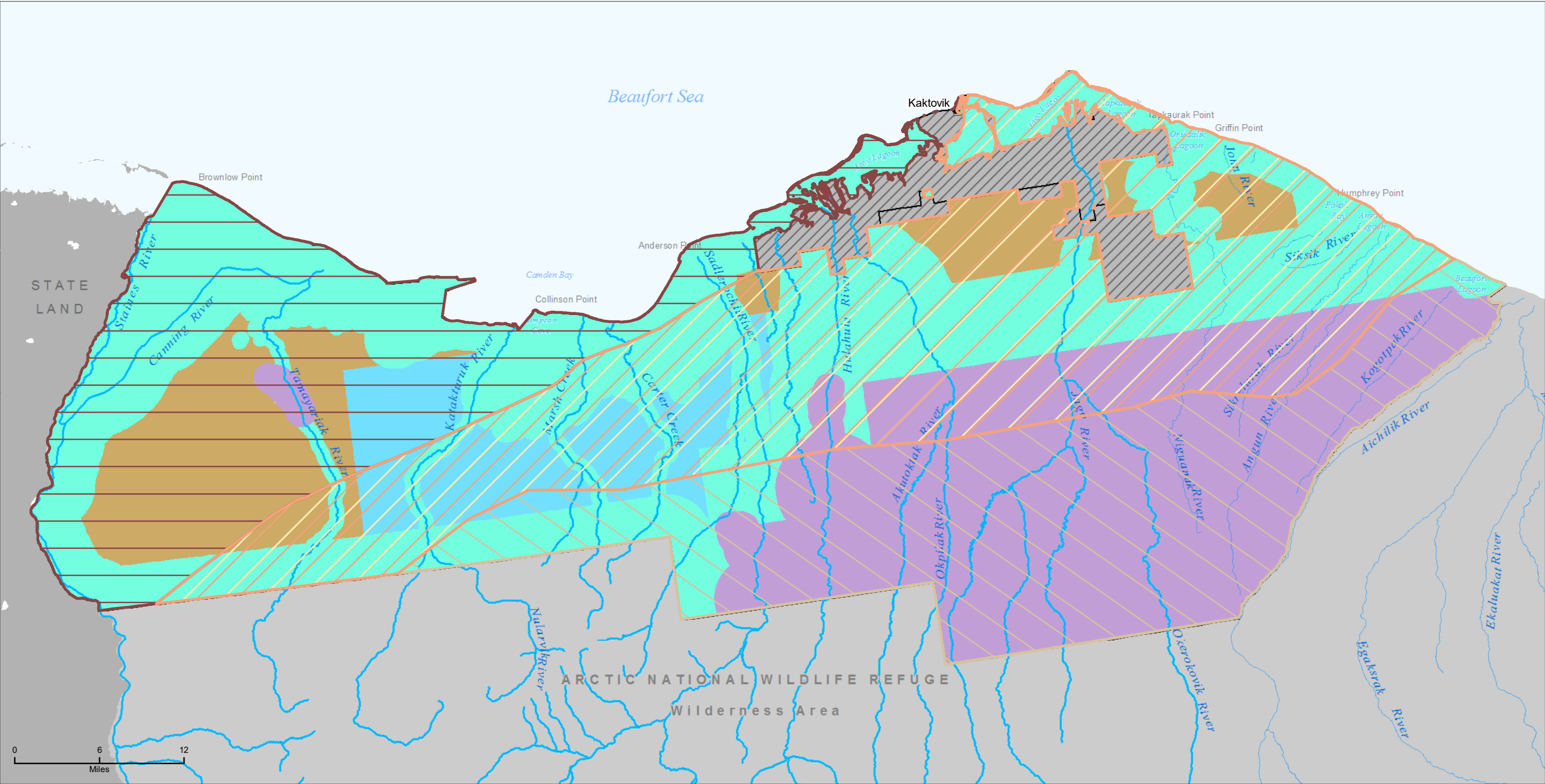
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- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



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Print Date: 08/27/2019

Map 3-7



■ Not offered for lease sale

■ Available for lease sale:

■ Subject to no surface occupancy

■ Subject to controlled surface use

■ Subject to timing limitations

■ Subject to only standard terms and conditions

■ Hydrocarbon potential

■ High

■ Medium

■ Low

■ Public Law 115-97 Coastal Plain

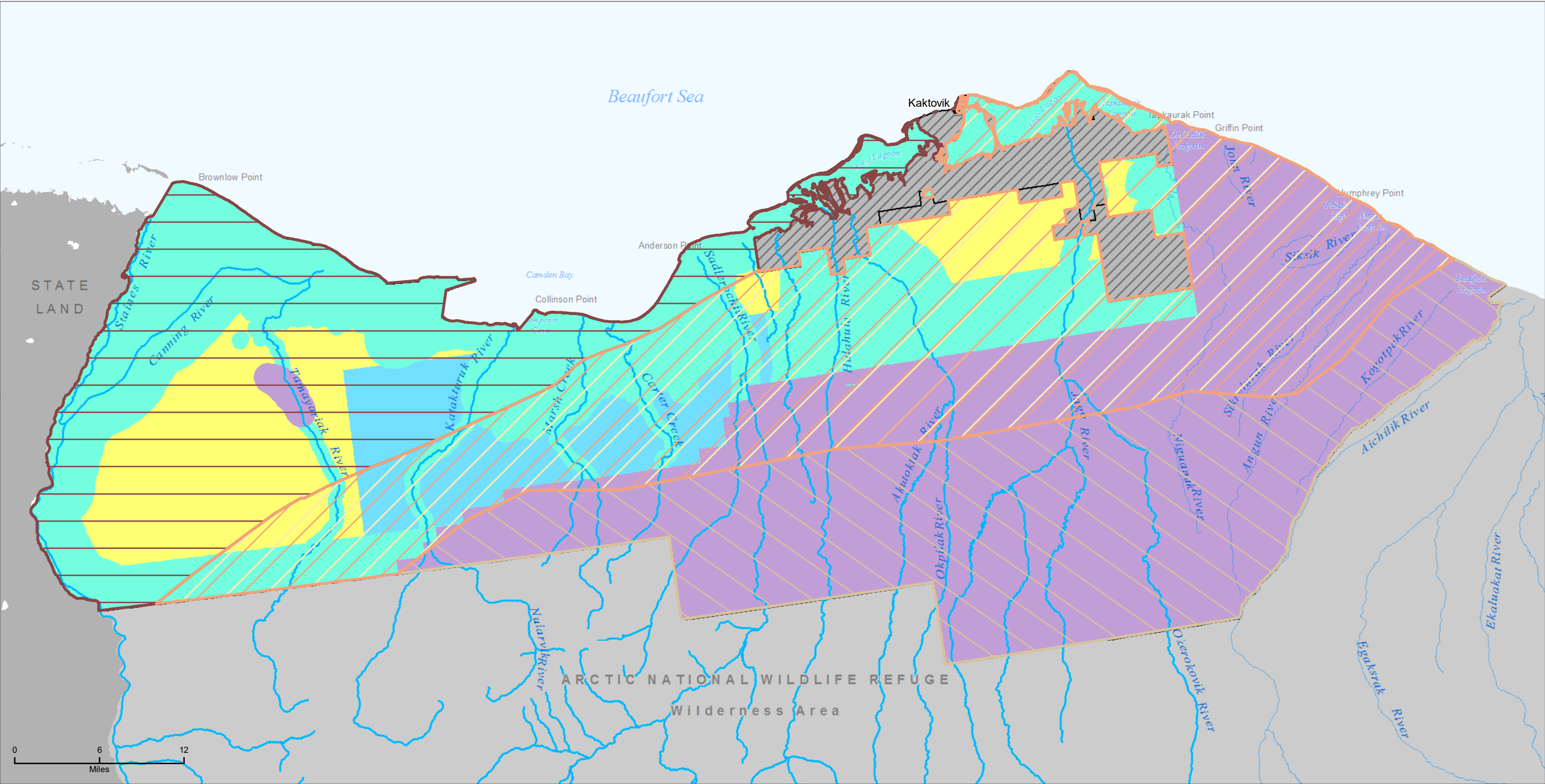
■ Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018, USFWS GIS 2018a, USGS GIS 1998  
Print Date: 08/27/2019

Map 3-8



Not offered for lease sale

Available for lease sale:  
Subject to no surface occupancy  
Subject to controlled surface use  
Subject to timing limitations  
Subject to only standard terms and conditions (none)

Hydrocarbon potential  
High  
Medium  
Low

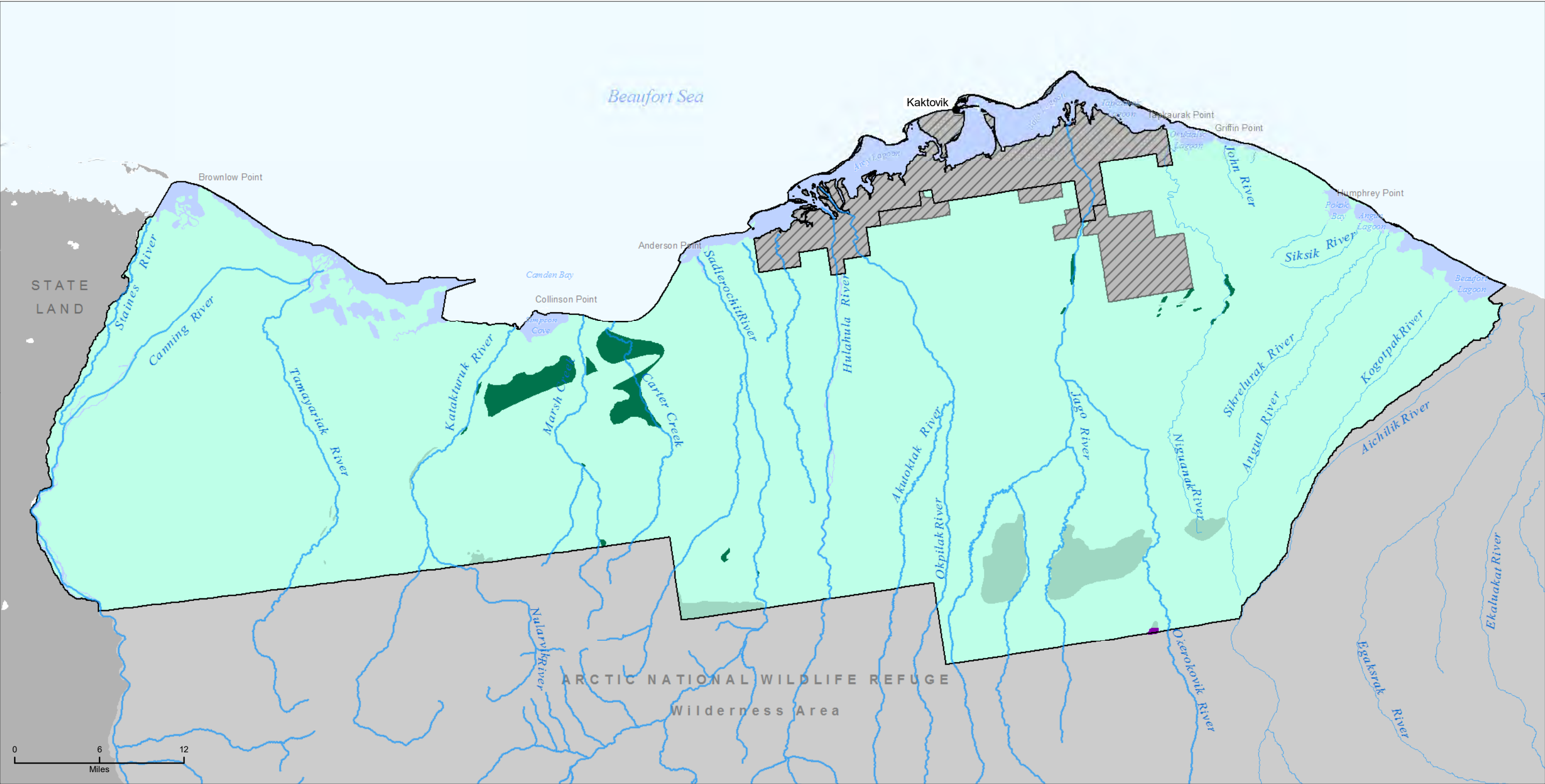
Public Law 115-97 Coastal Plain  
Excluded from Public Law 115-97  
Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018, USFWS GIS 2018a, USGS GIS 1998  
Print Date: 08/27/2019





Potential fossil yield classification

- 2-3
- 3
- 3-4
- 5
- Water

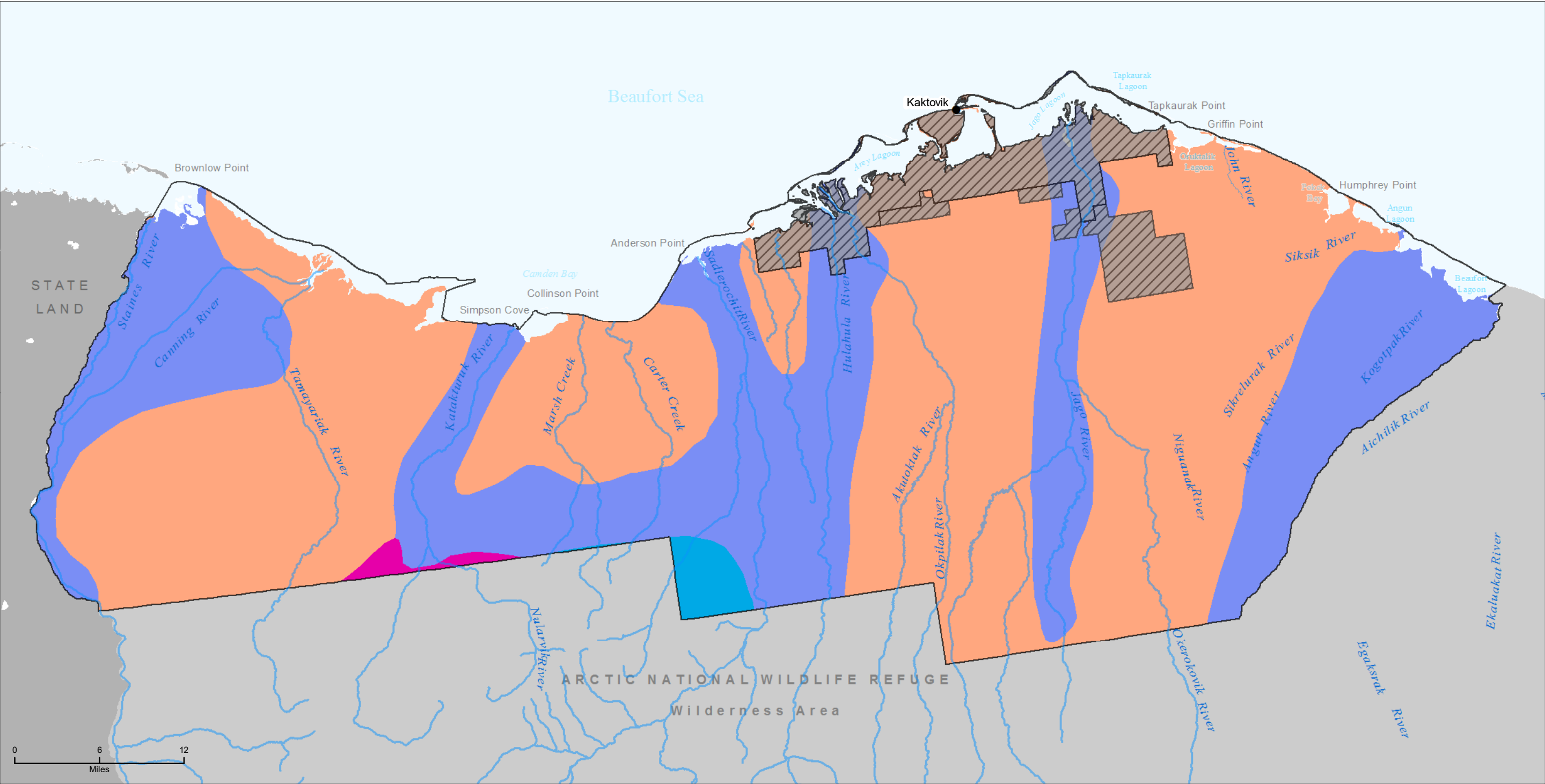
Public Law 115-97 Coastal Plain

- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018,  
USGS GIS 2015  
Print Date: 08/27/2019



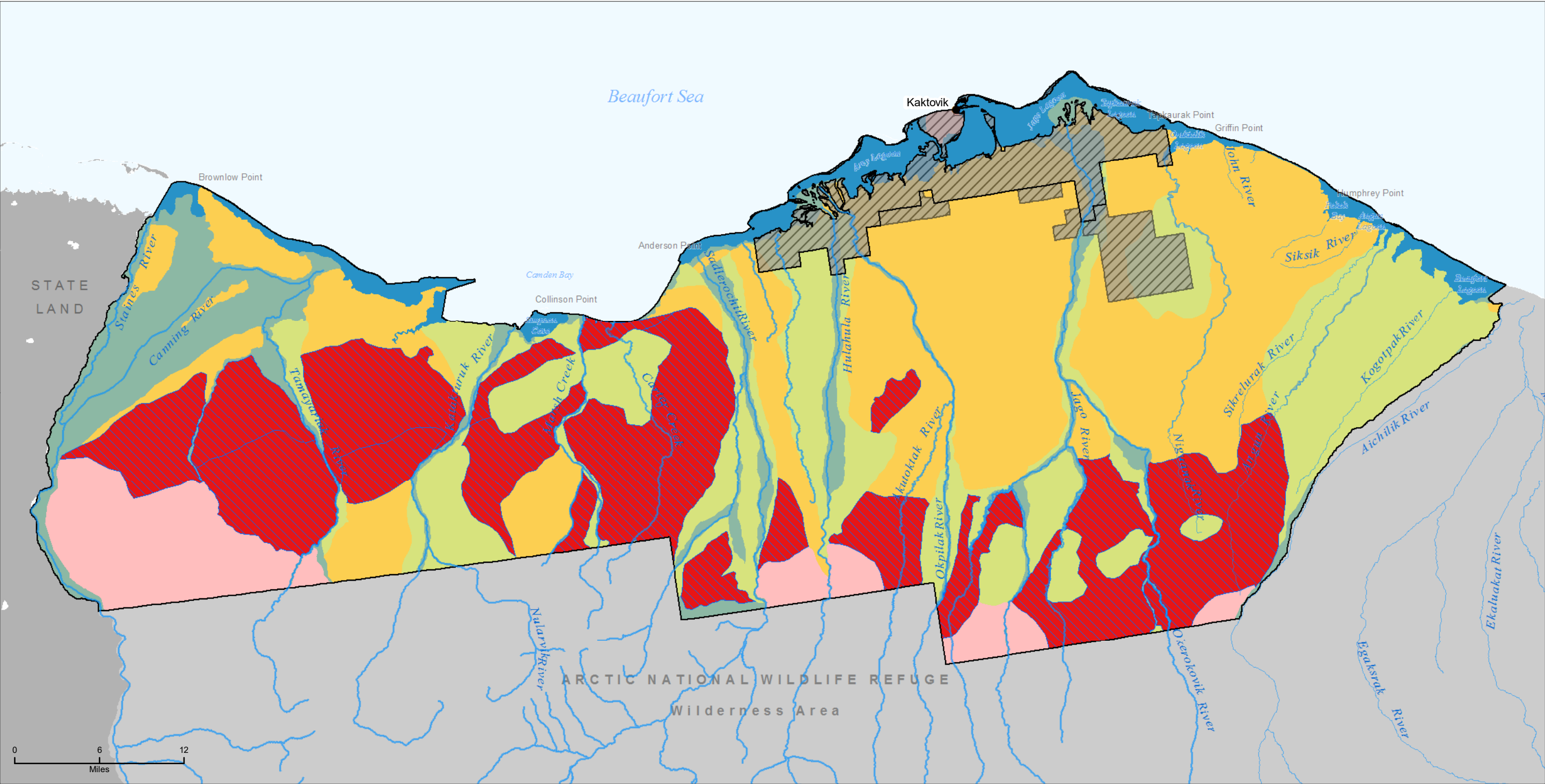
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- Typic Histoturbels-Typic Aquiturbels (s9256)
- Typic Histoturbels-Typic Haploturbels-Typic Fibristels-Typic Aquiturbels-Ruptic histic aquiturbels (s9389)
- Typic Molliturbels-Typic Aquiturbels-Lithic Haploturbels (s9396)
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- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018,  
Jorgenson GIS 2014  
Print Date: 08/27/2019

Map 3-11



Massive ice

30-70%

10-80%

10-30%

5-10%

<5%

0

Yedoma

Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97

Coastal Plain or outside the BLM's oil and gas leasing authority

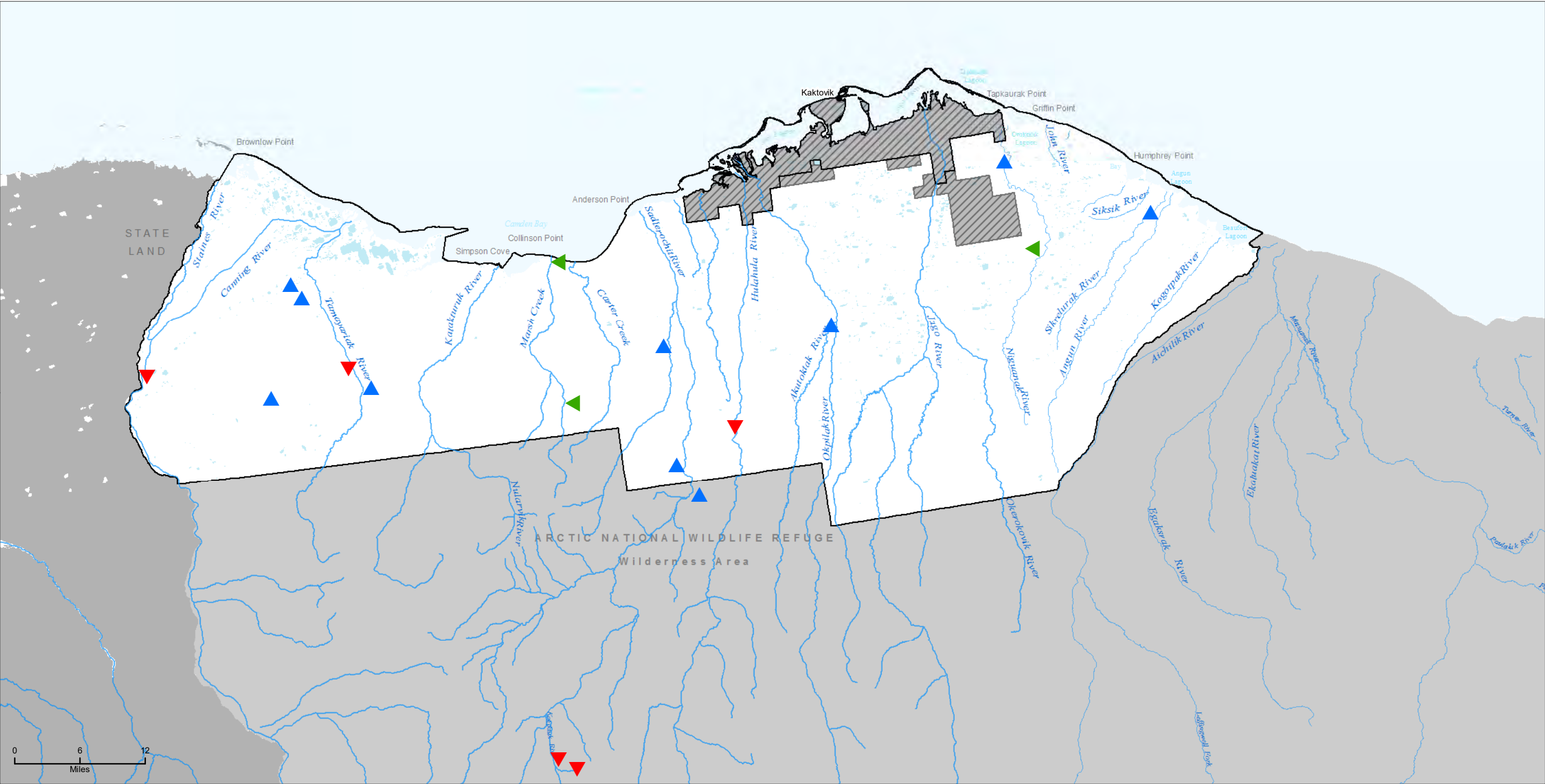


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Data Source: BLM GIS 2018,  
Jorgenson GIS 2014  
Print Date: 08/27/2019

Map 3-12





- ▲ FWS gaging station

▼ USGS gaging station

▲ Climate monitoring gaging station
- Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97

▨ Coastal Plain or outside the BLM's oil and gas leasing authority

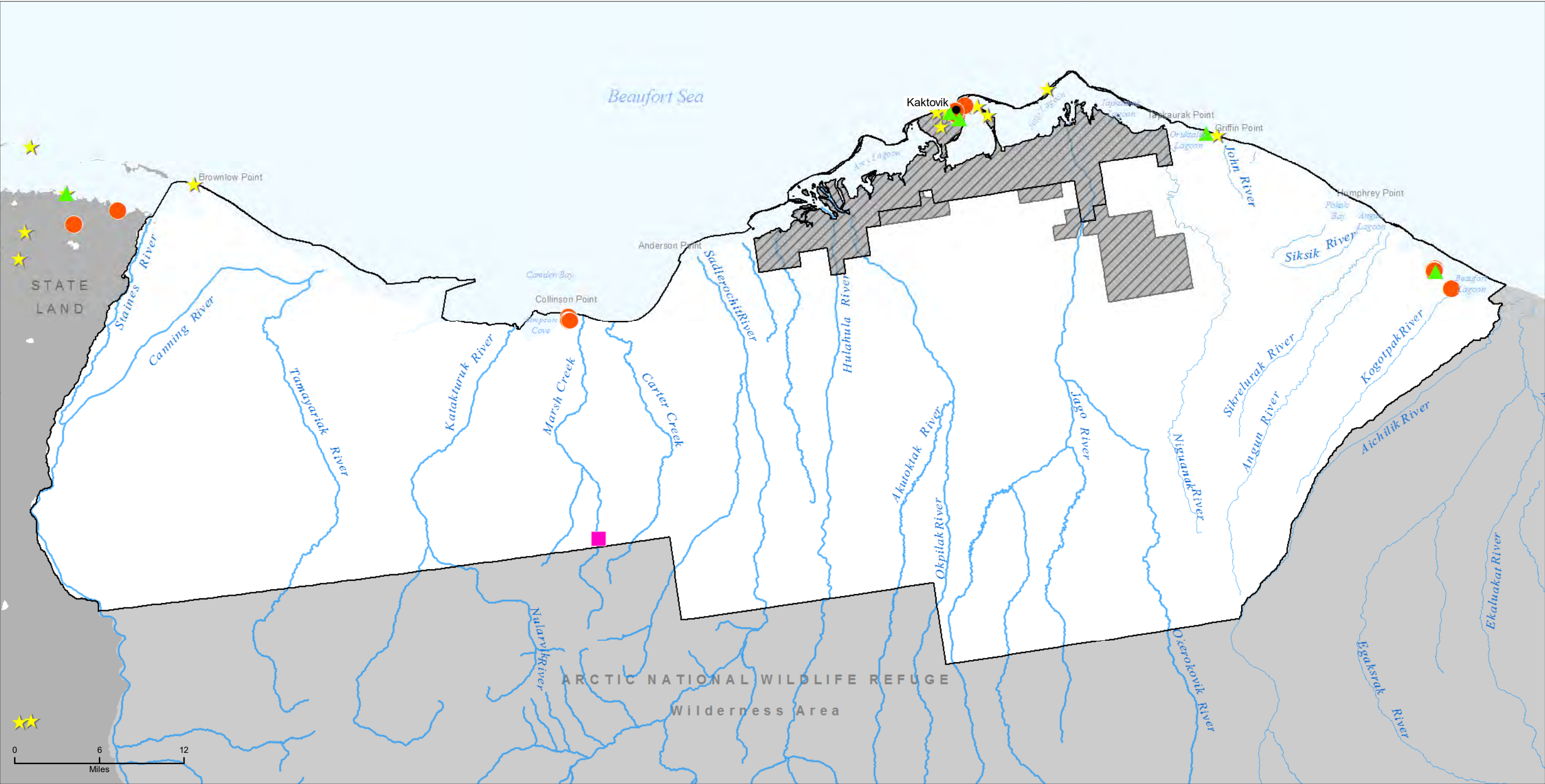


Data Source: BLM GIS 2018,  
NOAA GIS 2018  
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Map 3-13





Alaska Department of Environmental Conservation—  
contaminated site

- Active
- ★ Clean-up complete
- Informational

▲ Resource Conservation and Recovery Act site

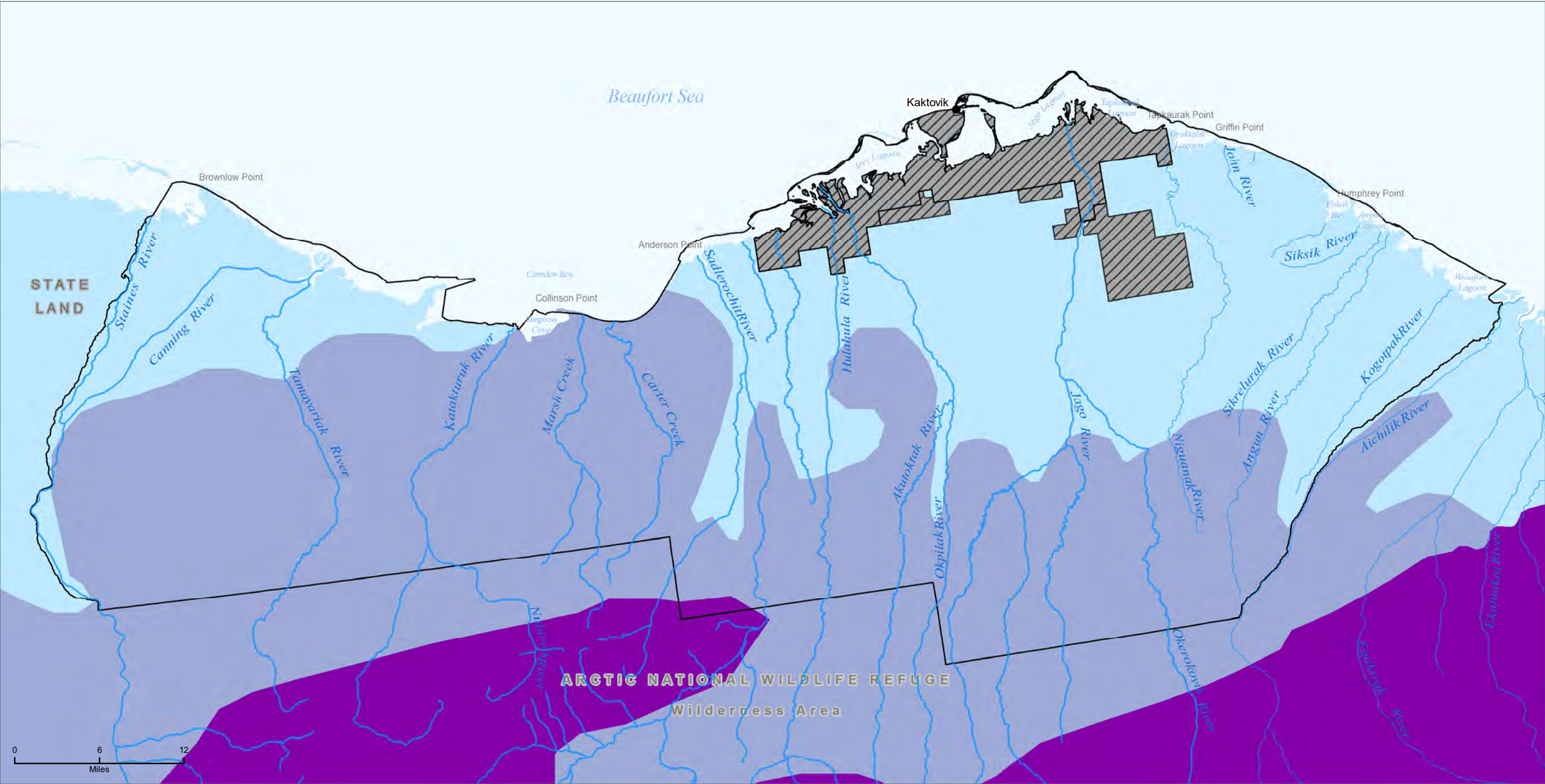
▭ Public Law 115-97 Coastal Plain

▨ Excluded from Public Law 115-97  
Coastal Plain or outside the BLM's  
oil and gas leasing authority



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.

Data Source: BLM GIS 2018,  
ADEC GIS 2018, EPA GIS  
2018  
Print Date: 08/27/2019



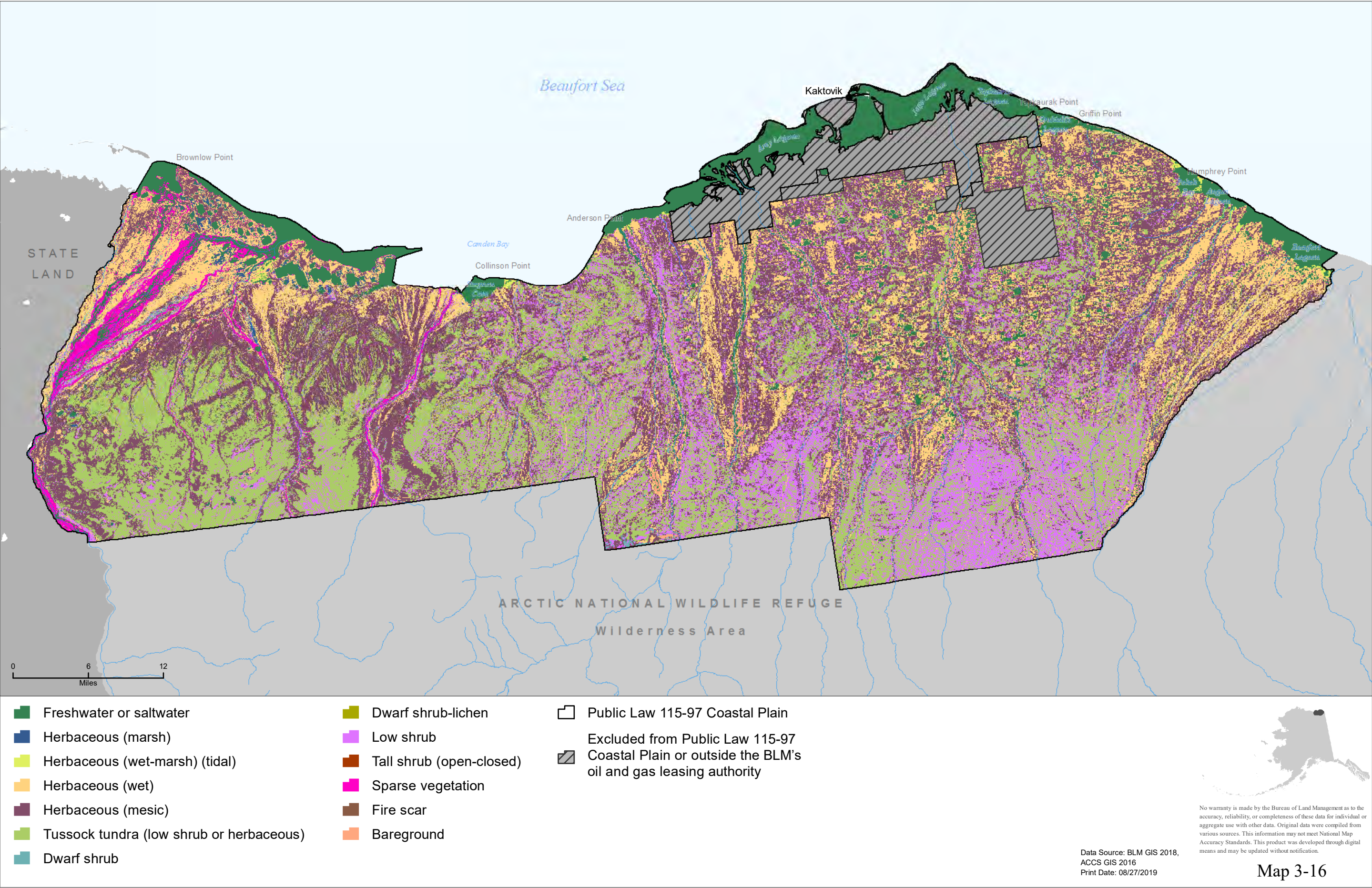
- |                        |  |
|------------------------|--|
| Beaufort Coastal Plain | Public Law 115-97 Coastal Plain  |
| Brooks Foothills       | Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority |
| Brooks Range           |  |



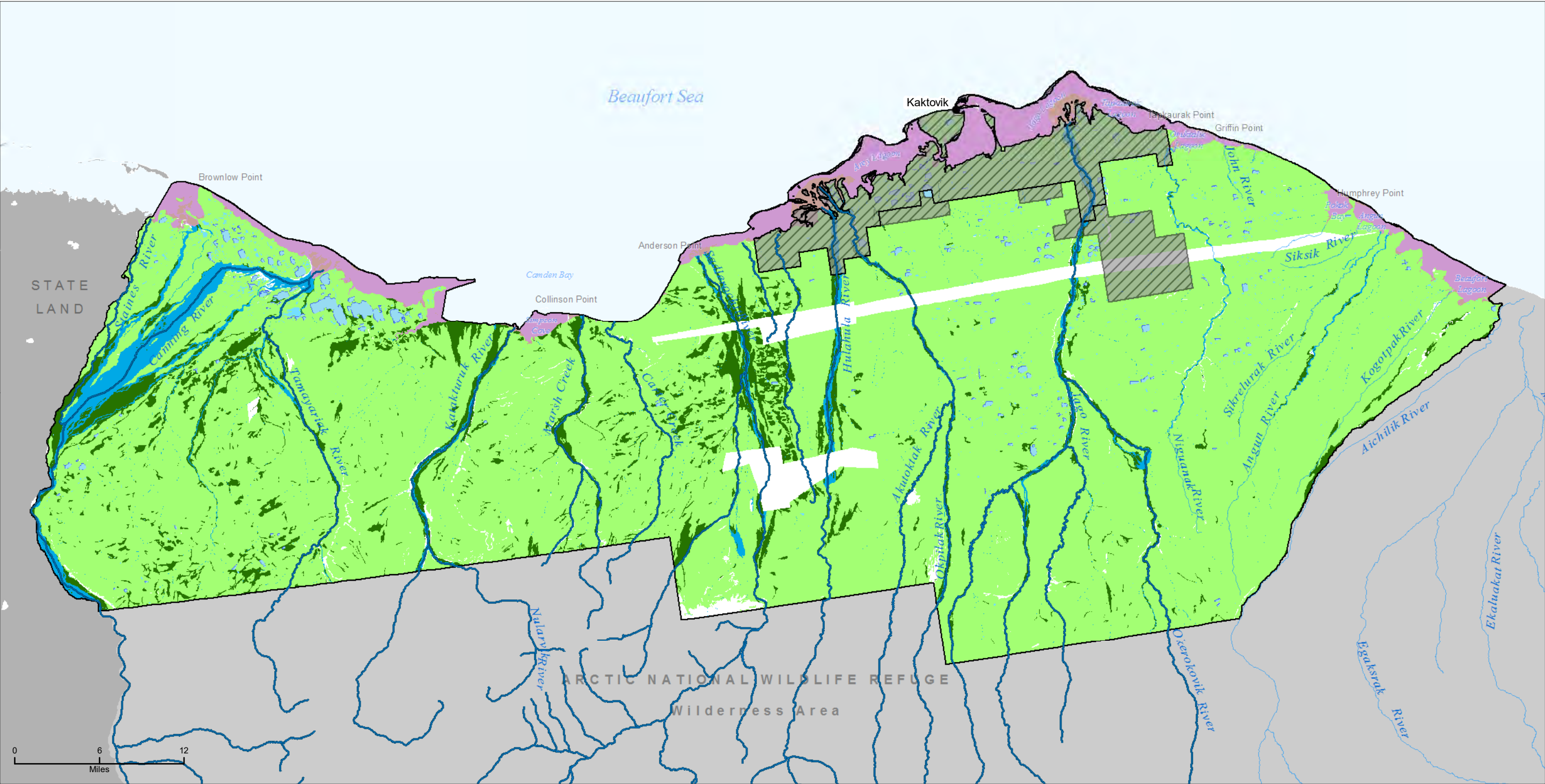
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed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

Data Source: BLM GIS 2018,  
Nowacki et al GIS. 2001  
Print Date: 08/28/2019









- Major river

Lake

Freshwater pond

Riverine

Estuarine and marine wetland

Freshwater emergent wetland

Freshwater forested/shrub wetland

Missing data
- Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97

Coastal Plain or outside the BLM's oil and gas leasing authority

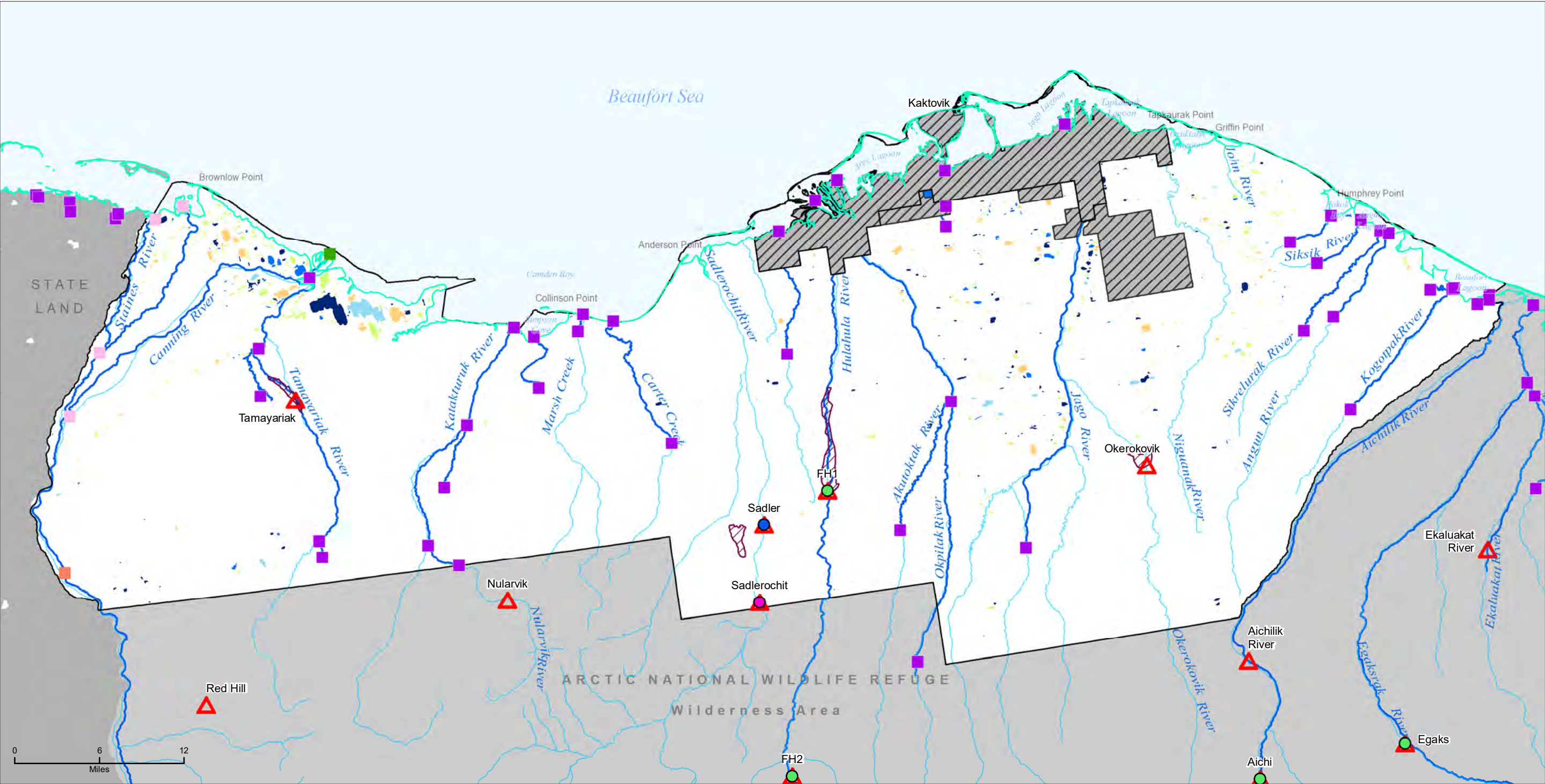


No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed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

Data Source: BLM GIS 2018,  
NWI GIS 2018  
Print Date: 08/27/2019

Map 3-17





Fish Presence—ADFG Anadromous Waters Catalog

- Dolly Varden
- Pink Salmon, Dolly Varden and Whitefish
- Chum Salmon, Pink Salmon, Dolly Varden and Whitefish
- Pink Salmon and Whitefish

Fish overwintering in springs

- Anadromous Dolly Varden and Arctic Grayling
- Resident Dolly Varden and juvenile Arctic Grayling
- Arctic Grayling

Unfrozen lake (%)

- 0
- 1-25
- 26-49
- 50-74
- 75-96

Spring



Aufeis

Anadromous waters catalog (AWC) stream

Coastline

Public Law 115-97 Coastal Plain

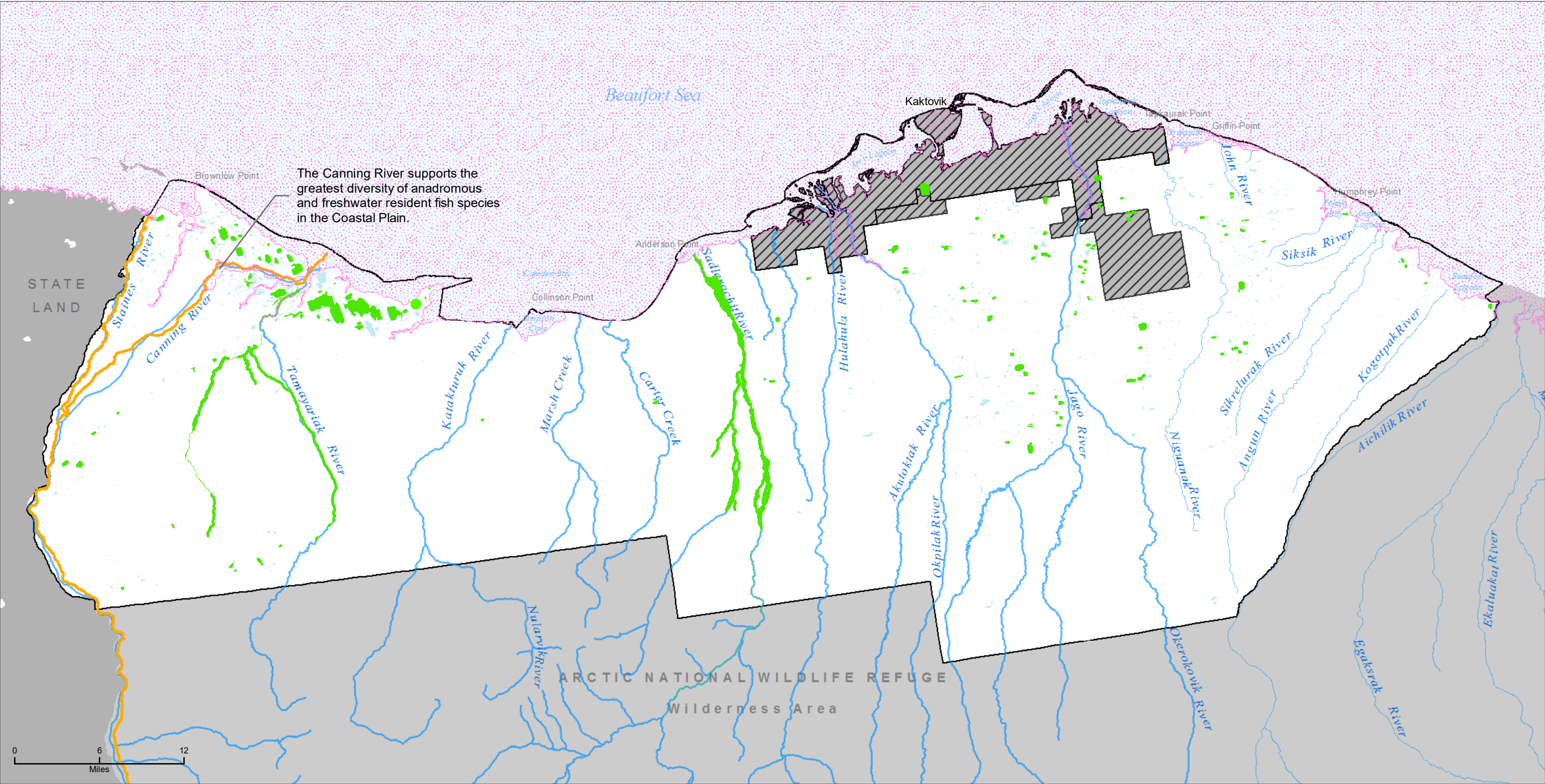
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



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.

Data Source: BLM GIS 2018, ADFG GIS 2018  
Print Date: 08/28/2019





Essential fish habitat—Arctic Cod

Essential fish habitat—Pink and Chum Salmon

Reservation of water for instream use

Public Law 115-97 Coastal Plain

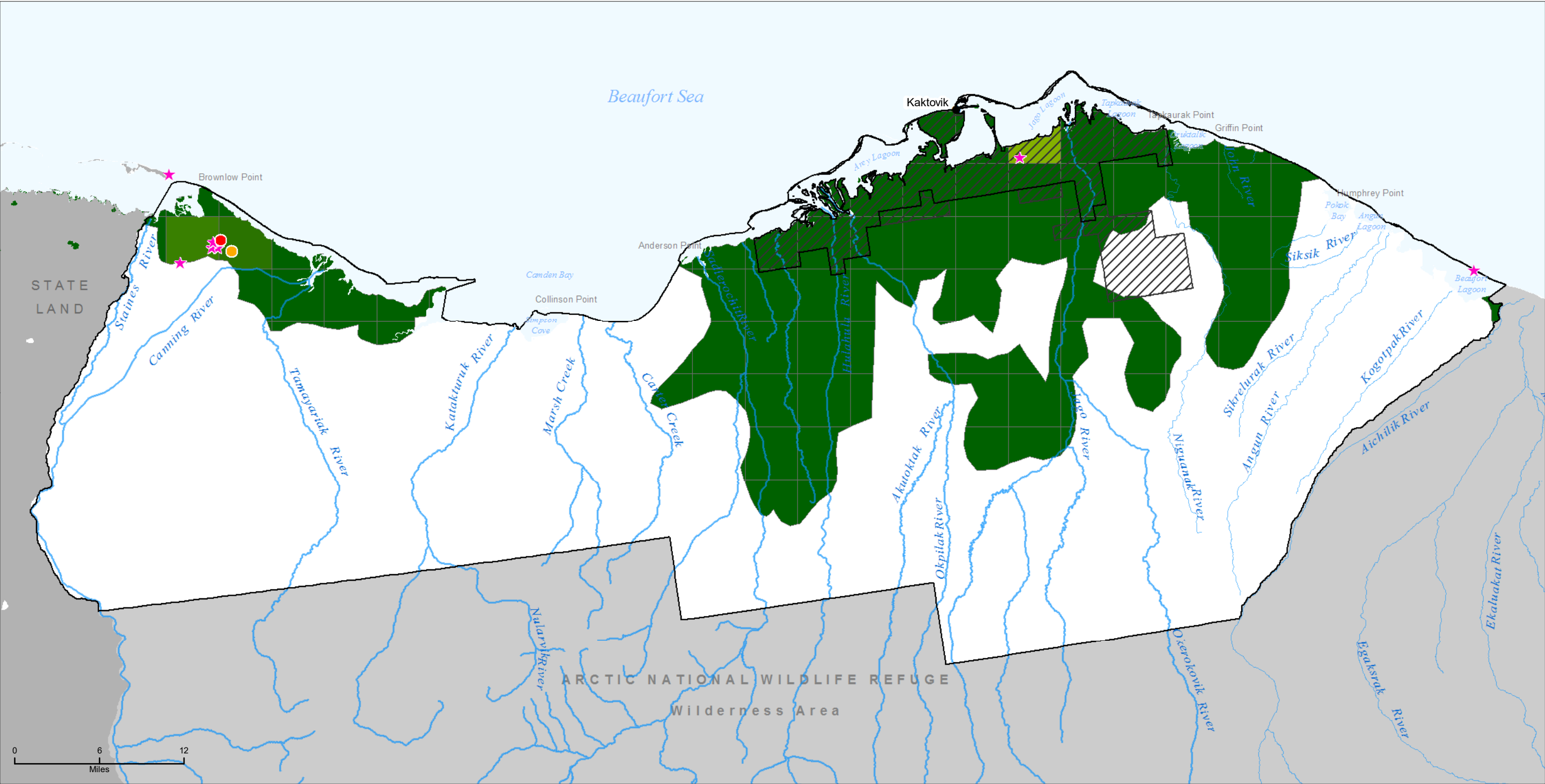
Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

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.

Data Source: BLM GIS 2018, NOAA GIS 2018, ADFG GIS 2018  
Print Date: 08/27/2019

Map 3-19





Spectacled Eider nest site  
● 2005  
● 2014, 2017

All spectacled eider observations from the North Slope Eider aerial survey, 1992-2006, and the Arctic Coastal Plain breeding waterbird aerial survey, 1992-2014, aerial survey sightings 1999-2007

Mean spectacled eider density (birds/km<sup>2</sup>) from bird observations collected during the ACP aerial breeding pair waterbird survey, 1992-2016. Birds occurred in low densities in the program area.

Higher density  
Low density

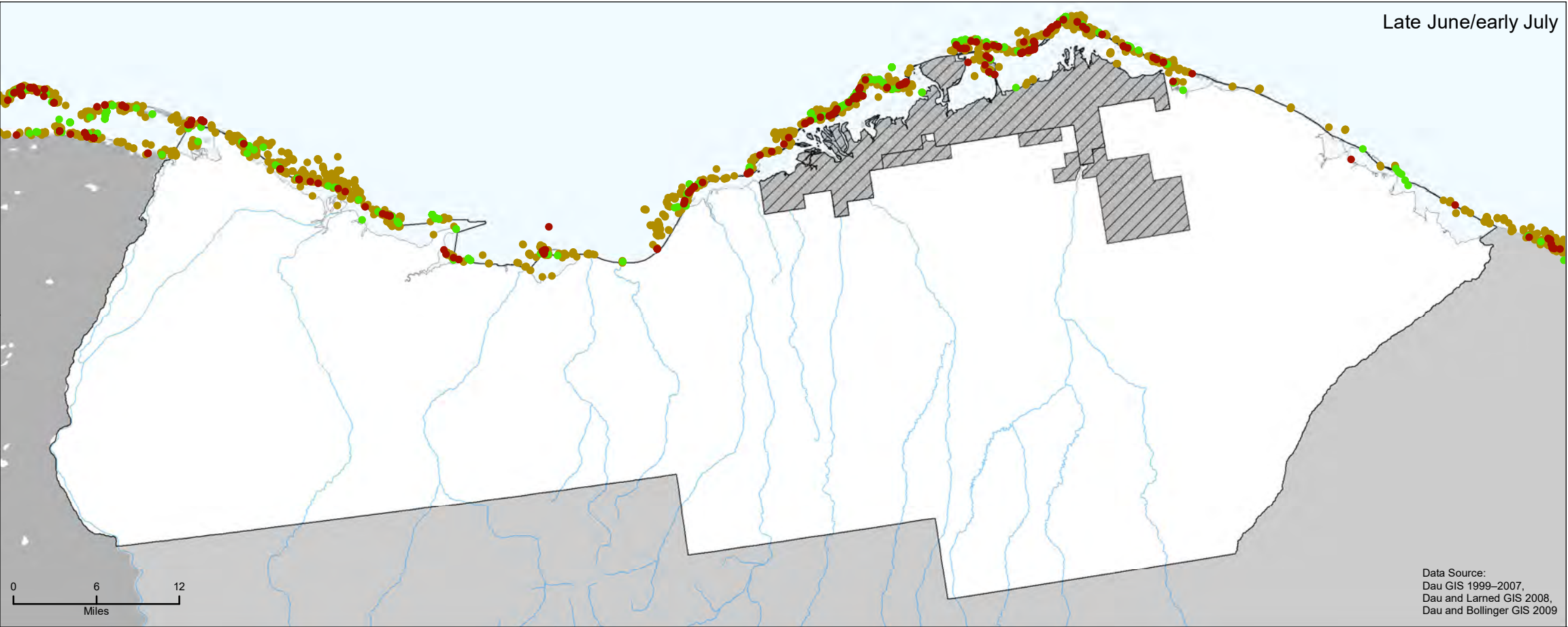
Public Law 115-97 Coastal Plain  
Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



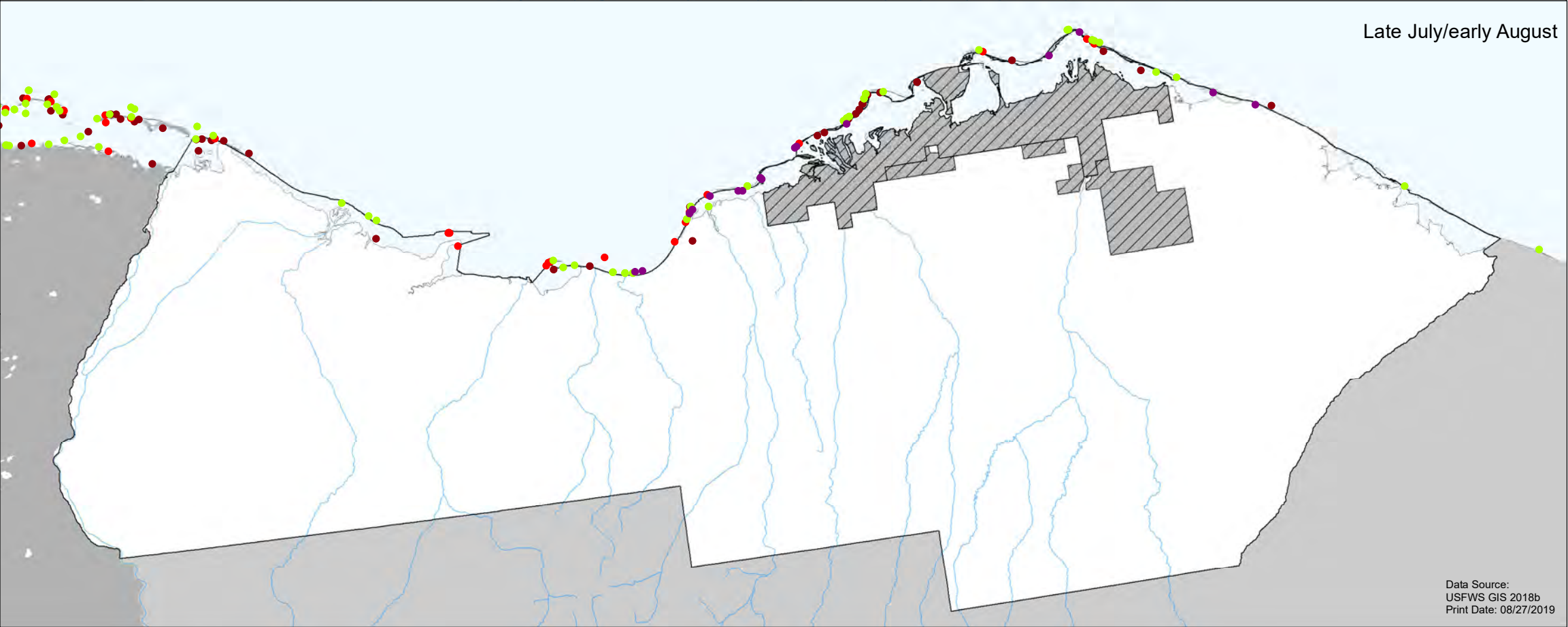
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed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

Data Source: BLM GIS 2018, USFWS GIS 2005, 2014, 2017, USFWS GIS 2019  
Print Date: 08/27/2019

Map 3-20



- 2008
- 2009
- 1999–2007
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



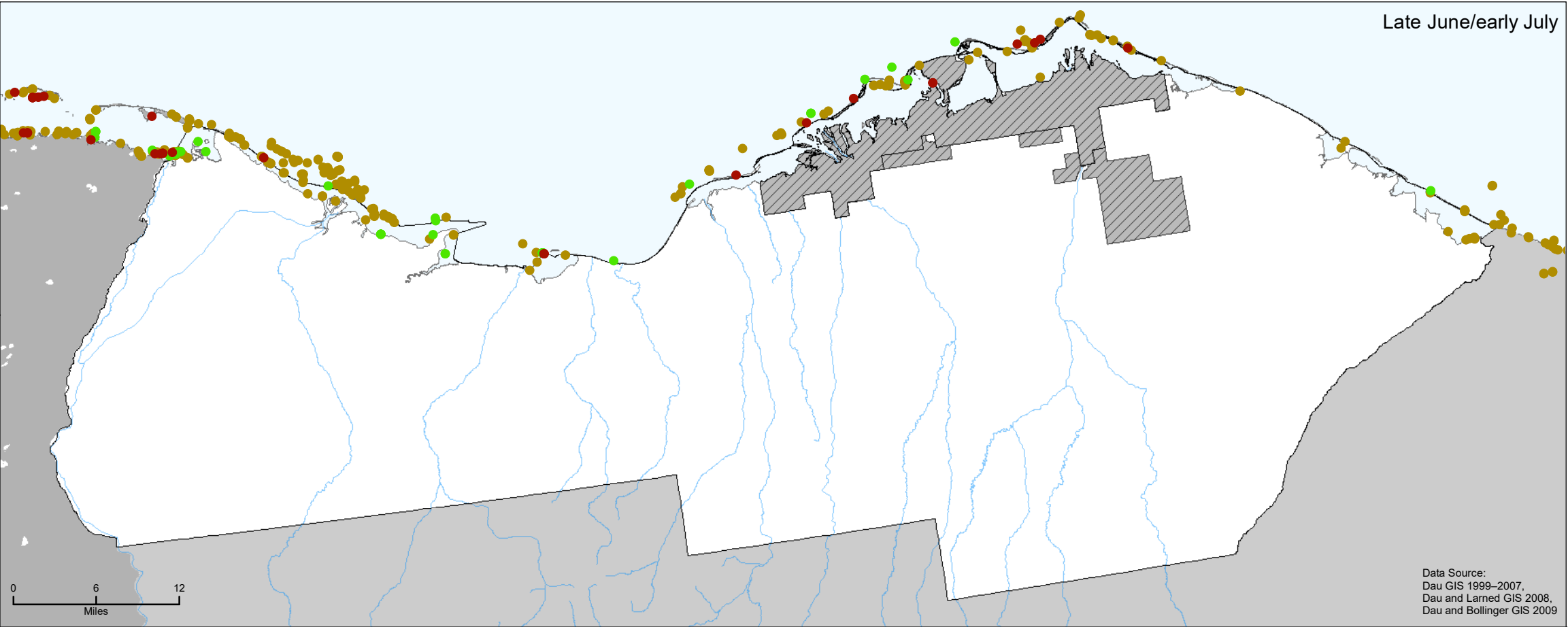
- 1999
- 2001
- 2002
- 2003



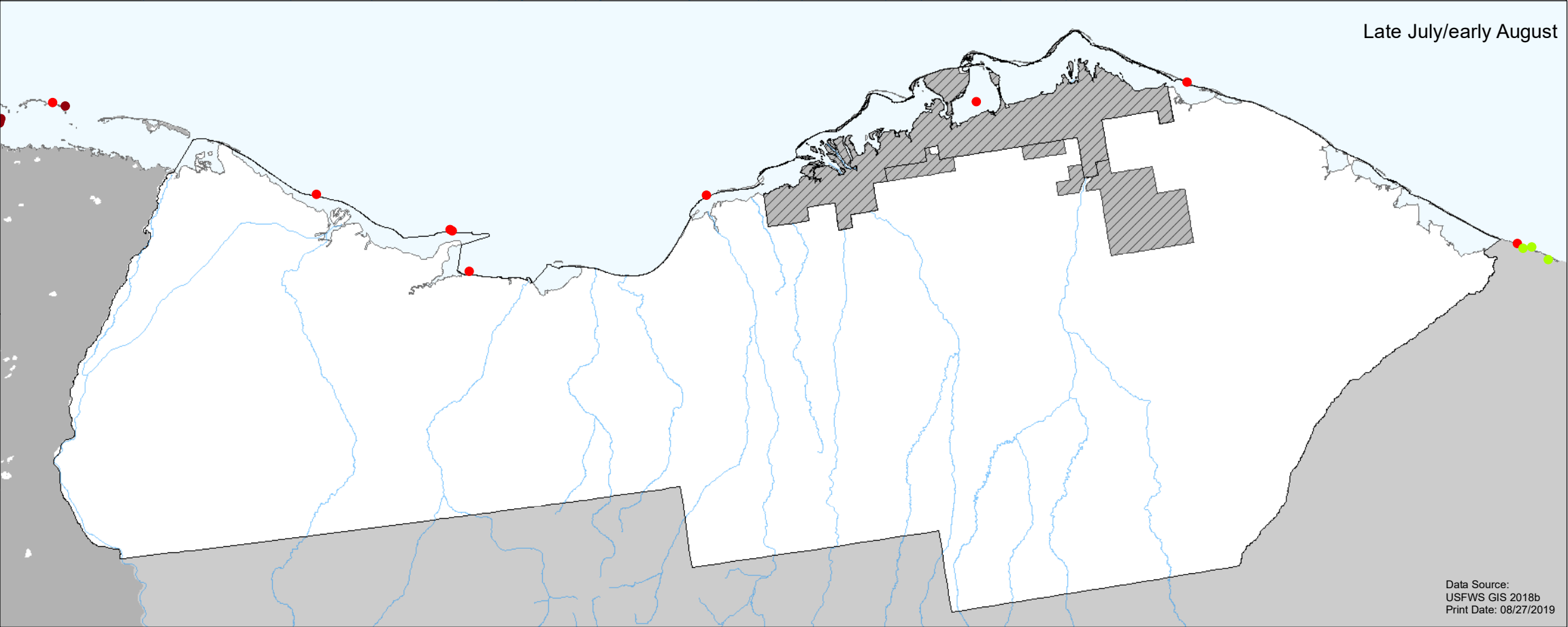
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed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

Map 3-21





- 2008
- 2009
- 1999–2007
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

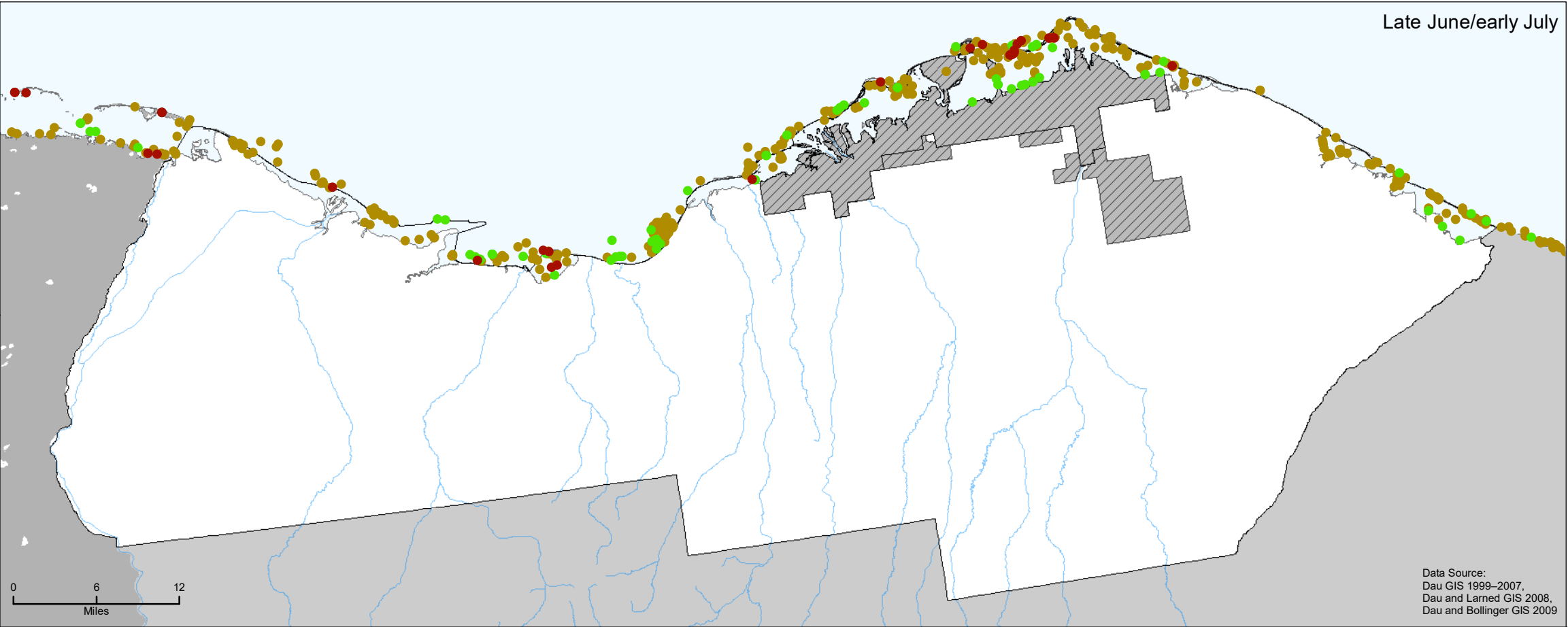


- 1999
- 2001
- 2002
- 2003

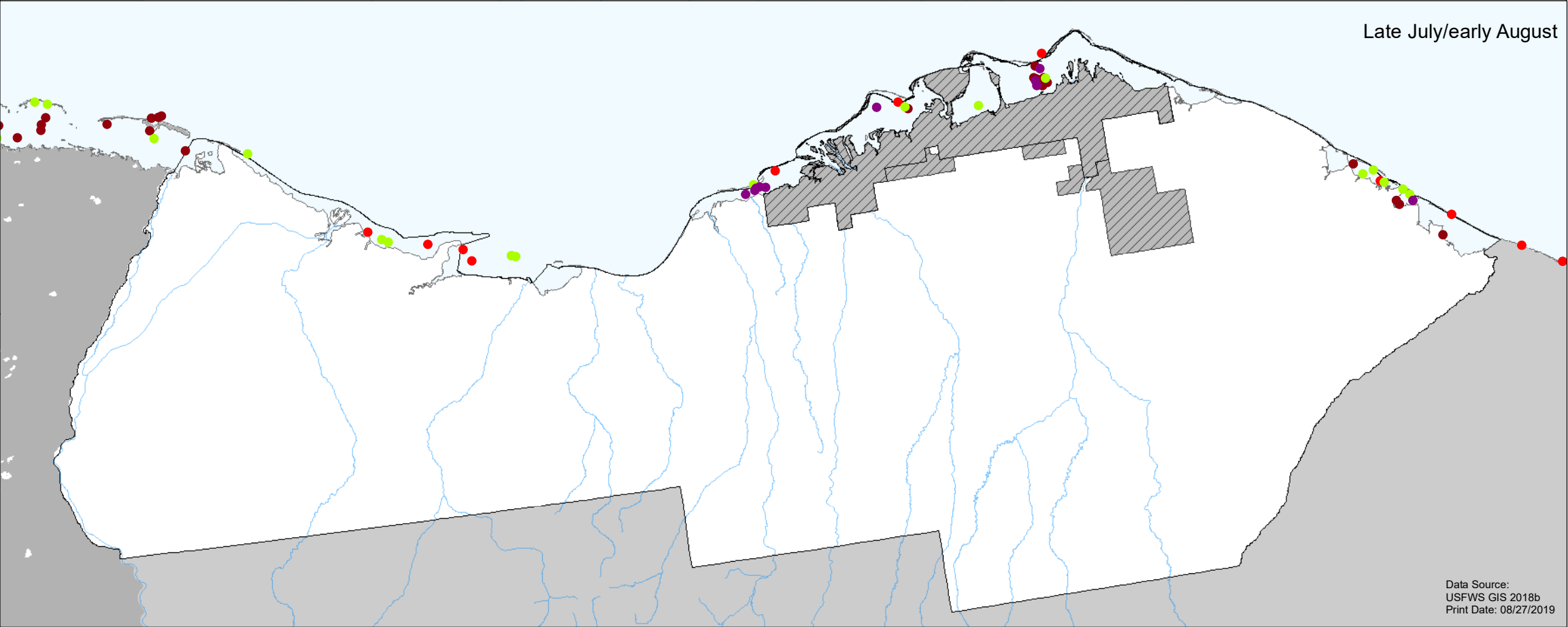


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Map 3-22



- 2008
- 2009
- 1999–2007
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



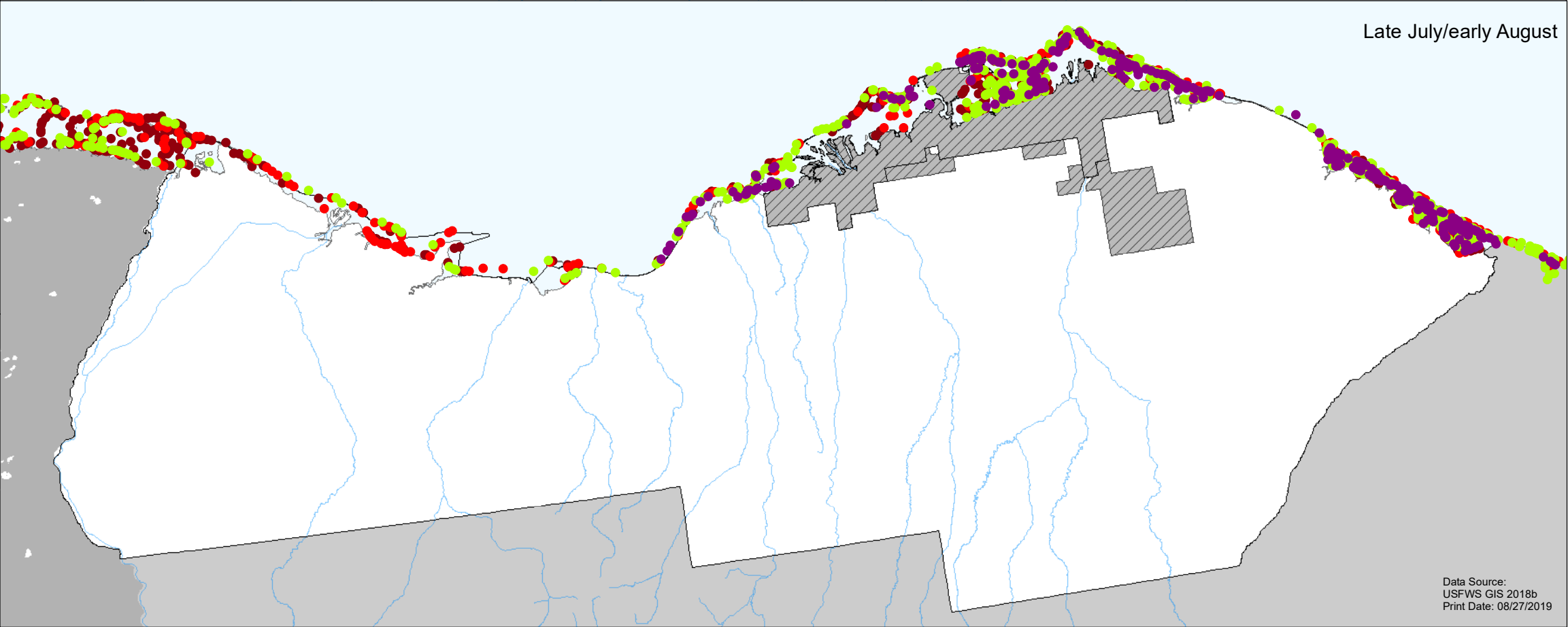
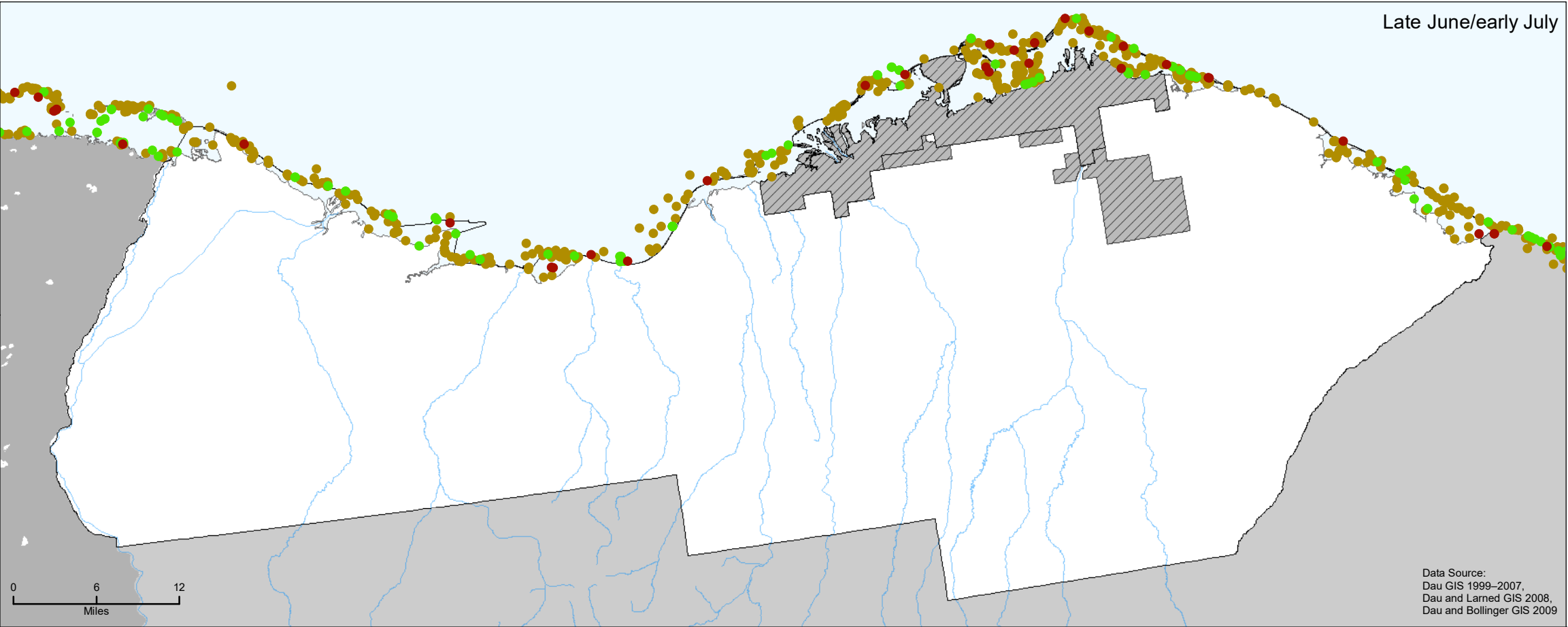
- 1999
- 2001
- 2002
- 2003



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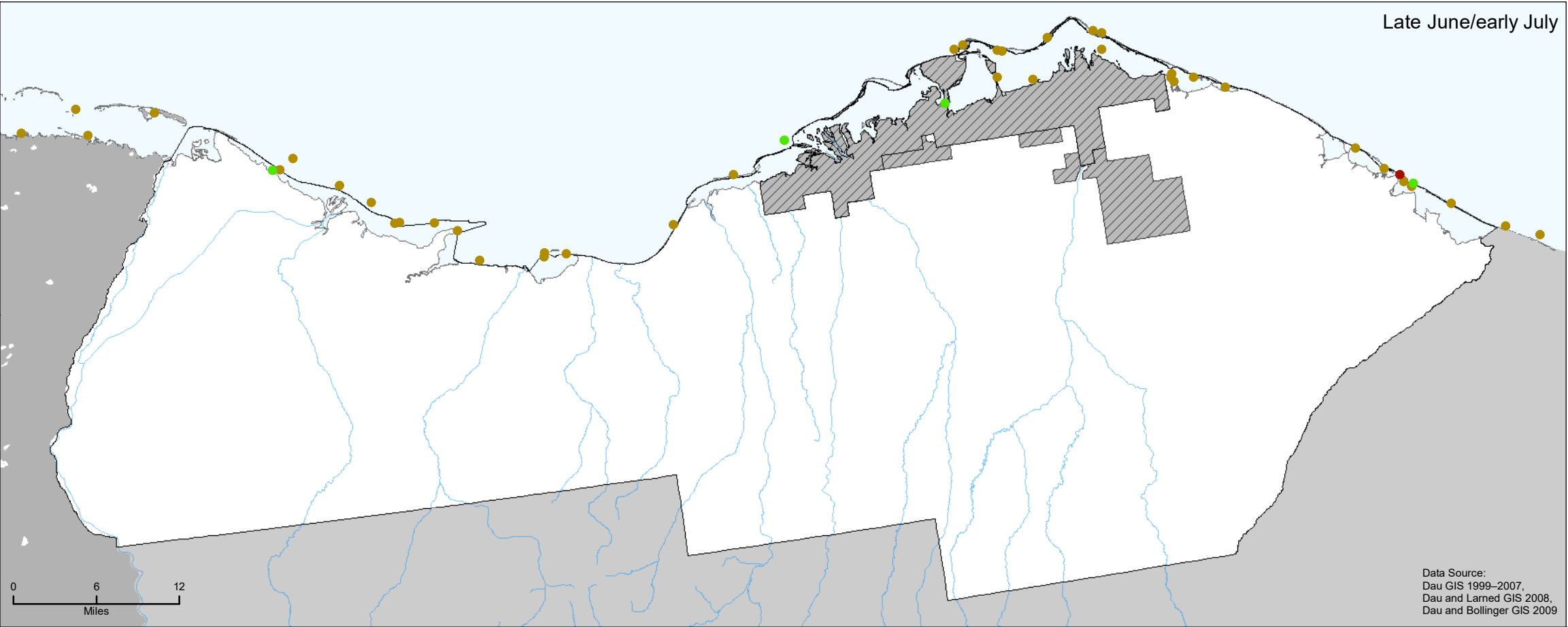
Map 3-23



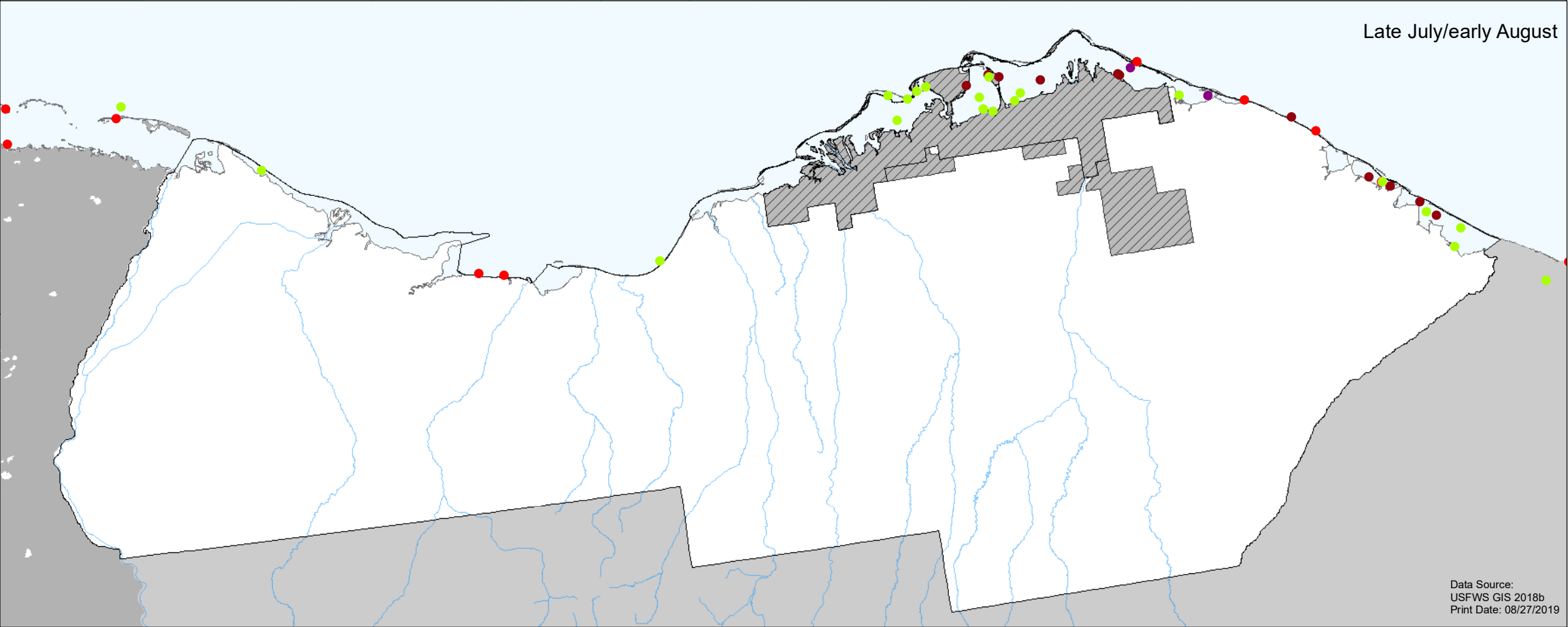


No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed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

Map 3-24



- 2008
- 2009
- 1999–2007
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



- 1999
- 2001
- 2002
- 2003



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Map 3-25

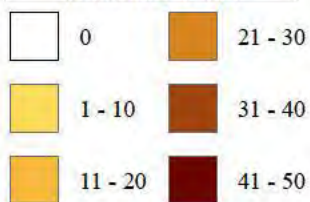




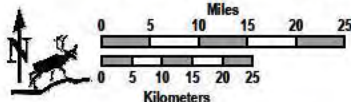
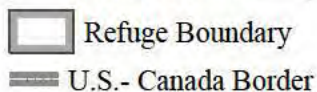
## Arctic National Wildlife Refuge

### Frequency of Occurrence of Snow Goose Flocks with >500 birds Observed During Aerial Surveys, 1982-2004

#### Number Flocks

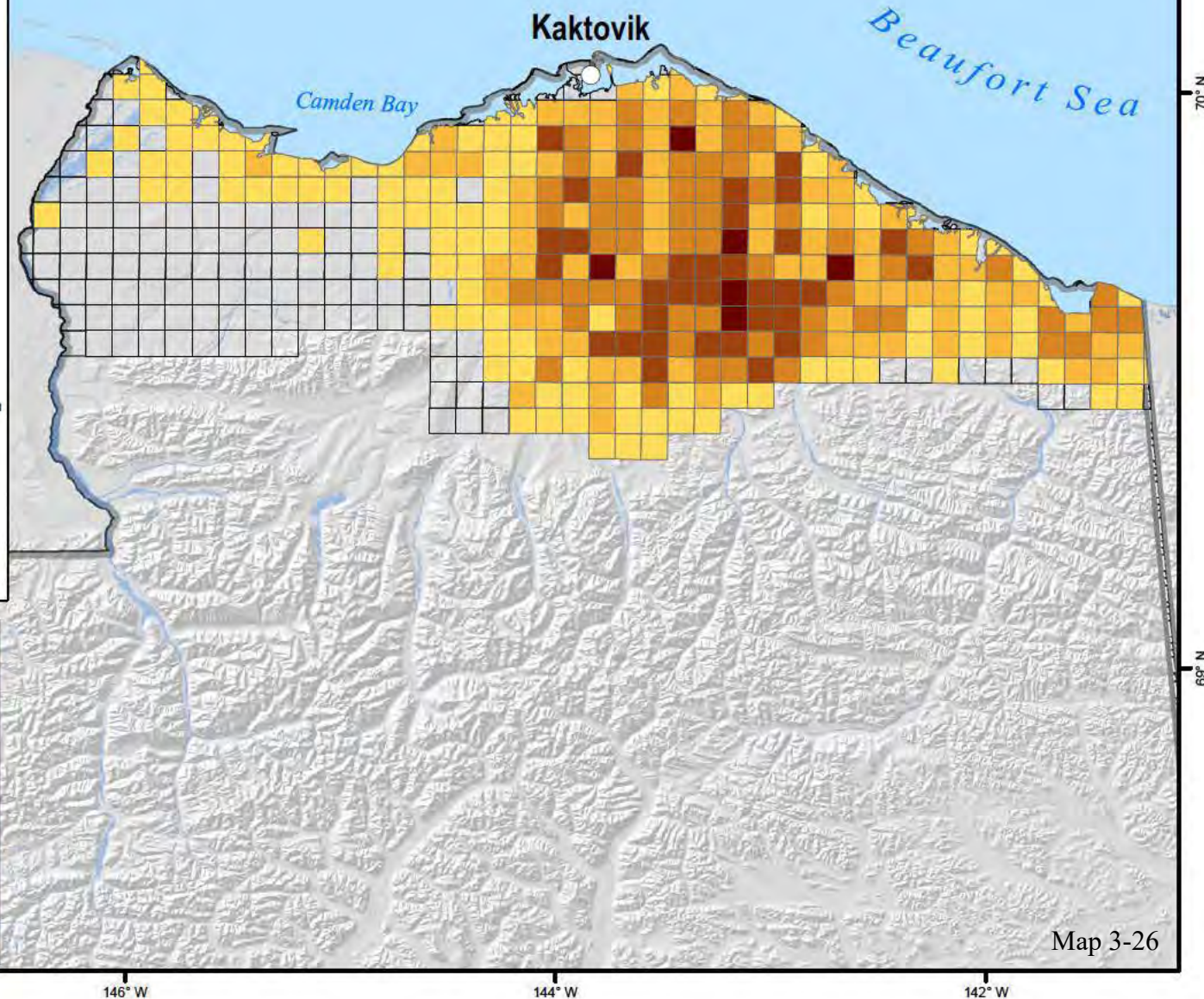


#### Other Features



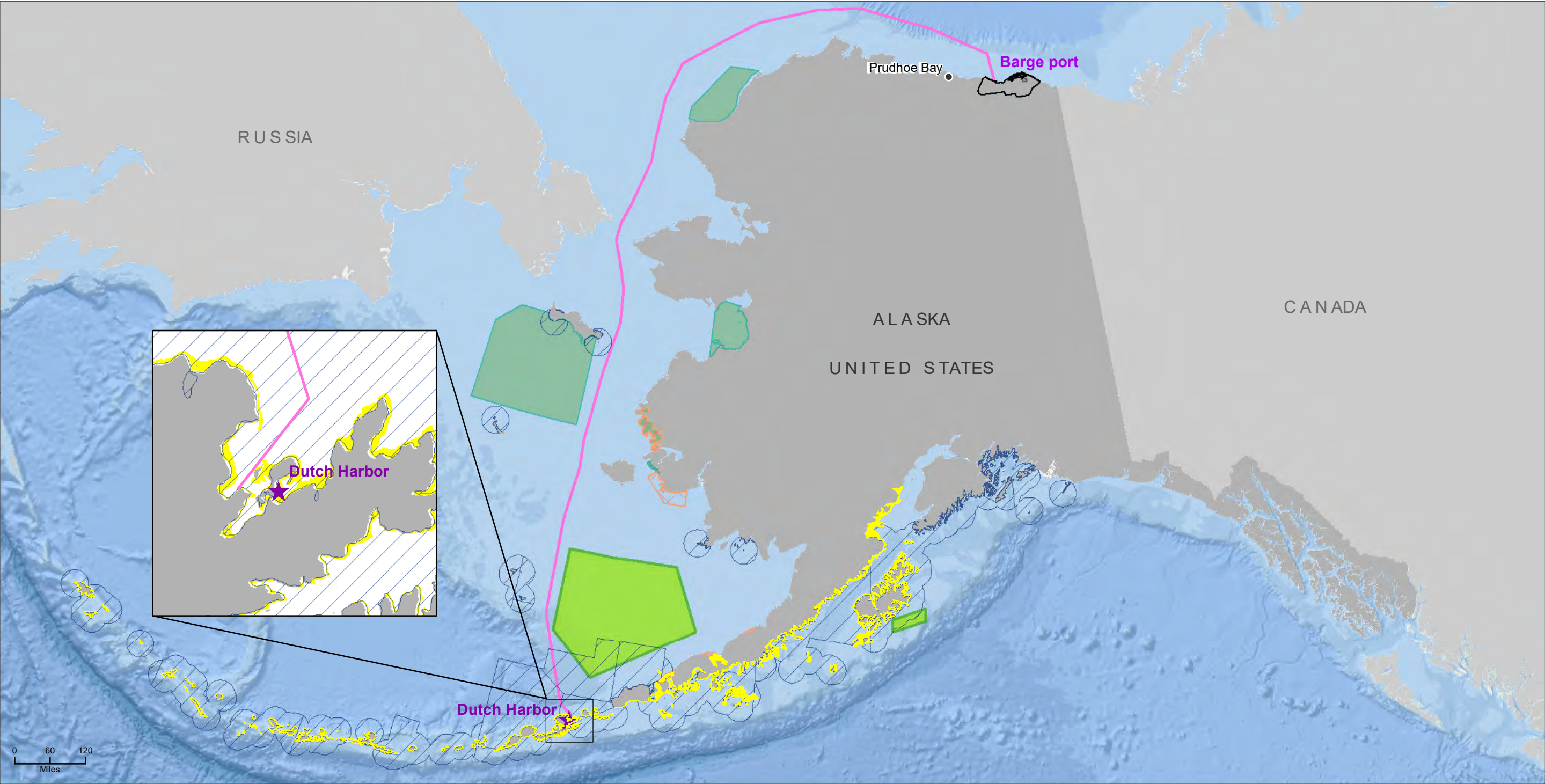
Alaska Albers Equal Area Conic Projection, 1983 North American Datum.

Aerial surveys were conducted between 1982 and 2004 to census the number of snow geese staging on the Arctic Refuge coastal plain prior to their fall migration. The figure shows the numbers of flocks with greater >500 birds observed within 5 km x 5 km grid cells covering the survey area. Surveys were conducted in 1982, 1984-89, 1992-93, 1997-99, 2000-01, and 2003-04.



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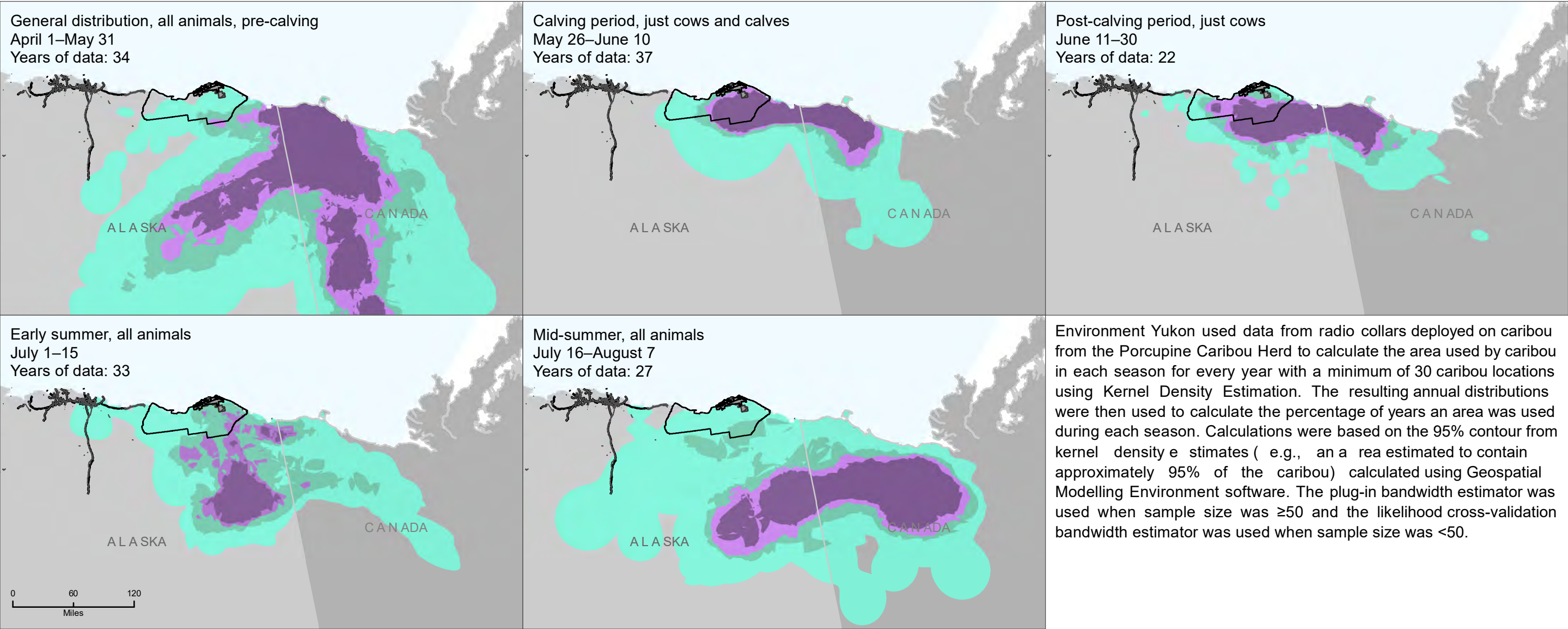


- Sea otter critical habitat
- Steller's sea lion critical habitat (foraging area and 20 nautical mile aquatic zone)
- North pacific right whale critical habitat
- Steller's eider critical habitat
- Spectacled eider critical habitat
- Potential marine vessel transportation route
- Public Law 115-97 Coastal Plain

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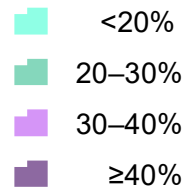
Data Source: BLM GIS 2018  
Print Date: 08/27/2019





Environment Yukon used data from radio collars deployed on caribou from the Porcupine Caribou Herd to calculate the area used by caribou in each season for every year with a minimum of 30 caribou locations using Kernel Density Estimation. The resulting annual distributions were then used to calculate the percentage of years an area was used during each season. Calculations were based on the 95% contour from kernel density estimates (e.g., an area estimated to contain approximately 95% of the caribou) calculated using Geospatial Modelling Environment software. The plug-in bandwidth estimator was used when sample size was  $\geq 50$  and the likelihood cross-validation bandwidth estimator was used when sample size was  $< 50$ .

Percent of years that caribou are present

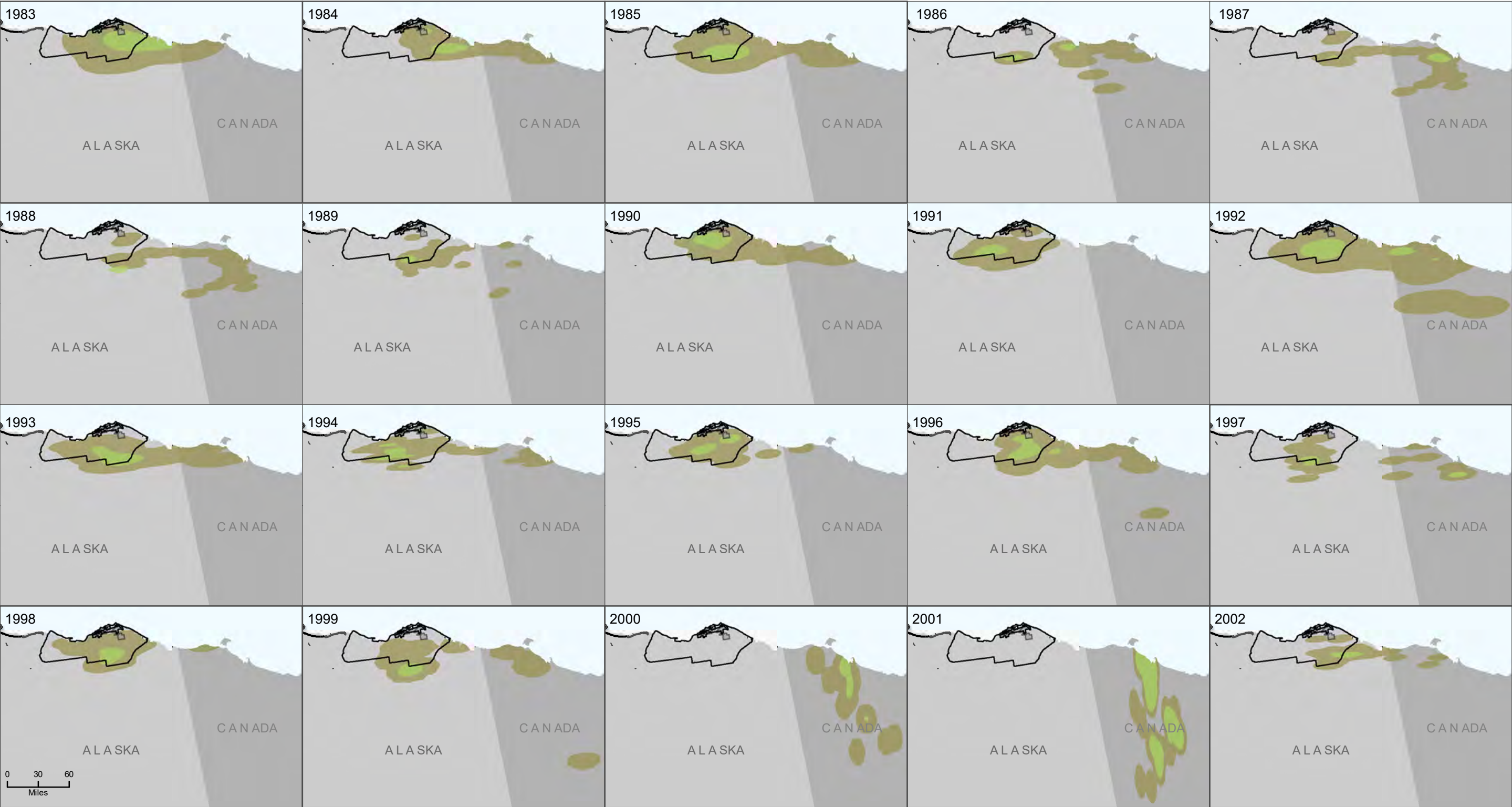


- Existing oil and gas roads or pipelines
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018, Environment Yukon GIS 2018  
Print Date: 08/28/2019

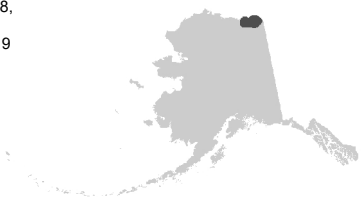


- Concentrated calving area
- Annual calving ground
- Existing oil and gas roads or pipelines
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

Concentrated calving areas were defined as the annual kernel density contour that included areas with greater than average calving density and annual calving grounds were defined as the 99% kernel density utilization distributions obtained from annual calving sites (Griffith et al. 2002, USFWS 2015). GIS layers were created by Alaska Department of Fish and Game following methods of Griffith et al. (2002). No concentrated calving area data for 2014, 2015, 2016. Annual calving ground data for 2010, 2012, 2013, 2014, 2015, 2016, 2017 were calculated as 95% kernel density utilization distributions of female caribou by Environment Yukon.

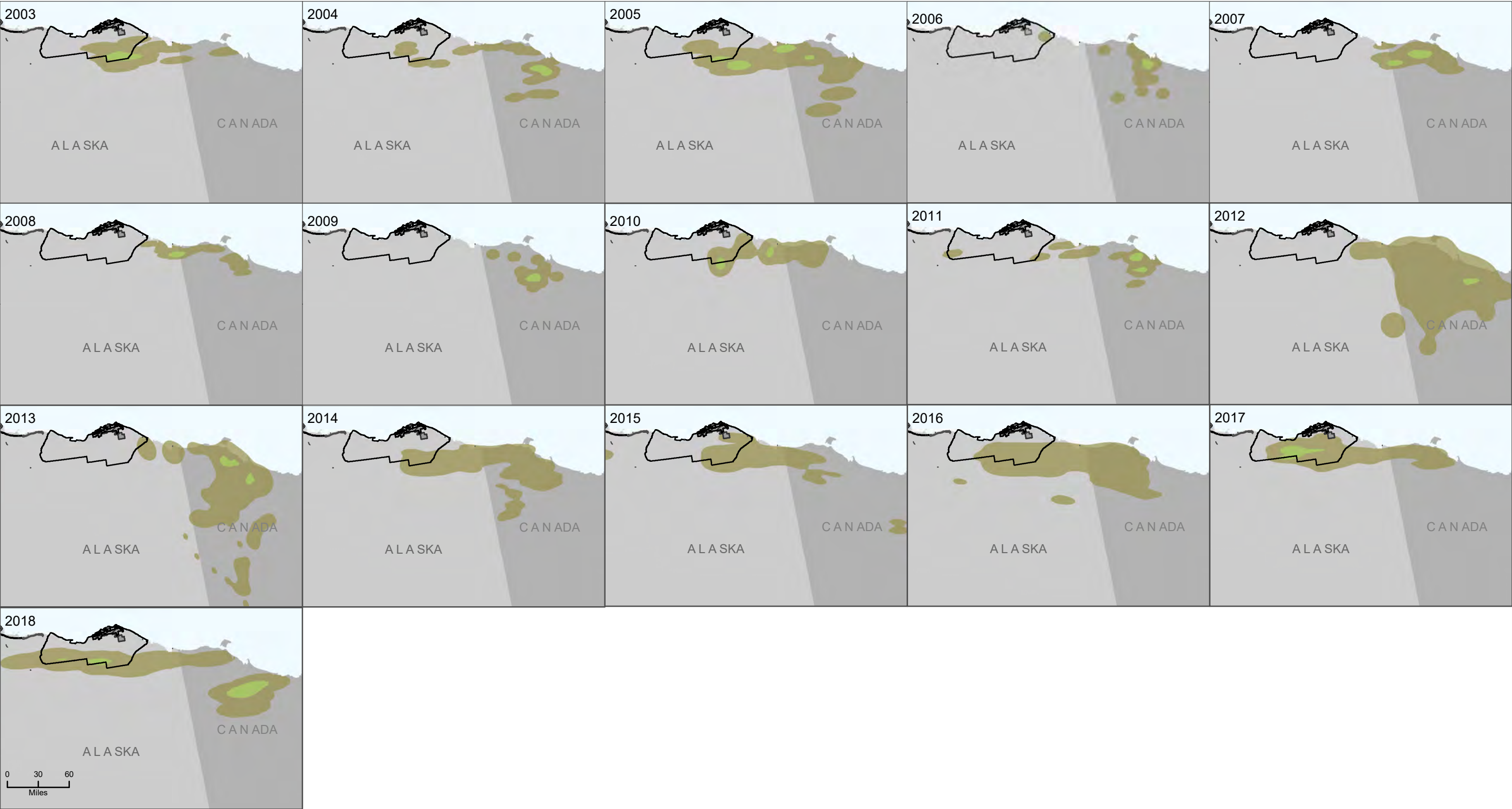
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Data Source: BLM GIS 2018, ADFG GIS 2019 and Environment Yukon GIS 2019  
Print Date: 08/28/2019



Map 3-29





- Concentrated calving area
- Annual calving ground
- Existing oil and gas roads or pipelines
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

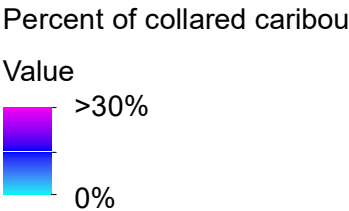
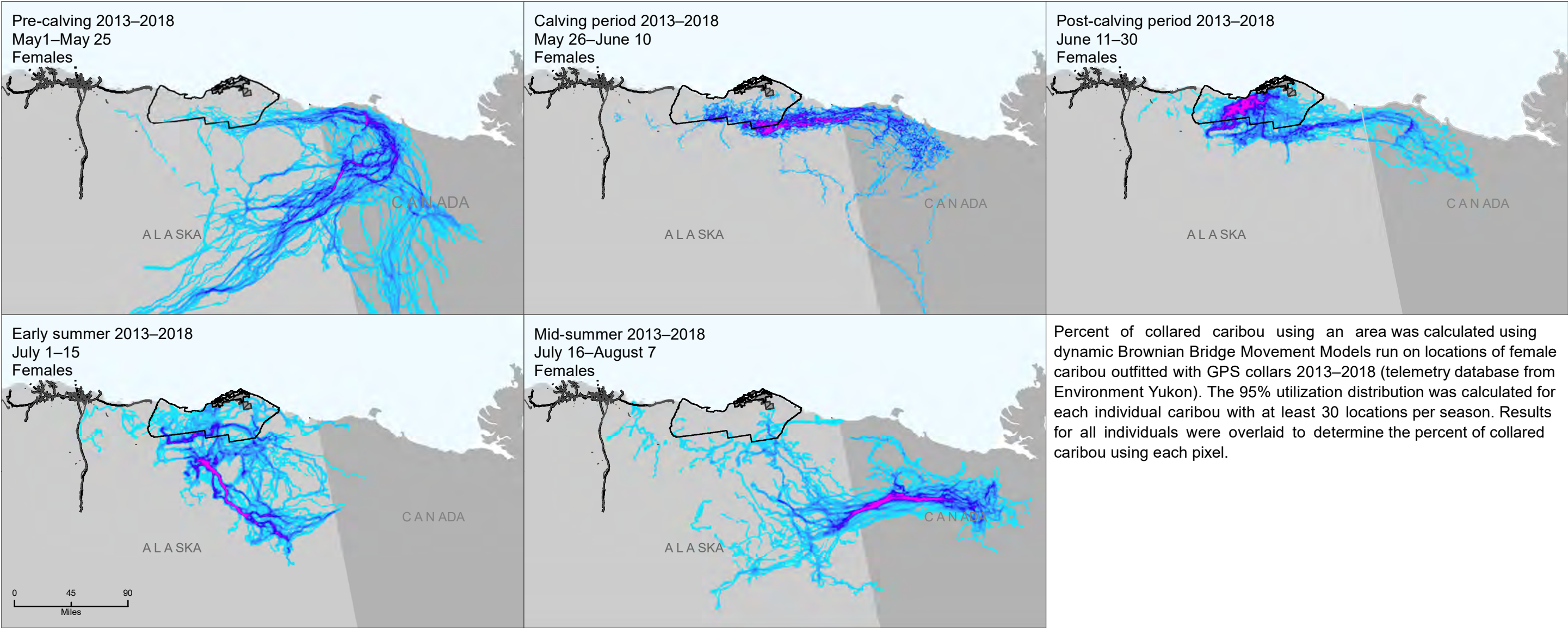
Concentrated calving areas were defined as the annual kernel density contour that included areas with greater than average calving density and annual calving grounds were defined as the 99% kernel density utilization distributions obtained from annual calving sites (Griffith et al. 2002, USFWS 2015). GIS layers were created by Alaska Department of Fish and Game following methods of Griffith et al. (2002). No concentrated calving area data for 2014, 2015, 2016. Annual calving ground data for 2010, 2012, 2013, 2014, 2015, 2016, 2017 were calculated as 95% kernel density utilization distributions of female caribou by Environment Yukon.

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Data Source: BLM GIS 2018, ADFG GIS 2019 and Environment Yukon GIS 2019  
Print Date: 08/28/2019



Map 3-30



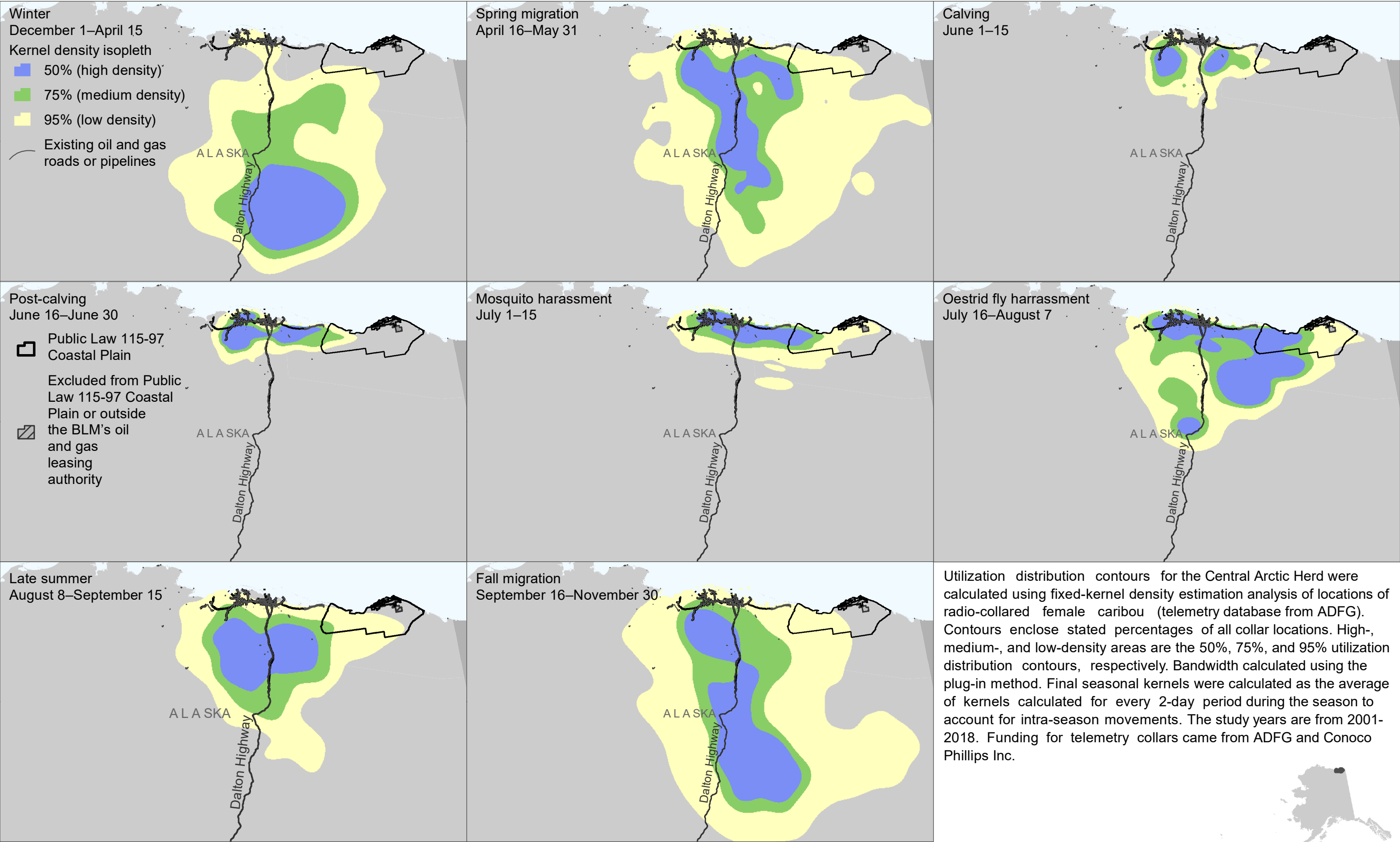
- Existing oil and gas roads or pipelines
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018, Environment Yukon GIS 2018  
Print Date: 08/28/2019

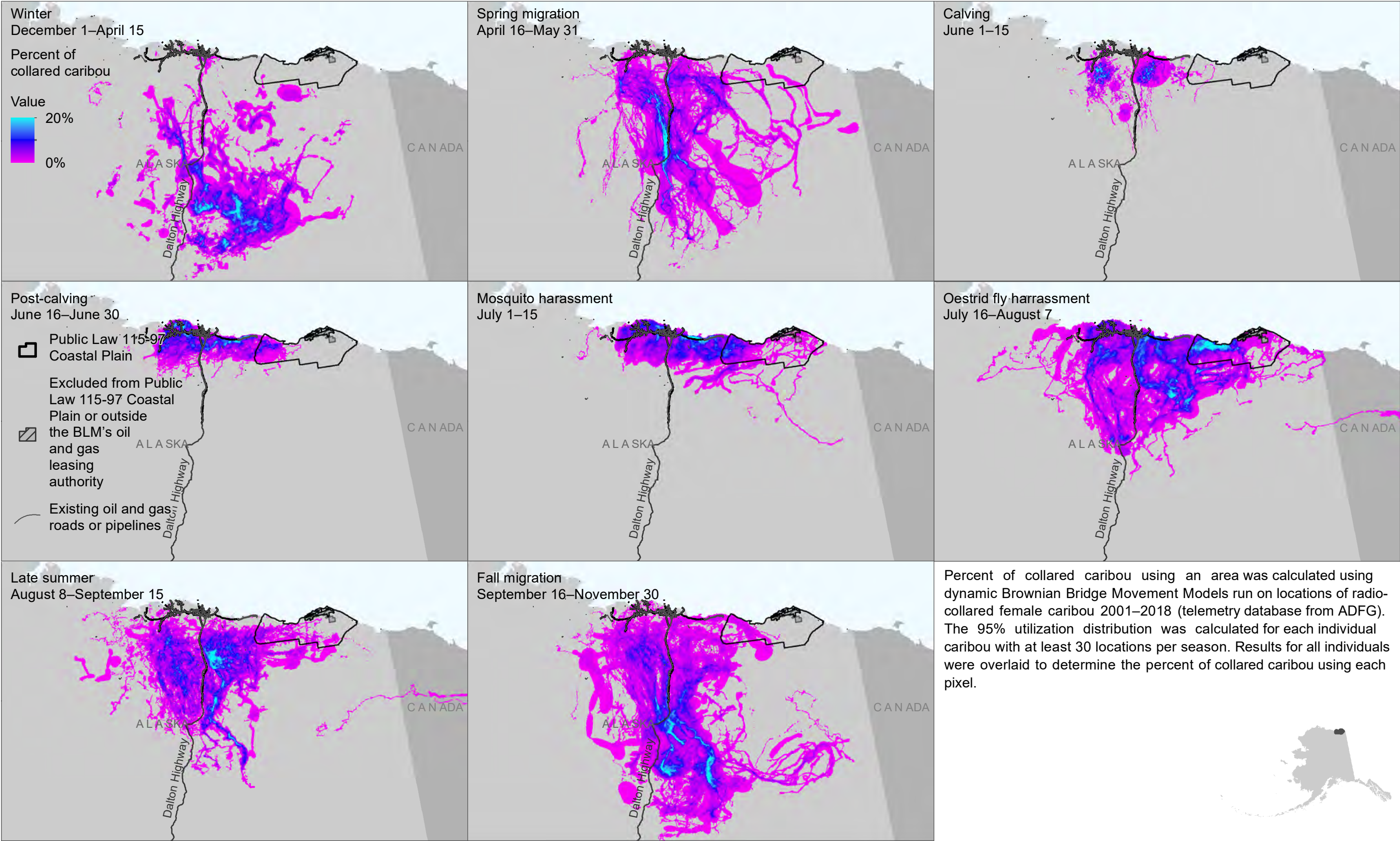




Utilization distribution contours for the Central Arctic Herd were calculated using fixed-kernel density estimation analysis of locations of radio-collared female caribou (telemetry database from ADFG). Contours enclose stated percentages of all collar locations. High-, medium-, and low-density areas are the 50%, 75%, and 95% utilization distribution contours, respectively. Bandwidth calculated using the plug-in method. Final seasonal kernels were calculated as the average of kernels calculated for every 2-day period during the season to account for intra-season movements. The study years are from 2001-2018. Funding for telemetry collars came from ADFG and Conoco Phillips Inc.







0 30 60  
Miles

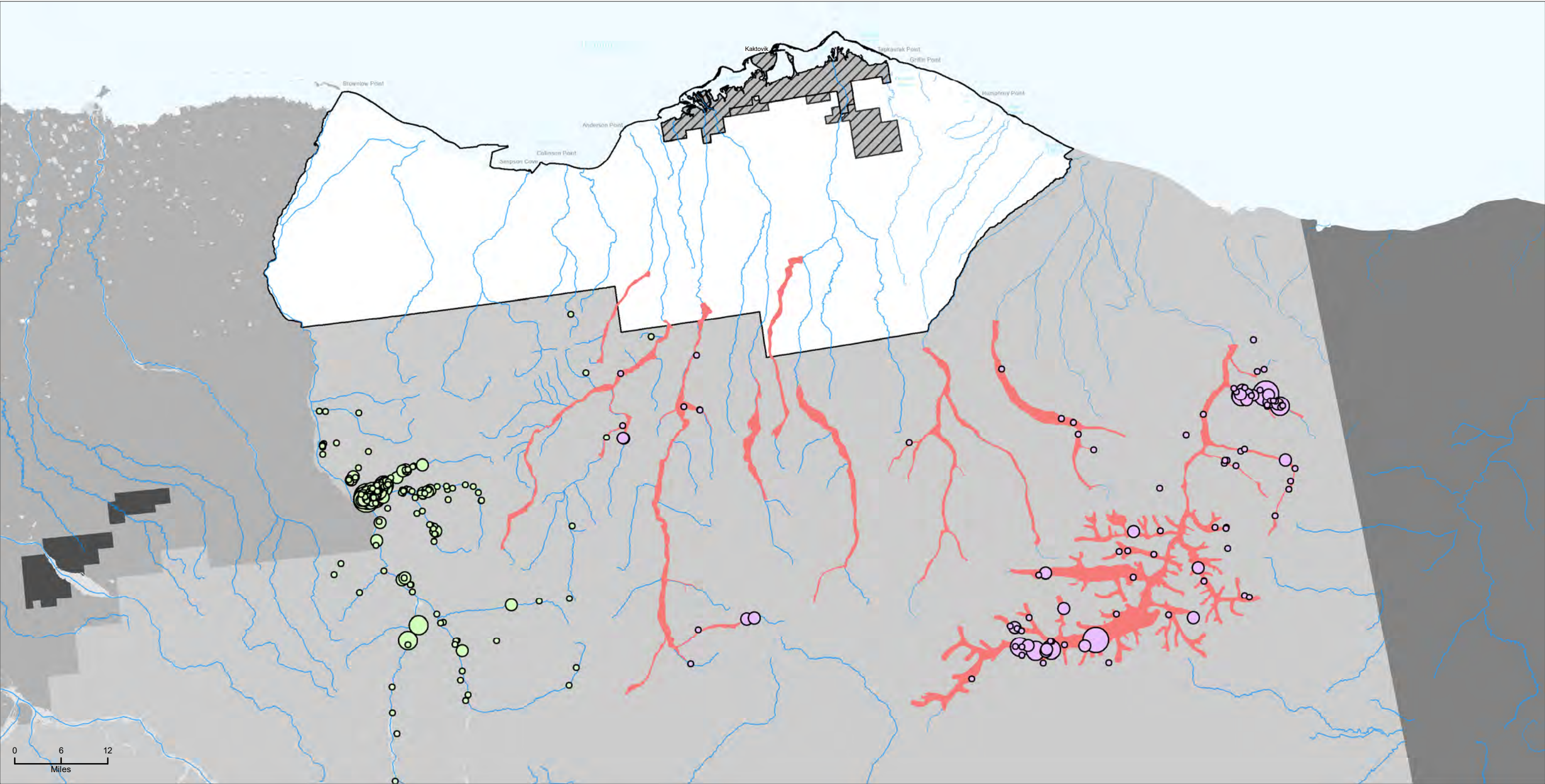
Data Source: BLM GIS 2018,  
ADFG GIS 2019 and  
Environment Yukon GIS 2019  
Print Date: 08/28/2019

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Percent of collared caribou using an area was calculated using dynamic Brownian Bridge Movement Models run on locations of radio-collared female caribou 2001–2018 (telemetry database from ADFG). The 95% utilization distribution was calculated for each individual caribou with at least 30 locations per season. Results for all individuals were overlaid to determine the percent of collared caribou using each pixel.







USFWS observations, April (2014-2018), number of individuals

- 1 - 2
- 3 - 5
- 6 - 8
- 9 - 13

USFWS moose survey area

Moose winter habitat

ADFG observations, March-May (2002-2019), number of individuals

- 1 - 4
- 5 - 9
- 10 - 17
- 18 - 33

Land ownership outside of Public Law 115-97 Coastal Plain

- Bureau of Land Management
- Fish and Wildlife Service
- Undetermined
- Yukon Territory

Public Law 115-97 Coastal Plain Excluded from Public Law 115-97 oil and gas leasing authority

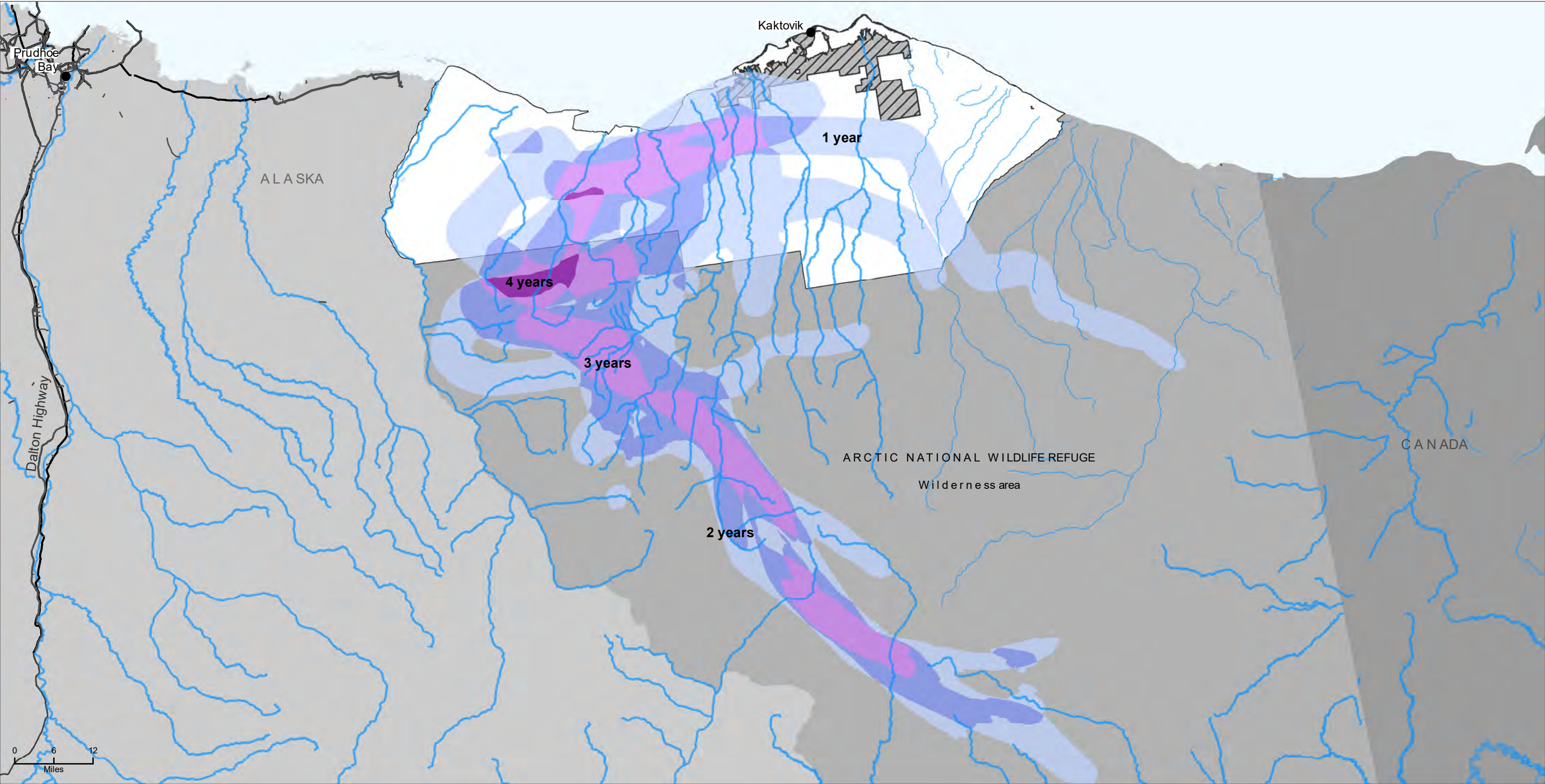
Coastal Plain or outside the BLM's



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Data Source: BLM GIS 2018,  
USFWS GIS 2019,  
ADFG GIS 2018





Location of large post-calving aggregations of Porcupine Caribou (estimated to be between 21,000 and 121,000 animals) during 2014–2017 on a scale of 1–4, where 4 indicates large groups were present in all 4 years (remade from Russell and Gunn 2019).

- 1

2

3

4
- Existing oil and gas roads or pipelines

Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97

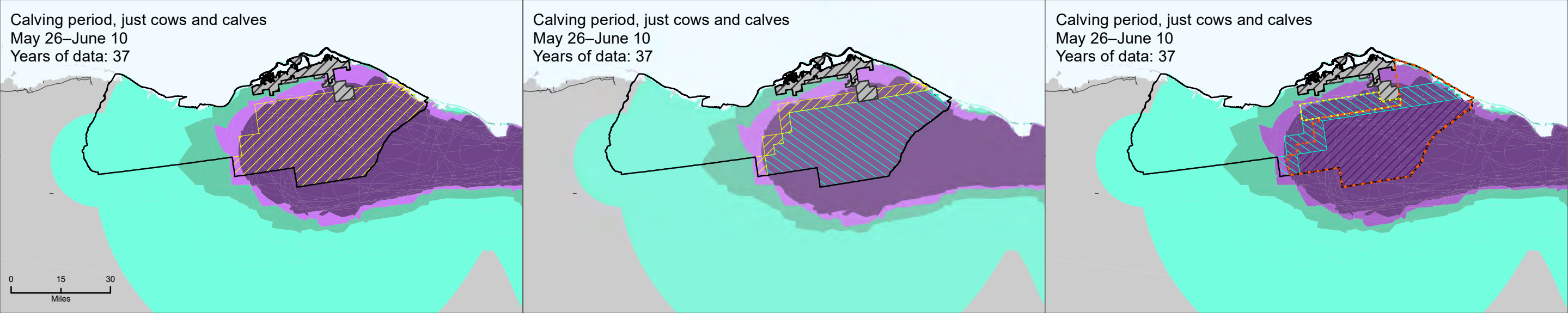
Coastal Plain or outside the BLM's oil and gas leasing authority



Data Source: BLM GIS 2018, Russell, D. and A. Gunn. 2019  
Print Date: 08/28/2019

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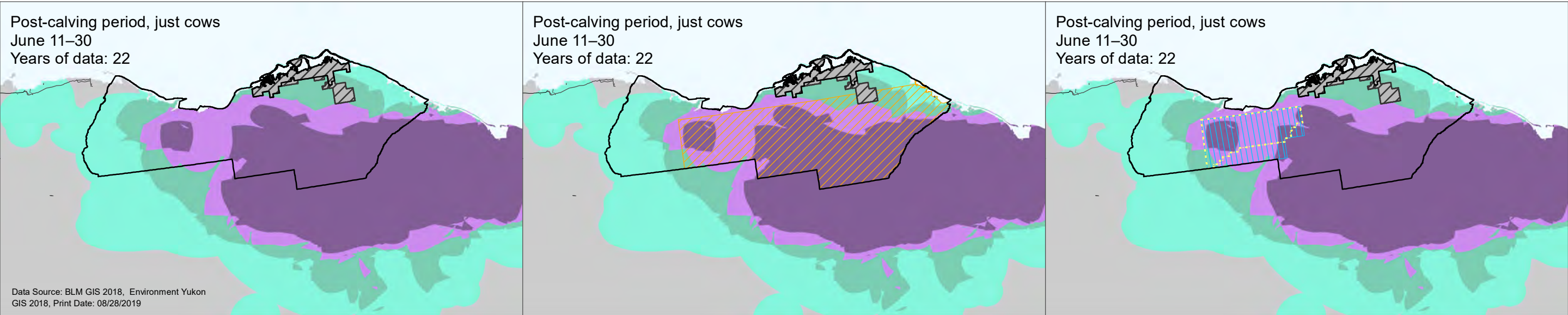
**Alternative B:**  
Lease stipulation 7—Porcupine Caribou calving habitat, timing limitation, May 20-June 20  
Existing oil and gas roads or pipelines  
Public Law 115-97 Coastal Plain  
Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

**Percent of years that caribou are present**  
    <20%  
    20–30%  
    30–40%  
    ≥40%

**Alternative C:**  
Lease stipulation 7—Porcupine Caribou calving habitat, no surface occupancy  
Lease stipulation 7—Porcupine Caribou calving habitat, timing limitation, May 20-June 20

**Alternative D1 :**  
Lease stipulation 7—Porcupine Caribou calving habitat, not offered for lease sale  
Lease stipulation 7—Porcupine Caribou calving habitat, no surface occupancy

**Alternative D2:**  
Lease stipulation 7—Porcupine Caribou calving habitat, not offered for lease sale  
Lease stipulation 7—Porcupine Caribou calving habitat, no surface occupancy



**Alternative B:**  
Lease stipulation 8—Porcupine Caribou post-calving habitat, required operating procedure 23

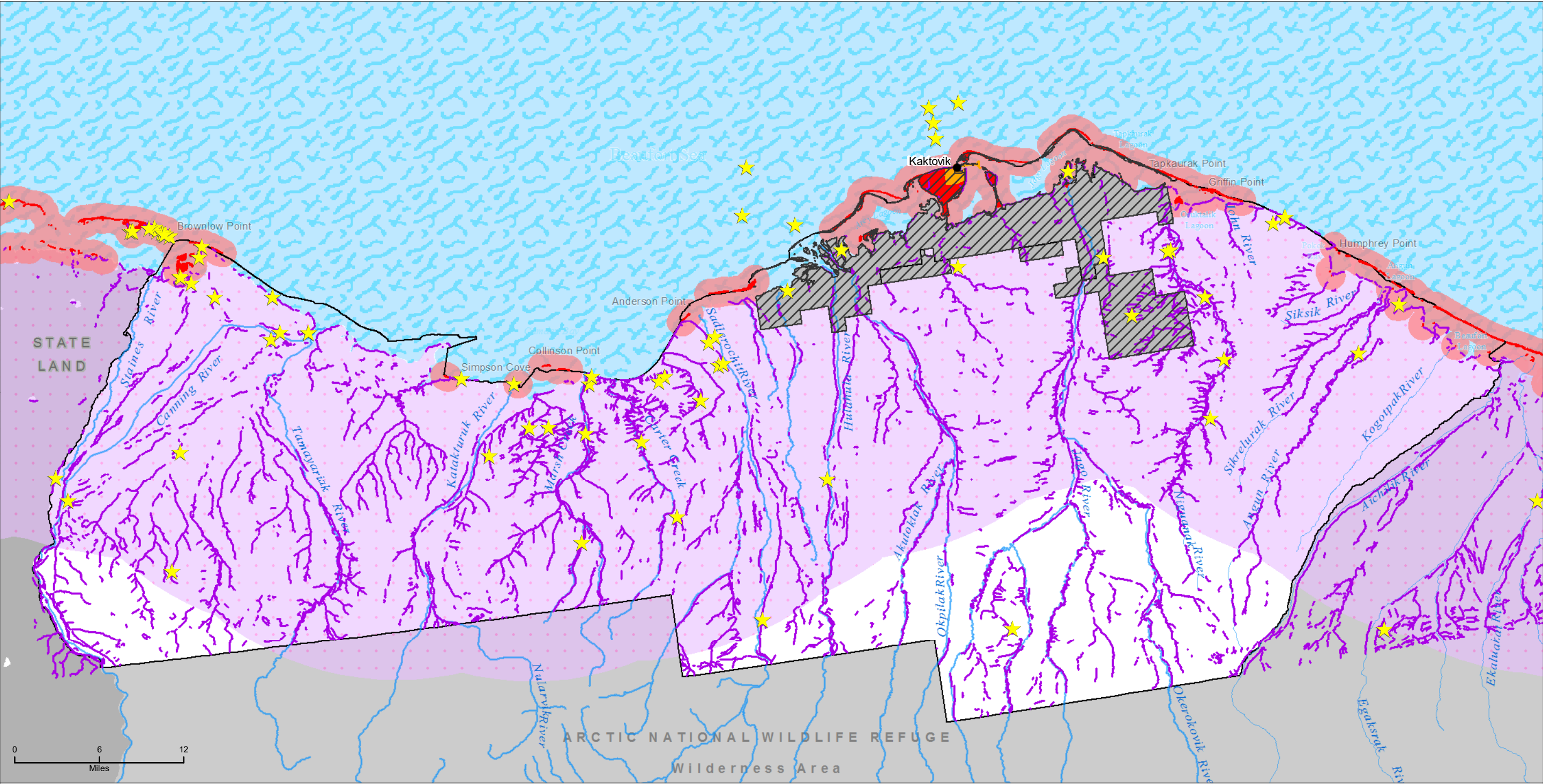
**Alternative C:**  
Lease stipulation 8—Porcupine Caribou post-calving habitat, timing limitation, June 15-July 20

**Alternative D1:**  
Lease stipulation 8—Porcupine Caribou post-calving habitat, controlled surface use and timing limitation, June 15-July 20

**Alternative D2:**  
Lease stipulation 8—same

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- ★ Polar bear maternal dens (Durner et al. 2010; Durner, personal communication)

— Polar bear maternal den habitat (Durner et al. 2006)
- Sea ice unit

Barrier island no disturbance zone

Barrier island unit

Terrestrial denning unit
- Kaktovik: an exclusion under Section 4(b)(2) of the Endangered Species Act

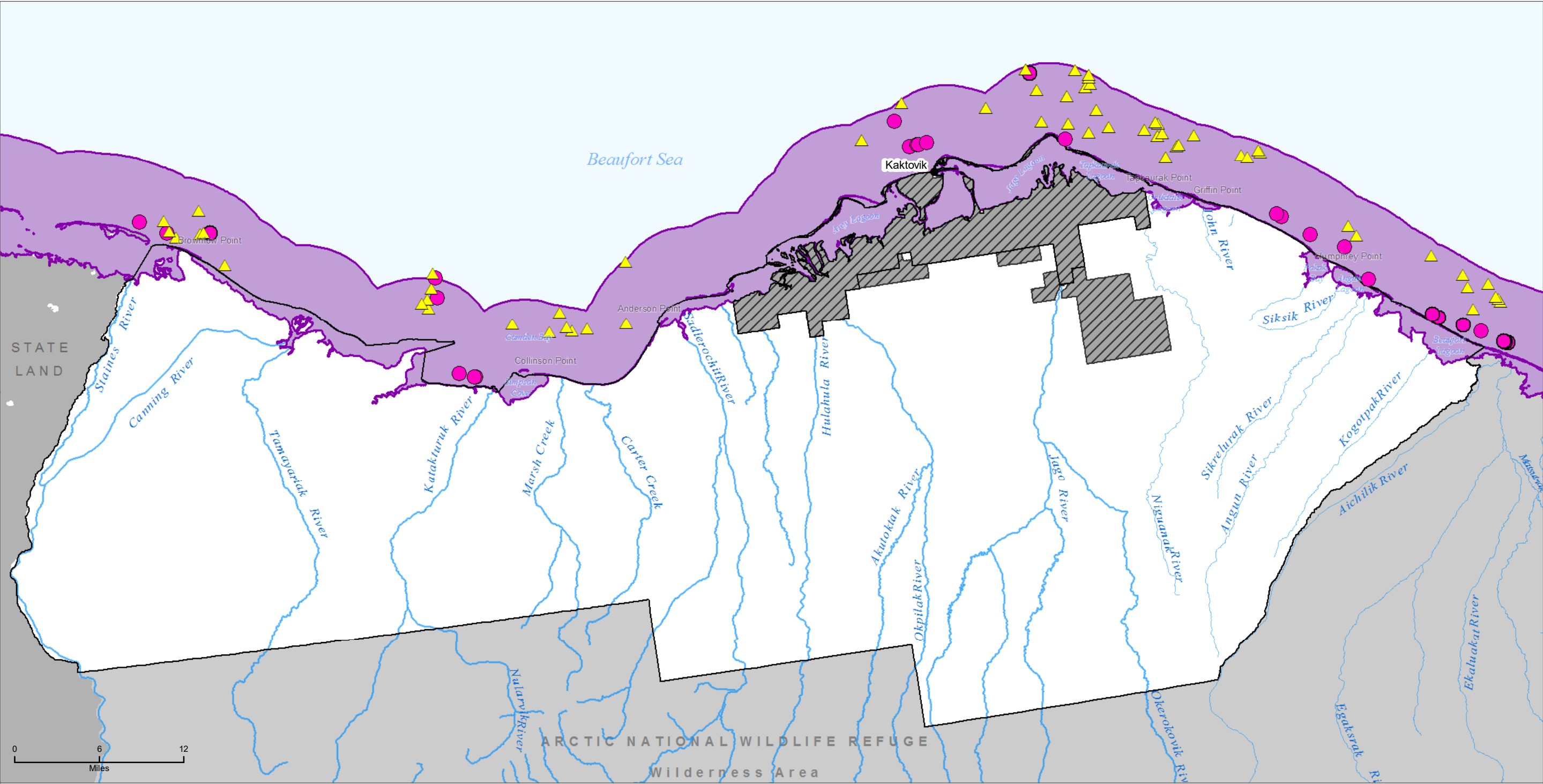
Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018, USFWS GIS 2010, USGS GIS 2005  
Print Date: 08/27/2019



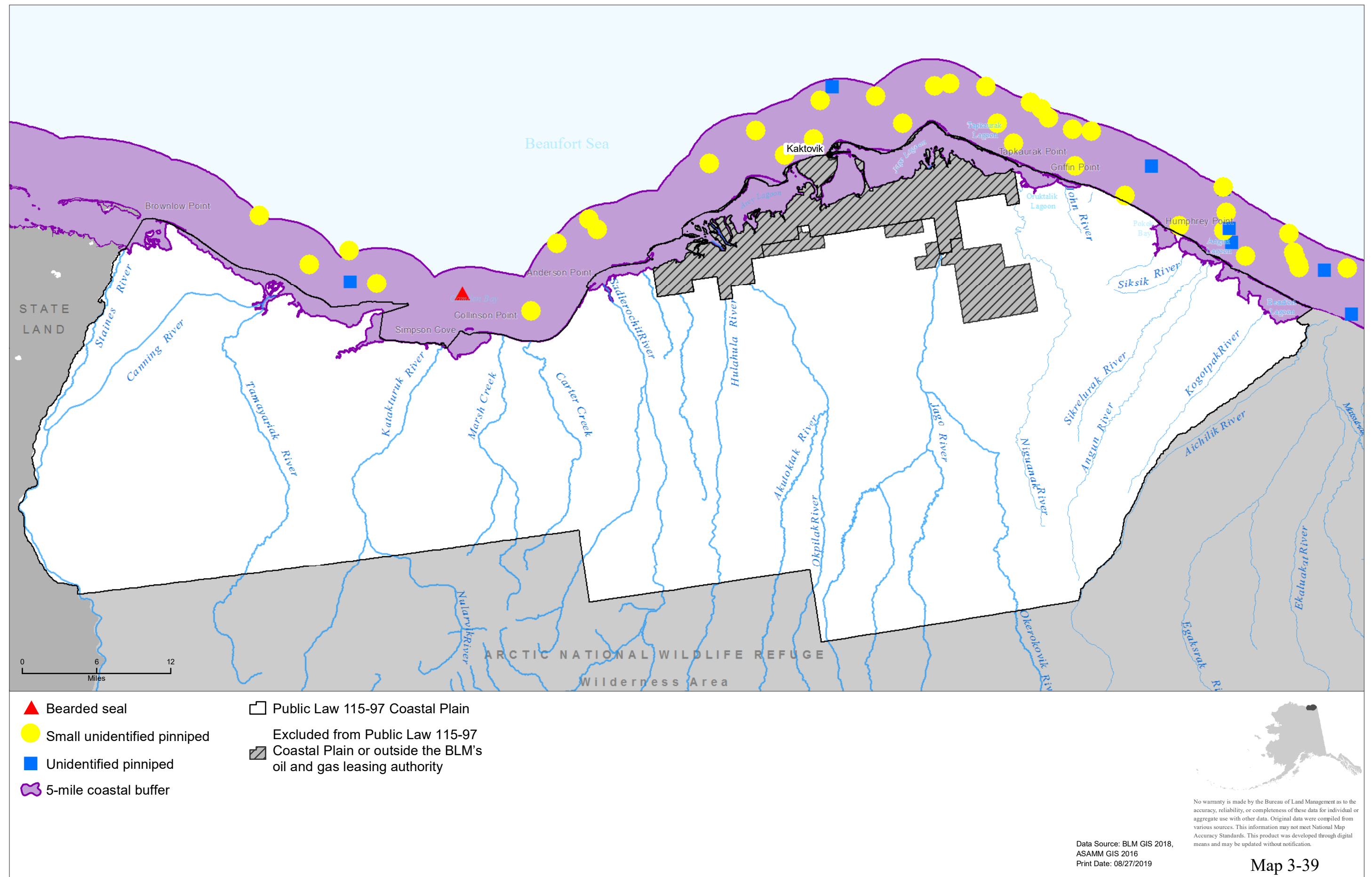
- Bowhead whale sighting (2012–2016)
- Beluga whale sighting (2012–2016)
- 5-mile coastal buffer
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

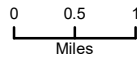
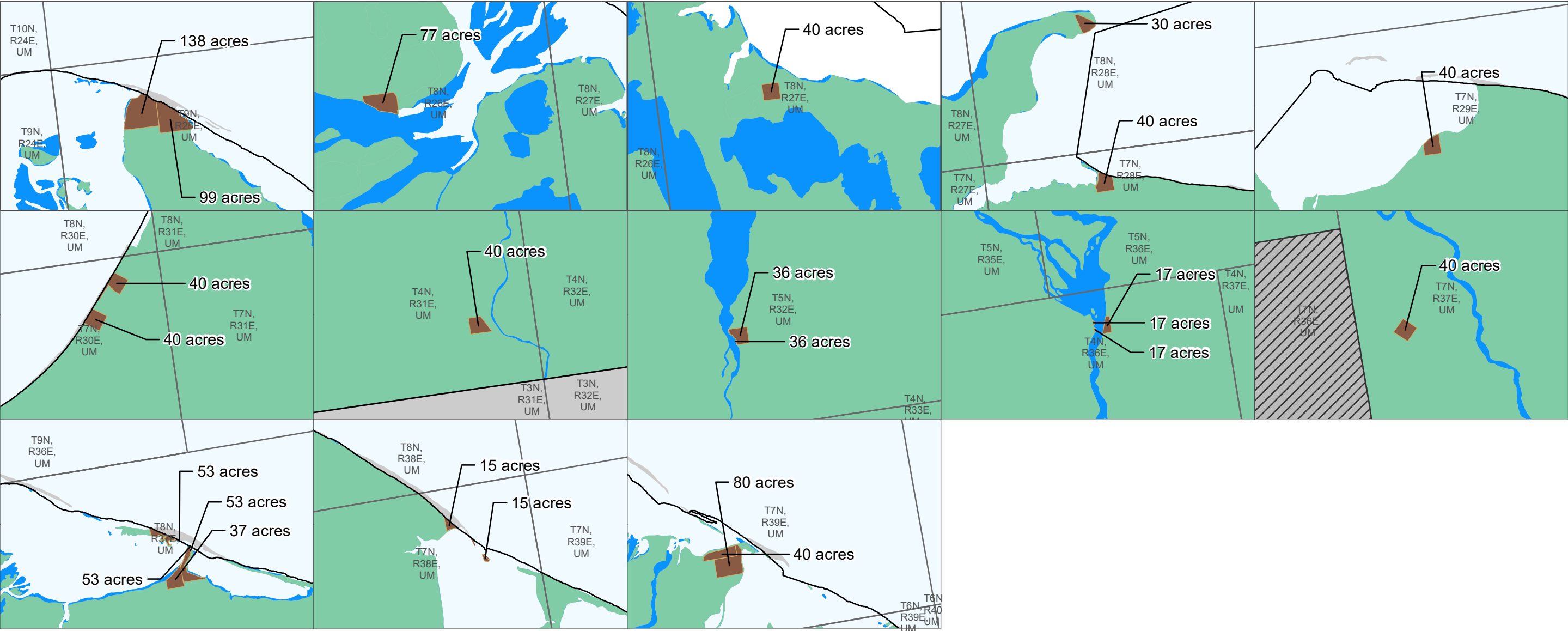
Data Source: BLM GIS 2018, ASAMM GIS 2016  
Print Date: 08/27/2019



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- U.S. Fish and Wildlife Service
- Native Lands (patented or interim conveyed)
- Native Allotment

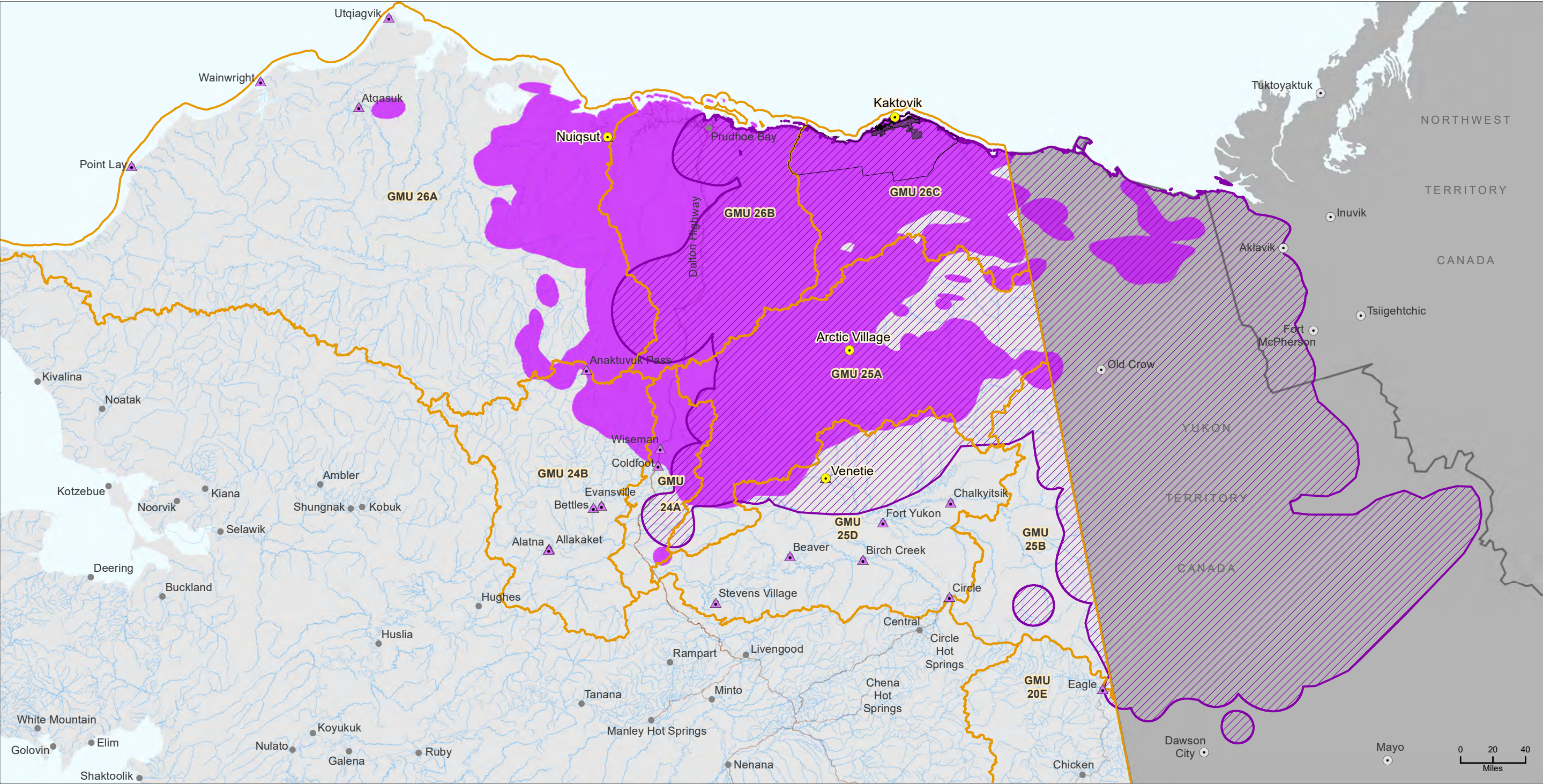
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

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Data Source: BLM GIS 2018  
Print Date: 08/28/2019







- Subsistence study community
- Canadian study community
- ▲ Caribou study community
- Other community
- ▭ Game management unit (Alaska Department of Fish and Game)
- Central Arctic Herd range
- ▨ Porcupine Herd range

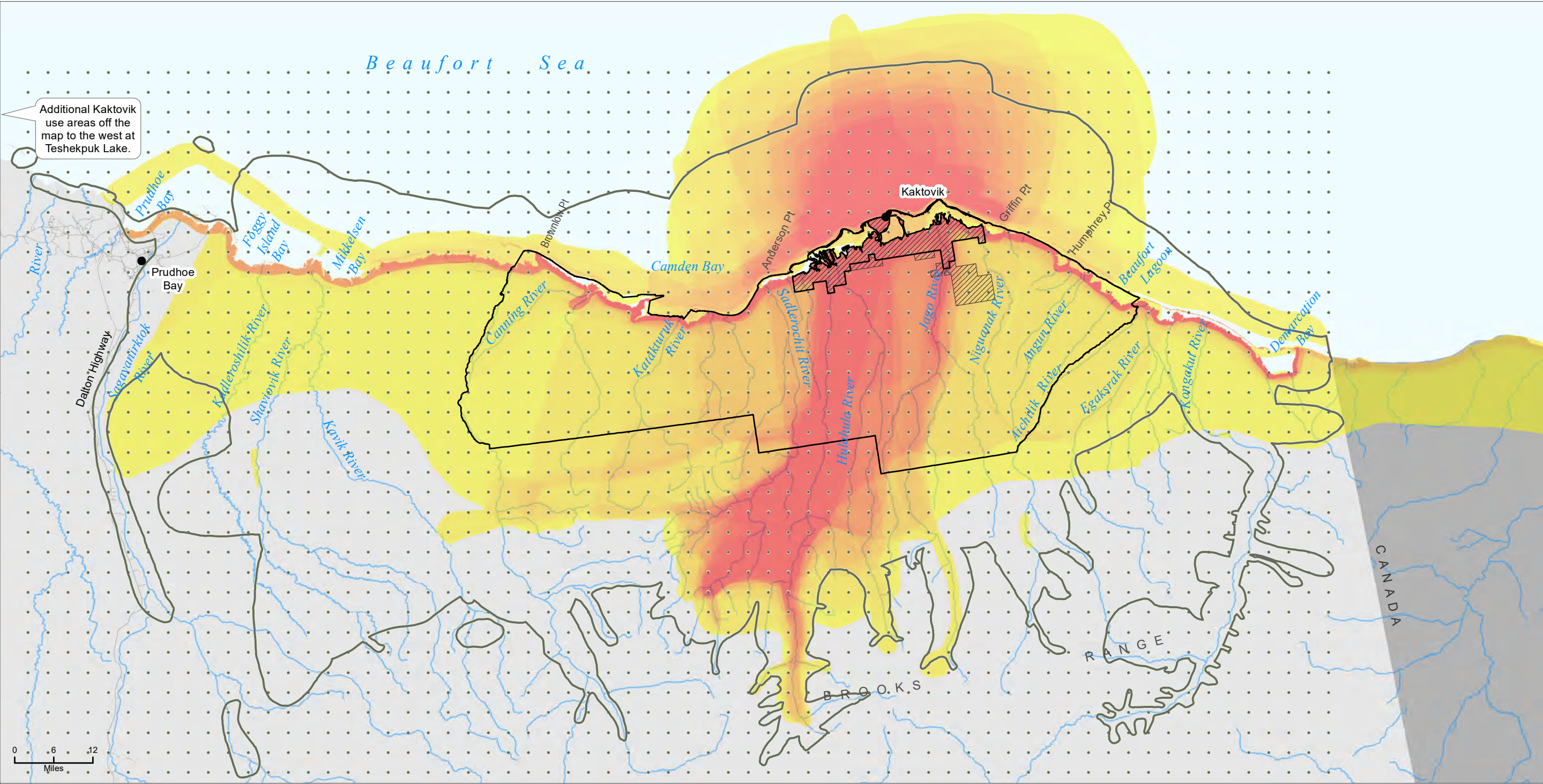
- ▭ Public Law 115-97 Coastal Plain
- ▭ Excluded from Public Law 115-97
- ▨ Coastal Plain or outside the BLM's oil and gas leasing authority



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Data Source: BLM GIS 2018  
Map prepared by: Stephen R. Braund & Associates  
Print Date: 06/19/2019





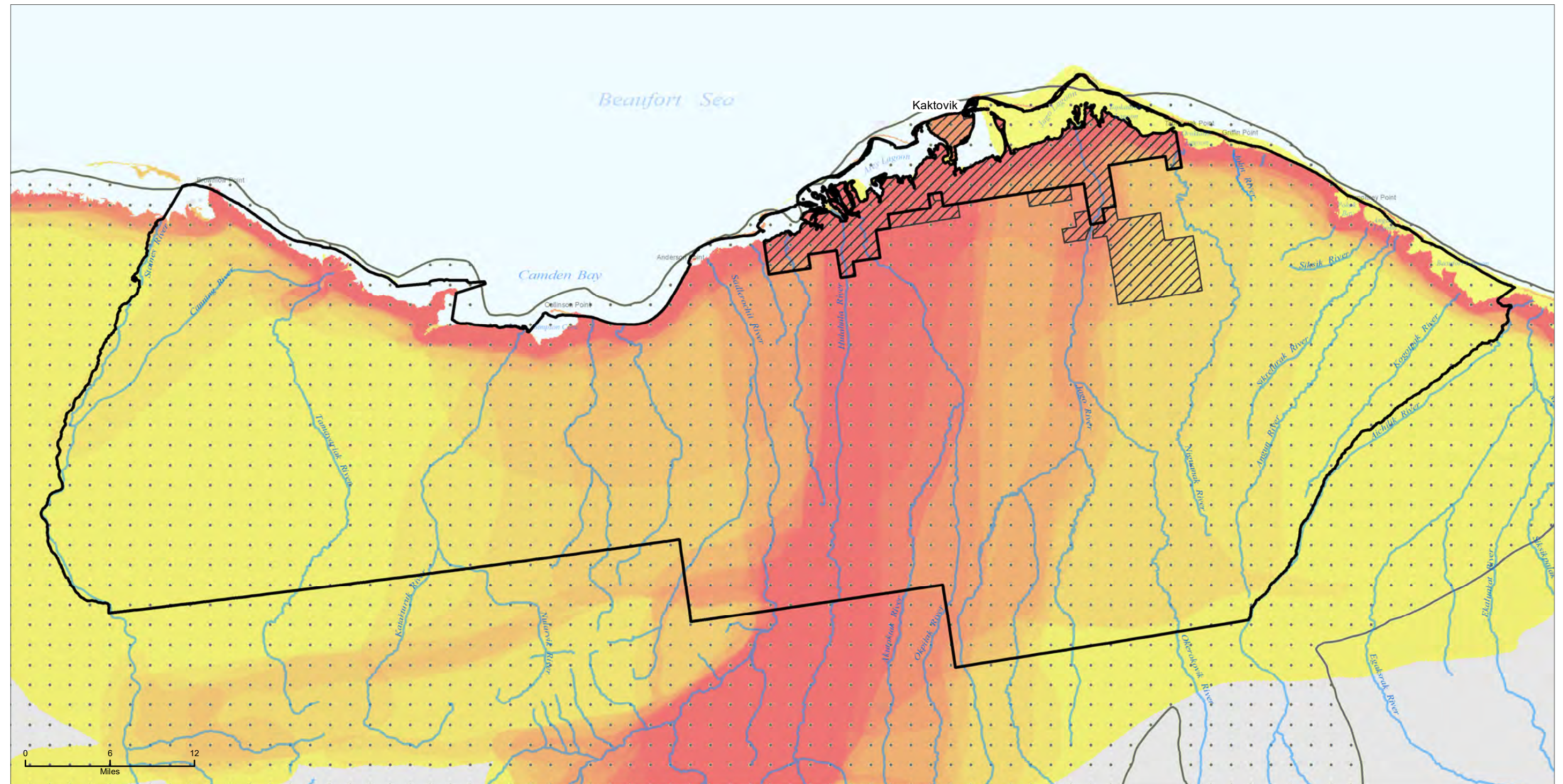
- All resources, lifetime prior to 1979<sup>1</sup>
- Public Law 115-97 Coastal Plain
- Overlapping<sup>2</sup> subsistence use areas
- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority
- Low subsistence use areas
- High subsistence use areas
- all resources, 1996-2006



Data Source: BLM GIS 2018,  
1) Pedersen 1979 2) SRB&A  
2010

Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

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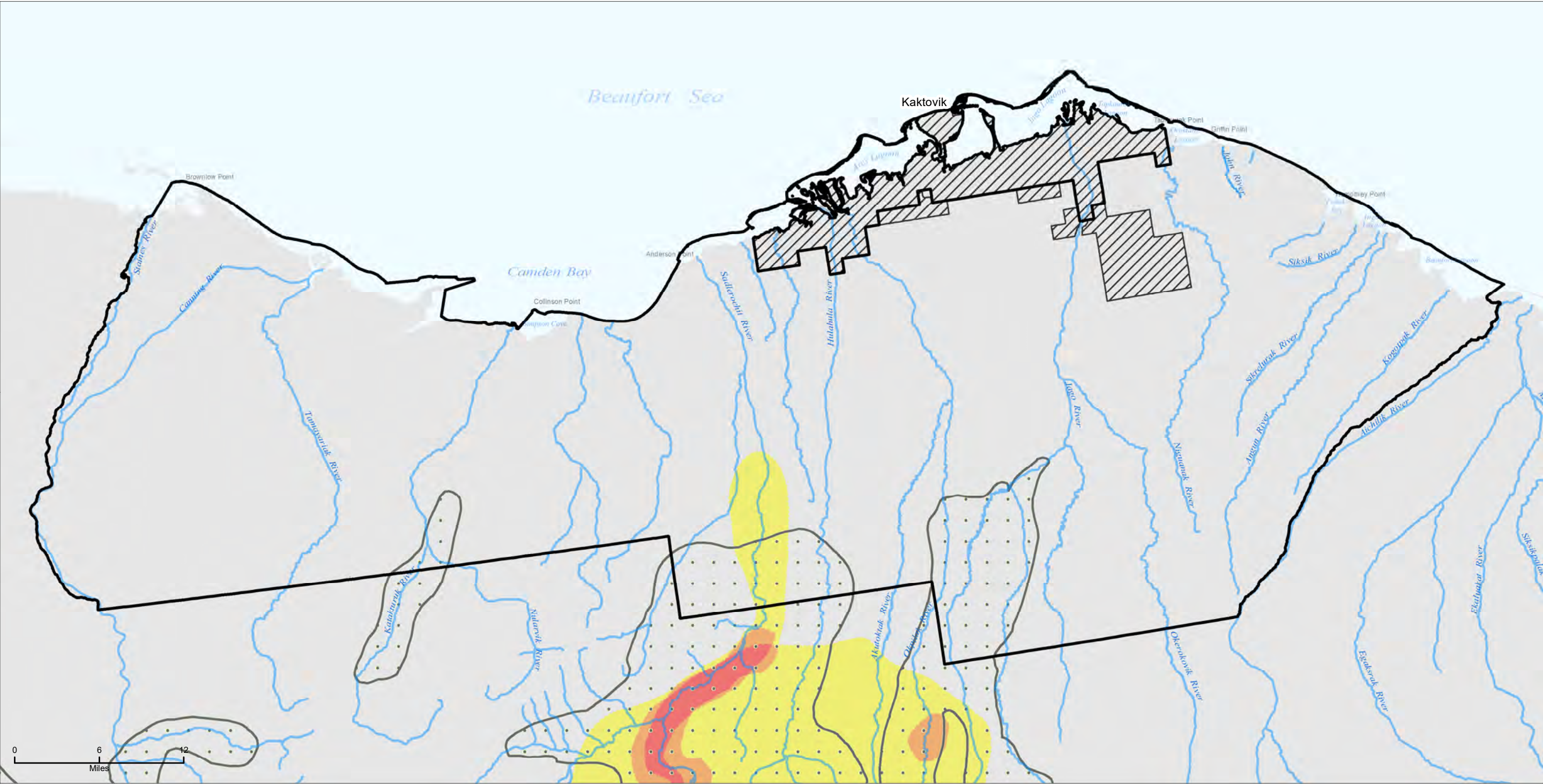
 Caribou, lifetime prior to 1979 <sup>1</sup> Overlapping <sup>2</sup> subsistence use areas caribou, 1996–2006	 Public Law 115-97 Coastal Plain Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority
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Data Source: BLM GIS 2018,  
1) Pedersen 1979 2) SRB&A  
2010

Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

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- Moose, lifetime prior to 1979<sup>1</sup>

Overlapping<sup>2</sup>  
use areas  
moose,  
1996–2006

High

Low
- Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97

Coastal Plain or outside the BLM's  
oil and gas leasing authority

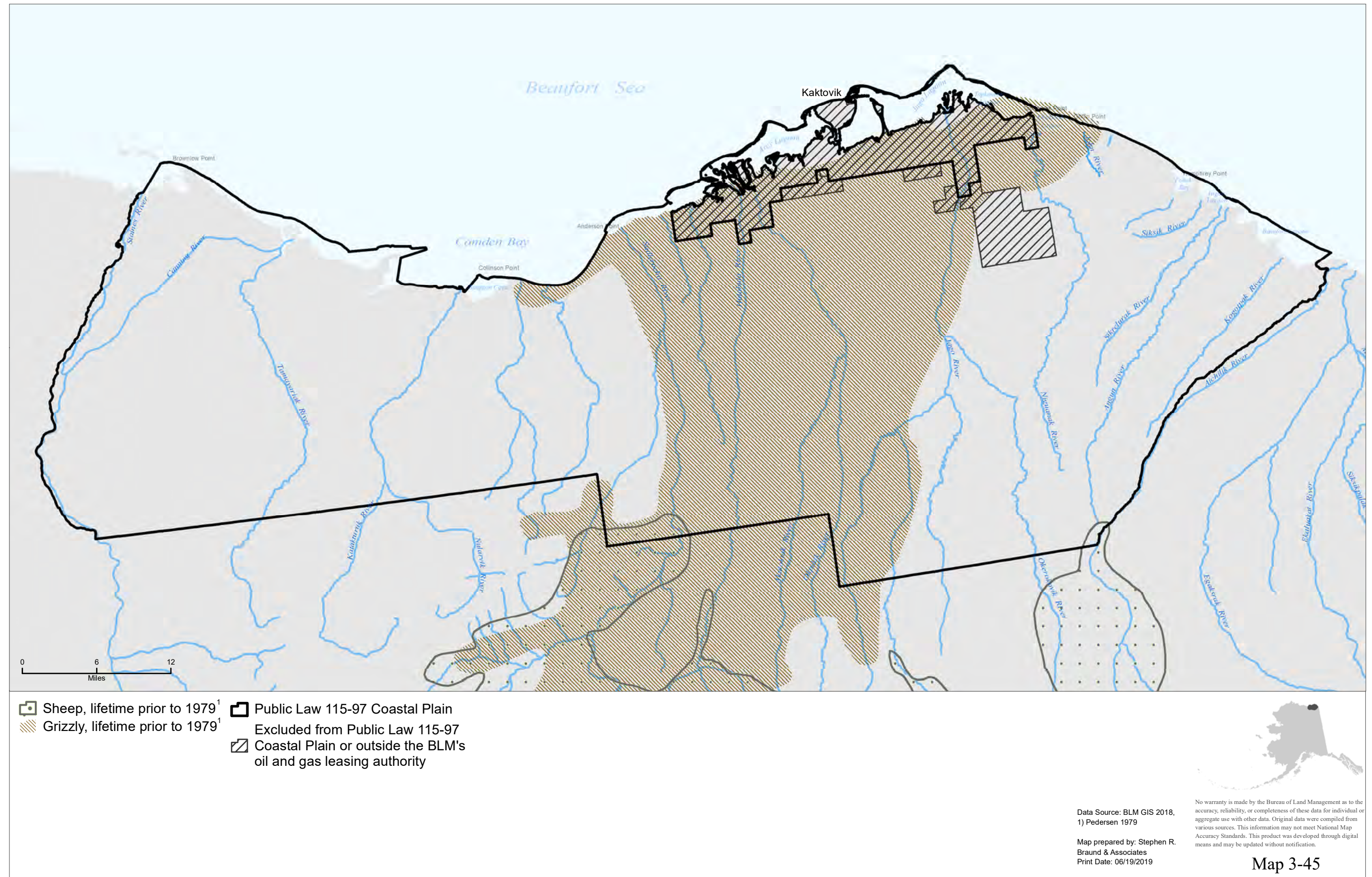
Data Source: BLM GIS 2018,  
1) Pedersen 1979 2) SRB&A  
2010

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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.

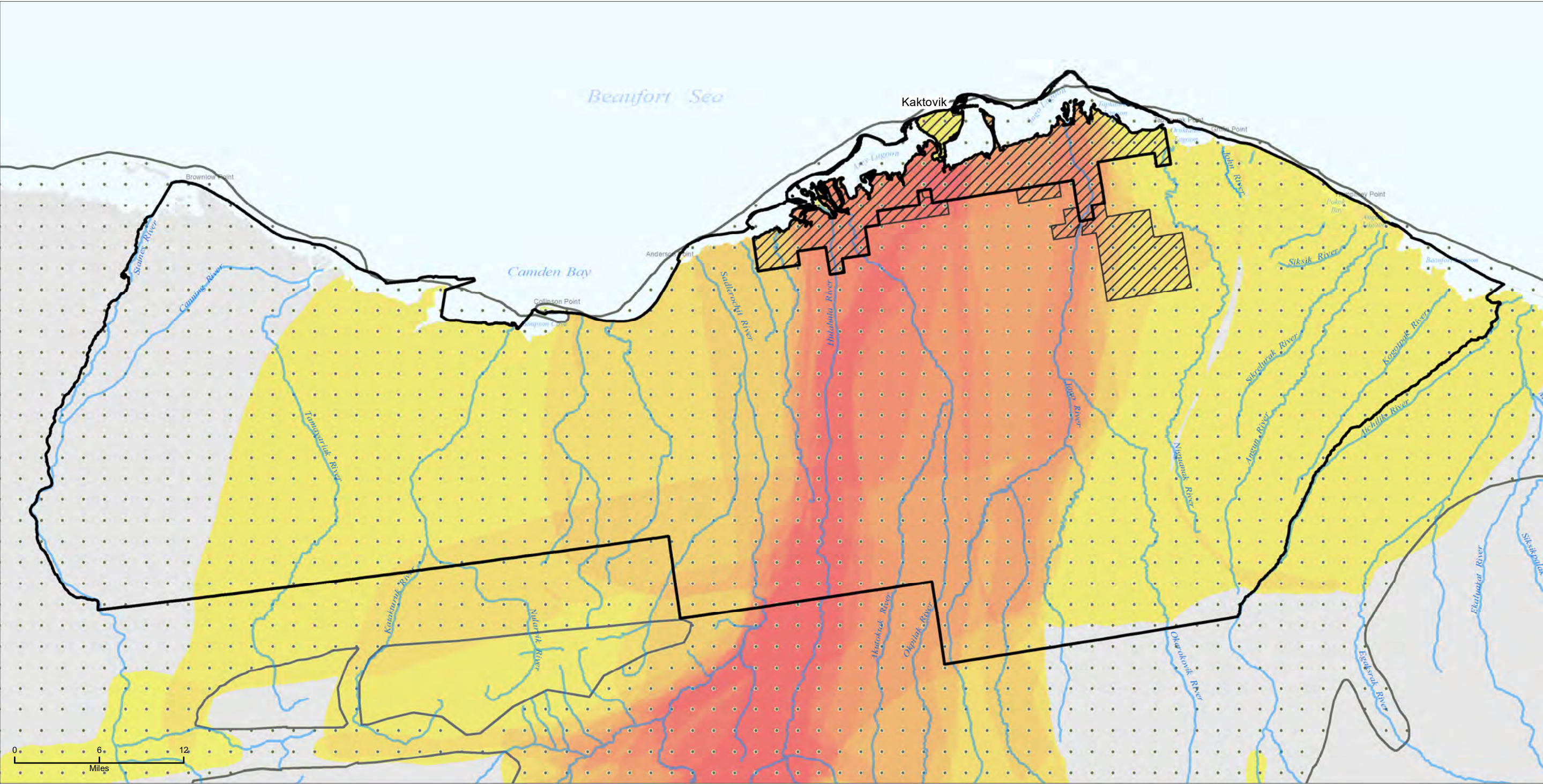
Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

Map 3-44









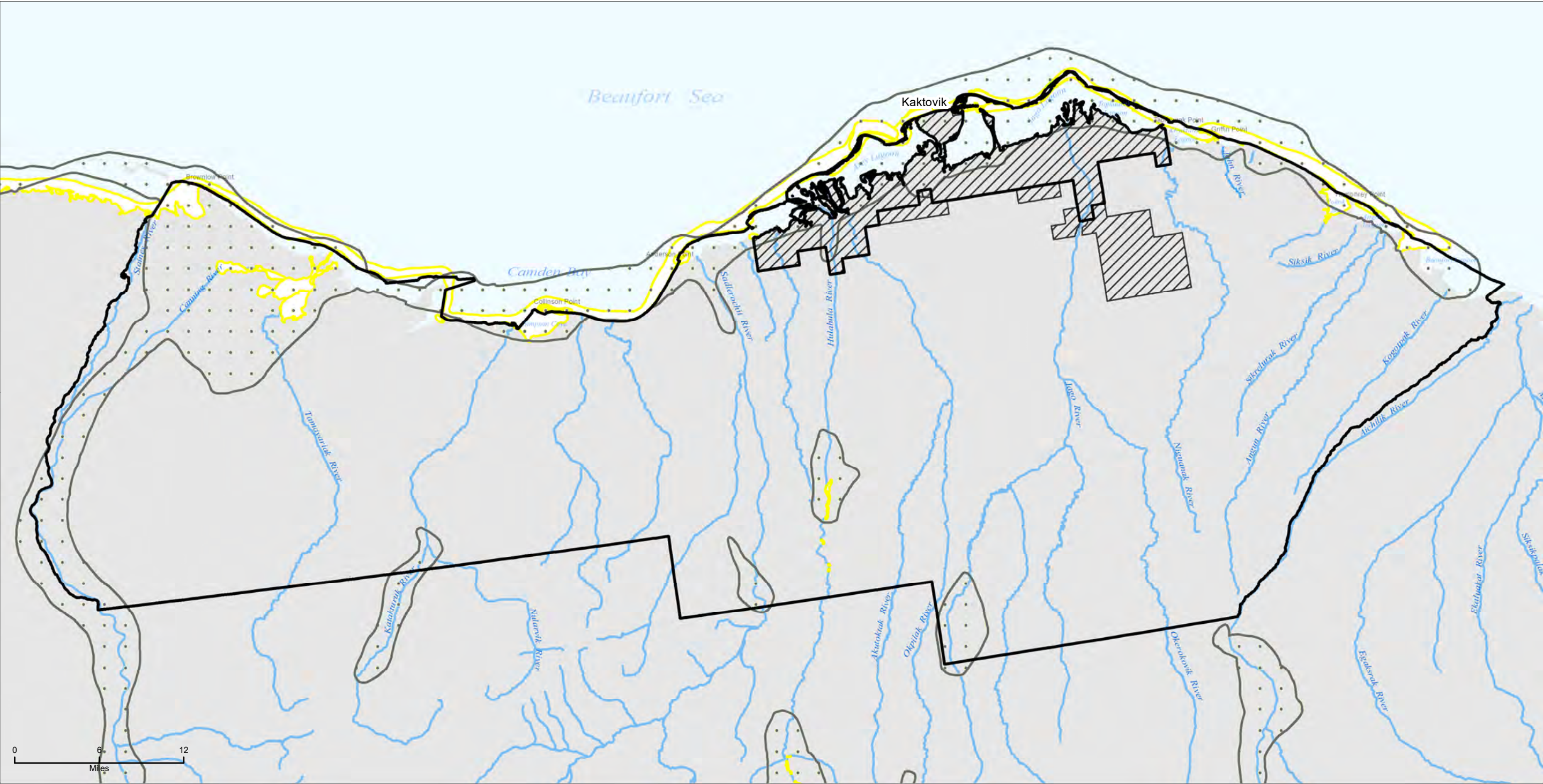
- Furbearer Hunting, Circa 1923-1983<sup>1</sup>
- Public Law 115-97 Coastal Plain
- Overlapping<sup>2</sup> subsistence use areas wolf and wolverine, 1996-2006
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

Data Source: BLM GIS 2018, 1) Pedersen, Coffing and Thompson 1985 2) SRB&A 2010

Map prepared by: Stephen R. Braund & Associates  
Print Date: 06/19/2019

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- Fishing, lifetime prior to 1979<sup>1</sup>

Overlapping<sup>2</sup>  
use areas  
fish,  
1996–2006
- Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97  
Coastal Plain or outside the BLM's  
oil and gas leasing authority



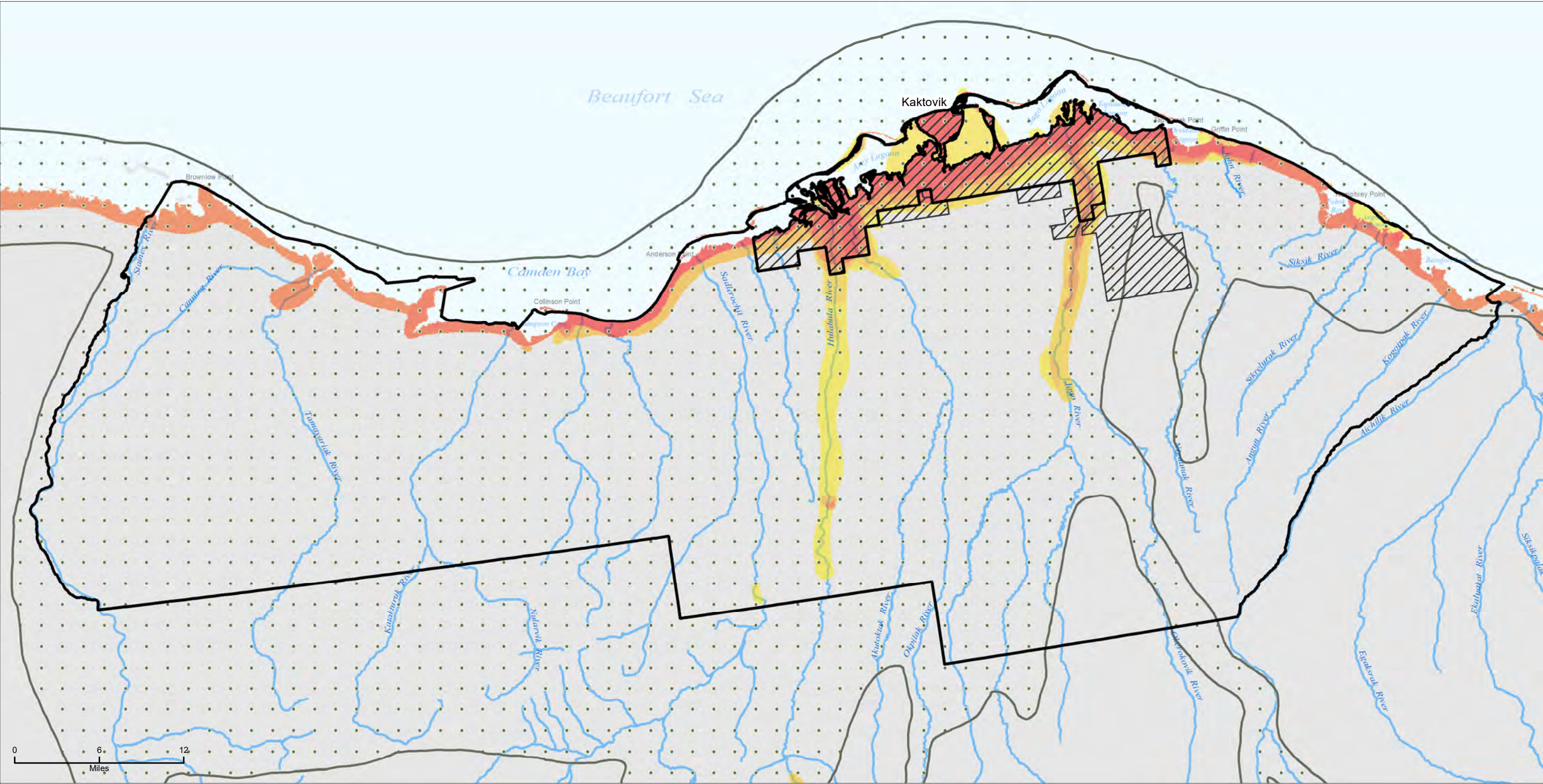
Data Source: BLM GIS 2018,  
1) Pedersen 1979 2) SRB&A  
2010

Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

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Map 3-47





- Wildfowl, lifetime prior to 1979<sup>1</sup>

Overlapping<sup>2</sup>  
subsistence  
use areas  
eider and goose,  
1996–2006
- Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97  
Coastal Plain or outside the BLM's  
oil and gas leasing authority

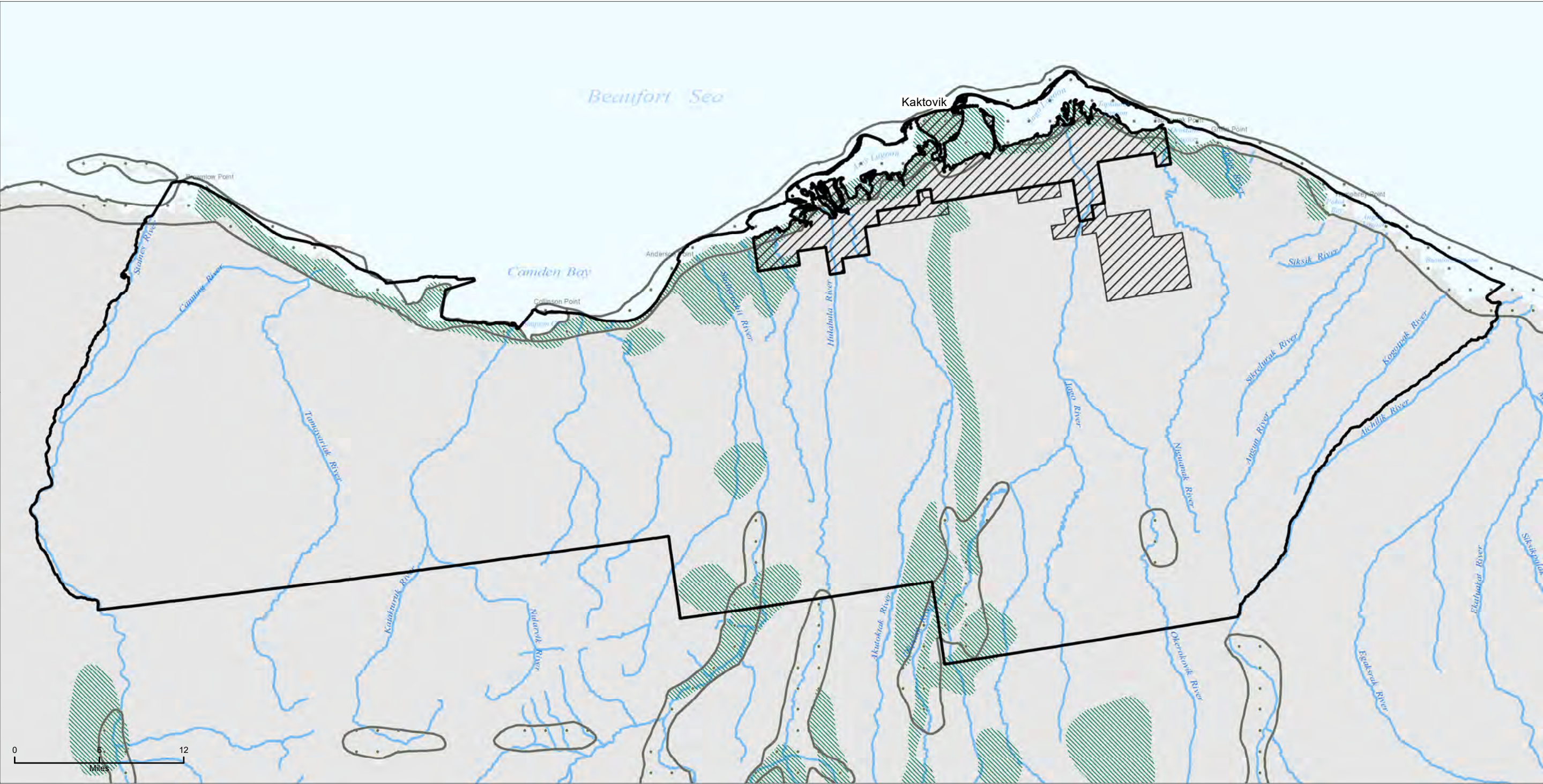
Data Source: BLM GIS 2018,  
1) Pedersen 1979 2) SRB&A  
2010

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Accuracy Standards. This product was developed through digital  
means and may be updated without notification.

Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

Map 3-48





- Vegetation, lifetime prior to 1979<sup>1</sup>
- Wood, lifetime prior to 1979<sup>1</sup>
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority

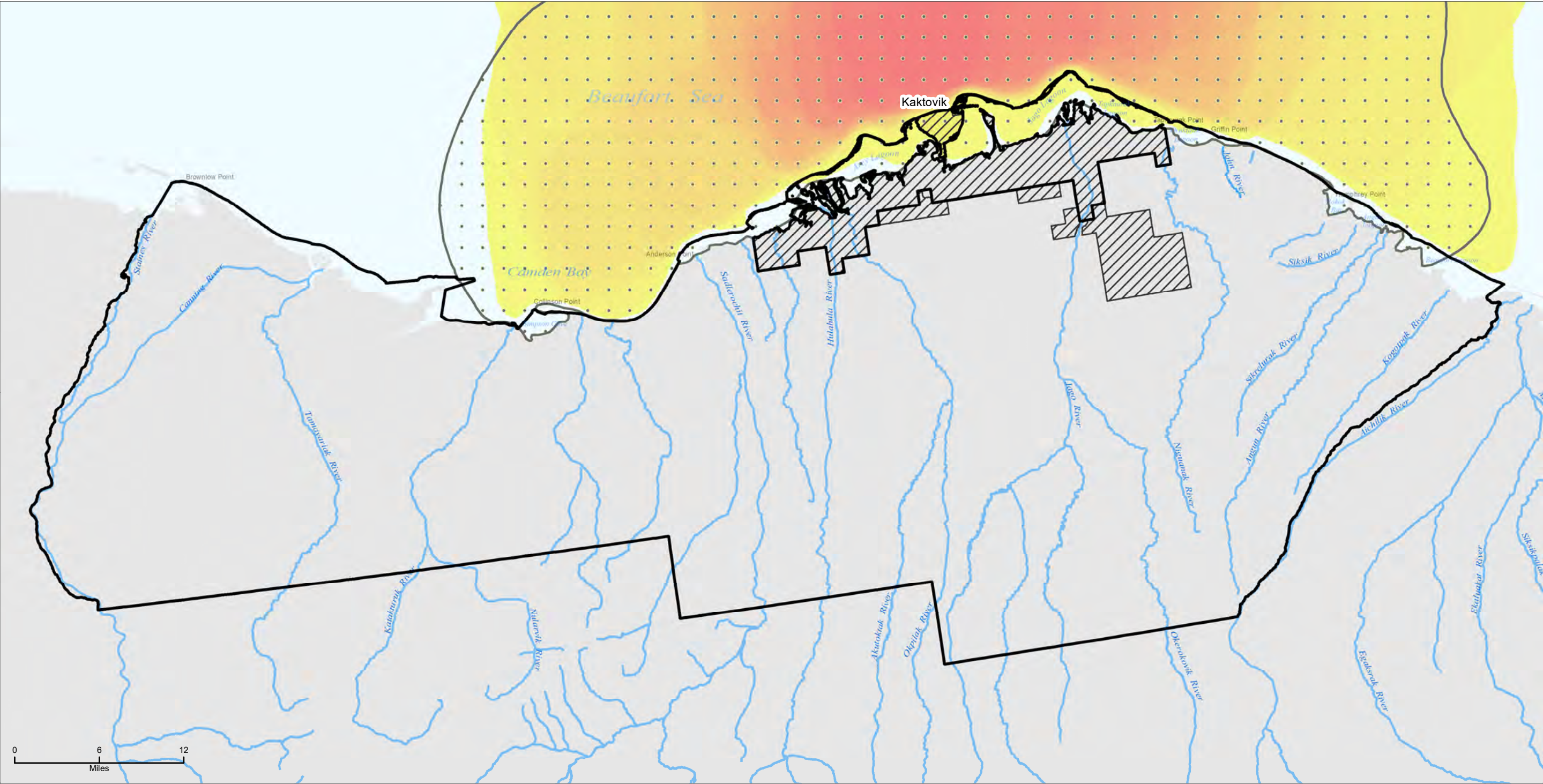


Data Source: BLM GIS 2018,  
1) Pedersen 1979

Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

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- Whale, lifetime prior to 1979<sup>1</sup>
- Public Law 115-97 Coastal Plain
- Overlapping<sup>2</sup> use areas bowhead, 1996–2006
- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority

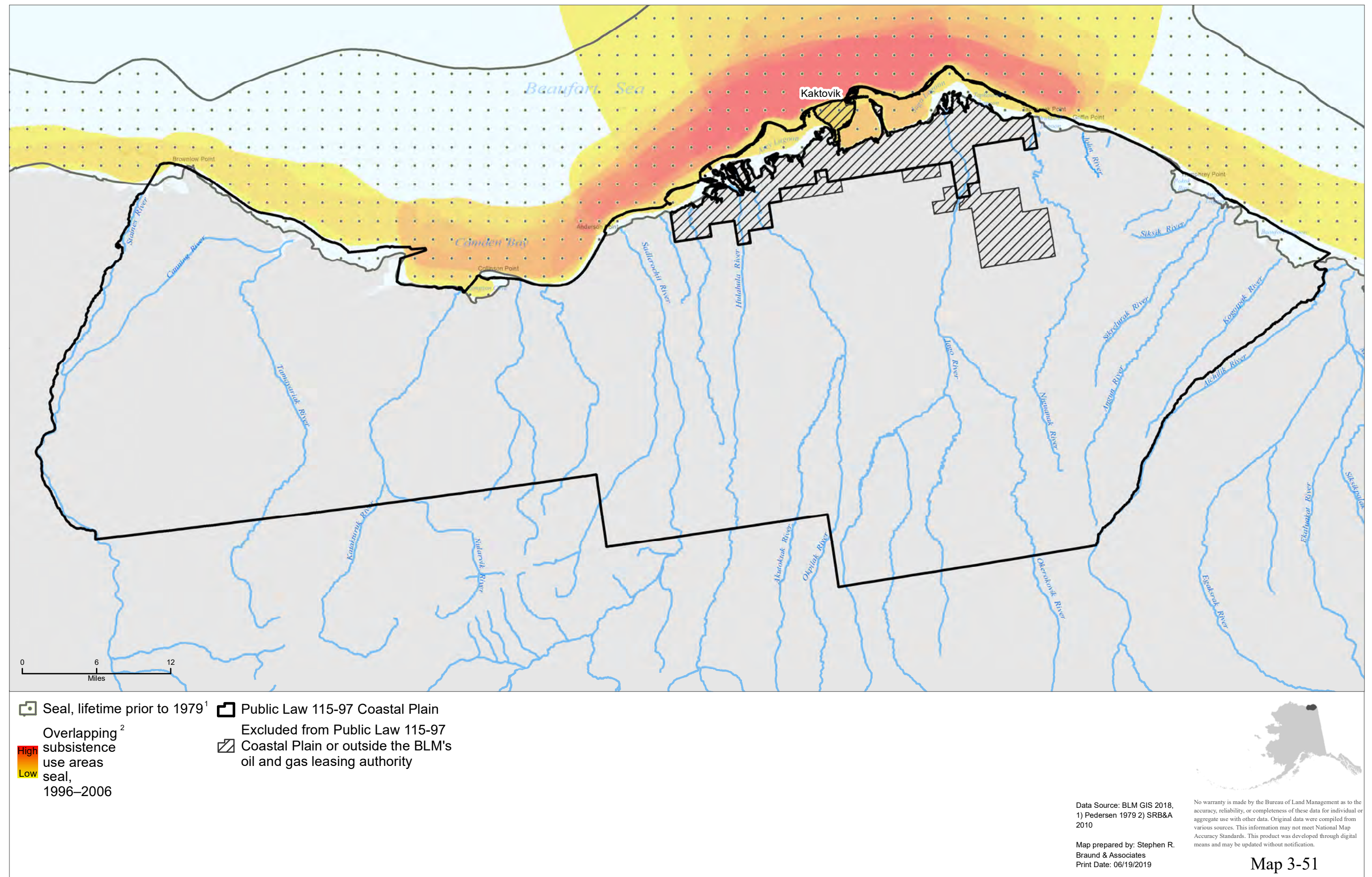
Data Source: BLM GIS 2018, 1) Pedersen 1979 2) SRB&A 2010

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.

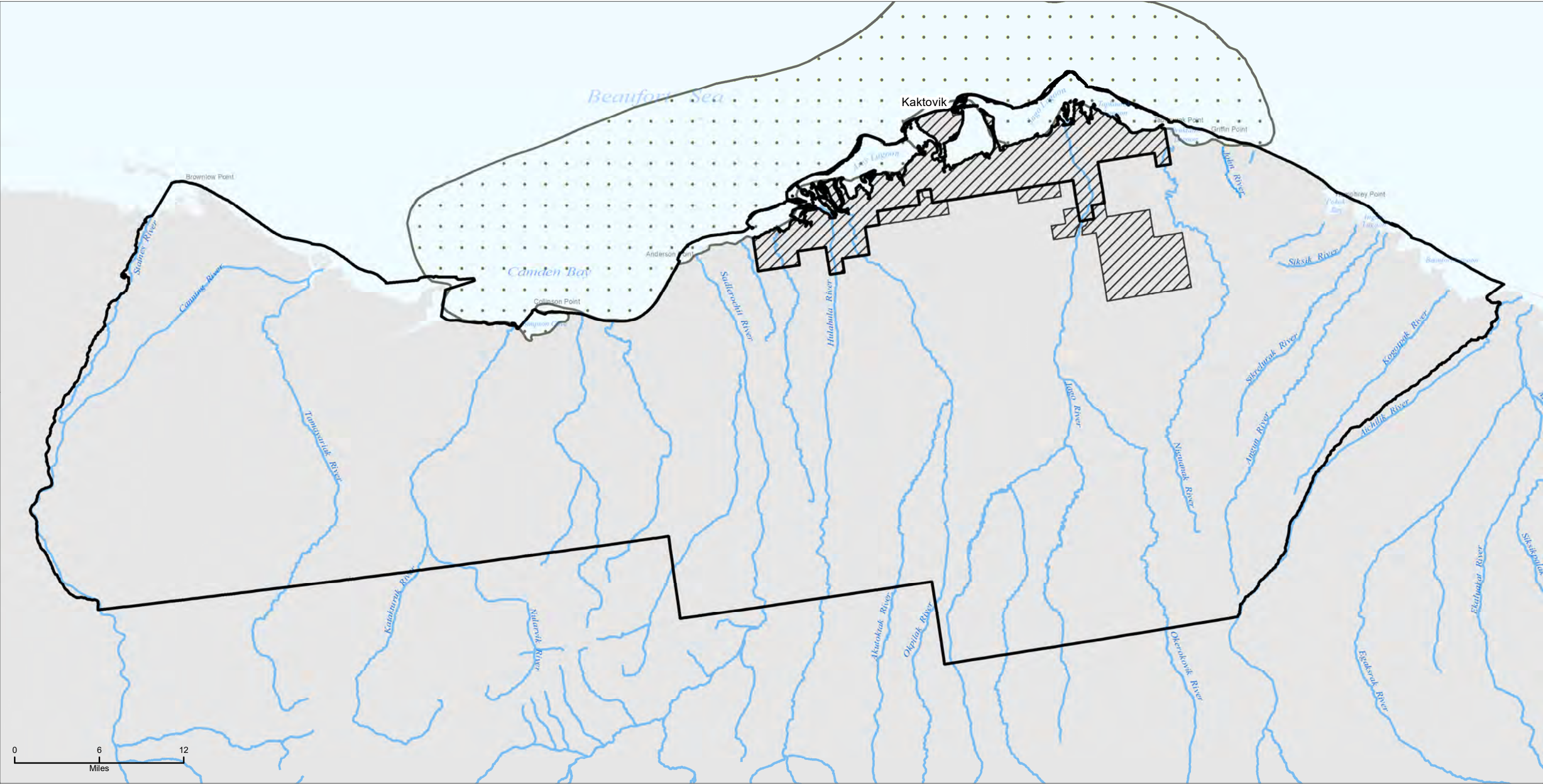
Map prepared by: Stephen R. Braund & Associates  
Print Date: 06/19/2019

Map 3-50







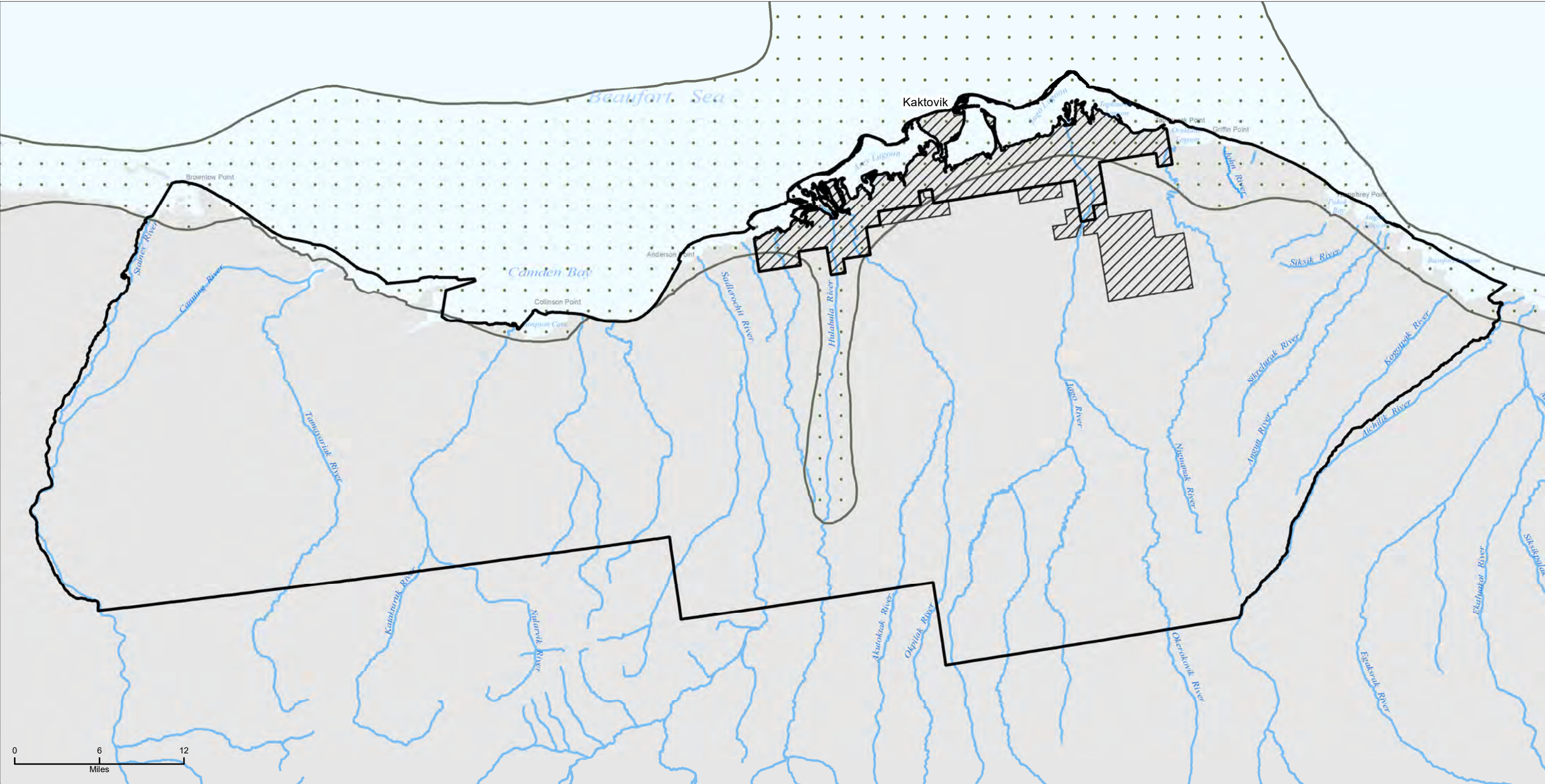


- Walrus, lifetime prior to 1979<sup>1</sup>

Overlapping<sup>2</sup>  
subsistence  
use areas  
walrus,  
1996–2006
- Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97  
Coastal Plain or outside the BLM's  
oil and gas leasing authority





- Polar bear, lifetime prior to 1979<sup>1</sup>
- Public Law 115-97 Coastal Plain Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority

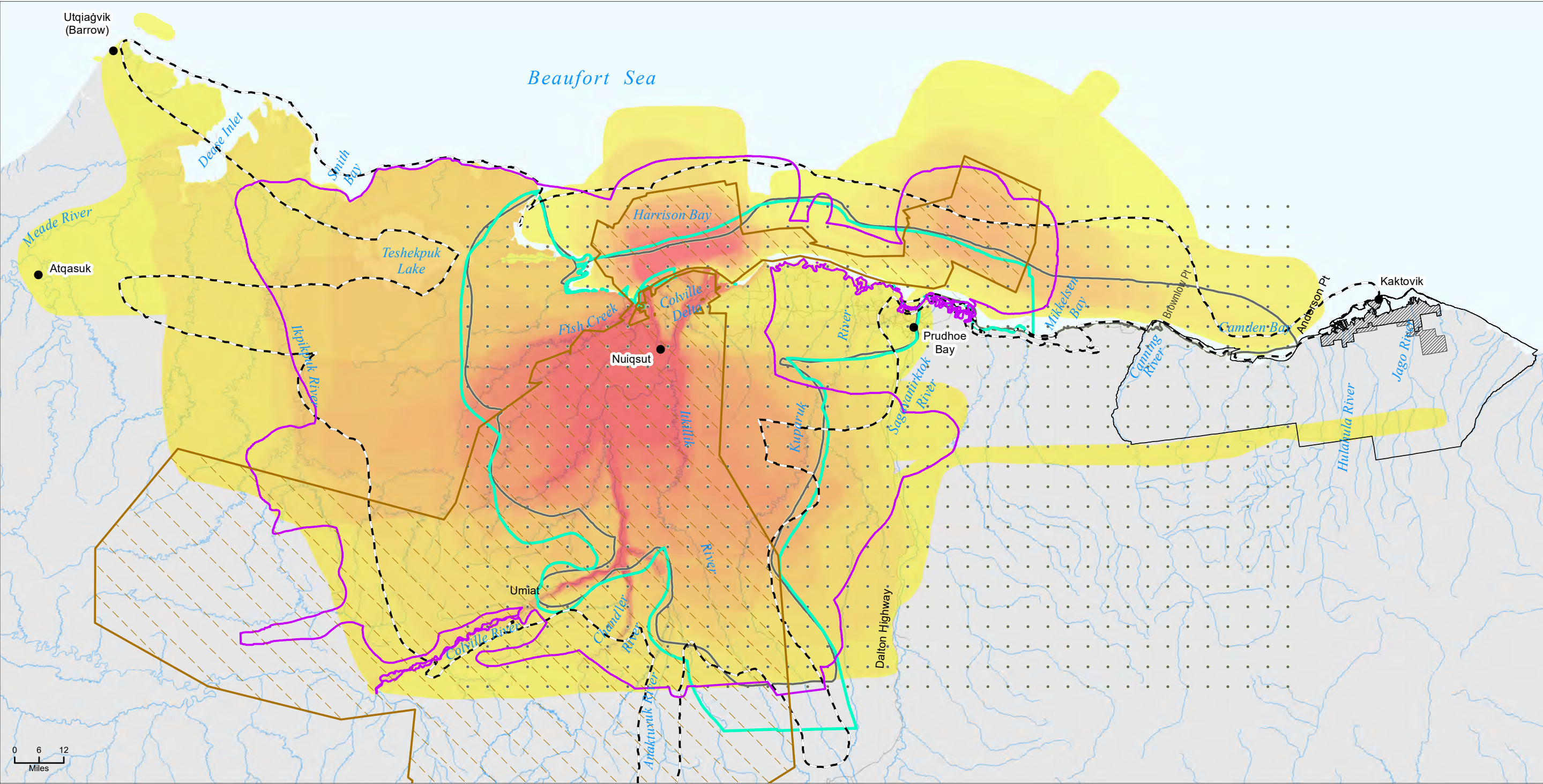


Data Source: BLM GIS 2018,  
1) Pedersen 1979

Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

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- All resources, 2014<sup>1</sup>
- All resources, 1994–2003<sup>2</sup>
- All resources, 1973–1986<sup>3</sup>
- All resources, early 1970s<sup>4</sup>
- All resources, lifetime prior to 1979<sup>5</sup>
- High

Overlapping subsistence use areas
- Low

all resources, 1995–2006<sup>6</sup>
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

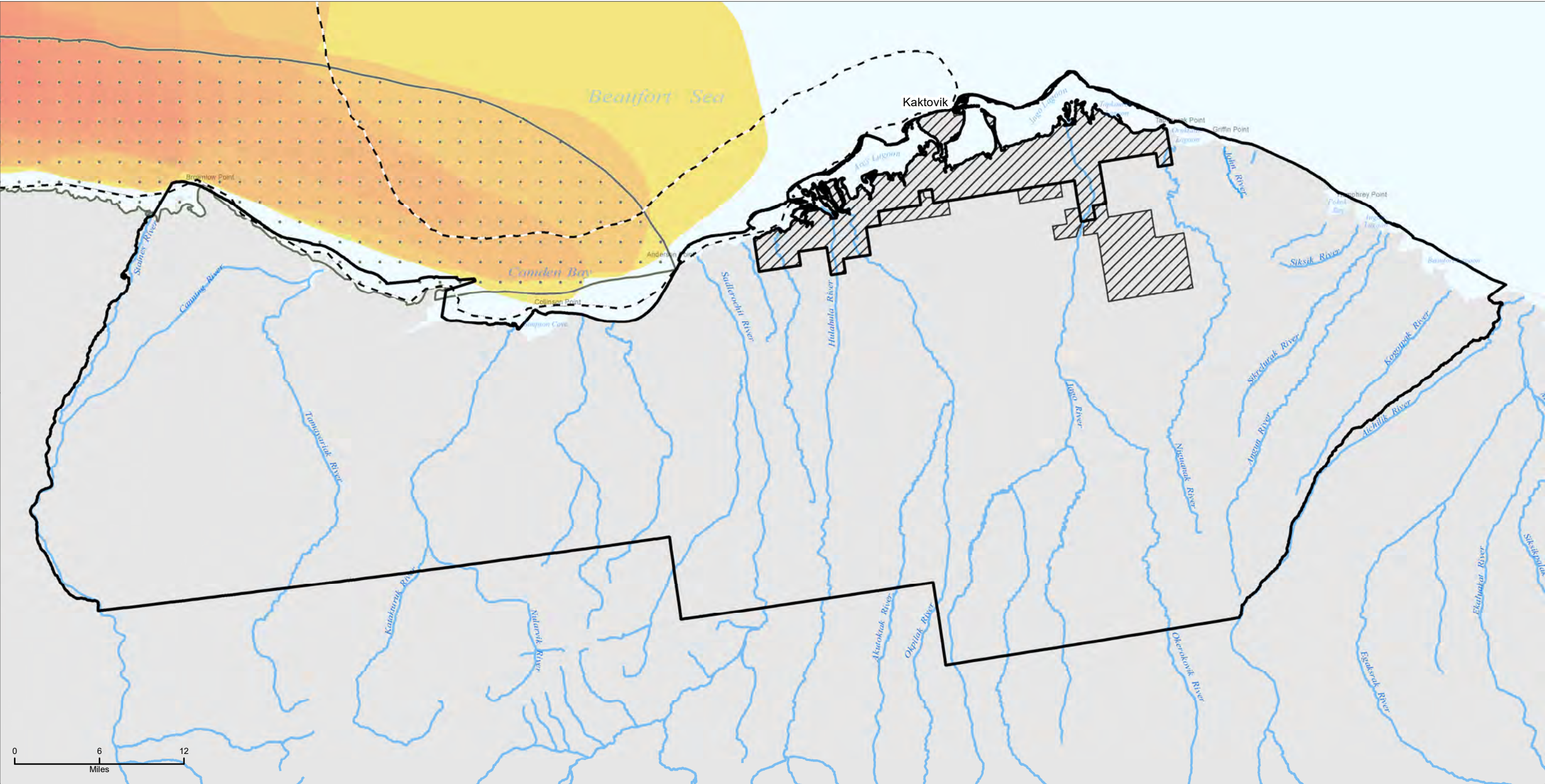
Data Source: BLM GIS 2018,  
1) Brown et al. 2016 2) BLM  
2004 3) Pedersen 1986 4)  
Brown 1979 5) Pedersen  
1979 6) SRB&A 2010

Map prepared by: Stephen R.  
Braund & Associates  
Print Date: 06/19/2019

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Map 3-54





- Whaling, 1973–1986<sup>1</sup>
- Whales, lifetime prior to 1979<sup>2</sup>
- Overlapping<sup>3</sup> subsistence use areas bowhead, 1995–2006
- Public Law 115-97 Coastal Plain
- Excluded from Public Law 115-97
- Coastal Plain or outside the BLM's oil and gas leasing authority

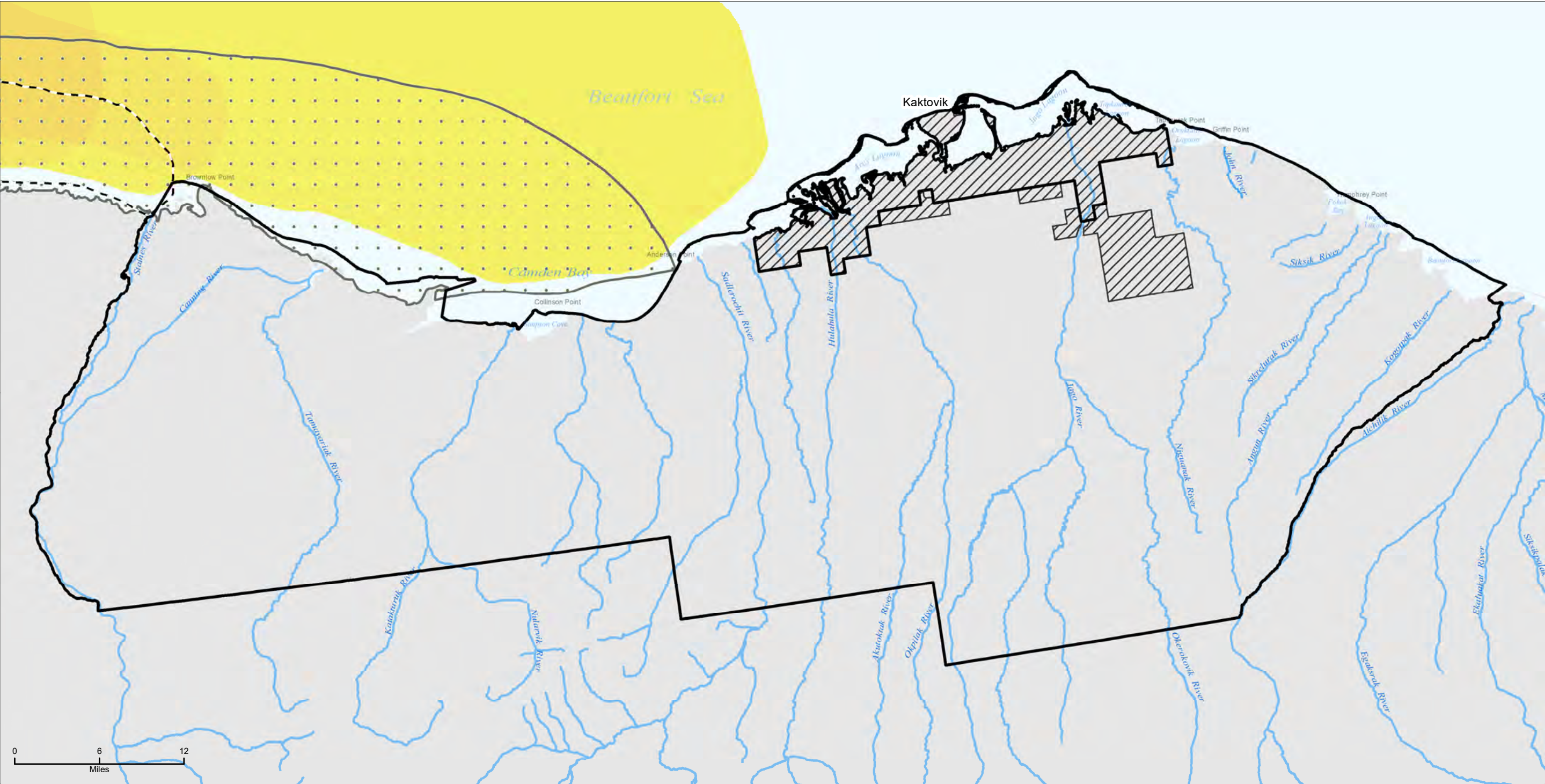
Data Source: BLM GIS 2018, 1) Pedersen 1986 2) Pedersen 1979 3) SRB&A 2010

Map prepared by: Stephen R. Braund & Associates  
Print Date: 06/19/2019



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- Seal, 1973–1986<sup>1</sup>

Seal, lifetime prior to 1979<sup>2</sup>

High

Overlapping<sup>3</sup>

Low

subsistence

use areas

seal,

1995–2006

Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97

Coastal Plain or outside the BLM's

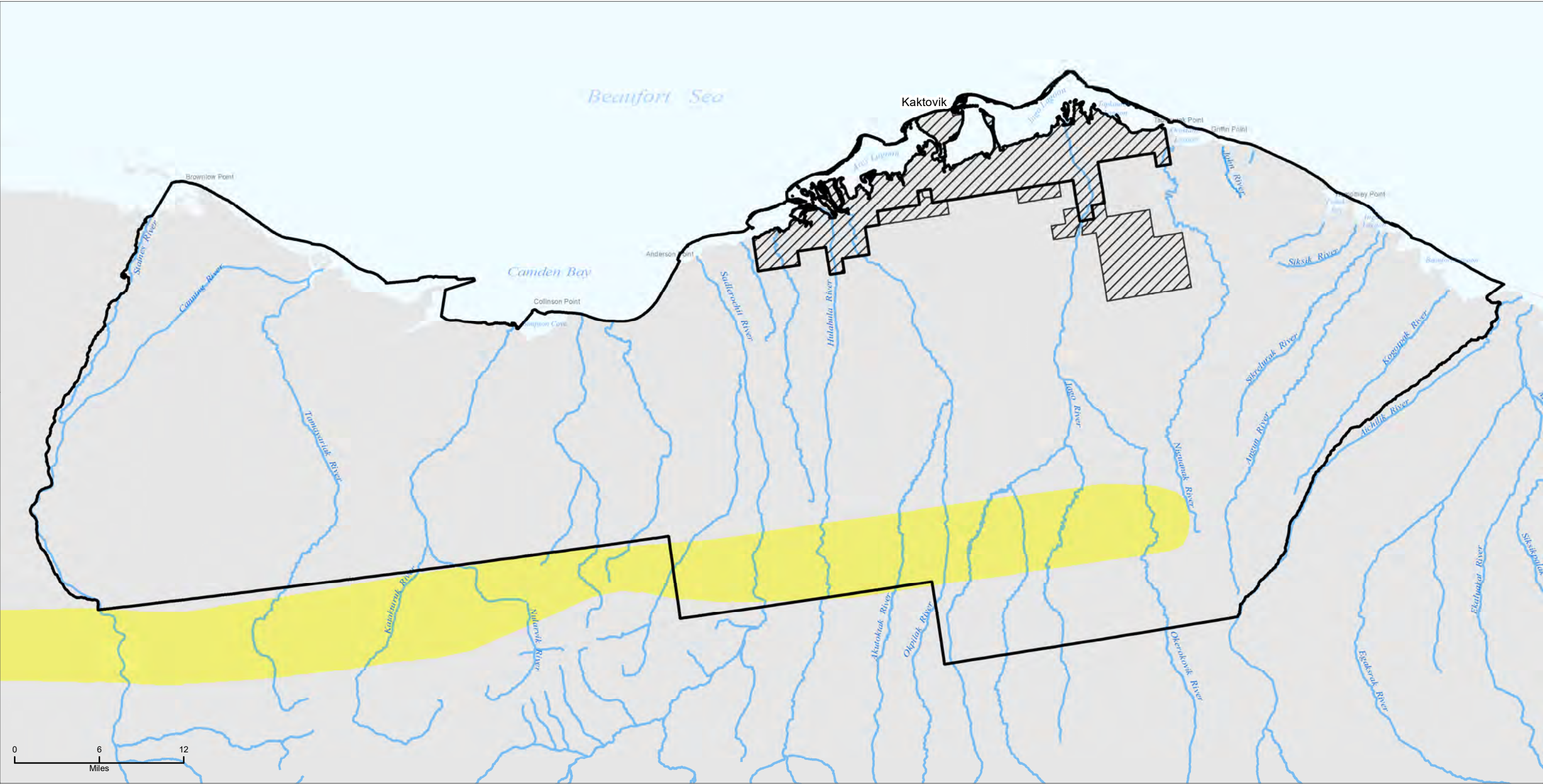
oil and gas leasing authority
- Data Source: BLM GIS 2018, 1) Pedersen 1986 2) Pedersen 1979 3) SRB&A 2010

Map prepared by: Stephen R. Braund & Associates  
Print Date: 06/19/2019

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Map 3-56





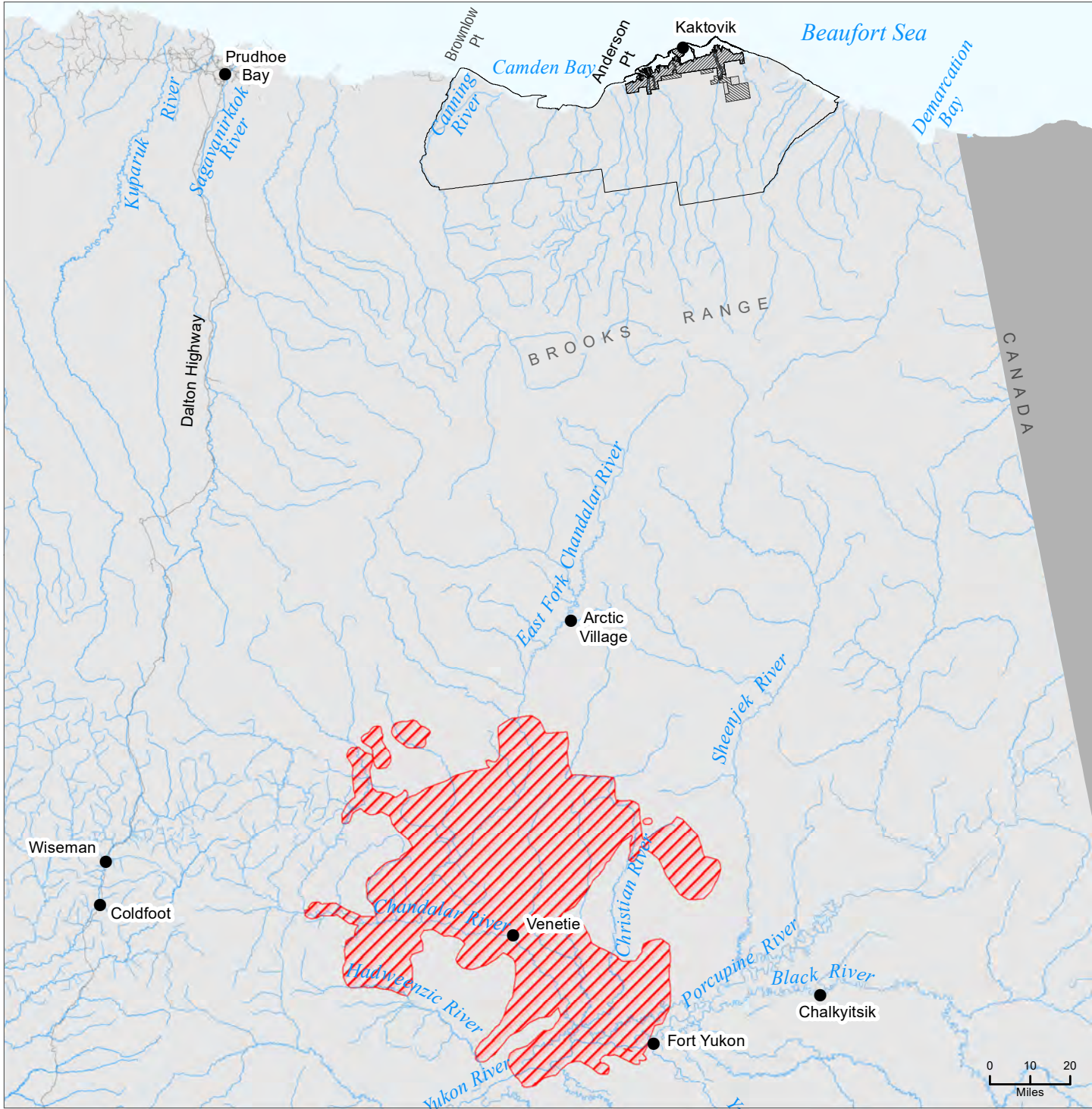
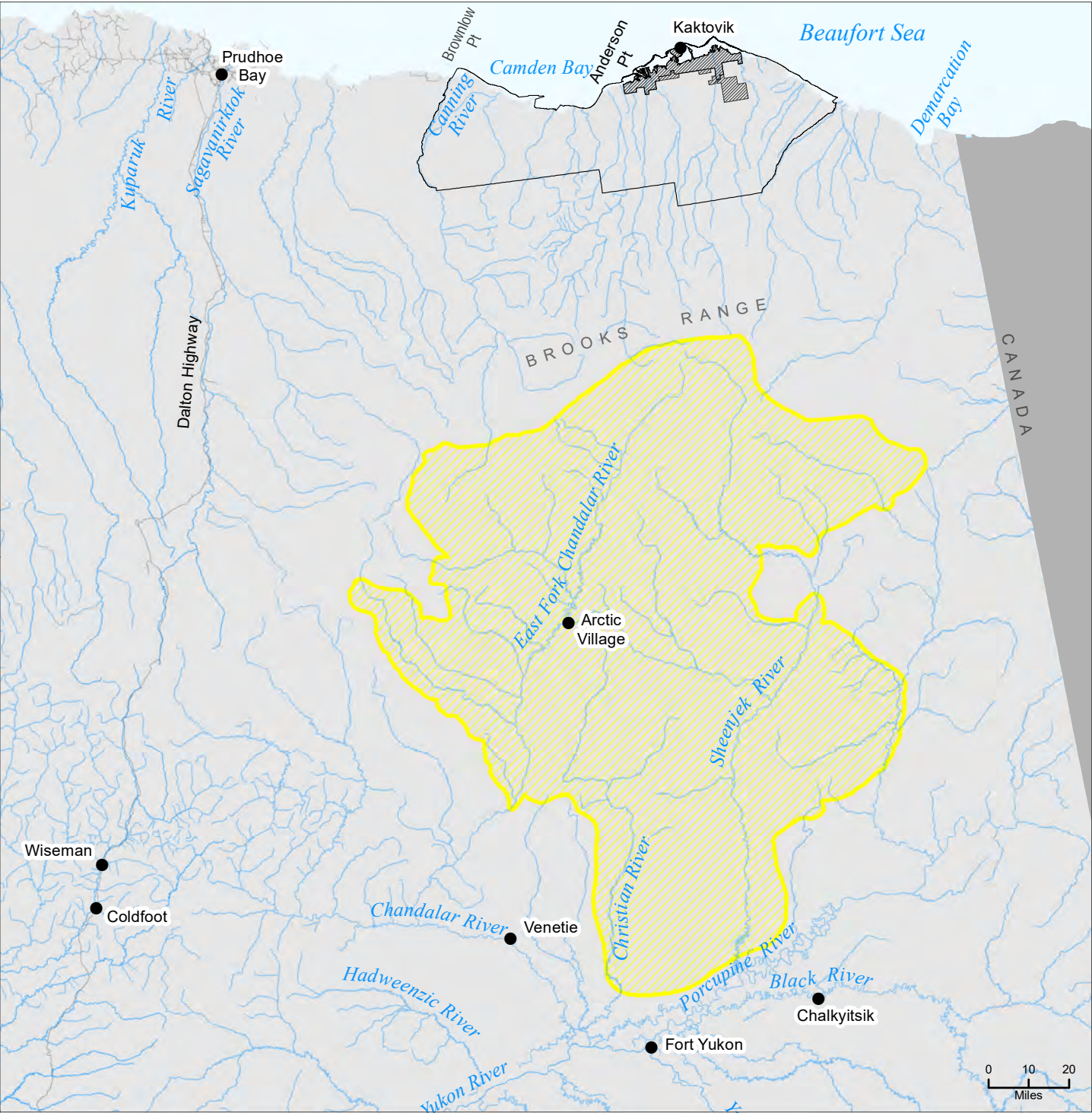
- Overlapping<sup>1</sup>  
subsistence  
use areas  
wolf and wolverine,  
1995–2006
- High  
Low
- Public Law 115-97 Coastal Plain  
Excluded from Public Law 115-97  
Coastal Plain or outside the BLM's  
oil and gas leasing authority


Data Source: BLM GIS 2018,  
1) SRB&A 2010



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-  Arctic Village, all resources, lifetime prior to 1980<sup>1</sup>

 Venetie, all resources, lifetime prior to 1981<sup>1</sup>
-  Public Law 115-97 Coastal Plain

 Excluded from Public Law 115-97

 Coastal Plain or outside the BLM's oil and gas leasing authority

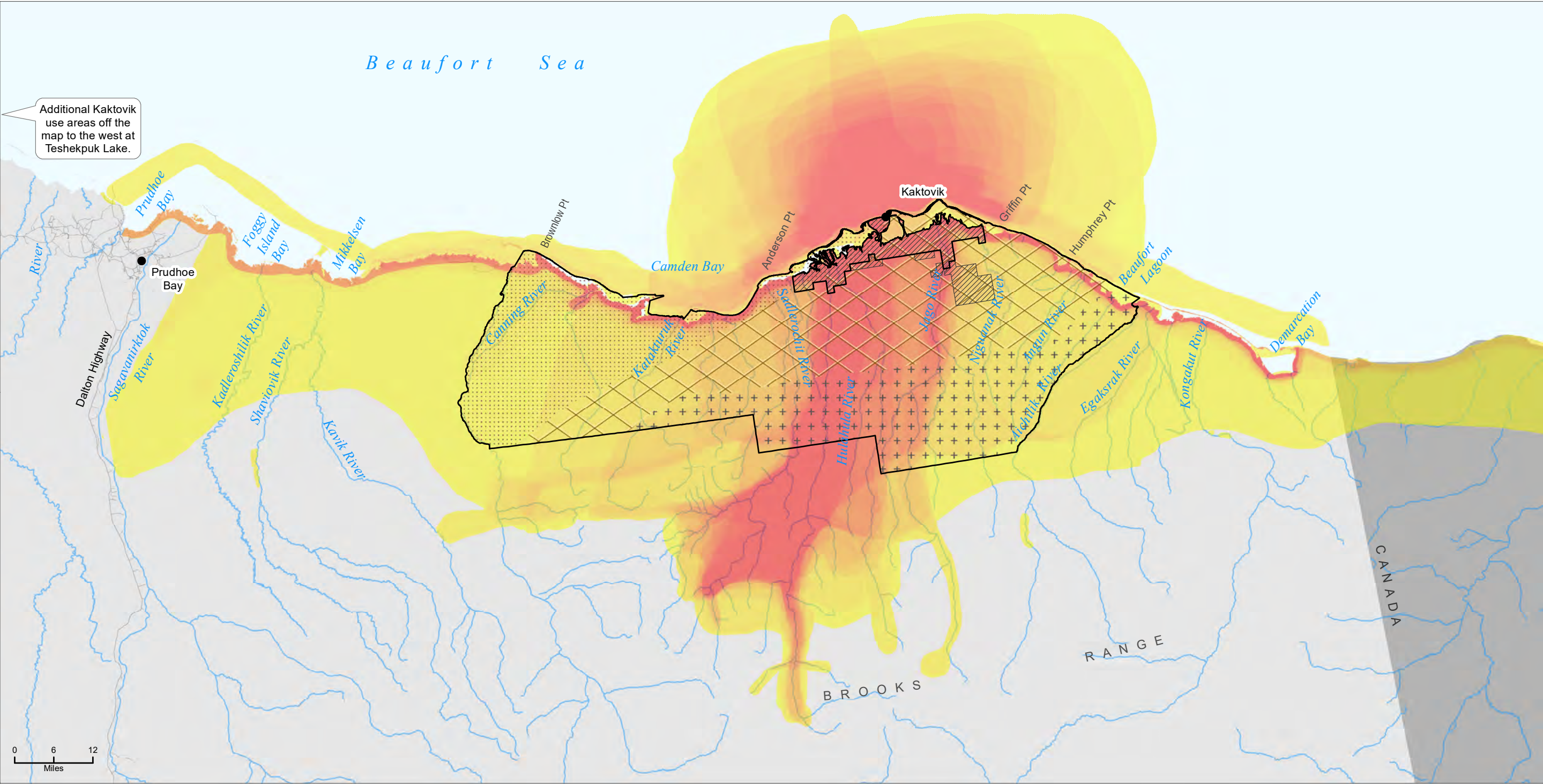


Data Source: BLM GIS 2018,  
1) Caulfield 1983

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- High

Low

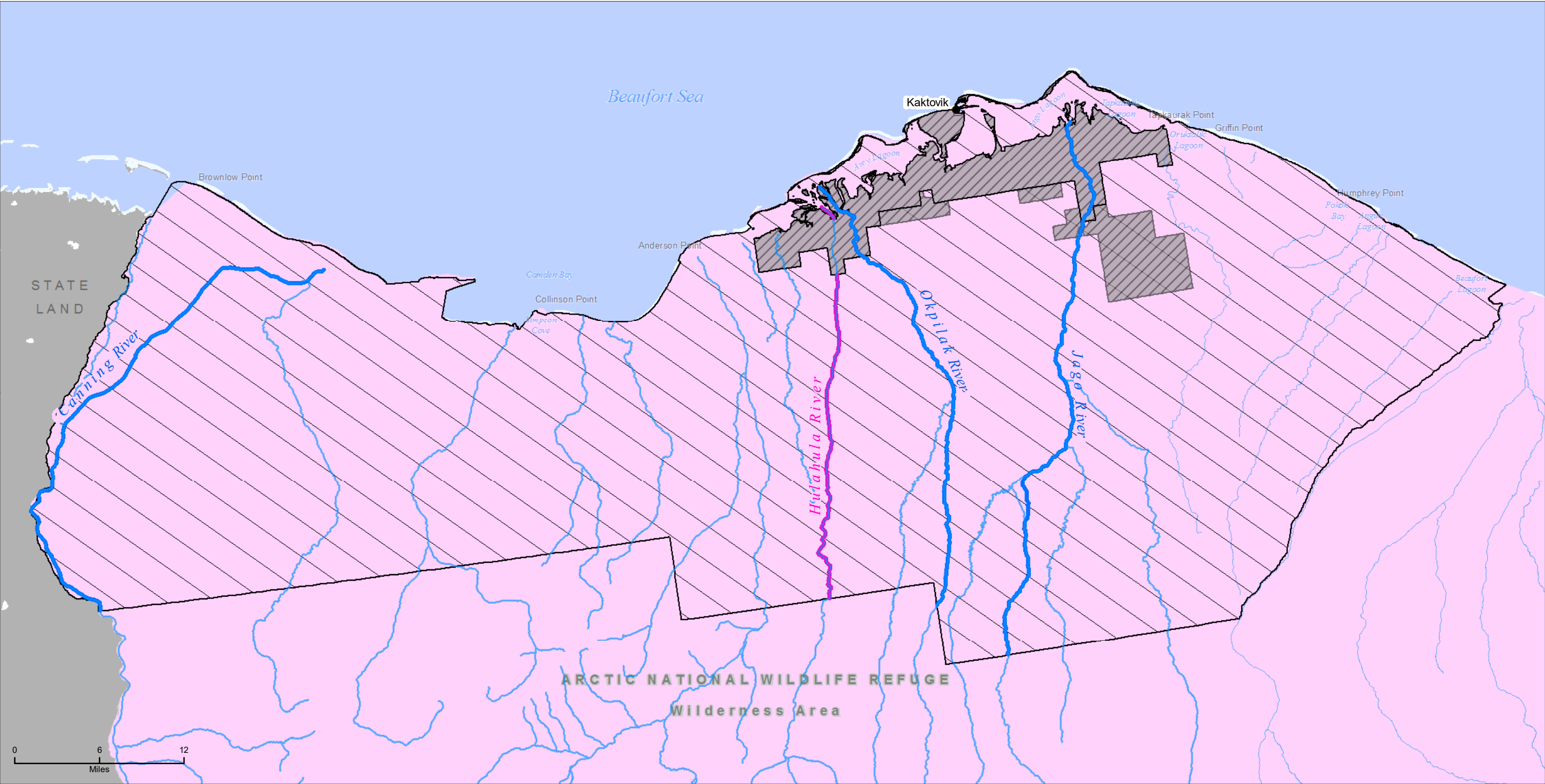
Overlapping<sup>1</sup> subsistence use areas all resources, 1996–2006
- Public Law 115-97 Coastal Plain Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

High hydrocarbon potential  
Medium hydrocarbon potential  
Low hydrocarbon potential

Data Source: BLM GIS 2018, 1) SRB&A 2010

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Print Date: 06/19/2019

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Wild and scenic river, suitable

Wild and scenic river, eligible

Minimal management

Marine protected area

Marine protected area, interface

Public Law 115-97 Coastal Plain

Excluded from Public Law 115-97 Coastal Plain or outside the BLM's oil and gas leasing authority

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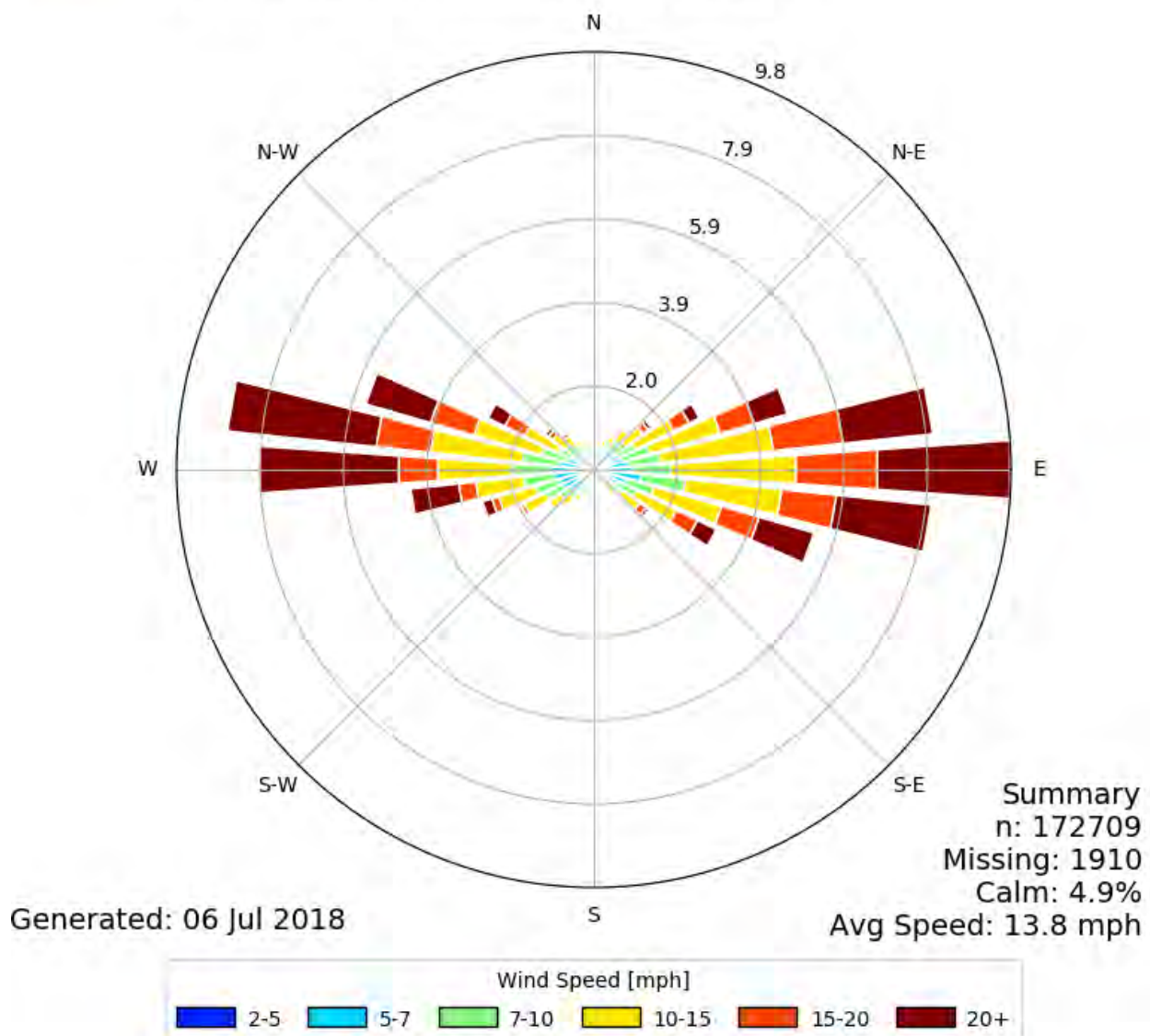
Data Source: BLM GIS 2018, NOAA GIS 2017, FWS GIS 2015  
Print Date: 08/27/2019

Map 3-60



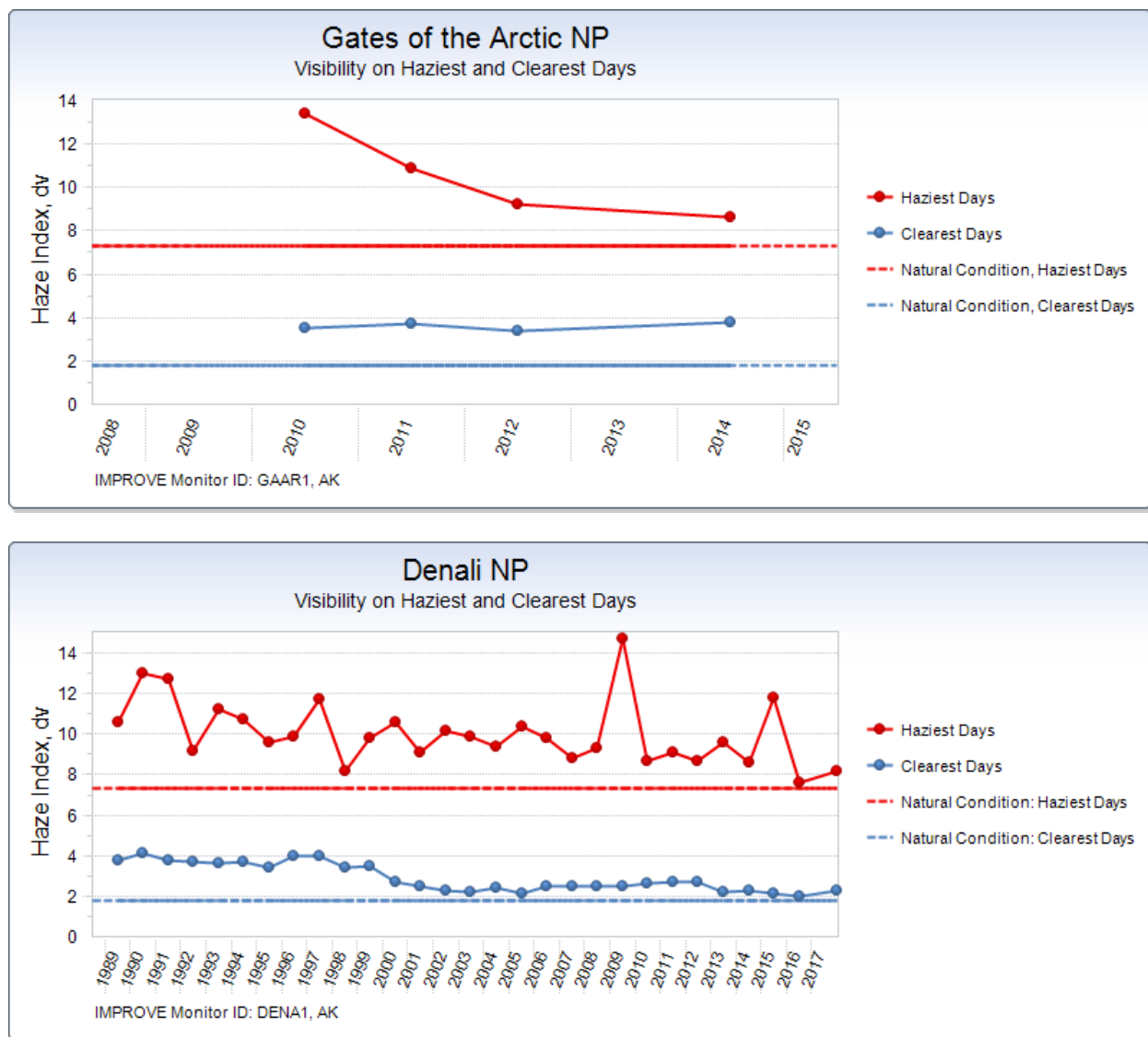


[PABA] BARTER ISLAND(AWOS)  
Windrose Plot [All Year]  
Period of Record: 01 Jan 2008 - 31 Dec 2017



Source: Iowa State University (copyright: used with permission), Iowa Environmental Mesonet (IEM)  
website: <http://mesonet.agron.iastate.edu/>

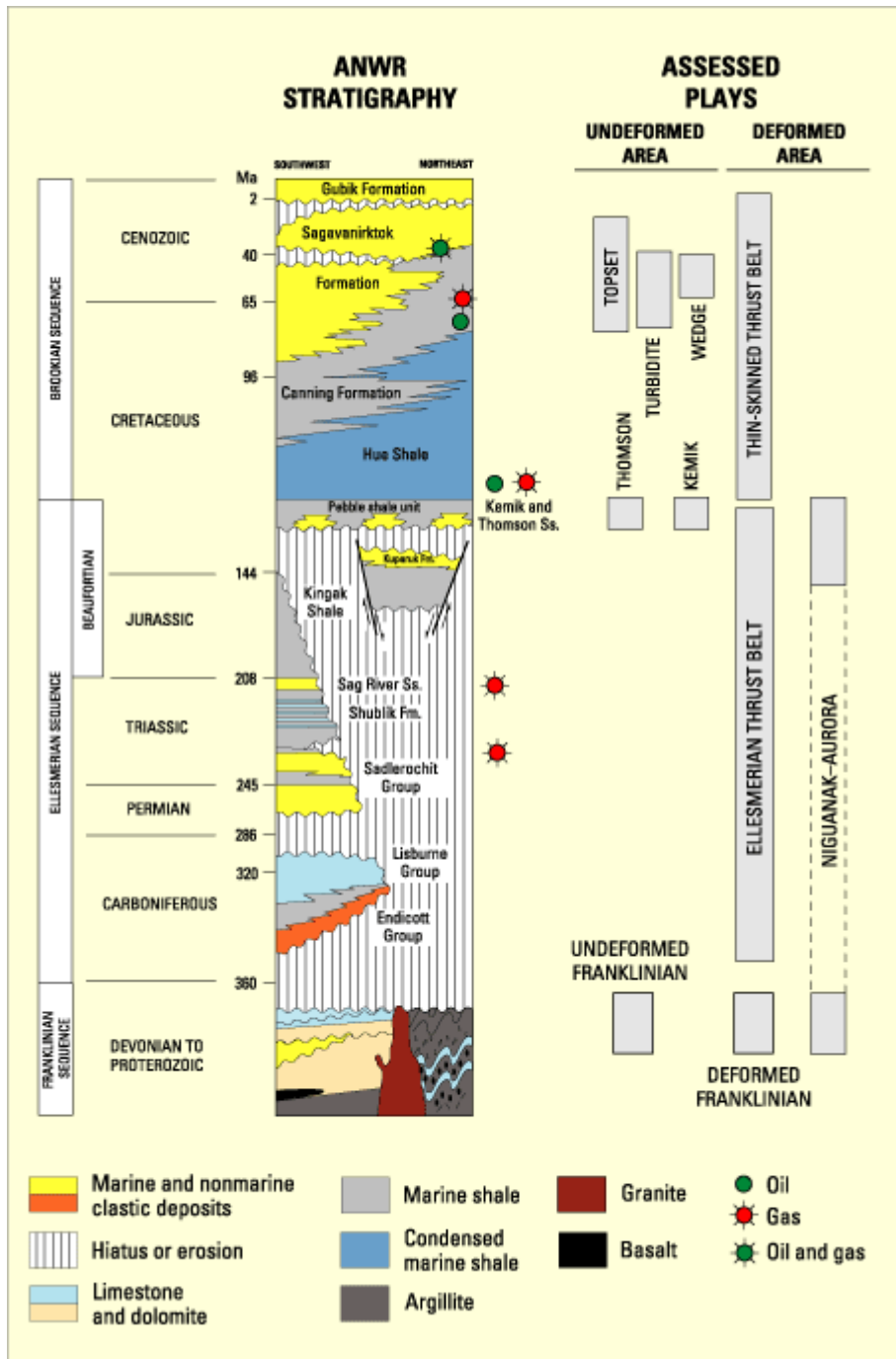
**Figure 3-1:** Wind Rose Plot for Barter Island, Kaktovik, Alaska



Source: IMPROVE 2018a

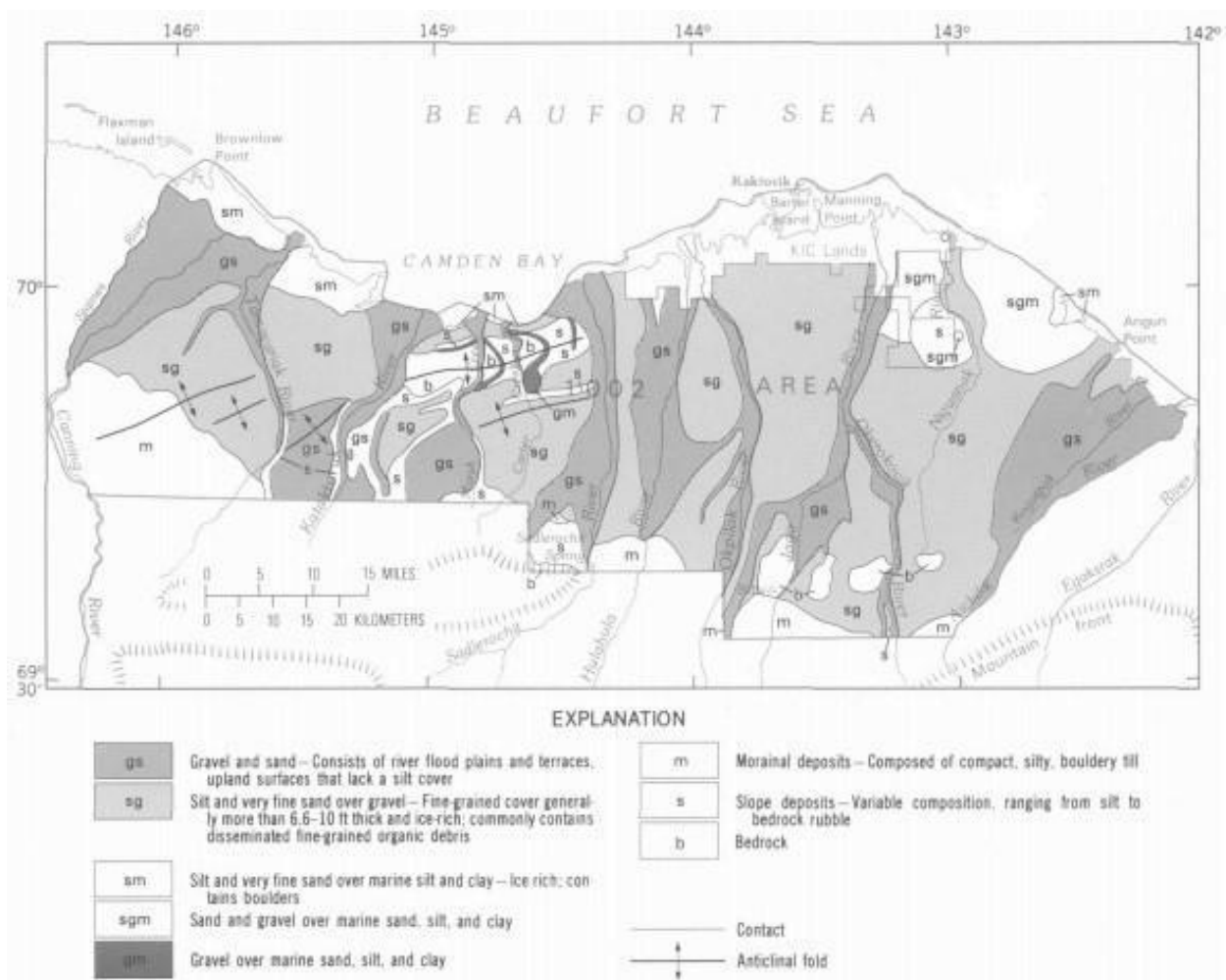
**Figure 3-2:** Visibility Data for Gates of the Arctic National Park and Denali National Park





Source: US Geological Survey (USGS 1998b) Fact Sheet 0028-02 Figure 3

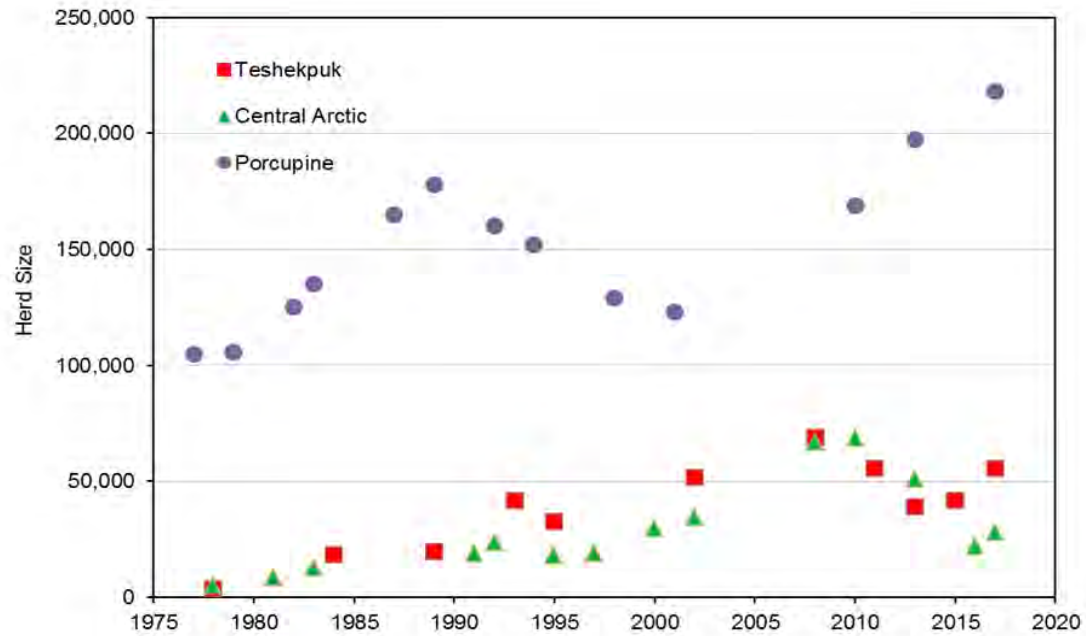
**Figure 3-3:** Stratigraphy of the Coastal Plain



Source: Clough et al. 1987

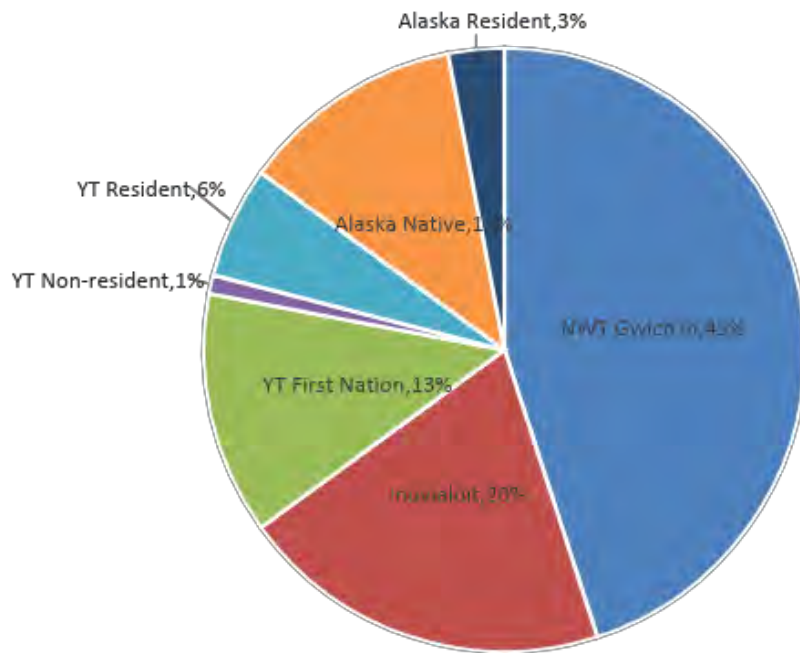
**Figure 3-4:** Generalized Surficial Deposits of the Coastal Plain Area





Source: Lenart 2018

**Figure 3-5:** Population Size of Three Caribou Herds in Arctic Alaska, 1977-2017



Source: Porcupine Caribou Management Board 2010

**Figure 3-6:** Average Portion of Harvest of Porcupine Caribou Herd Between the US and Canada (1992-1994)





**Figure 3-7:** Visual Resources Photo 1

Typical layout for central processing facility with airstrip and pipeline (Alpine CPF on State land).



**Figure 3-8:** Visual Resources Photo 2

Typical layout for exploration well with ice pad and ice road (Stony Hill well site in NPR-A).