

# Science-informed Land Management Tools for Arctic Alaska & Canada

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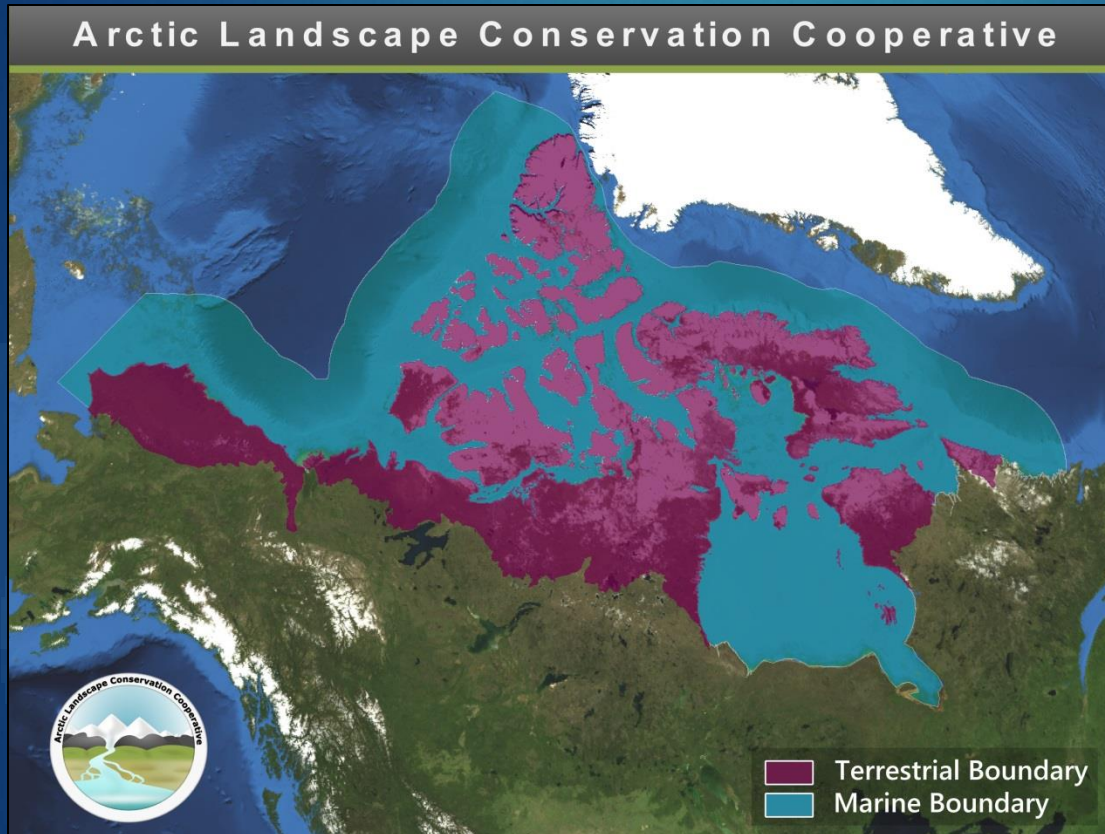
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1. *Office of Science Applications, U.S. Fish & Wildlife Service*
2. *Marine Mammals Management, U.S. Fish & Wildlife Service*
3. *North Slope Science Initiative, Bureau of Land Management*

# Who We Are

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- Partnership Driven Collaborative
- Bring together State, Federal, NGO, Industry, Academic, Tribal Partners with common goals
- Attempt to address issues larger than the mandate of any one entity

# Landscape Scale Approaches are Necessary

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- Increasing awareness that local land use decisions can affect landscapes
- Increasing energy needs
- Changing climate interacts with land use change



# Landscape Scale Approaches are similar to area-based management



- Ecosystem-Based
- Multiple objectives / management regimes
- Accounts for biophysical, socioeconomic, and cultural considerations
- May use no-impact or low-use areas as tools for resource management

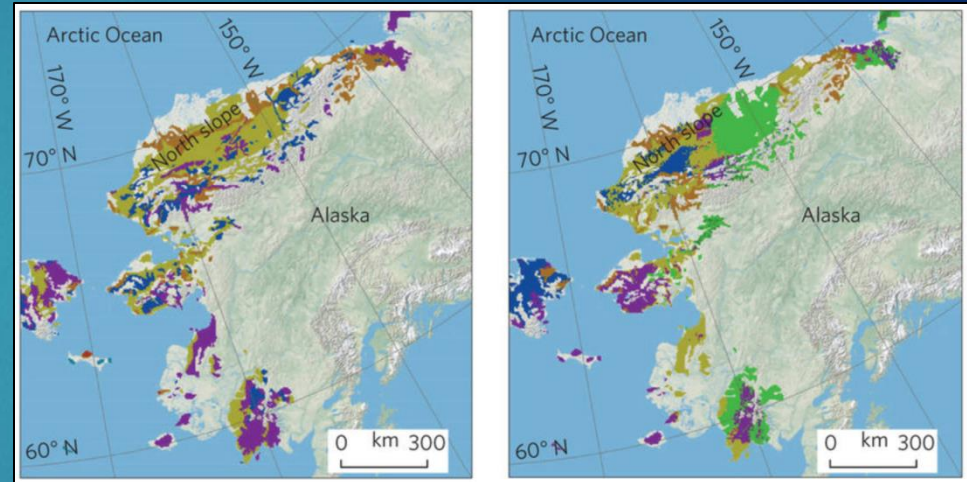
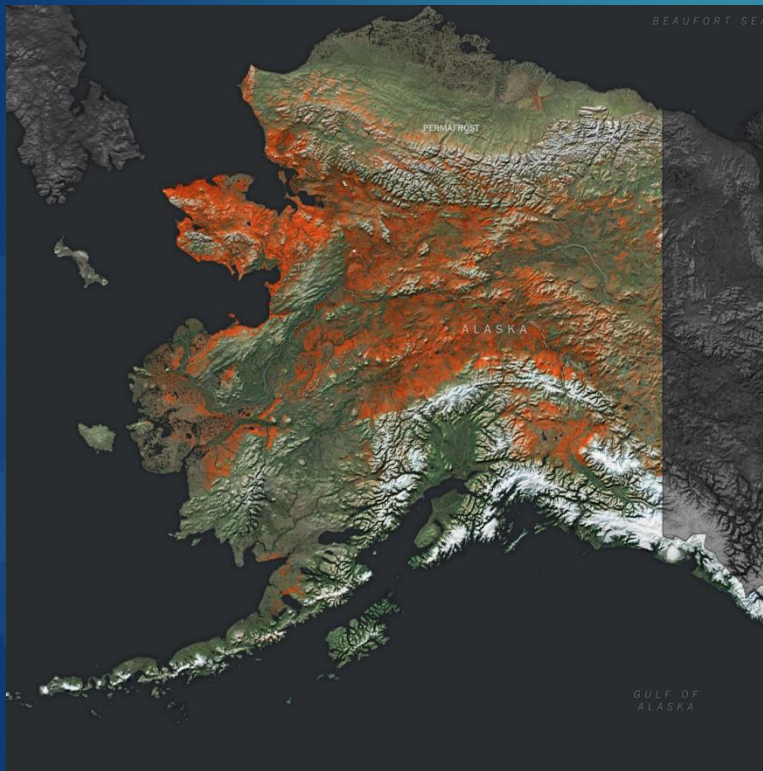
# Arctic LCC Focus

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- **Cumulative Effects Analysis**
  - Landform / Thermokarst
  - Climate
  - Phenology
  
- **Projecting How Future Landscapes Will Support:**
  - Responsible Resource Development
  - Wildlife and Ecosystem function

# Predicted Changes by 2050



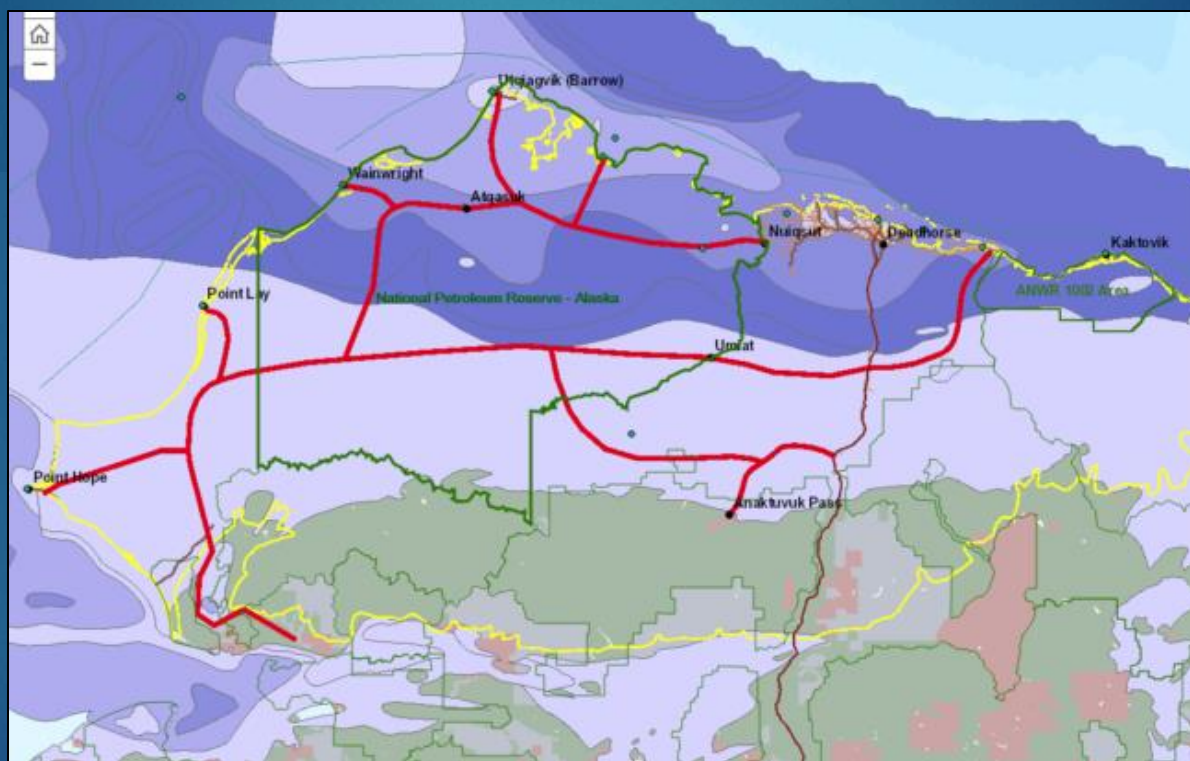
Vegetation classes

G1	T2
G2	P1
G3	P2
G4	S1
T1	S2

Pearson et al.  
2013. Nature

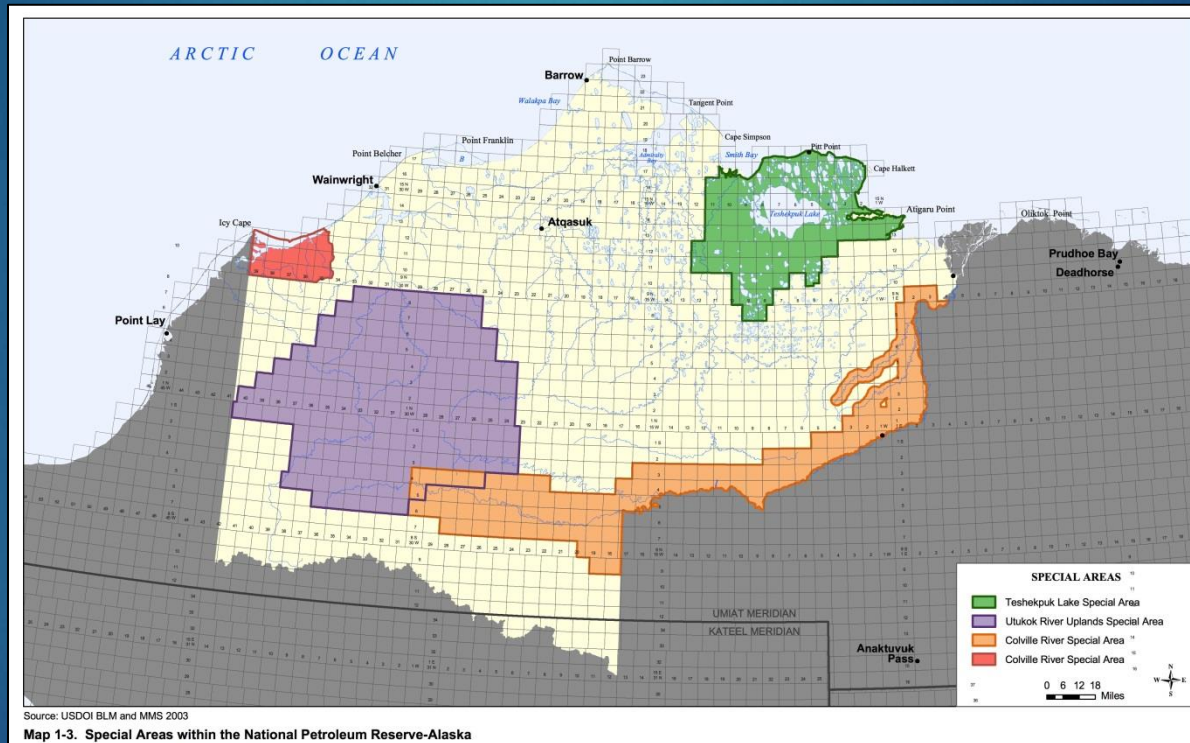
# Potential Land Use

**Changes:** Arctic Strategic Transportation and Resources (ASTAR) project



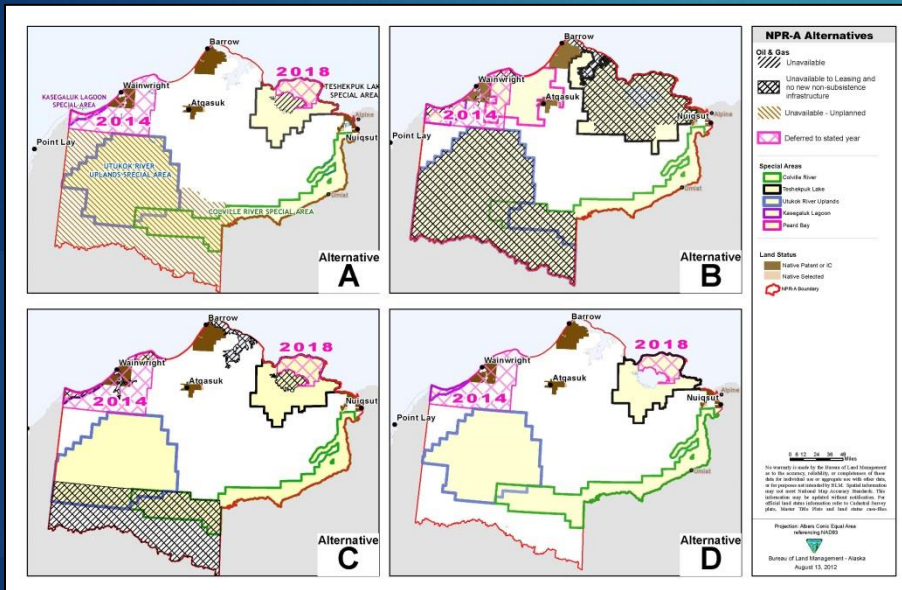
Alaska DNR

# Special Areas of NPR-A

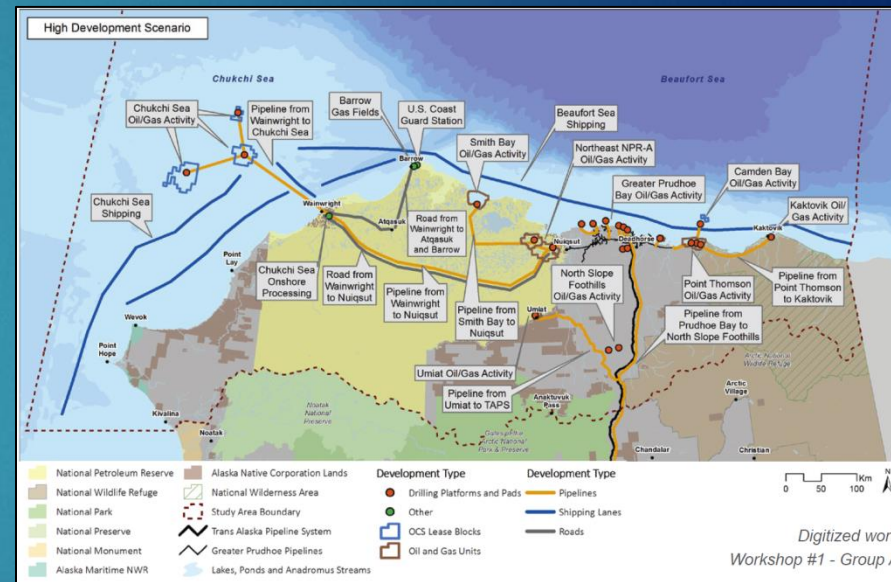




# Existing Work



IAP / EIS – NPRA  
2012-13



NSSI Development Scenarios –  
2015-16

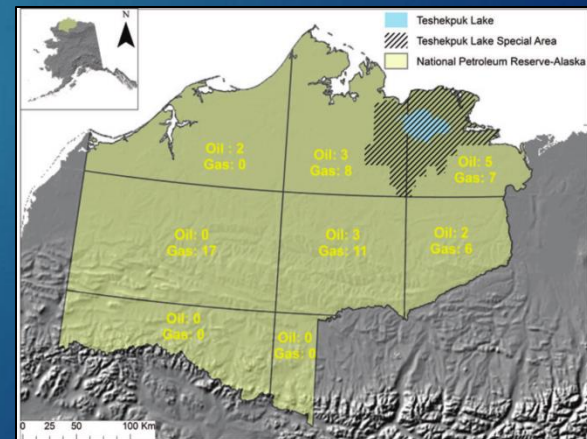
# Development Simulations

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- *Focus on Development Alternatives B, C, & D*
  - Three management regimes for leases
    - Available for leasing
    - Not Available but pipelines, roads etc. are possible
    - Not Available for leasing
  - *Simulate spatially- explicit development inside leases based on economic potential*

- *Assess potential impacts*

- Caribou calving; Caribou migration; nesting shorebirds / waterfowl; impacts to subsistence

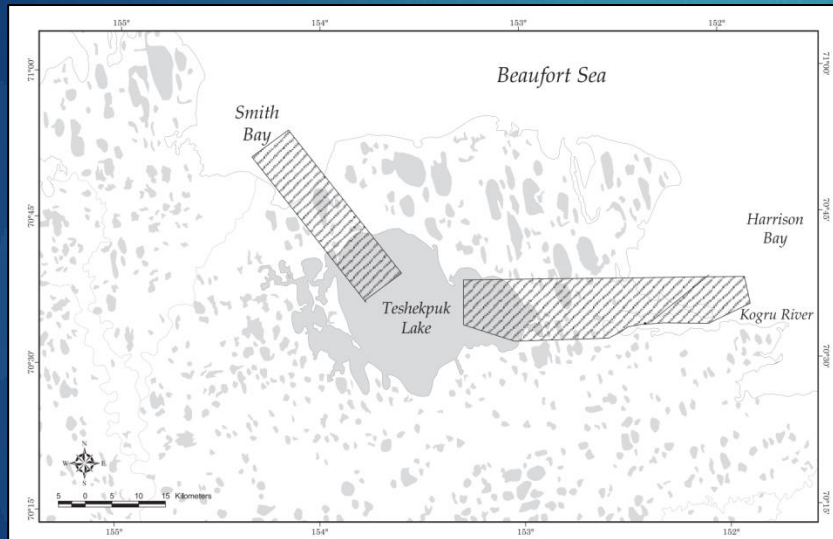


Wilson et al. 2013. Con Letters

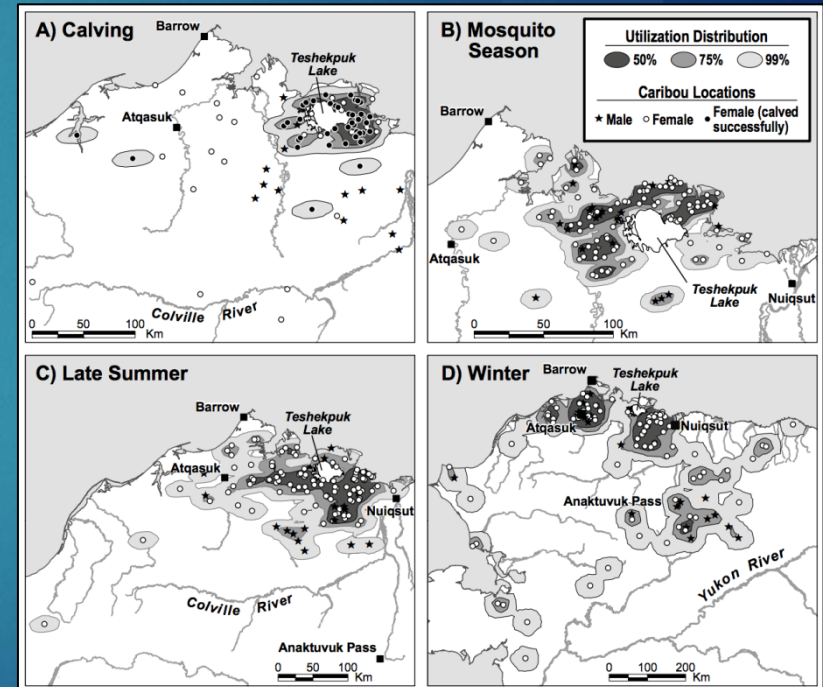
# Teshkepuk Caribou Herd

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- Baseline migration information available prior to oil and gas development (1990-2005) for TCH



Person et al. 2007. Arctic

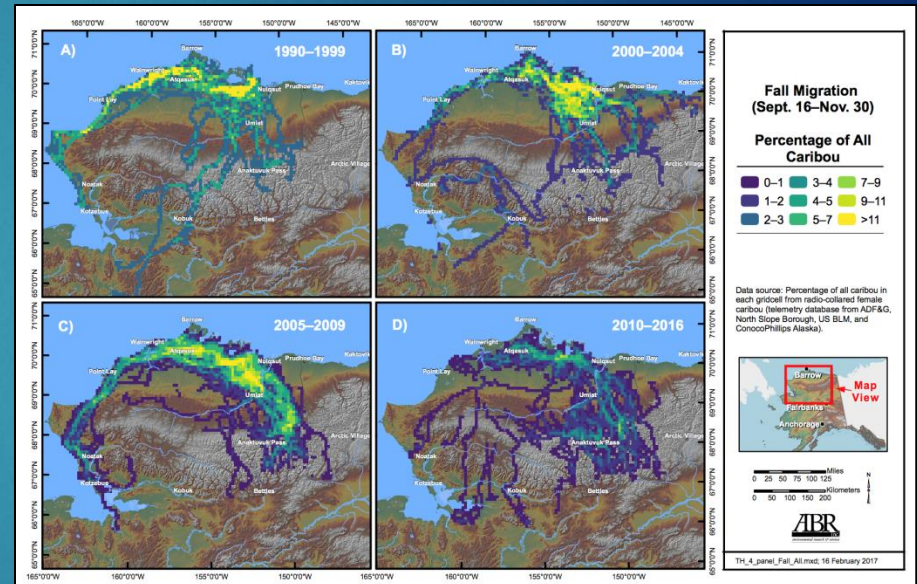
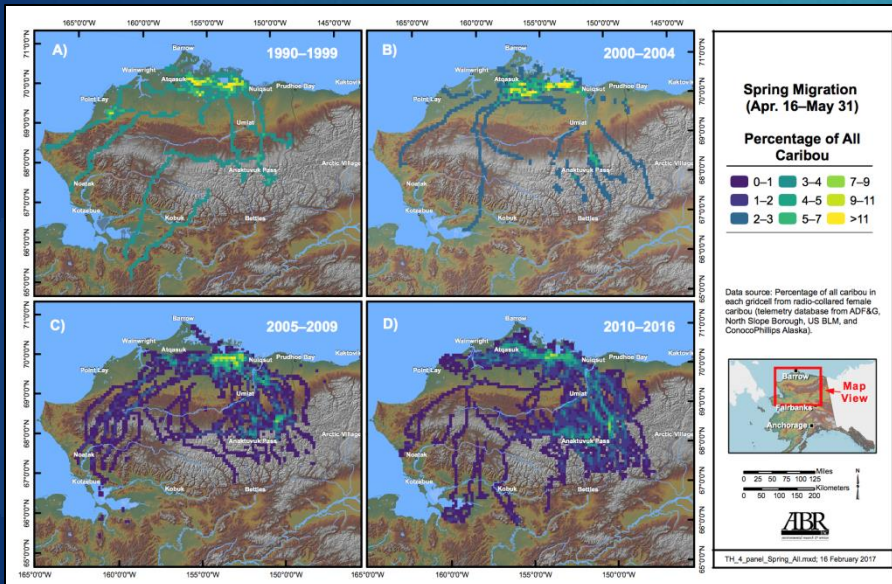


Person et al. 2007. Arctic

# Teshkepuk Caribou Herd

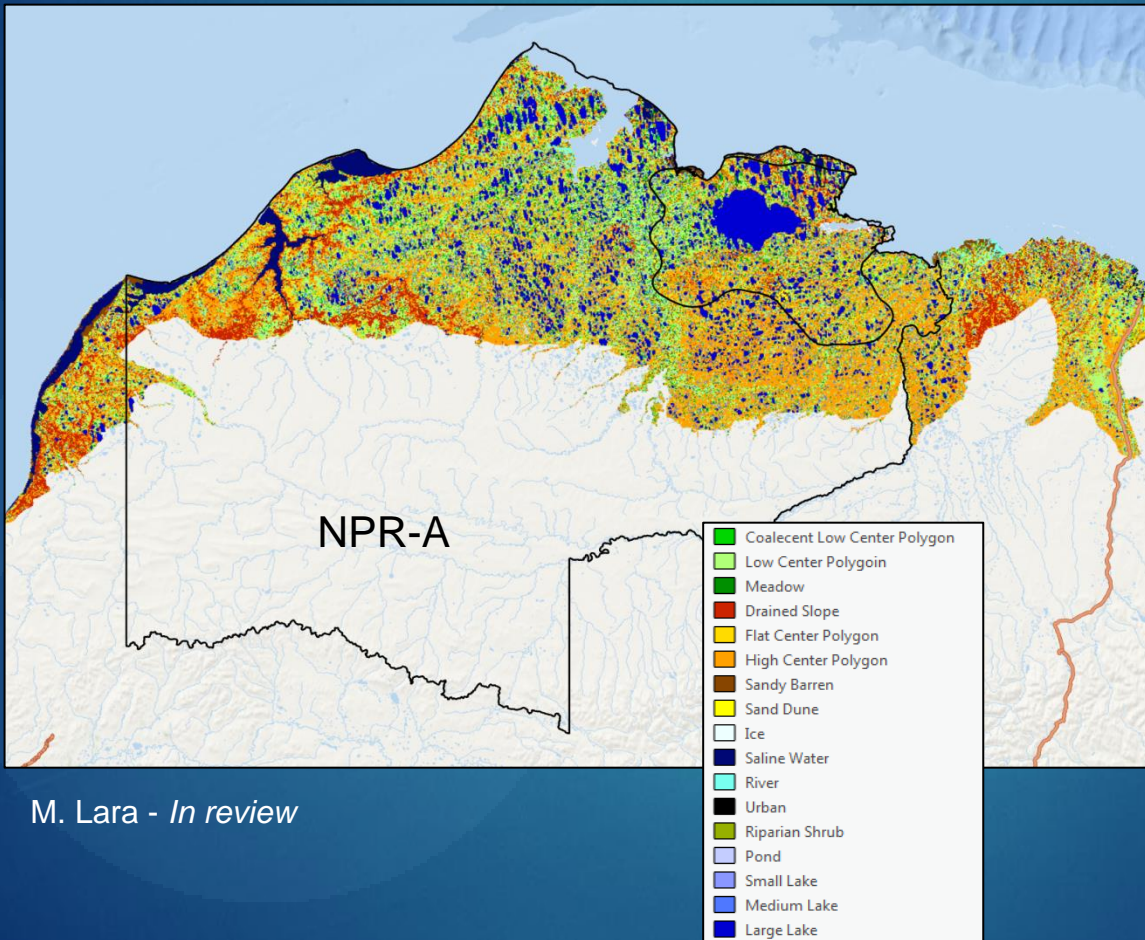
## Spring Migration 1990 - 2016

## Fall Migration 1990 - 2016



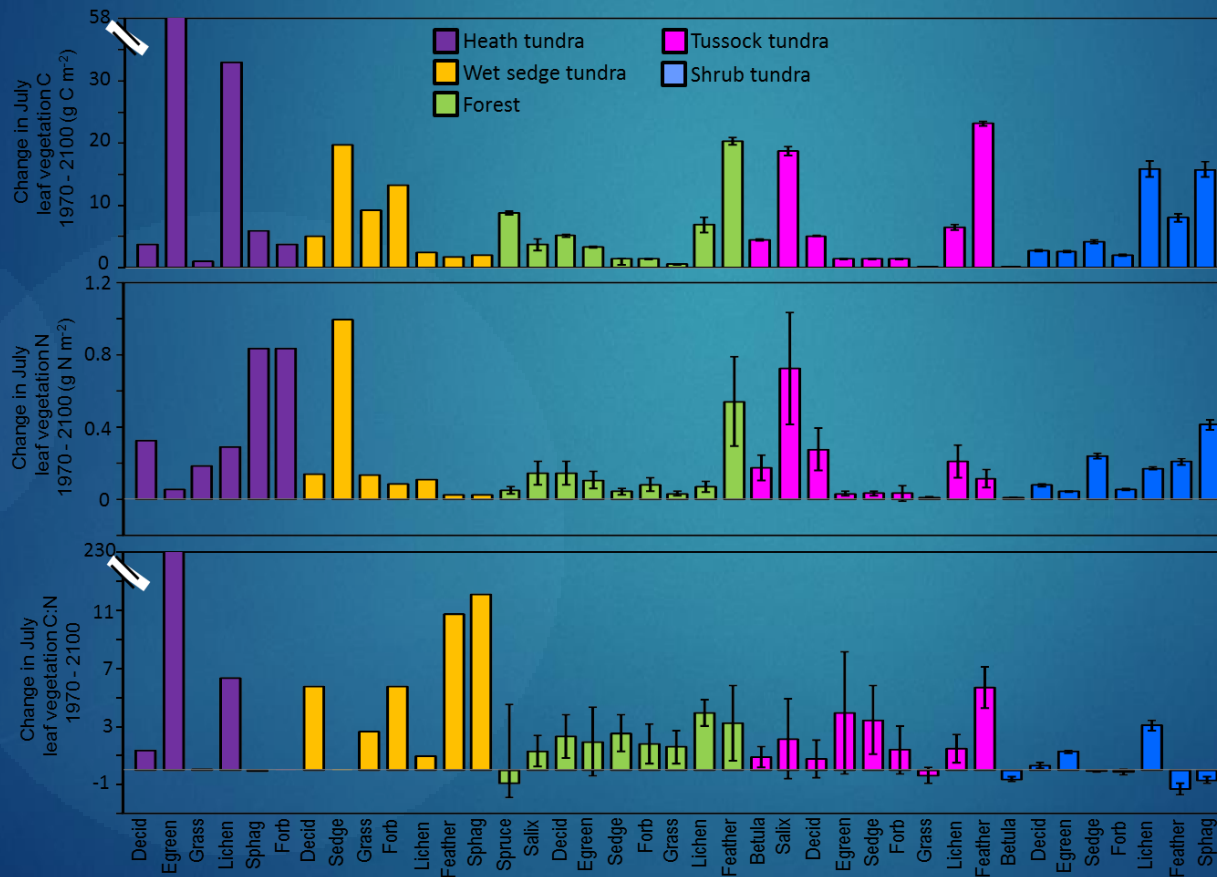
# Updating Landforms & Vegetation

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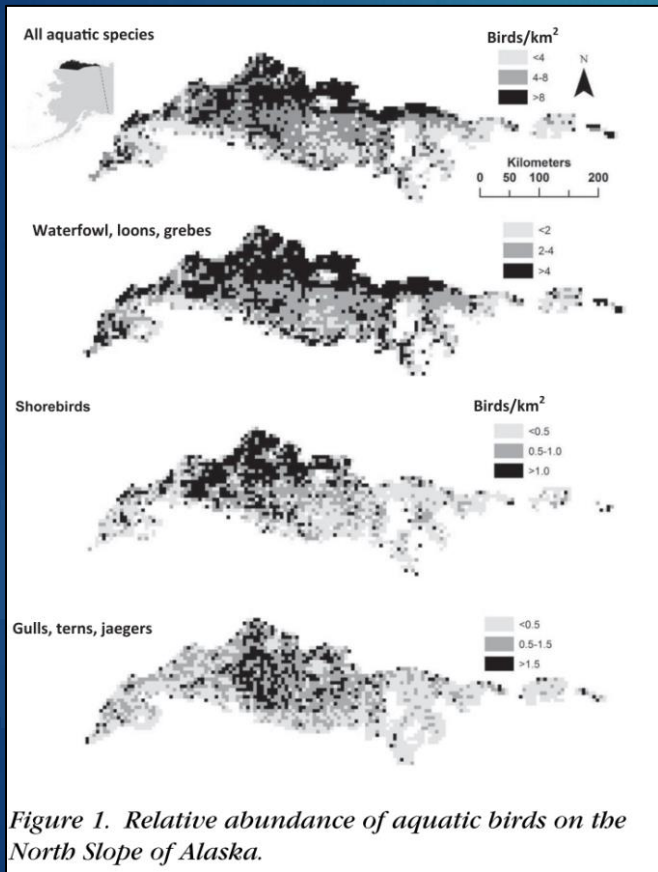
M. Lara - *In review*

# Updating Landforms & Vegetation

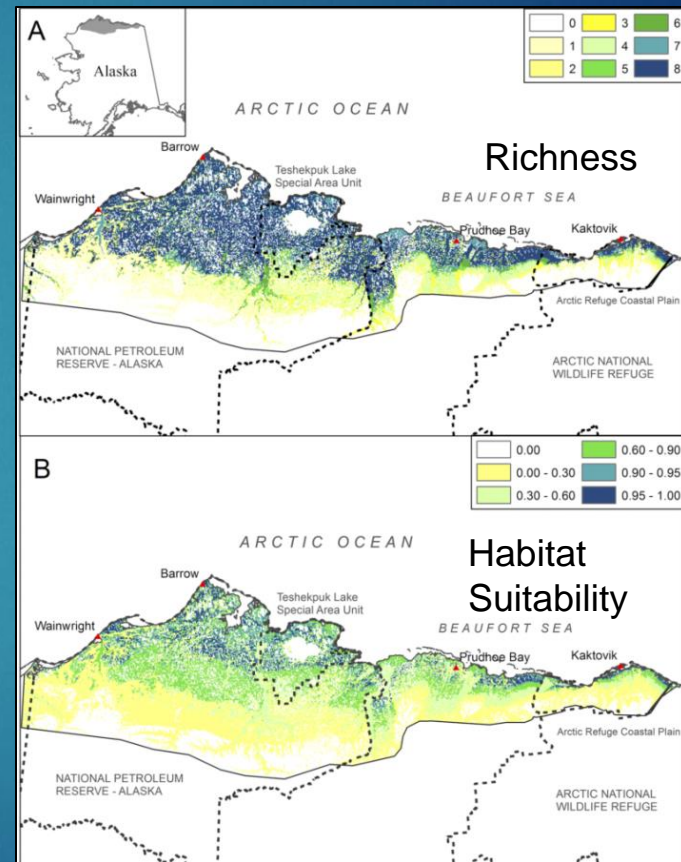


# Other potential impacts

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Bart et al. 2013. ConBio



Saalfeldt et al. 2013. Ecosphere

# Development of Decision Support Tools

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- *Interactive and Iterative tools*
  - *Focus on potential impacts across multiple management regimes*
  - *Spatial Prioritization as one tool for managers*
- *Quantifying impacts given modern technological advancements*
  - *Future development patterns and footprints may not look like historical patterns*
- *Bringing Ecosystem and species expertise to the table*
  - *To best characterize impacts that differ across space and time (e.g., sensitive species)*