BLM Alaska Landscape Initiatives

NASA ABoVE Science Meeting
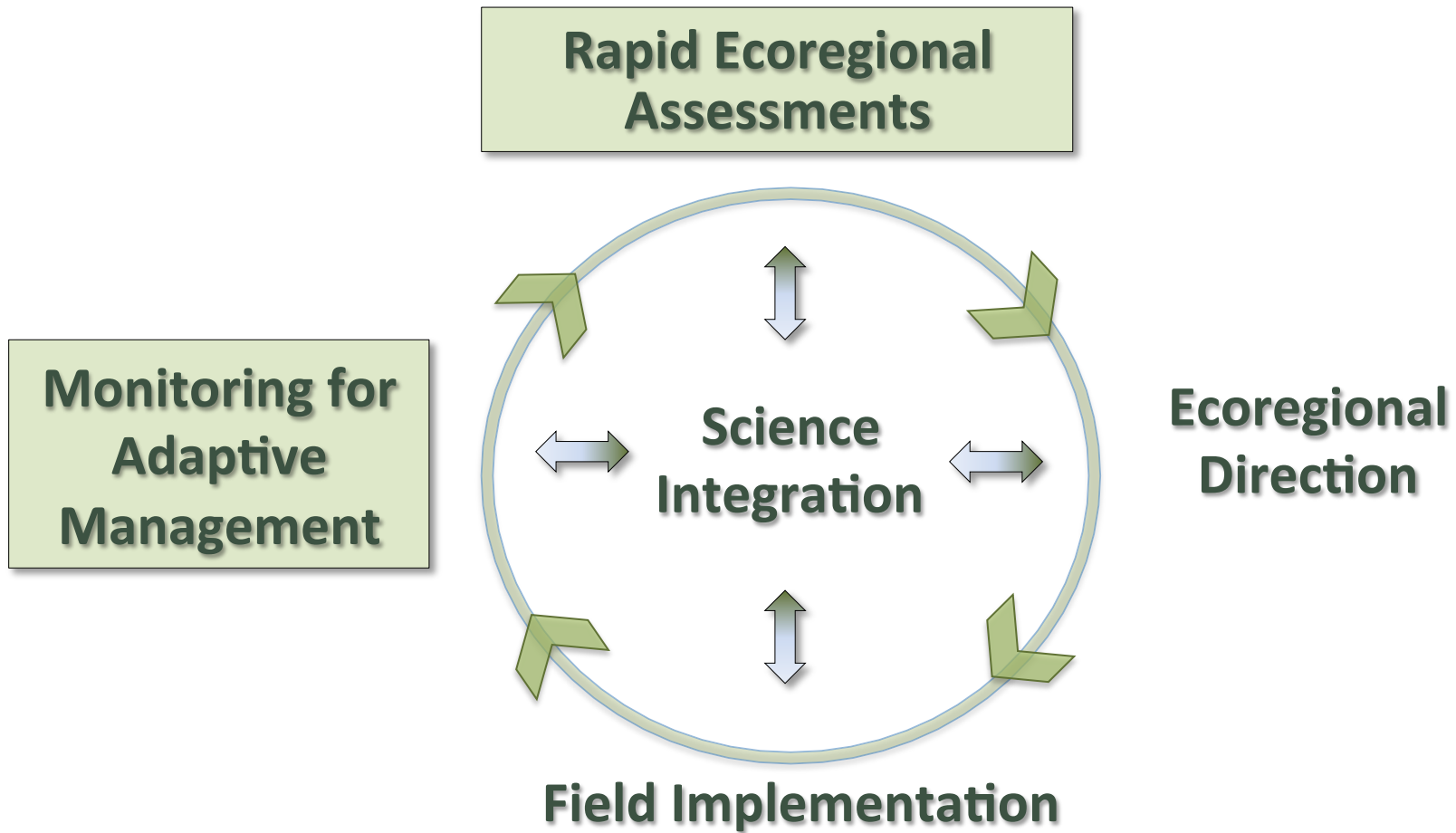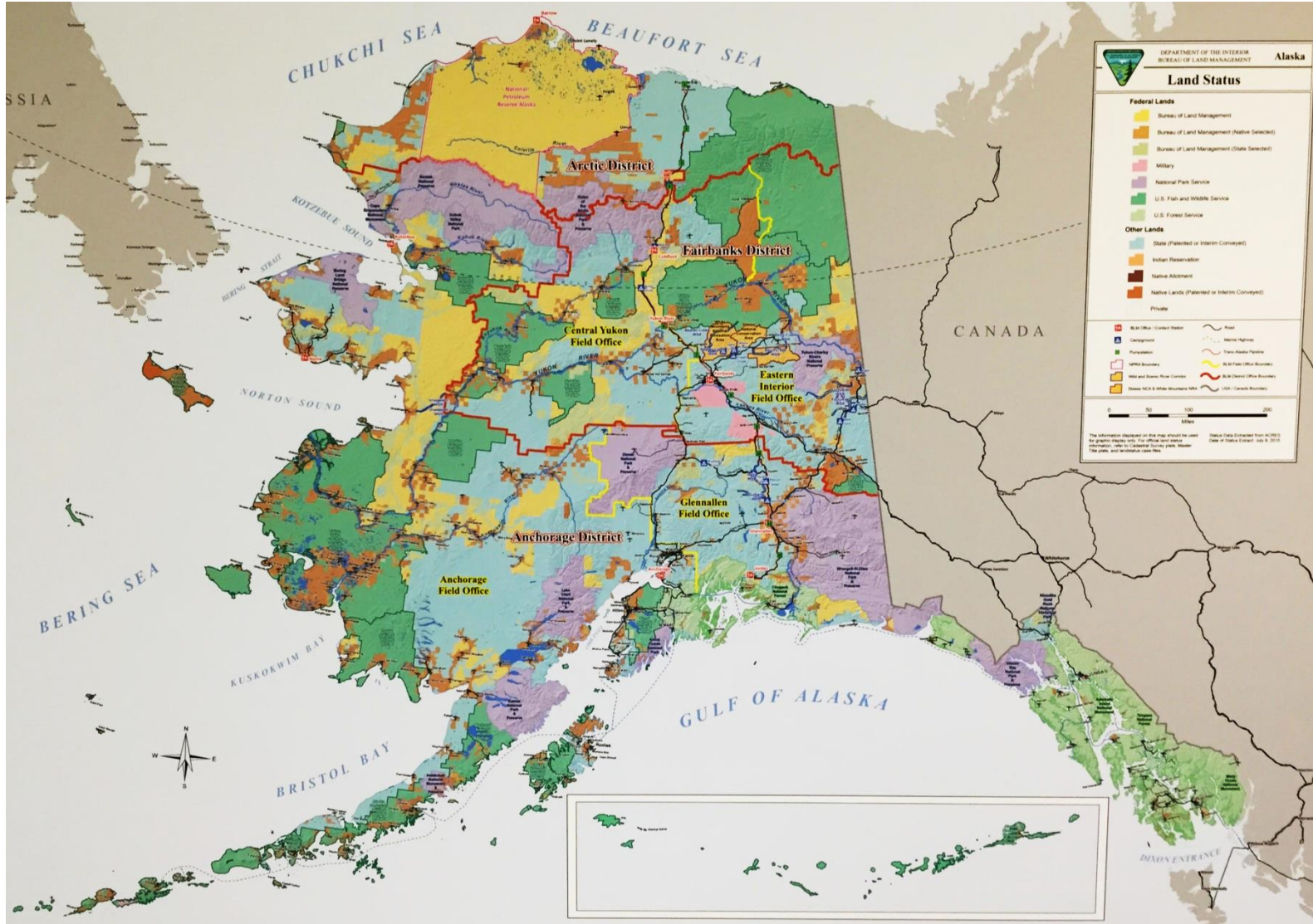
Jan 2016

Sec. Orders 3289 and 3330

- Addressing Impacts of Climate Change (2009)
  - The Order also directed the Department's bureaus and offices to "…work together, and with other Federal, state, tribal, and local governments, and private landowner partners, to develop landscape-level strategies for understanding and responding to climate change impacts."

- Mitigation Strategies (2013)
  - "…the use of a landscape-scale approach to identify and facilitate investment in key conservation priorities in a region."

BLM Landscape Approach

Rapid Ecoregional Assessments

Monitoring for Adaptive Management

Science Integration

Ecoregional Direction

Field Implementation

Alaska Land Status

BLM Alaska

BLM

Bureau of Land Management

Assessment, Inventory, and Monitoring Strategy

**For Integrated Renewable Resources Management**

Produced by
U.S. Department of the Interior
Bureau of Land Management
Washington, D.C. 20240
August 2011

NPR-A AIM Management Objectives

- Establish a long-term monitoring program (including processes/protocols/guidelines) to:
    - Quantitatively describe a pre-development statistically rigorous ecological status and trend baseline in the National Petroleum Reserve-Alaska (NPR-A);
    - Serve as a baseline monitoring network to ascertain the effectiveness of future management actions and adaptively manage, as necessary;
    - Establish an extensive sampling framework to, in part, integrate project-specific intensive sampling; and
    - Build on/integrate rich monitoring work already underway by the Arctic Field Office.

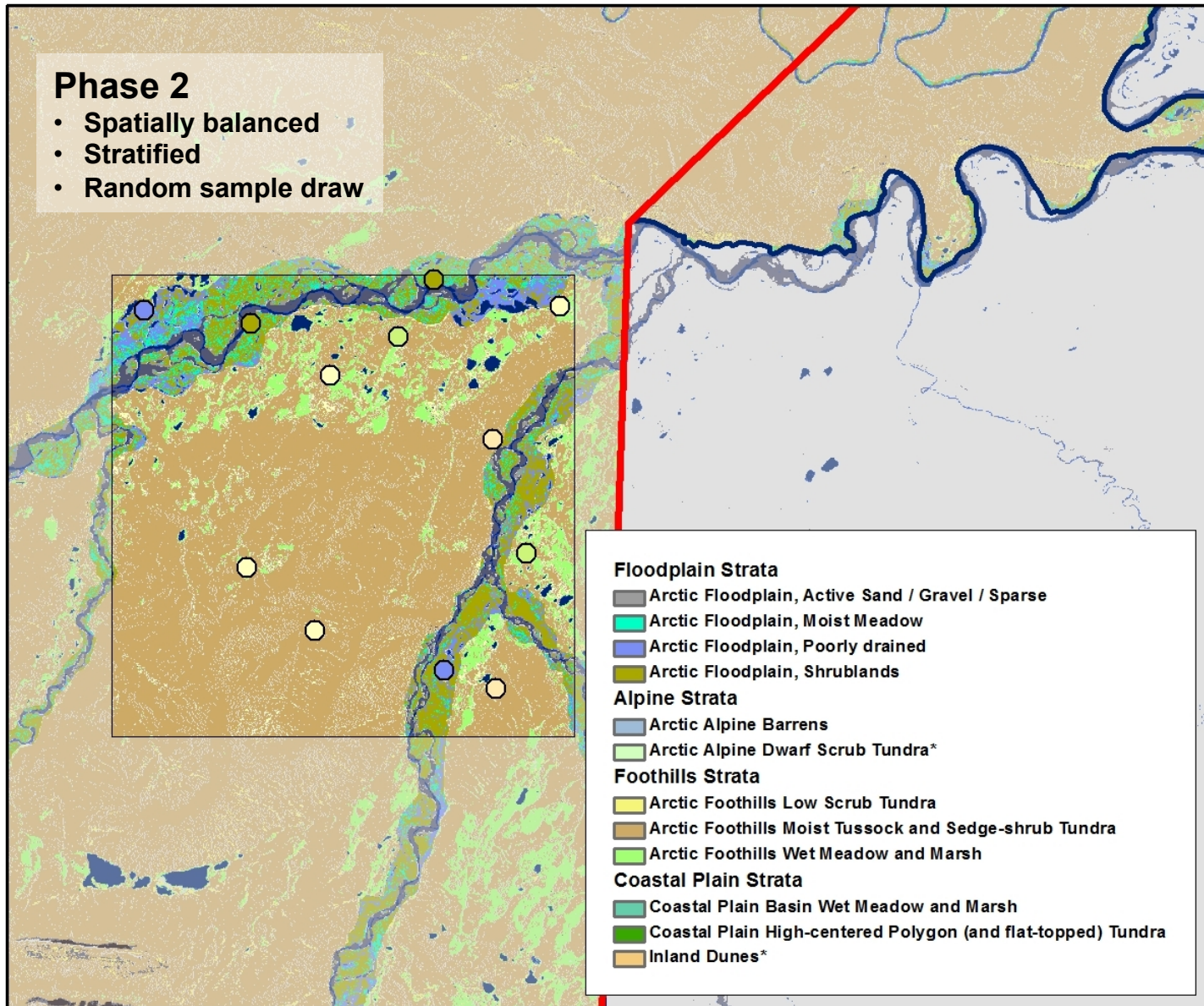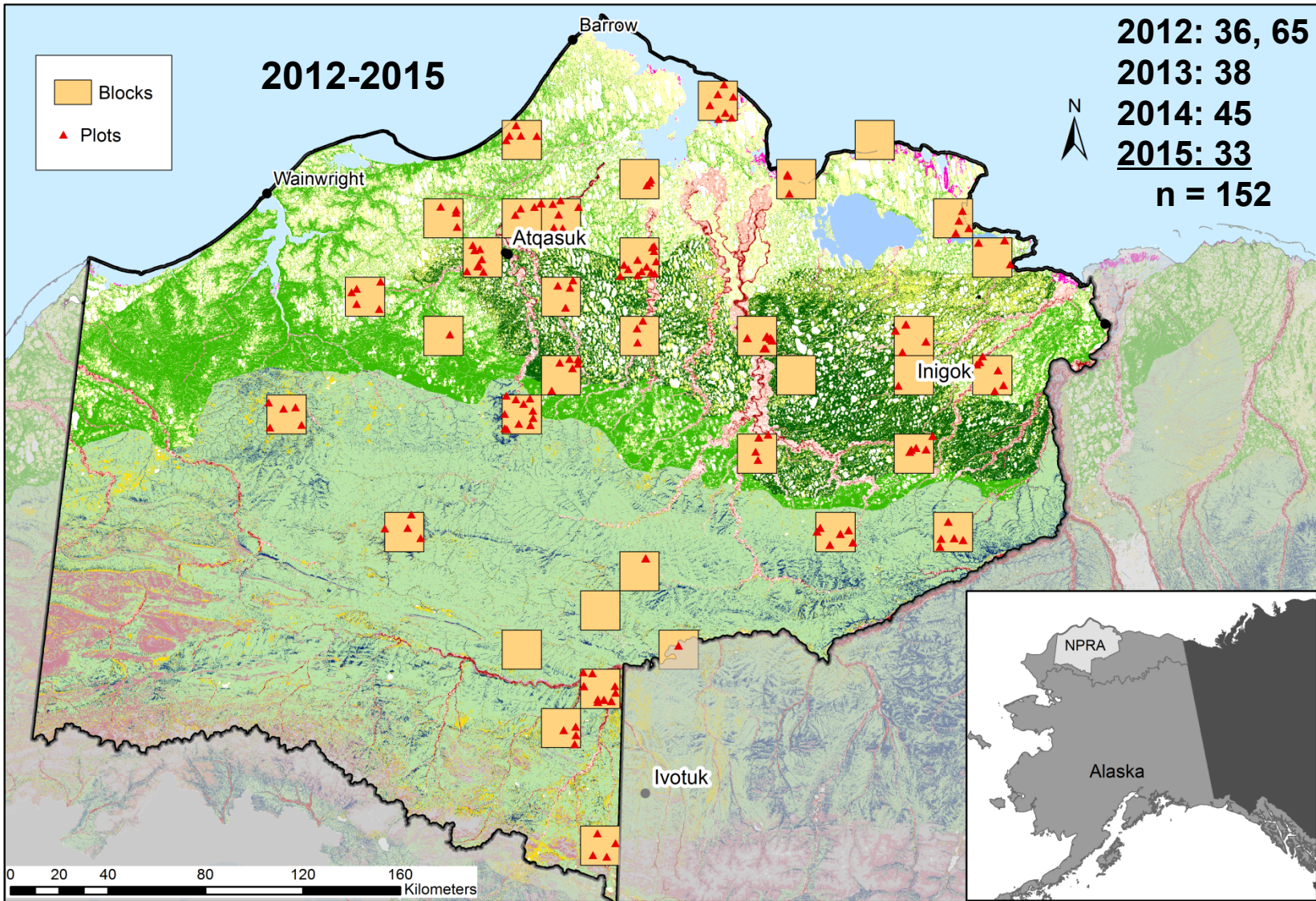# Two-Phase Sampling

Phase 1
- Ten square-mile grid
- Blocks randomly selected
- Strata evaluated
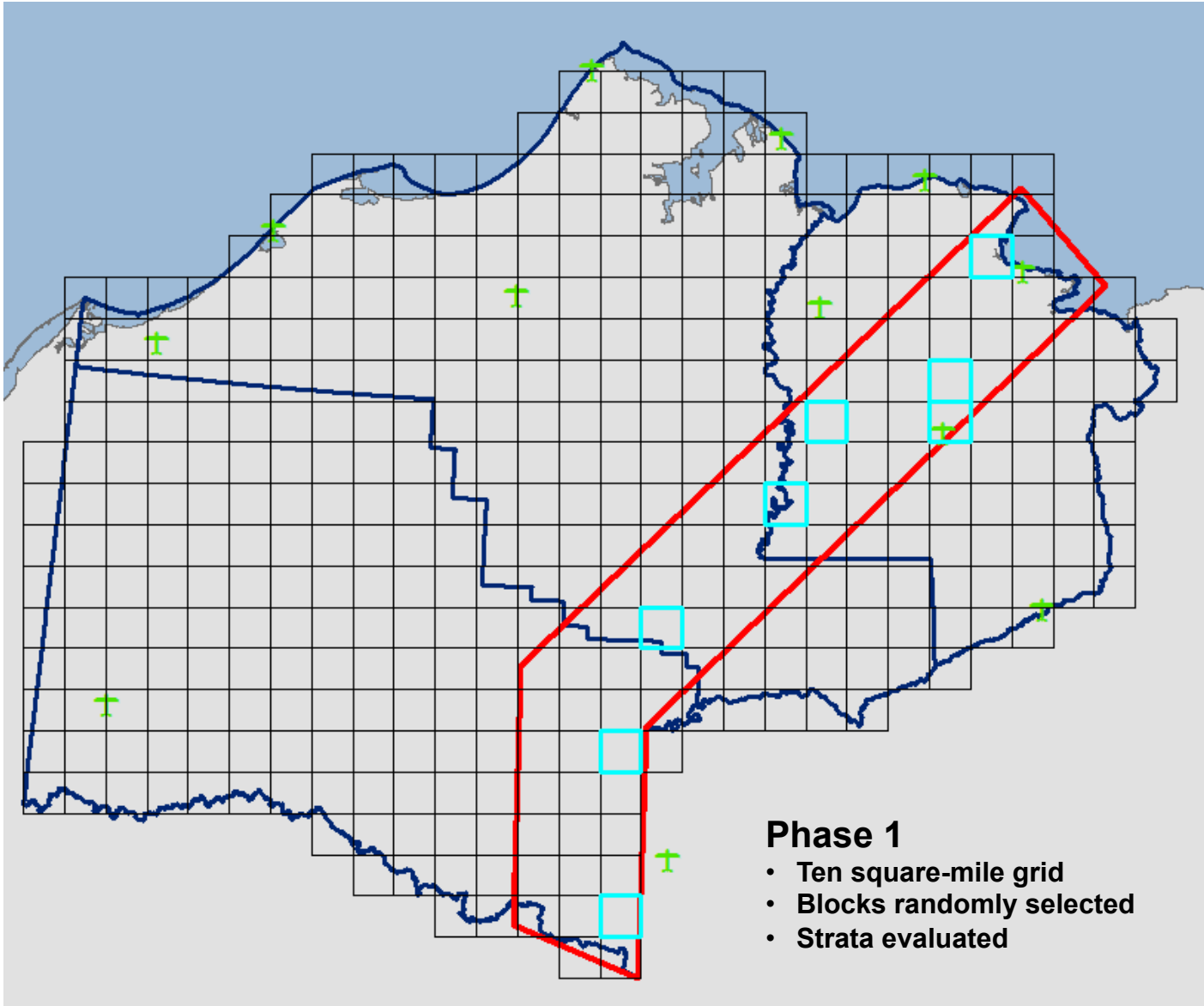
Two-Phase Sampling

Phase 2
- **Spatially balanced**
- **Stratified**
- **Random sample draw**

Floodplain Strata
- Arctic Floodplain, Active Sand / Gravel / Sparse
- Arctic Floodplain, Moist Meadow
- Arctic Floodplain, Poorly drained
- Arctic Floodplain, Shrublands

Alpine Strata
- Arctic Alpine Barrens
- Arctic Alpine Dwarf Scrub Tundra*

Foothills Strata
- Arctic Foothills Low Scrub Tundra
- Arctic Foothills Moist Tussock and Sedge-shrub Tundra
- Arctic Foothills Wet Meadow and Marsh

Coastal Plain Strata
- Coastal Plain Basin Wet Meadow and Marsh
- Coastal Plain High-centered Polygon (and flat-topped) Tundra
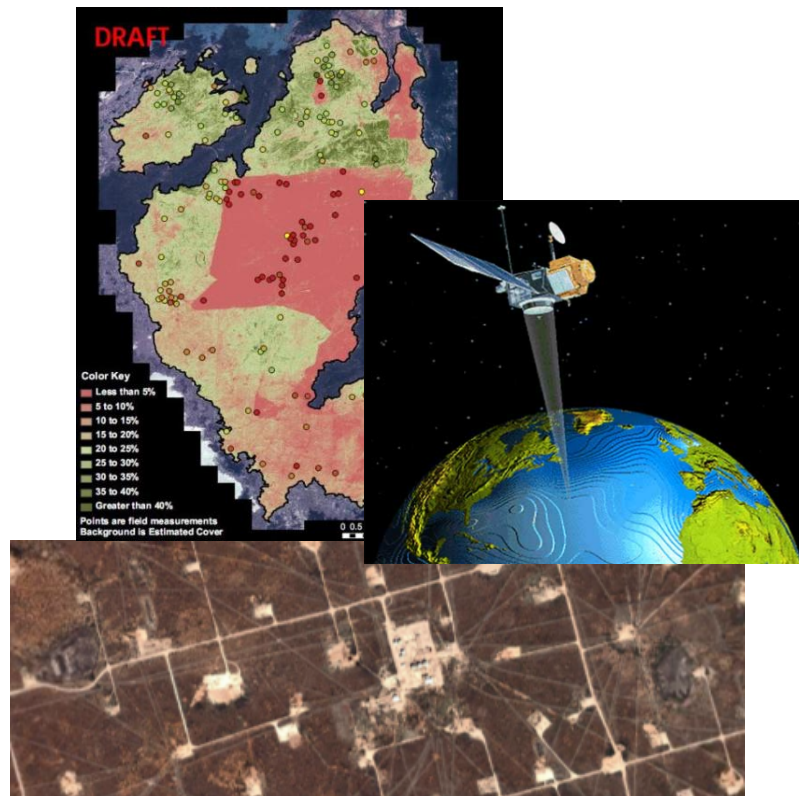- Inland Dunes*

Data Collection Approaches

Quantitative Condition & Trend
from
Plot-level data collection…
via "field" visits (core indicators), or
"remote" visits (UAS/ other)

Amount, Location, and Pattern
from
Mixed resolution imagery (2.5m to 250m) and spatial pattern metrics

Indicator List *(NPR-A pilot)*

Core:

- vegetation composition
- vegetation height
- bare ground
- non-native invasive plant species
- plant species of management concern
- proportion of soil surface in large canopy gaps
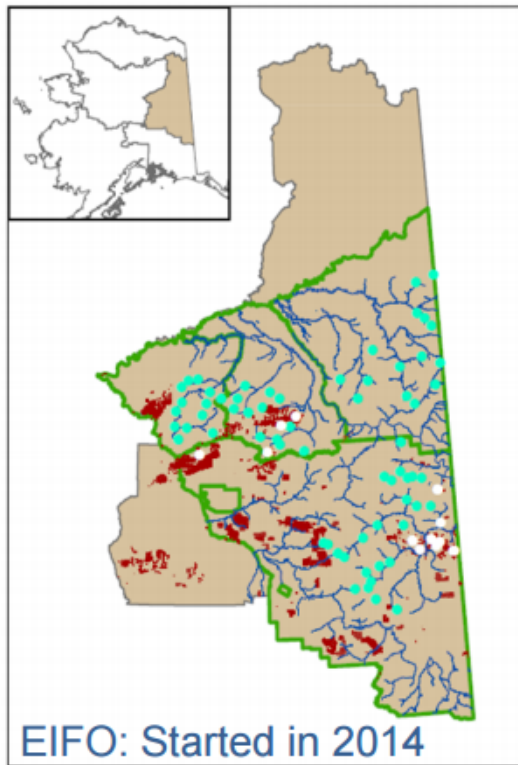- *landcover (habitat) amount, location, and pattern

Supplemental:

- moss/duff depth
- active layer depth
- *productivity/phenology
- *surficial permafrost features
- *surface water
- soil profile

*Collected via remote sensing

AIM Aquatic

Terrestrial forthcoming…

NPR-A: Started in 2015 in collaboration with AKDEC
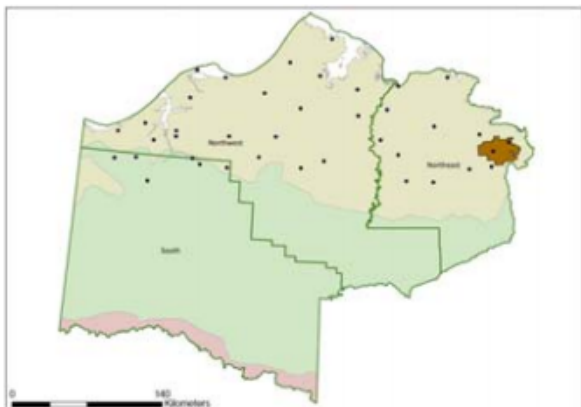
EIFO: Started in 2014
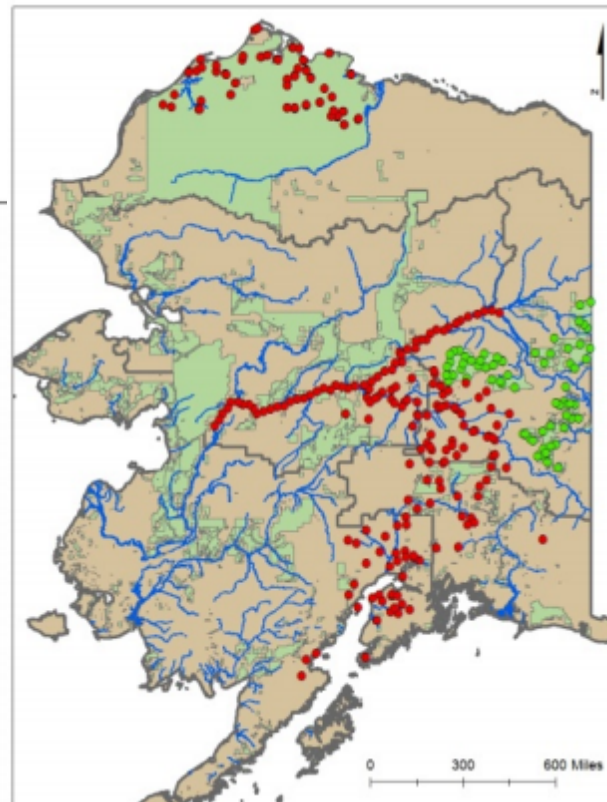
Indicator List *(Aquatic Westwide)*

Chemical
Conductivity
pH
Total Nitrogen[1]
Total Phosphorous[1]

Biological
Macroinvertebrates
% Shade
LWD
Riparian veg. cover

Physical
Temperature
Substrate
Pool dimensions/freq.
Floodplain connectivity
Bank angle/stability
Thalweg profile[1]
Instream habitat complexity[1]

BLM REAs
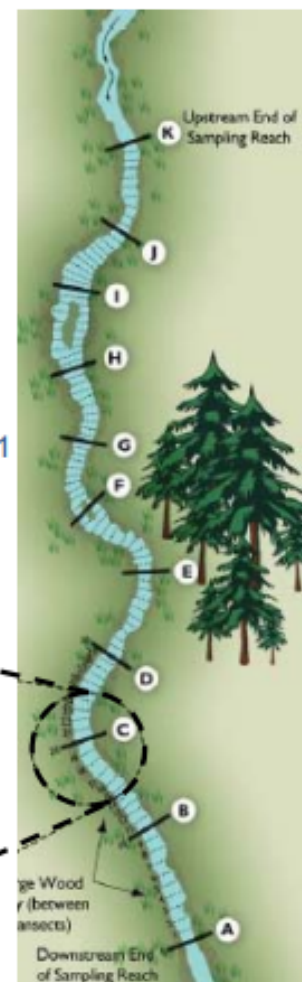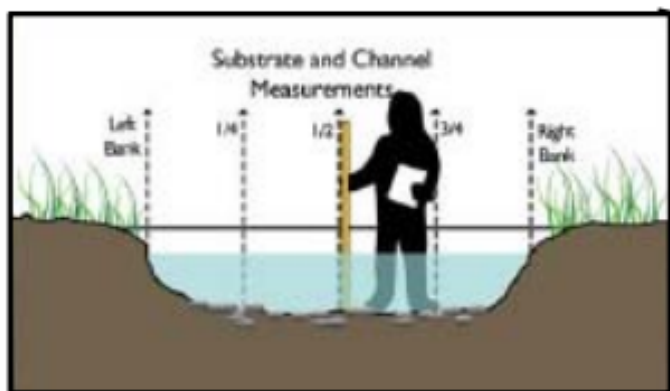
- Rapid Ecoregional Assessment
  - determine ecological values, conditions, and trends within large, regionally connected areas that have similar environmental characteristics
    - seek to identify important resource values and patterns of environmental change that may not be evident when focusing smaller, local land areas
    - gauge the potential of these habitats to be affected by regional change agents
  - "all" lands but "regional" resources
  - "rapid" because:
    - they synthesize existing information, rather than conduct research or collect new data
    - completed within 18-24 months

Locations of
Rapid Ecoregional
Assessments
(REAs)

Legend

Ecoregion(s) in REAs*

* Locations of REAs (indicated by
solid colors) are defined by one
or more ecoregions. Ecoregions
are based on Omernik Level III
Ecoregions and Unified
Ecoregions of Alaska. Hatched
areas of ecoregions were not
assessed.

Northwestern
Plains

Middle
Rockies

Northern
Great Basin

Wyoming
Basin

Central
Basin and Range

Colorado
Plateau

Southern
Great
Plains

Mojave
Basin and
Range

Sonoran
Desert

Madrean
Archipelago

Chihuahuan
Desert

North Slope

Central Yukon

Seward
Peninsula

Yukon
Kuskokwim

0   95   190
        Miles

0   100 200
        Miles

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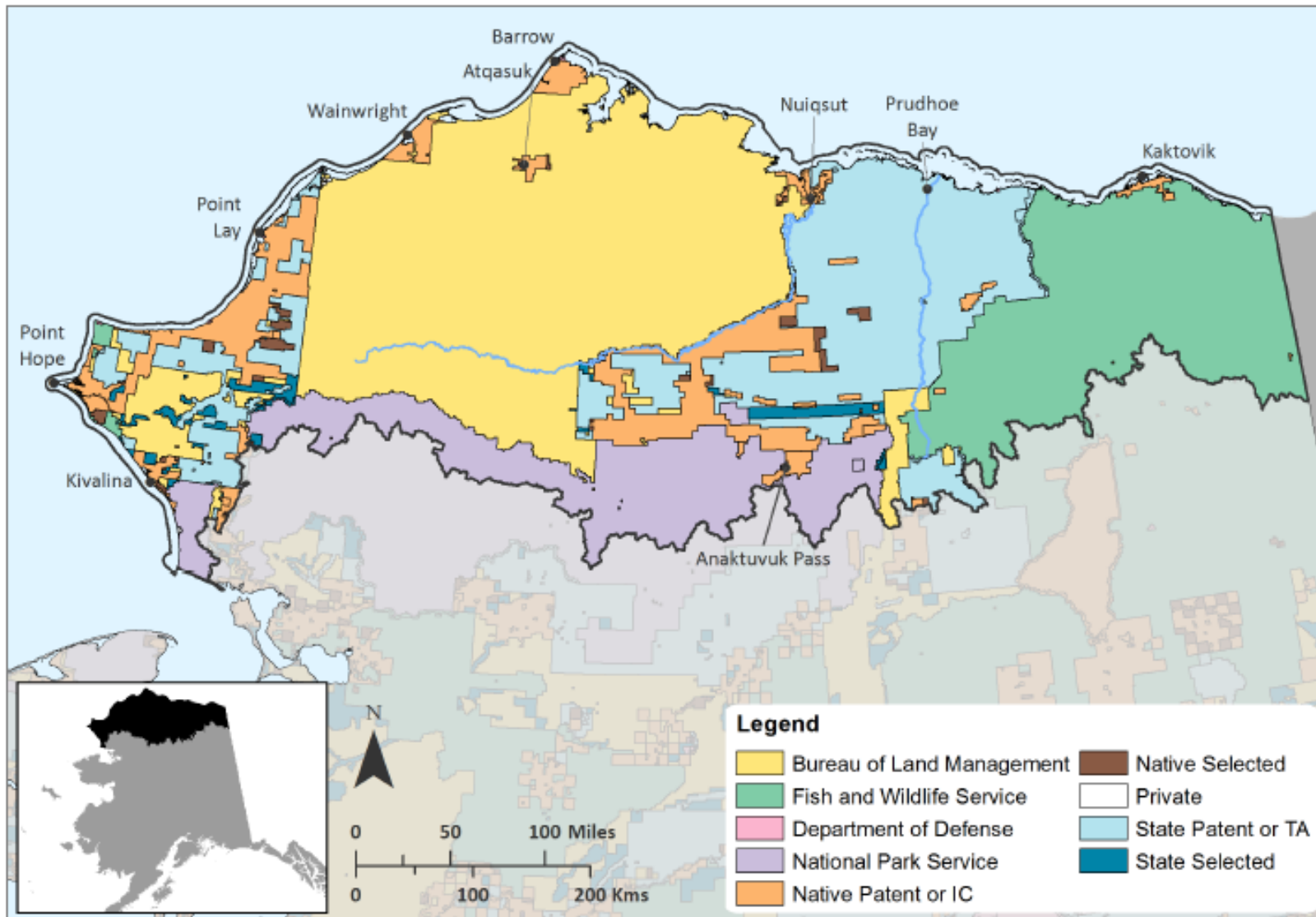
2.5. Land Owners and Stakeholders

Figure B-1. Land management status in the North Slope study area in 2014.

Table B-2. MQs selected by the AMT for analysis as part of the North Slope REA.

Abiotic Change Agents (Section C)	
AB-1	*Is the fire regime changing on the North Slope and what is the likely future fire regime (or range of regimes) based on climate projections and current knowledge of the relationships between climate and fire?*
AB-2	*How will permafrost change spatially and temporally over the next two decades?*
TC-3	*How will changes in precipitation, evapotranspiration, and active layer depth alter summer surface water availability in shallow-water and mesic/wet tundra habitats and how reliable are these projections?*
TC-5	*How is climate change affecting the timing of snow melt and snow onset, spring breakup and green-up, and growing season length?*
Anthropogenic Factors (Section E)	
AP-1	*What physical and perceptual limitations to access to subsistence resources by local residents are caused by oil/gas activities?*
AP-2	*How are oil, gas, and mineral development on the North Slope impacting near- and far-field air quality, with particular emphasis on communities and "sensitive class 2" areas such as ANWR, Gates, Noatak?*
AT-1	*What parameters can help measure impacts from anthropogenic activities independently of natural cycles and vice versa?*
AT-2	*What potential impacts will oil/gas exploration and development have on CE habitat?*
AT-3	*What additional contaminants baseline data are needed for fish, birds, marine and terrestrial species, particularly those that affect the health and safety of subsistence foods?*
AF-2	*What are the measurable and perceived impacts of development on subsistence harvest of fish?*
TF-3	*What are the measurable and perceived impacts of development on subsistence harvest of caribou?*
Aquatic Coarse Filter CEs (Section I)	
AC-1	*How does water withdrawal from lakes for oil and gas activities (year-round industrial and domestic use and winter operations) affect lake water quantity and water quality, outflow/stream connectivity, and down-basin stream habitat?*
Aquatic Fine Filter CEs (Section J)	

Table B-1. Change Agents and Conservation Elements selected for the North Slope REA.

Change Agents (CAs)
Climate
precipitation
temperature
thaw date
freeze date
climate envelopes
Fire
return interval
vegetation response
Permafrost
mean annual ground temperature
active layer thickness
Invasive Species
Anthropogenic Uses
subsistence
natural resource extraction
transportation and communication infrastructure
recreation
energy development

Conservation Elements (CEs)	
Coarse-Filter CEs	**Fine-Filter CEs**
Terrestrial Coarse-Filter	**Terrestrial Fine-Filter**
coastal plain moist tundra	Nearctic brown lemming
coastal plain wetland	Arctic fox
sand sheet wetland	caribou
sand sheet moist tundra	Lapland longspur
foothills tussock tundra	willow ptarmigan
alpine dwarf shrub	greater white-fronted goose
tidal marsh	raptor concentration areas
marine beach, barrier islands, and spits	**Aquatic Fine-Filter**
Aquatic Coarse-Filter	broad whitefish
deep connected lakes	Dolly Varden
shallow connected lakes	Arctic grayling
large streams	burbot
small streams	chum salmon

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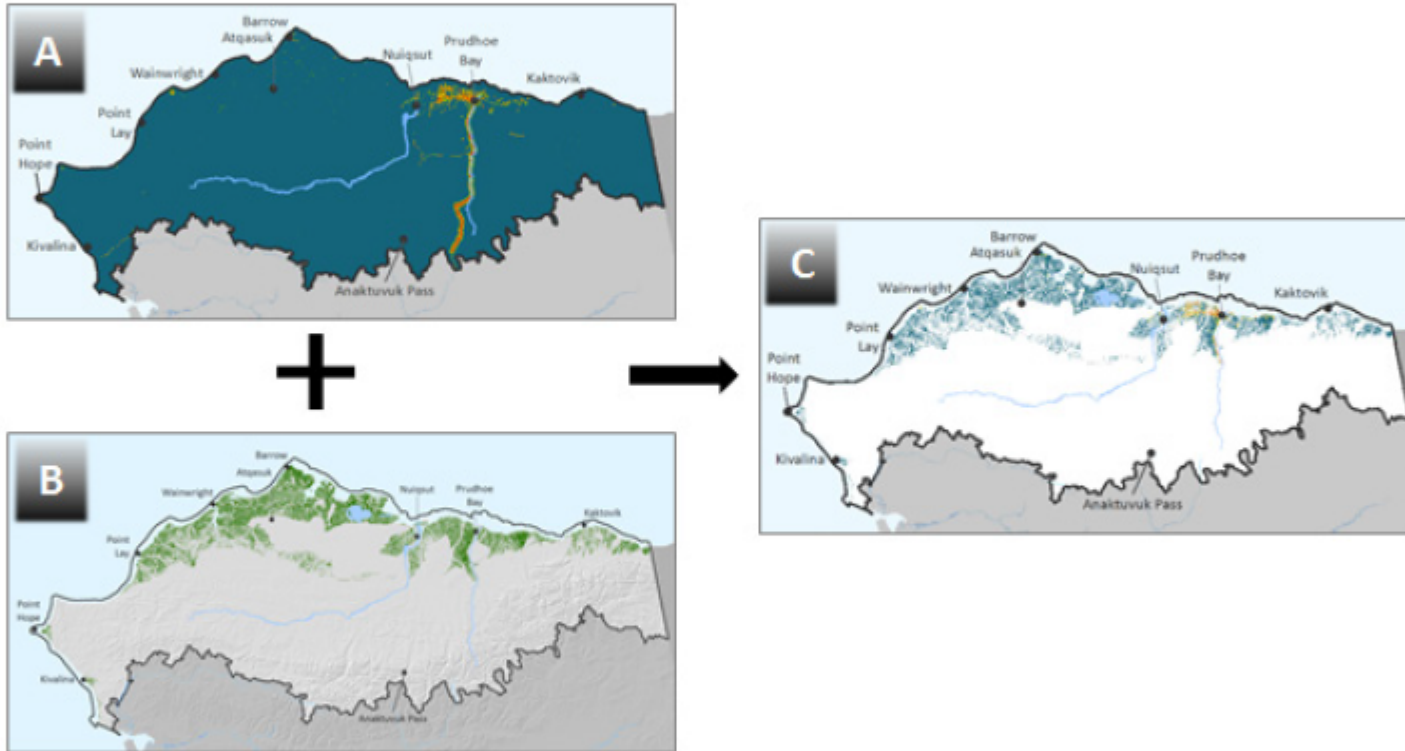BUREAU OF LAND MANAGEMENT

Figure B-5. Example process of assessing status of a Conservation Element (CE). Landscape condition (A) is extracted to the distribution of a CE (B) to generate the CE status (C). Warmer colors in the CE status represent areas of lower expected ecological condition.

K.   Data Gaps and Omissions

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MQ #	Management Question	Dataset Gap	Dataset Needed
TC 1	What are the impacts of oil/gas development (i.e. gravel pad and road construction; pipeline construction) on vegetation and hydrology? (Known impacts include burial, dust, saline runoff and altered soil moisture.)	Current extent, much less future extent, is poorly represented in publically available datasets.	Comprehensive infrastructure dataset available to the public
TC 2	What are the changes in habitat and vegetation related to changing permafrost conditions, and what will these changes mean to wildlife and habitats?	Mismatch of land cover datasets used by the different models. Mismatch of land cover used to model species and those used to map coarse-filter CEs.	Comprehensive, unified, hierarchical land cover dataset that is used across all modeling efforts.
TC 3	How will changes in precipitation, evapotranspiration, and active layer depth alter summer surface water availability in shallow-water and mesic/wet tundra habitats and how reliable are these projections?	Lack of understanding of hydrologic conditions, no spatial data, no hydrologic models, and no hydroclimatic models.	Watershed-scale hydrologic models for the North Slope
TC 4	What are the expected changes to habitat as a result of coastal erosion and coastal salinization?	No comprehensive current shoreline and historic shoreline maps and no storm surge model.	Consistently developed current shoreline and historic shoreline maps and a storm surge model.
TC 5	How is climate change affecting the timing of snow melt and snow onset, spring breakup and green-up, and growing season length?	Temporal resolution of climate data is too coarse to precisely quantify these changes	Daily climate data, better snow models
TF 1	What are the baseline data for the species composition, numbers of individuals, vegetation type used, and change in numbers/species composition of land birds and their habitat over time?	No spatial data for land birds and their habitat over time.	Need spatial data on land birds and their habitat over time.

Thank you…

Questions?