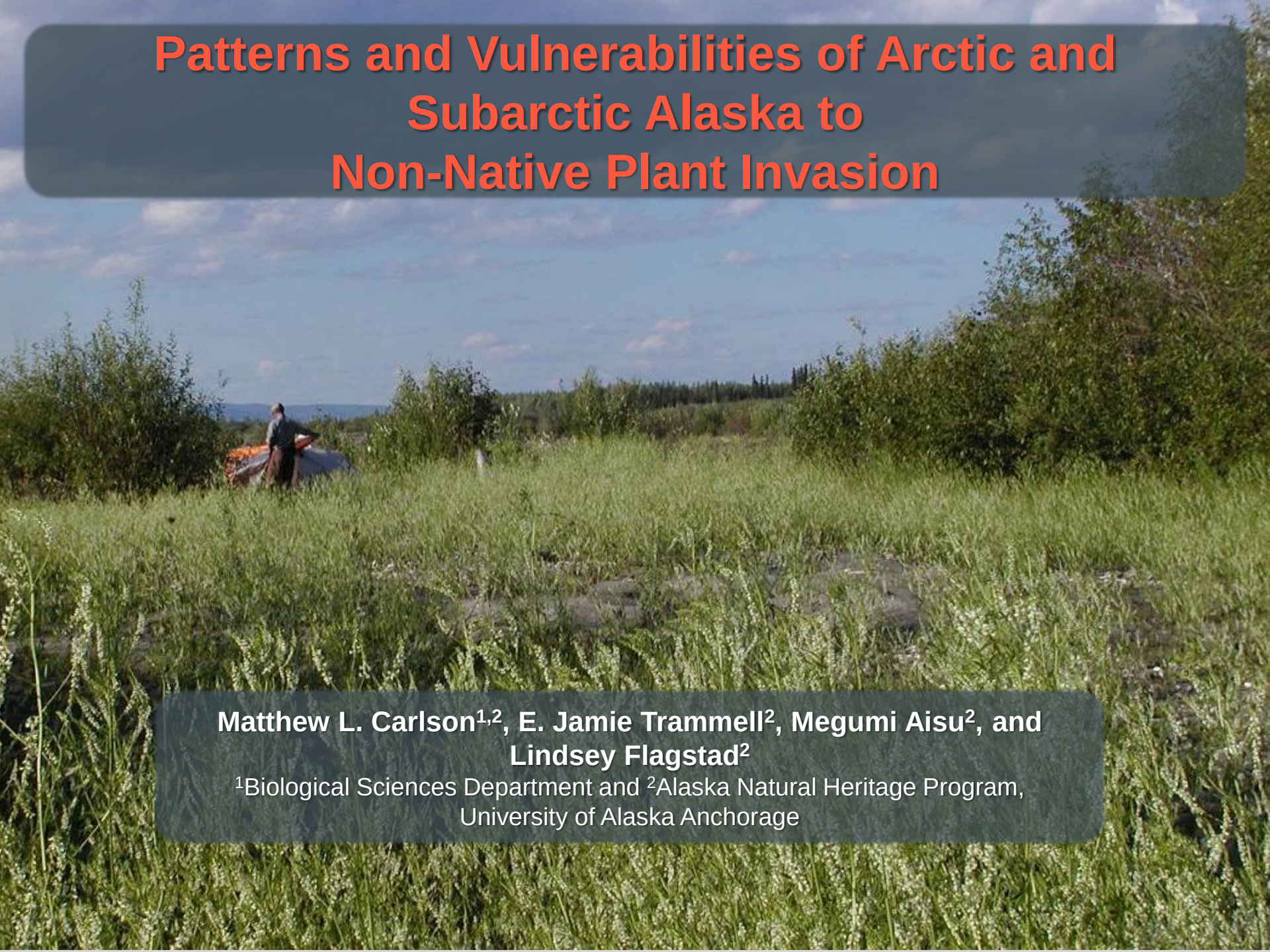
Patterns and Vulnerabilities of Arctic and Subarctic Alaska to Non-Native Plant Invasion



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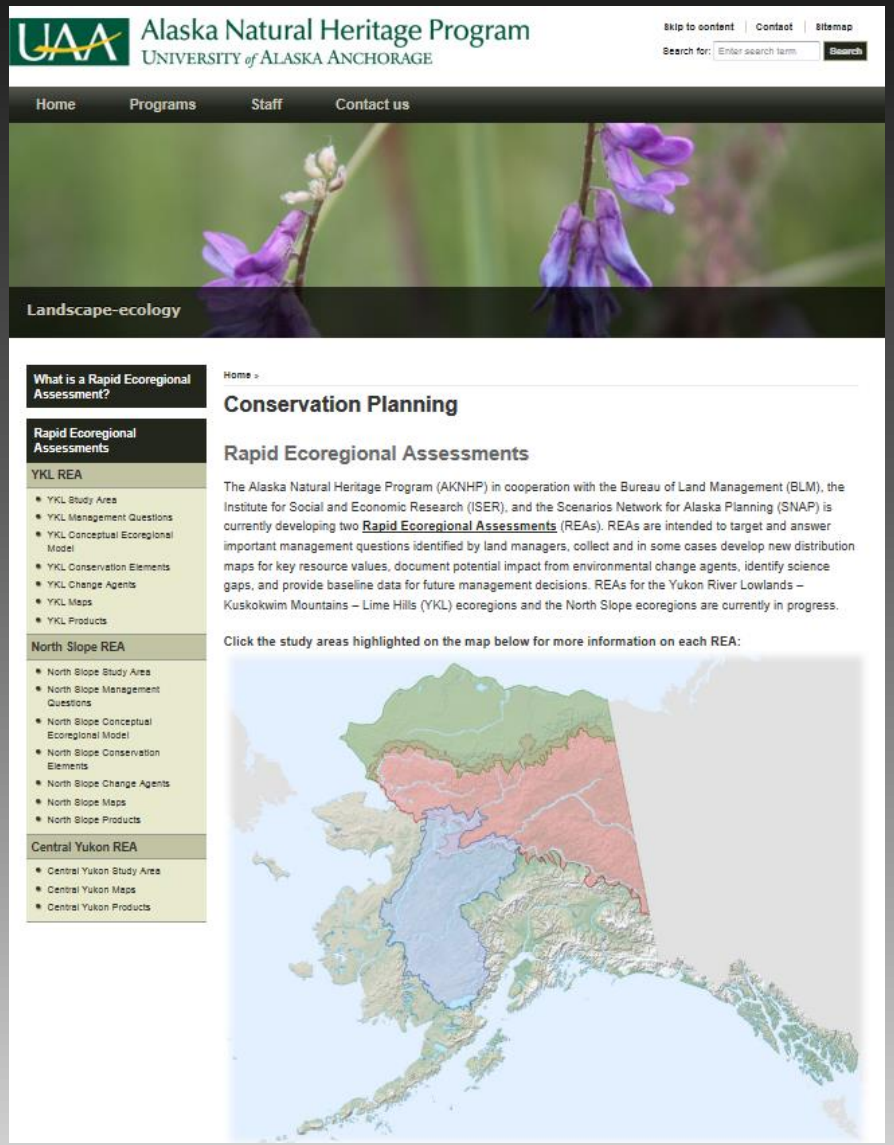
Bureau of Land Management: Rapid Ecoregional Assessments

Funding and guidance:
AK BLM, Scott Guyer, Alisa Segal, and Management Team

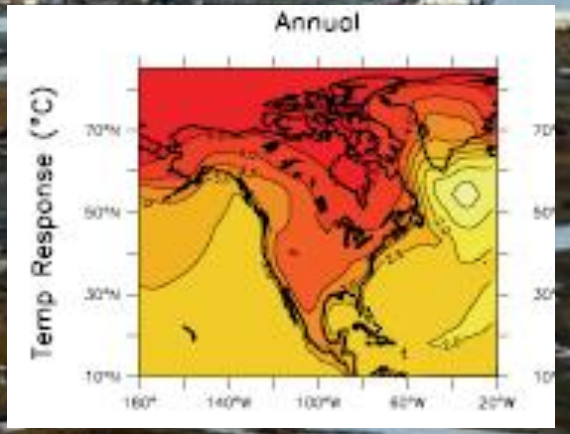
Collaborators:
SNAP – UAF
ISER – UAA
AKNHP – UAA



Arctic and boreal systems: lower levels of large scale human-induced habitat alteration than most other biomes - And fewer non-native species

Economies (subsistence & market) largely reliant on highly functional natural ecological systems
However, systems with low resistance and resiliency

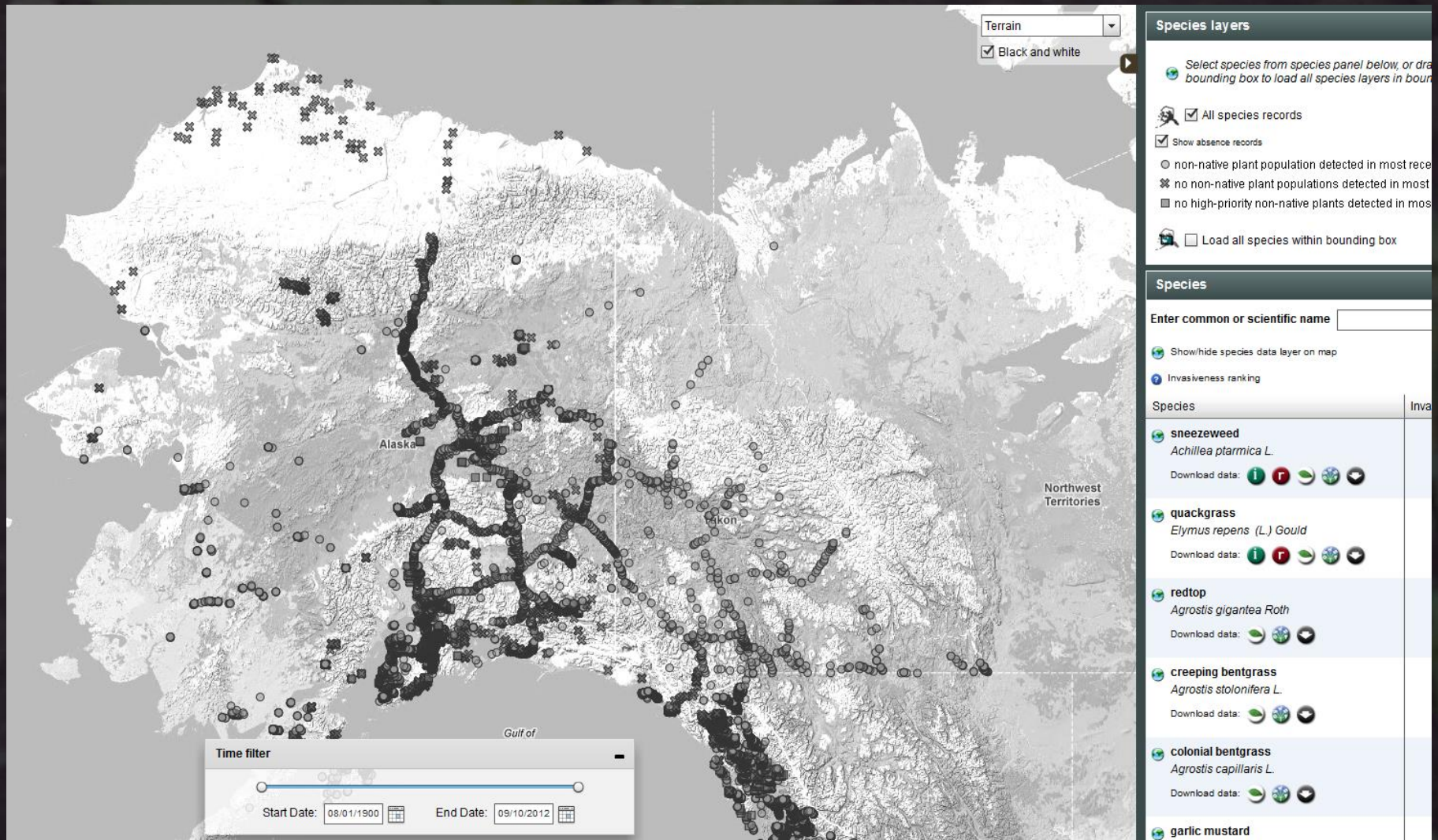
Arctic and boreal systems facing numerous stressors



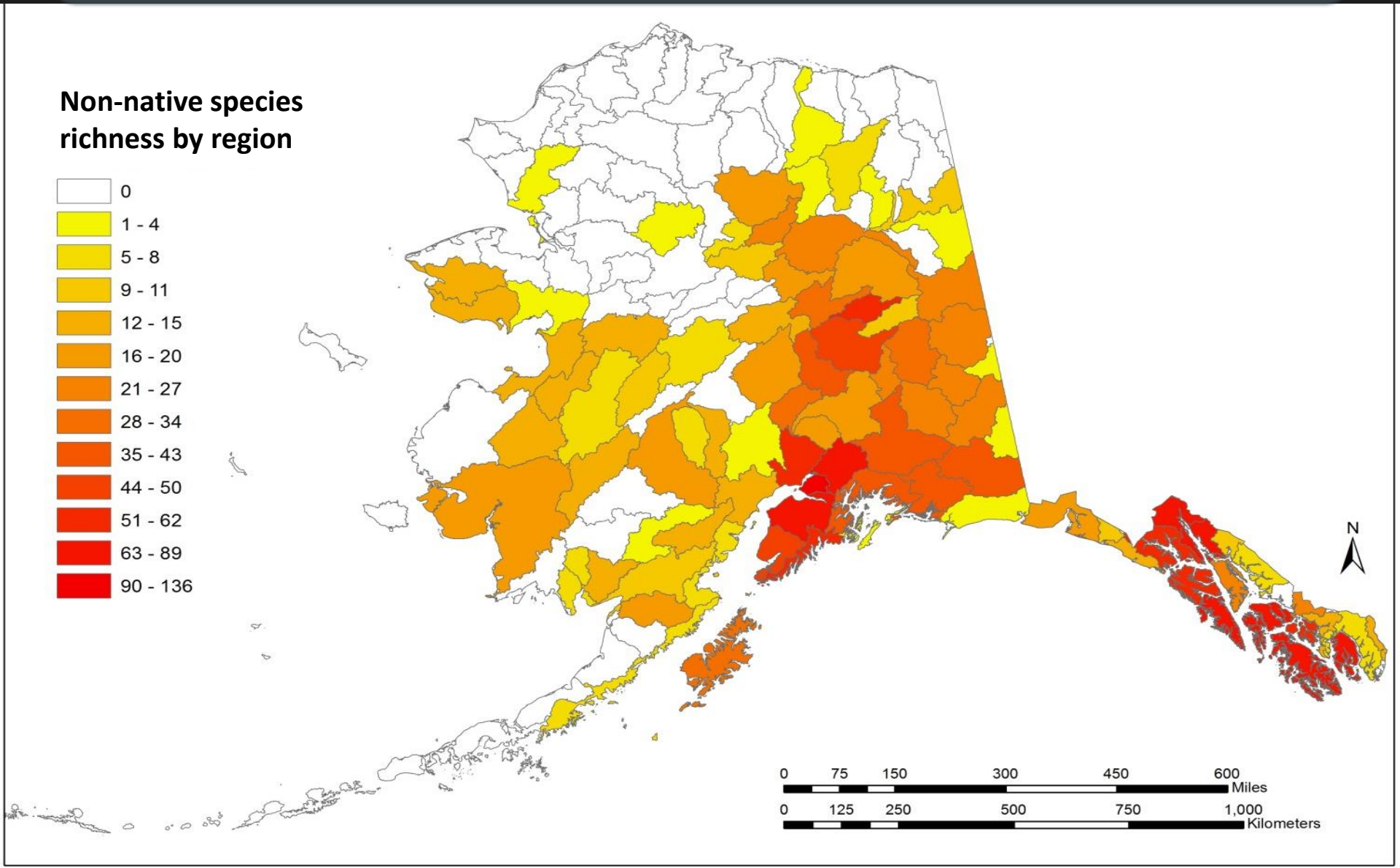
IPCC 2007

Current Status – Distribution

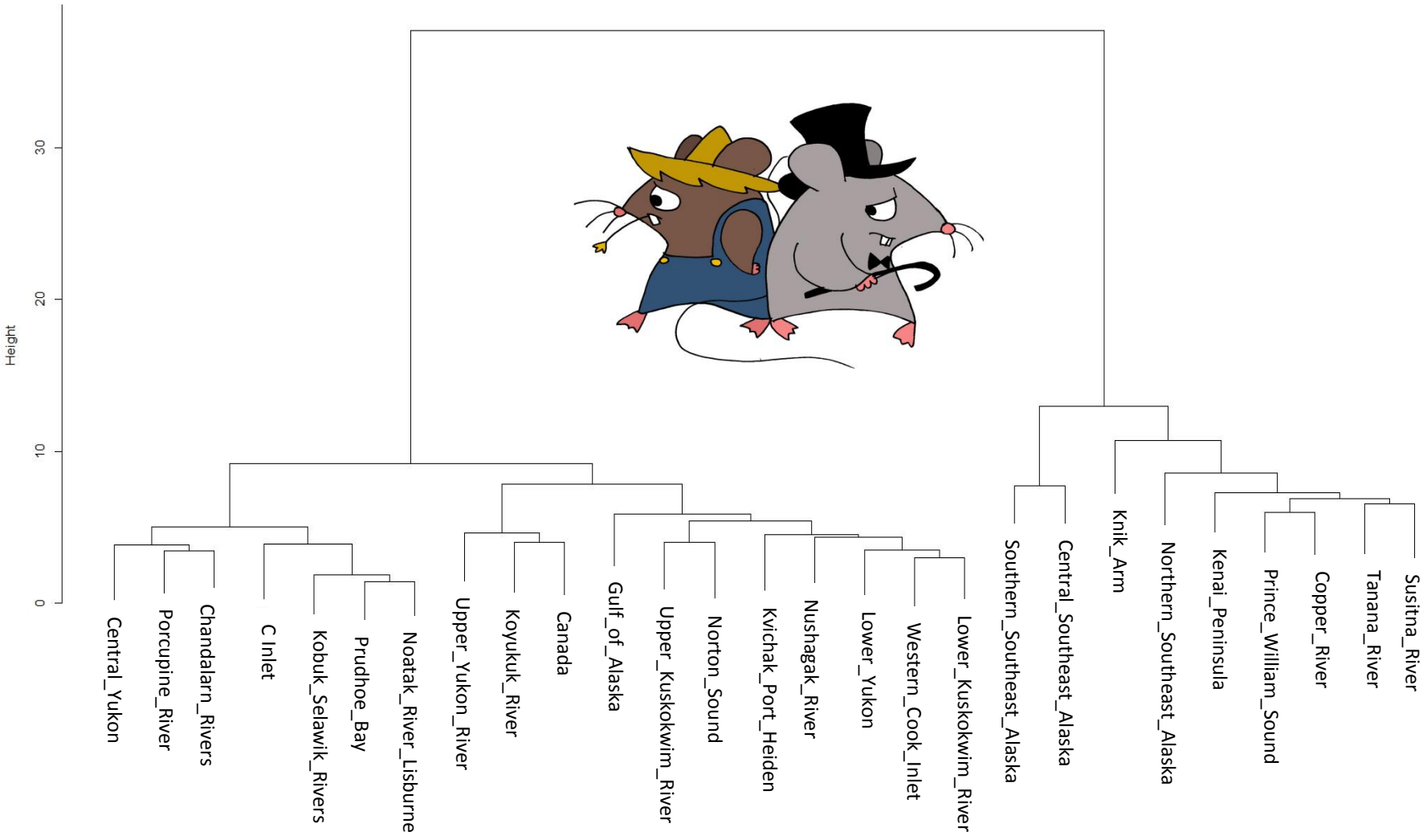
- Presence and Absence Data (AKEPIC: http://aknhp.uaa.alaska.edu/maps/akepic/



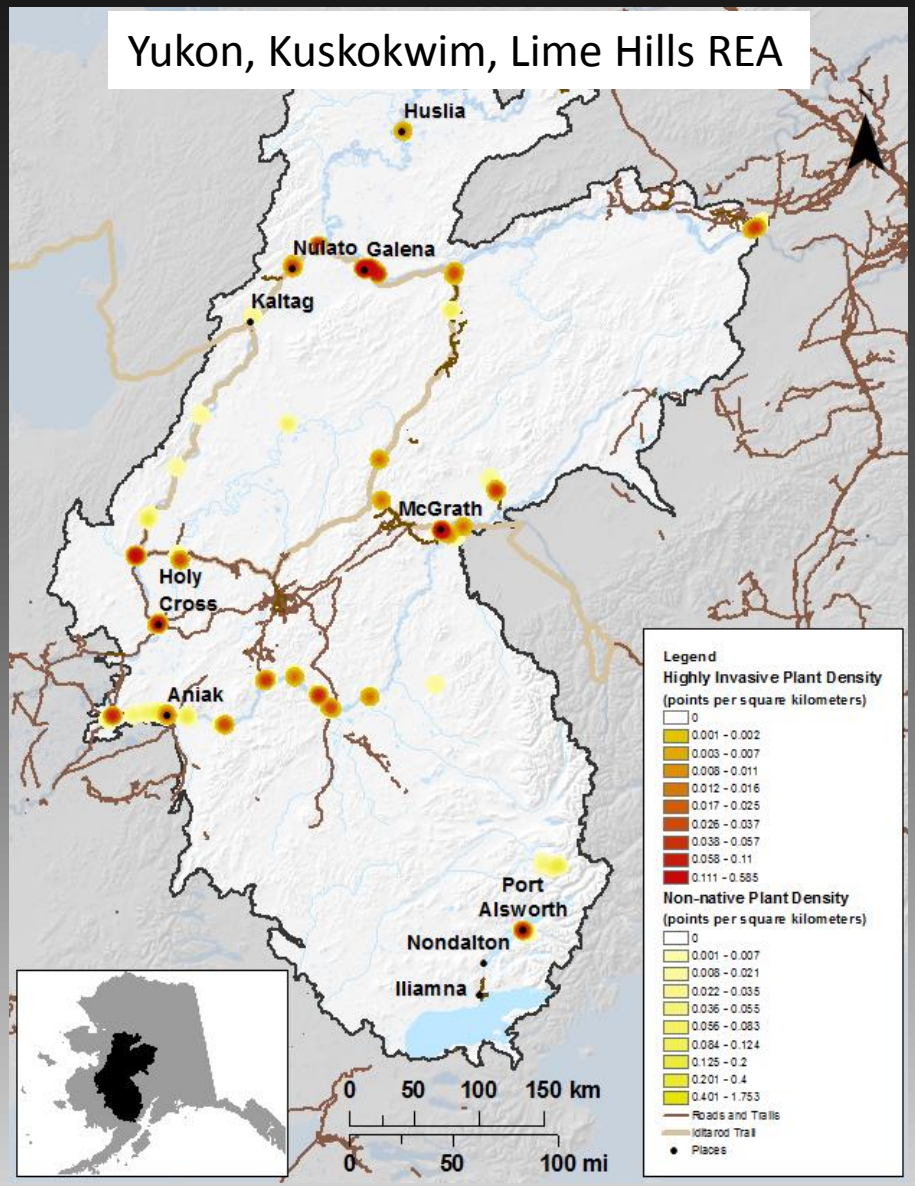
Current Status - Geographic patterns of non-native plant diversity



Geographic Pattern of Non-Native Species Assemblages



Exploring Scenarios of Infestation Vulnerability – 1 Subarctic



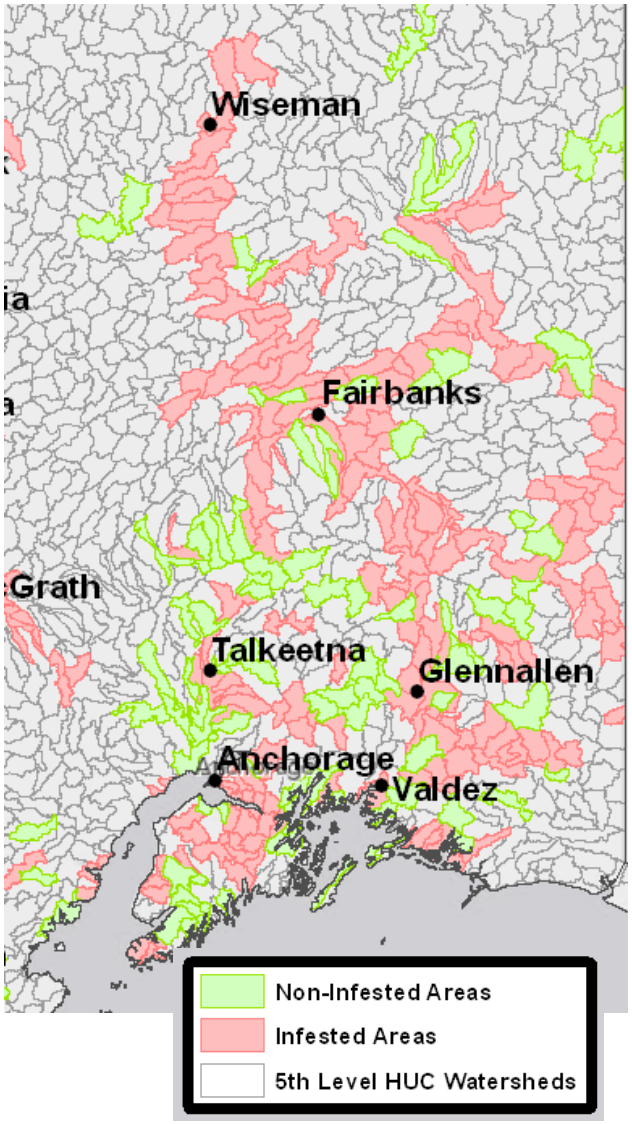
Current infestations concentrated in villages

- Secondarily along trails

Explore possible future conditions with a synthetic approach

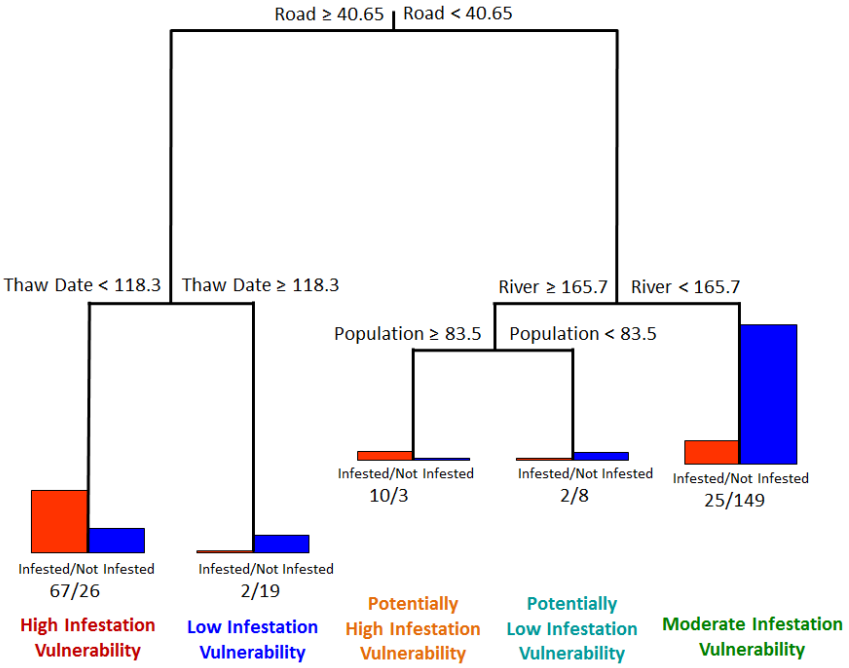
Exploring Scenarios of Infestation Vulnerability – 1 Subarctic

- Infestation index: Watersheds with "moderately-highly invasive" species record and ≥ 10 non-native species
- Association of 28 climate, habitat, and anthropogenic explanatory variables with 315 "infested/not infested" watersheds in CART and Random Forest
- Identify important threshold values
- Project onto region of interest in GIS
- Explore potential scenarios of climate, development, etc.

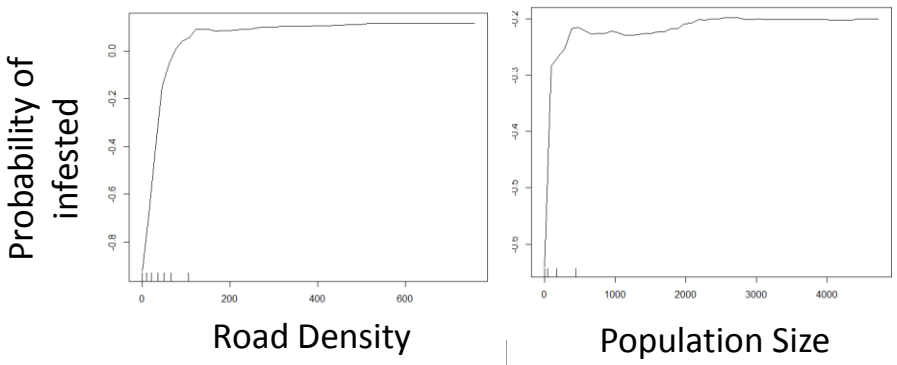


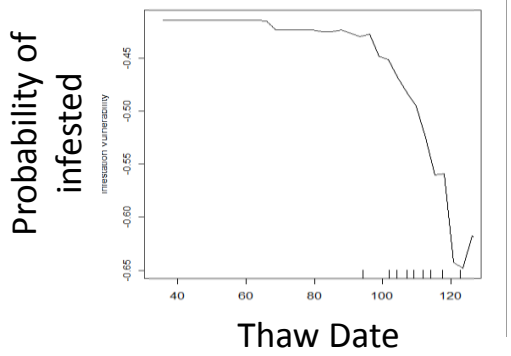
Exploring Scenarios of Infestation Vulnerability – 1 Subarctic

- Moderate model performance
- Useful explanatory variables
  - Road density
  - Date of thaw
  - River length
  - Population size



Partial Dependence Plots

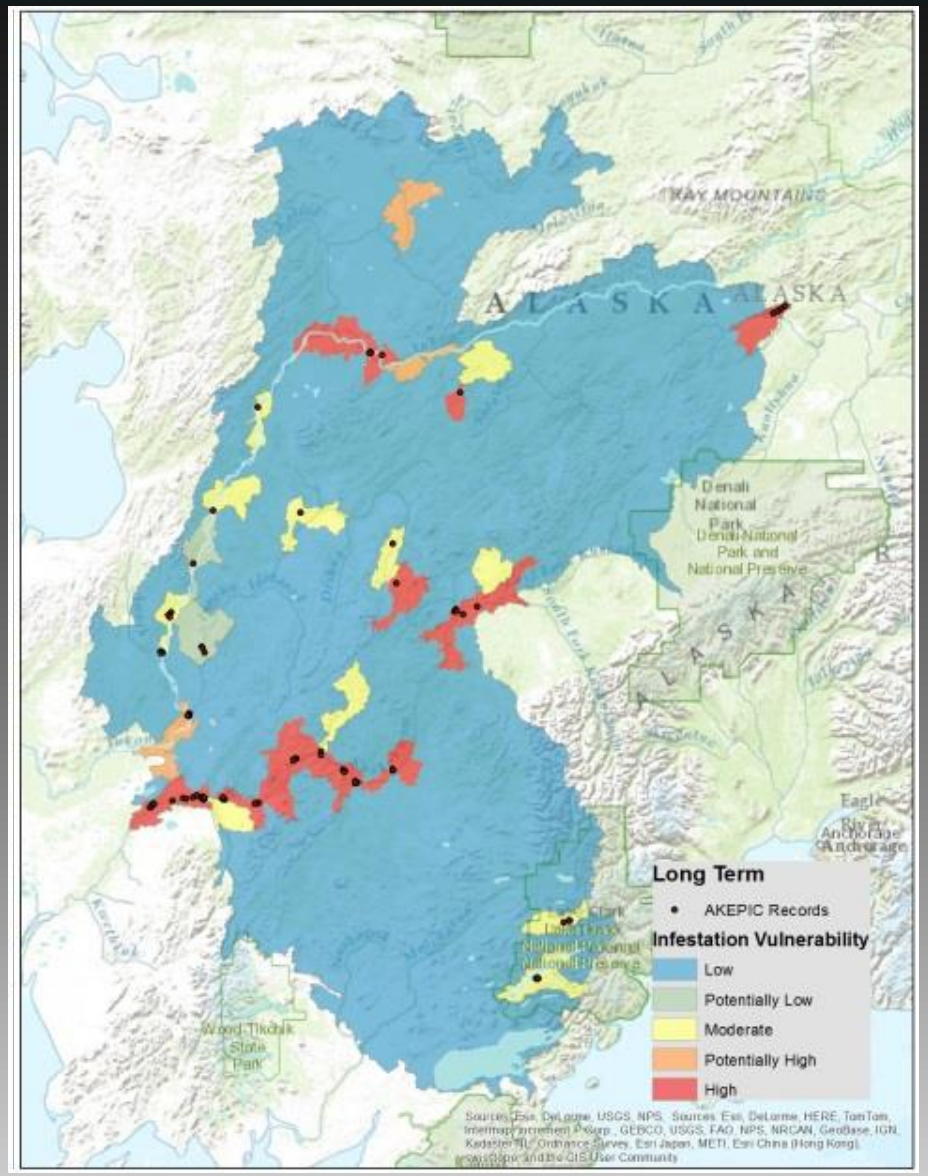




Exploring Scenarios of Infestation Vulnerability – 1 Subarctic

Yukon, Kuskokwim, Lime Hills Ecoregions

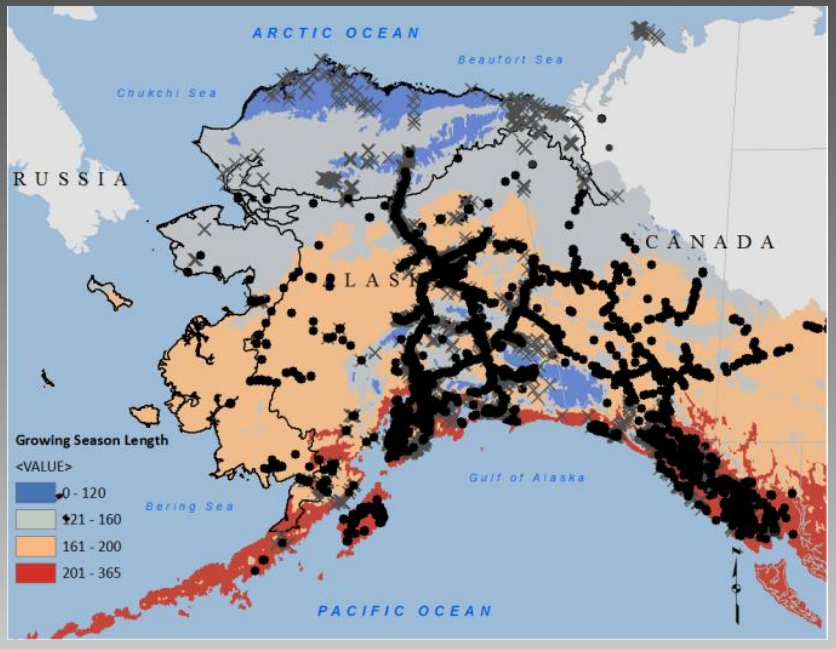
- Model outputs mapped on to YKL are reasonable correspondence with known infestations
- Low vulnerabilities overall
- Predicted increase risk along the Kuskokwim by 2060



Exploring Scenarios of Infestation Vulnerability – 2 Arctic

Exploring Scenarios of Infestation Vulnerability – 2 Arctic

- Non-native plants restricted to warm margins of arctic Alaska
- Cosmopolitan cold-tolerant weeds
- Short growing seasons and low temperatures appear to limit the number of non-native plant species



Exploring Scenarios of Infestation Vulnerability – 2 Arctic