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Disturbances Influencing Human Access to Ecosystem Services

Project Code: Brinkman-01

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Institutional Collaborations

- Federal & State: USDA Forest Service, Alaska Department of Fish and Game
- Native Organizations: Council of Athabascan Tribal Governments, Tanana Chiefs Conference, several community-level tribal entities
- UAF programs: Bonanza Creek LTER, Scenarios Network for Arctic and Alaska Planning, Community Partnerships for Self Reliance
- Interdisciplinary Science Team

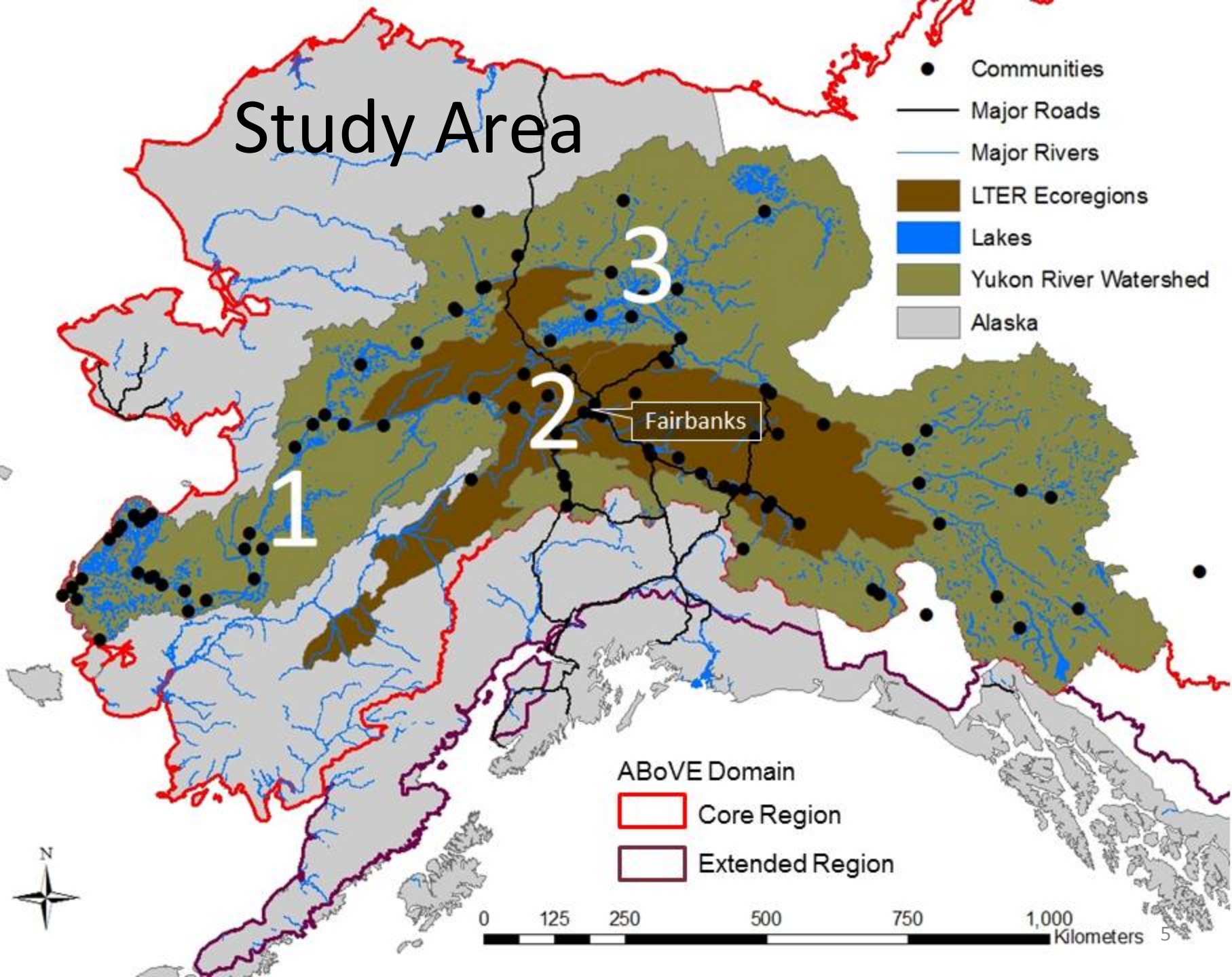
And... but... therefore

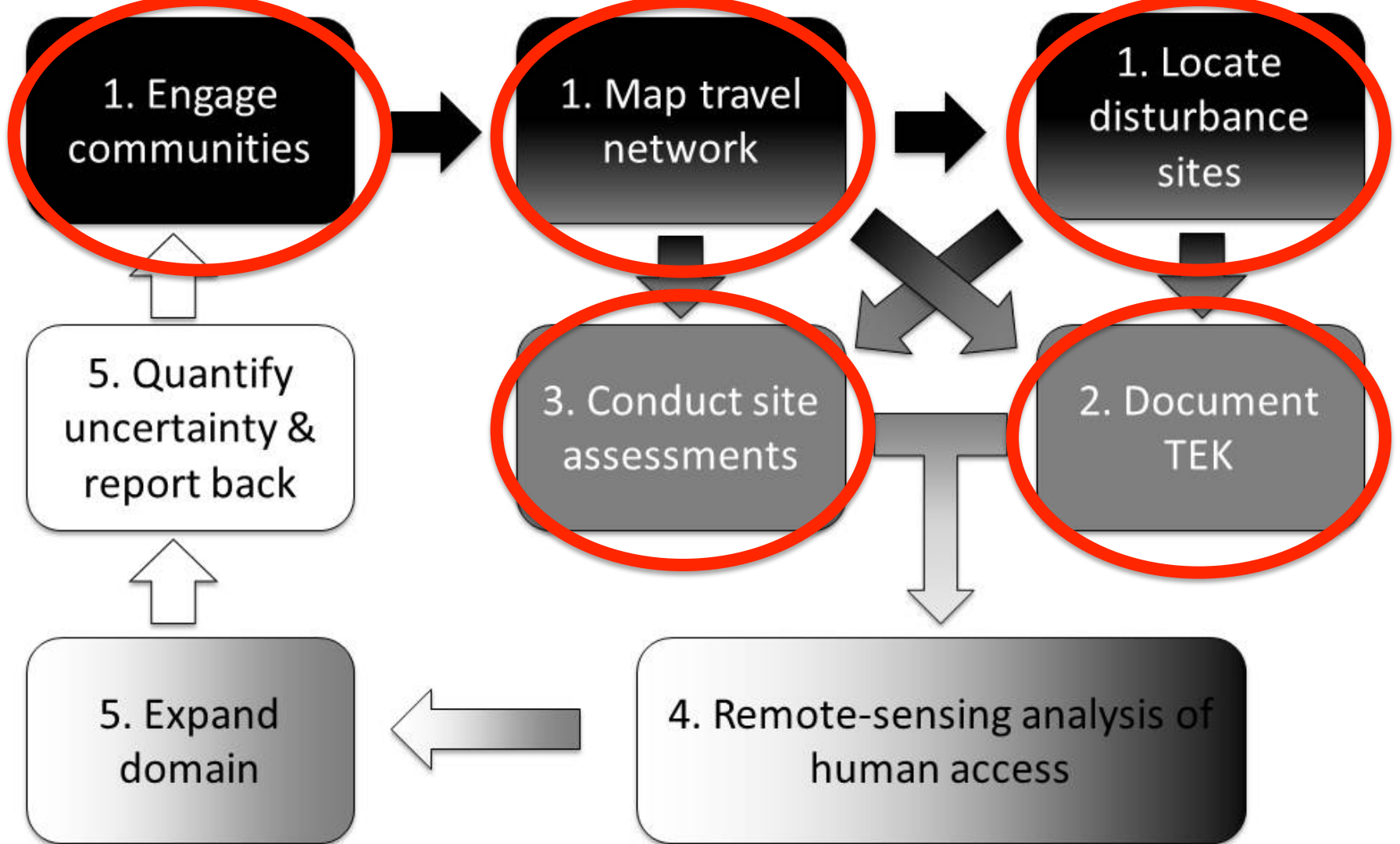
- Increasingly, communities within the ABoVE-domain have expressed concern that changes in the environment are influencing their ability to access wild resources, **AND** researchers have qualitatively documented local perceptions
- **BUT**, knowledge is limited on the level, range, and cause of disturbance.
- **THEREFORE**, we are implementing integrated research that describes the biophysical characteristics and mechanisms related to disturbances, and quantifies the extent and prevalence of access-altering disturbance.

Science Questions & Objectives

- Tier 2 Question: *How are environmental changes affecting critical ecosystem services?*
- Tier 2 Science Objectives
 - Ecosystem Dynamics (#3): *Understand how vegetation structure and hydrologic conditions interact with and respond to disturbance*
 - Ecosystem Service (#3): *Evaluate how changes in ecosystems will influence subsistence opportunities*

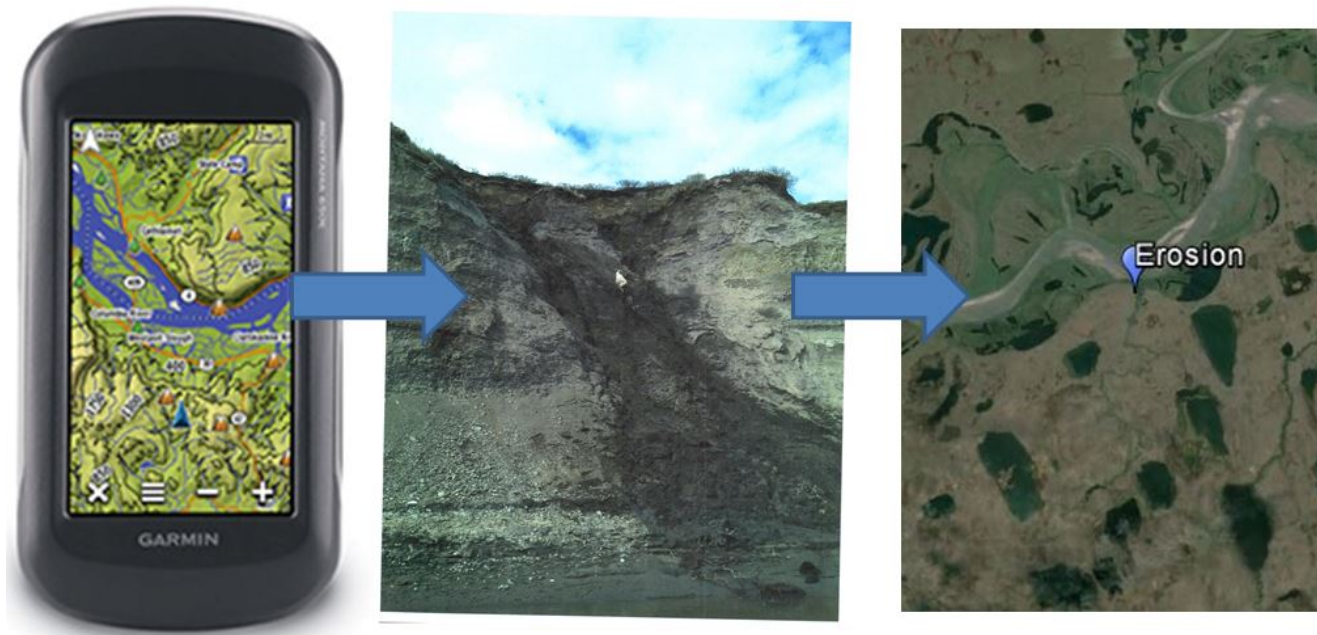
Study Area



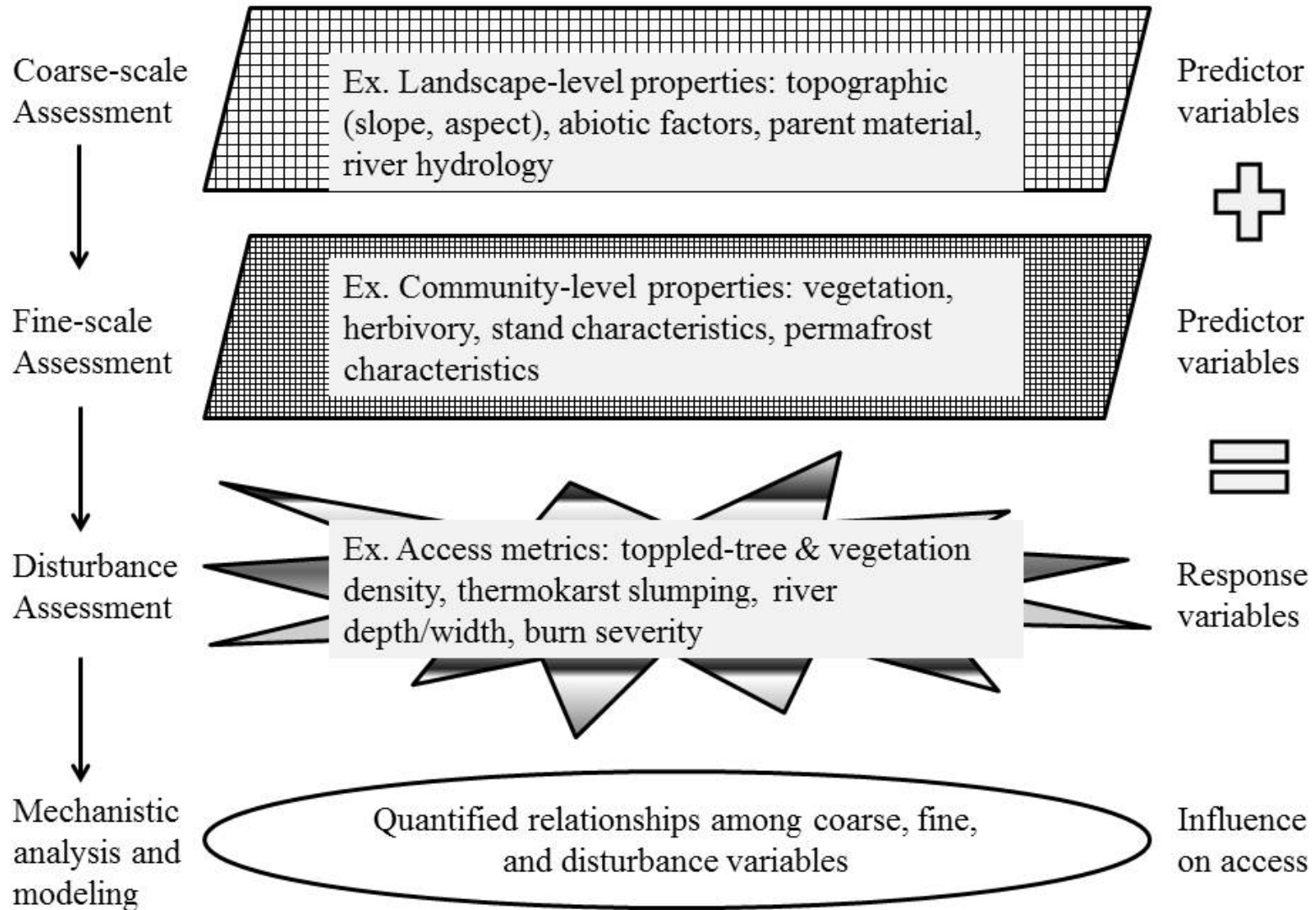


Field Measurements

- Community harvesters document travel network and disturbances influencing access
 - Harvester data sheets



Ecosystem Site Assessment



Remote sensing

- Assess characteristics (e.g., signatures) of disturbances and quantify change over time of disturbances using remote sensing

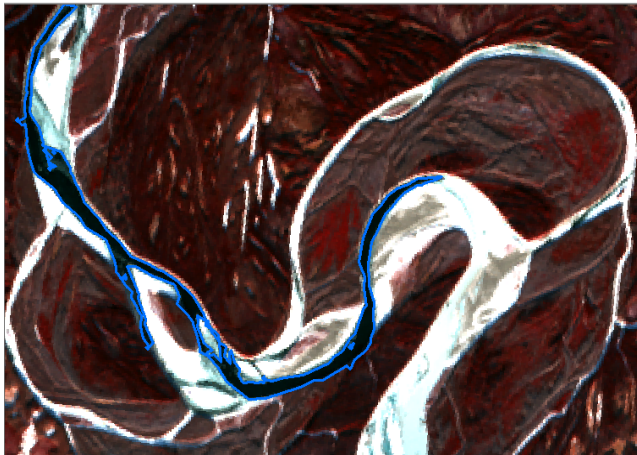


Spaceborne Remote Sensing

- Satellite sensing assets to be used
 - High spatial resolution for mapping travel network
 - NGA (National Geospatial-Intelligence Agency) high res commercial satellite imagery
 - High temporal resolution for assessing change (e.g., shoulder season disturbances)
 - Landsat-8 OLI, perhaps SAR?

Airborne Remote Sensing

- Existing airborne remote assets to be used
 - Historical coverage AHAP (Alaska High Altitude Photography) color infrared air photos



- Potential uses for new airborne data
 - Post-wildfire imagery near communities to map recent disturbances (thermokarsting, downed trees, etc.)

Modeling Approaches

- Types of models used
 - Disturbance inventory: ArcGIS Model Builder
 - Human-disturbance interactions: Netlogo
 - Site assessments: Statistical (regression, GLM)
 - Future scenarios: dynamic simulation model involving climate-driven feedbacks (Vensim)
- Driver data needed
 - Trail networks, disturbance sites, biophysical data, imagery around communities, climate and climate-driven variables
- Data formats and metadata standards
 - georeferenced geotiffs, NetCDF format, and .cvs files.
 - 1) Earth Observing System (EOS) Clearinghouse (ECHO), or 2) Ecological Metadata Standard (EML).

Geospatial Data Products

- Types: Subsistence travel network and an inventory of disturbances influencing access
- Coverage: Customary and traditionally use areas around communities
 - Extrapolate as variability and uncertainty allows
- Temporal range: Historic (1980s, current, and future scenarios)
- Format: UTM NAD83
- Stakeholder / user base: Agencies, tribal entities, and academics exploring social-ecological systems

Other expected products / outcomes

- Potential to function as a “Boundary Organization” to facilitate linkages between other NASA projects and local communities
- New framework for community-based participatory research that may foster integration of local knowledge with with instrument-based science

Questions & Comments

- Thanks for your time!