

Salmon Habitat Mapping in the Nushagak and Kvichak Watersheds

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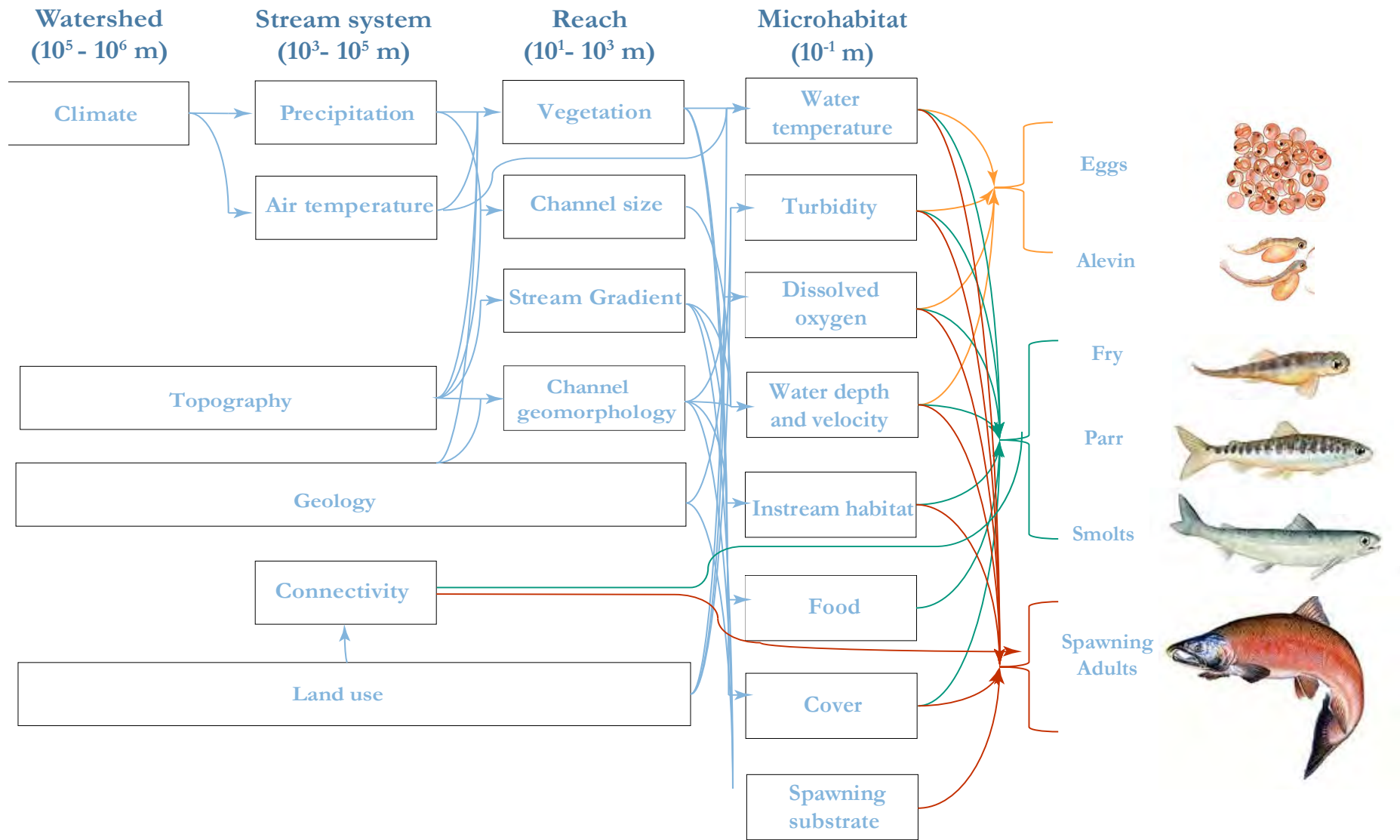
Mapping the value of salmon



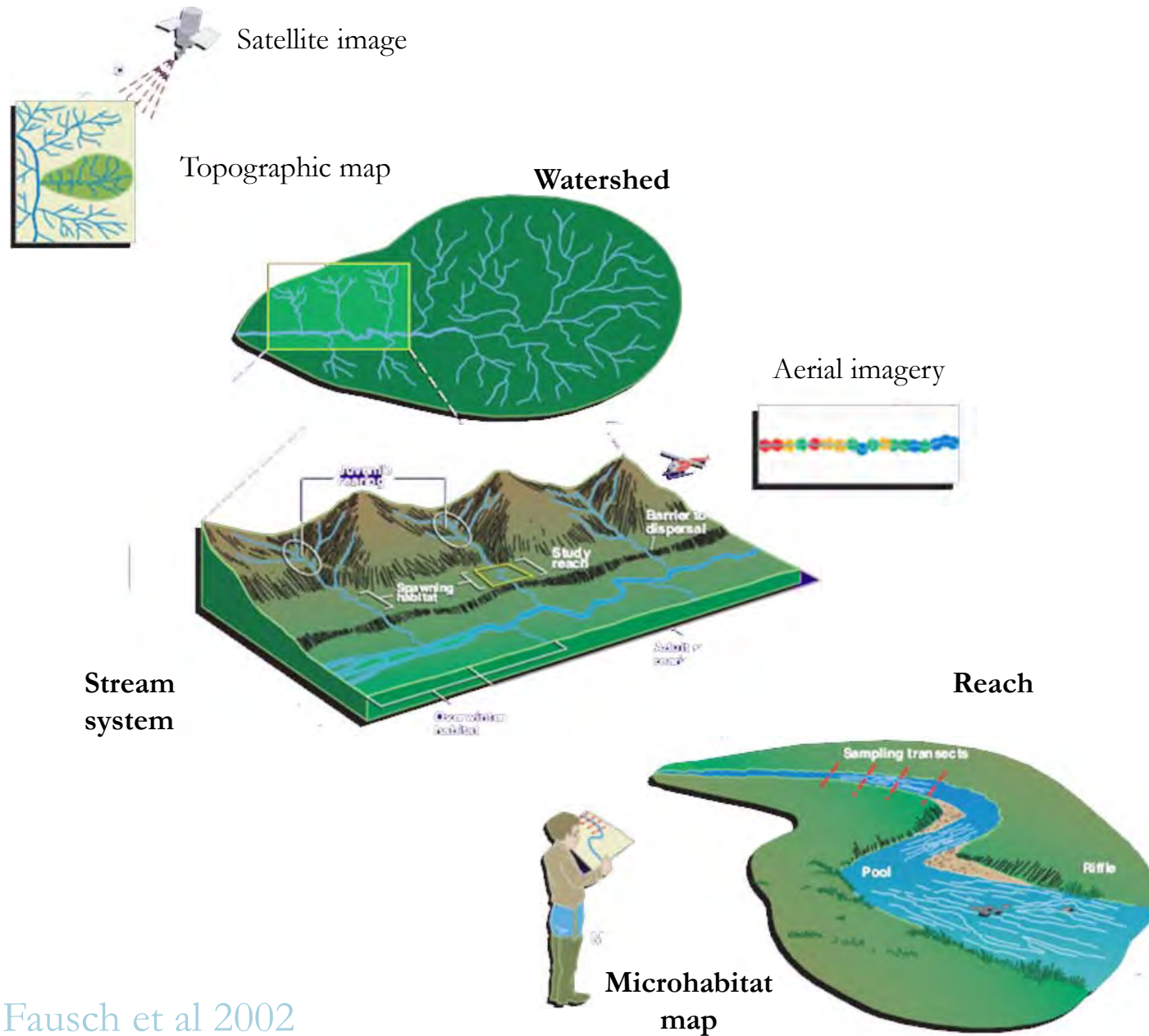
In order to integrate salmon conservation into land-use and resource development planning over large scales, we need spatially explicit information on salmon abundance patterns



Mapping of salmon habitat



Mapping salmon habitat



Fausch et al 2002



Nushagak and Kvichak

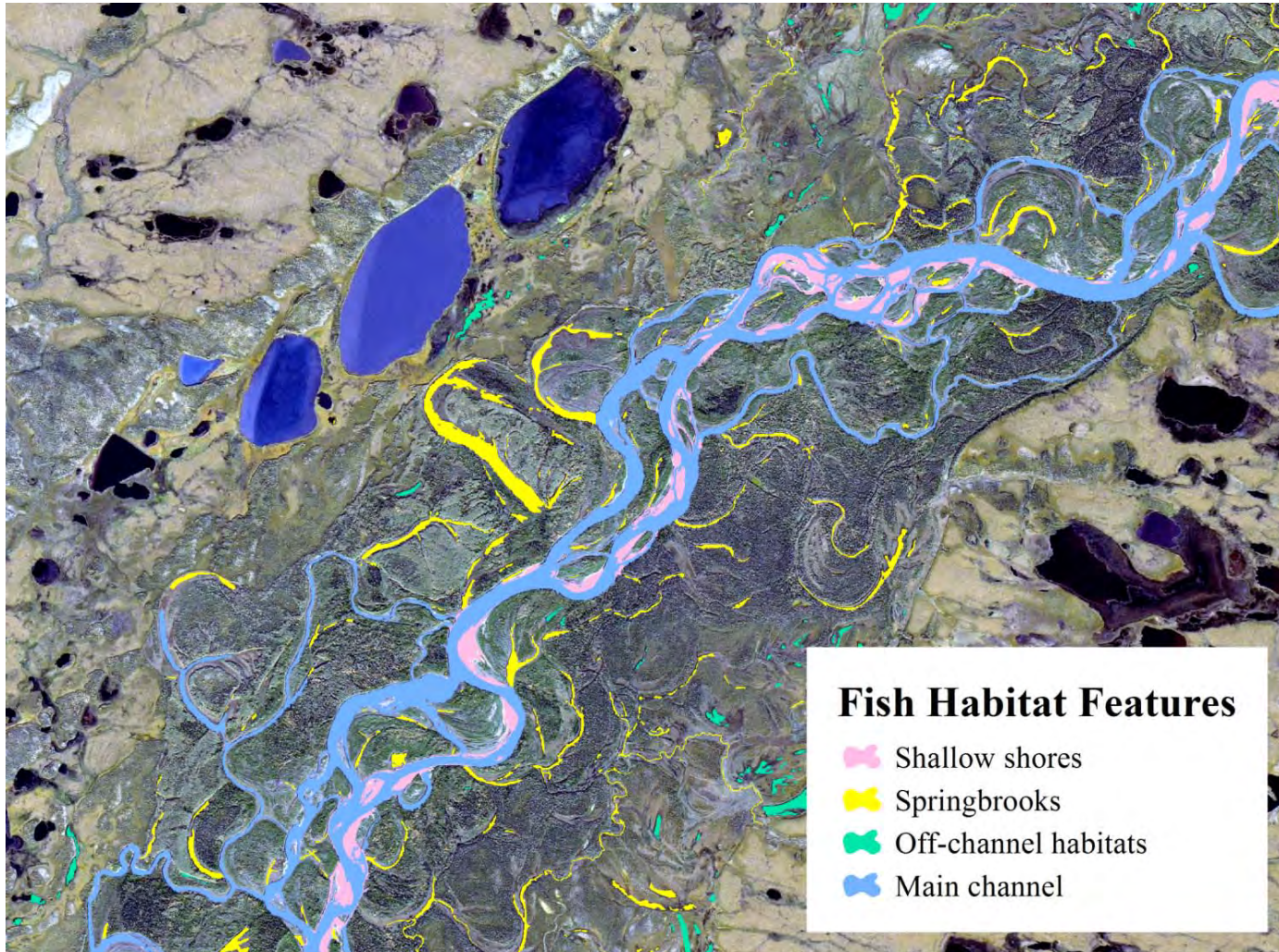


Objectives

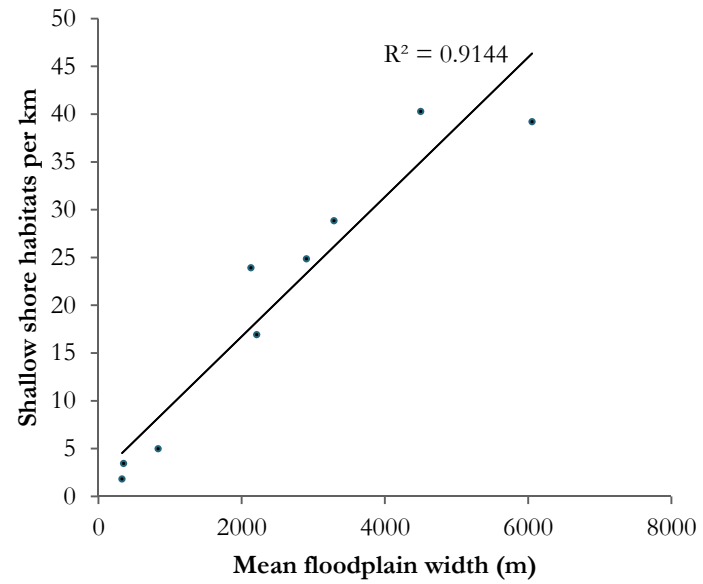
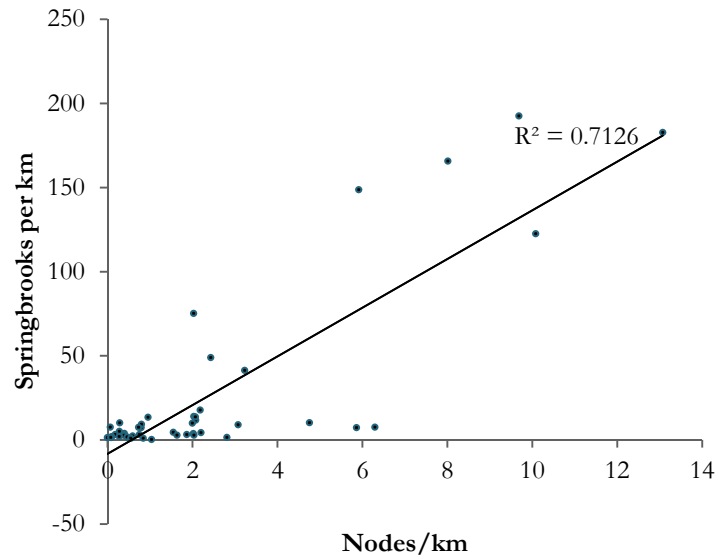
- Map reach-scale salmon habitat characteristics important to all species and life stages of Pacific salmon within the Nushagak and Kvichak watersheds
- Map likely salmon abundance patterns at multiple scales within the Nushagak and Kvichak watersheds by species and life stage.



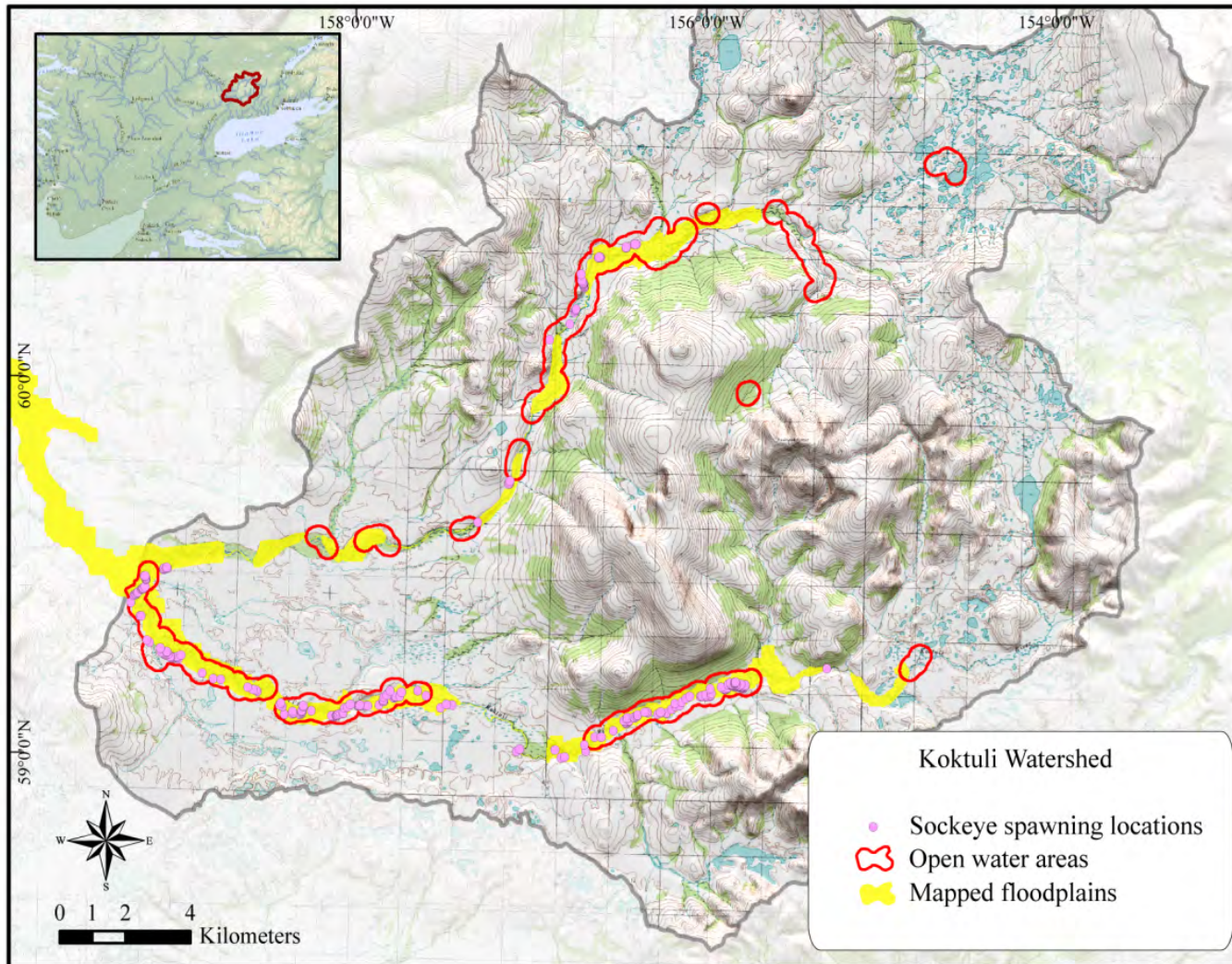
Fine-scale mapping



Fine-scale mapping



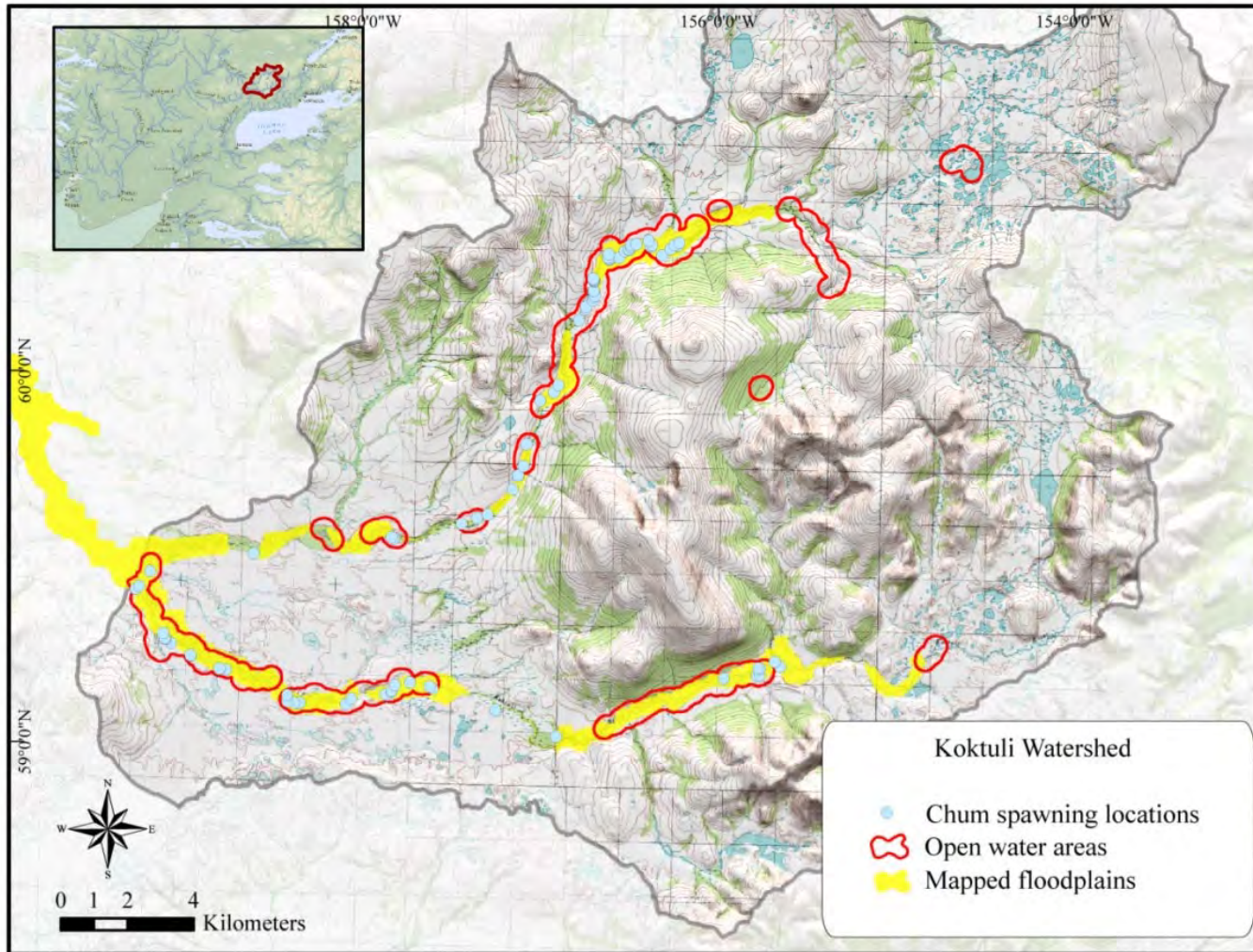
Fine-scale mapping



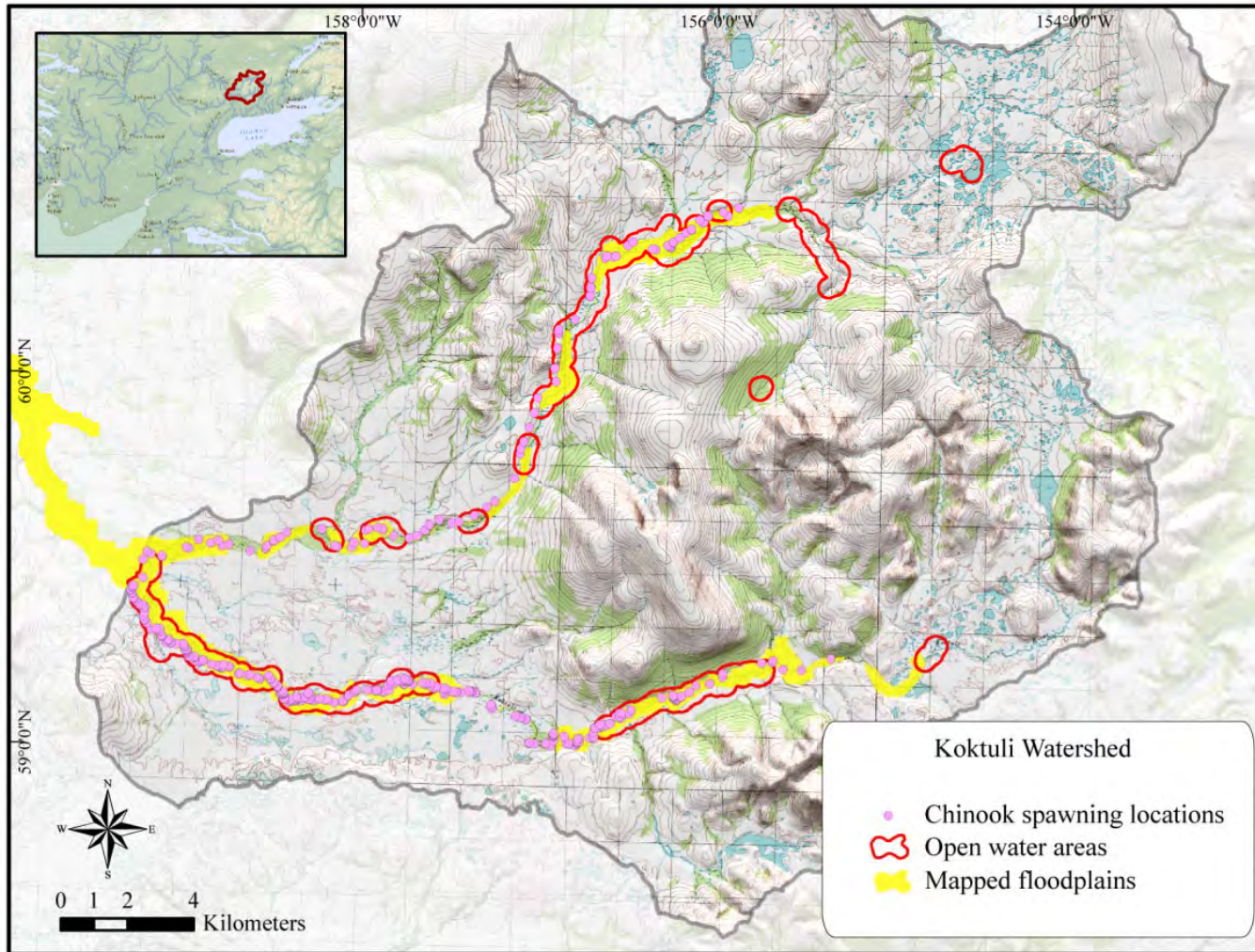
Floodplain width ($p < 0.02$)



Fine-scale mapping



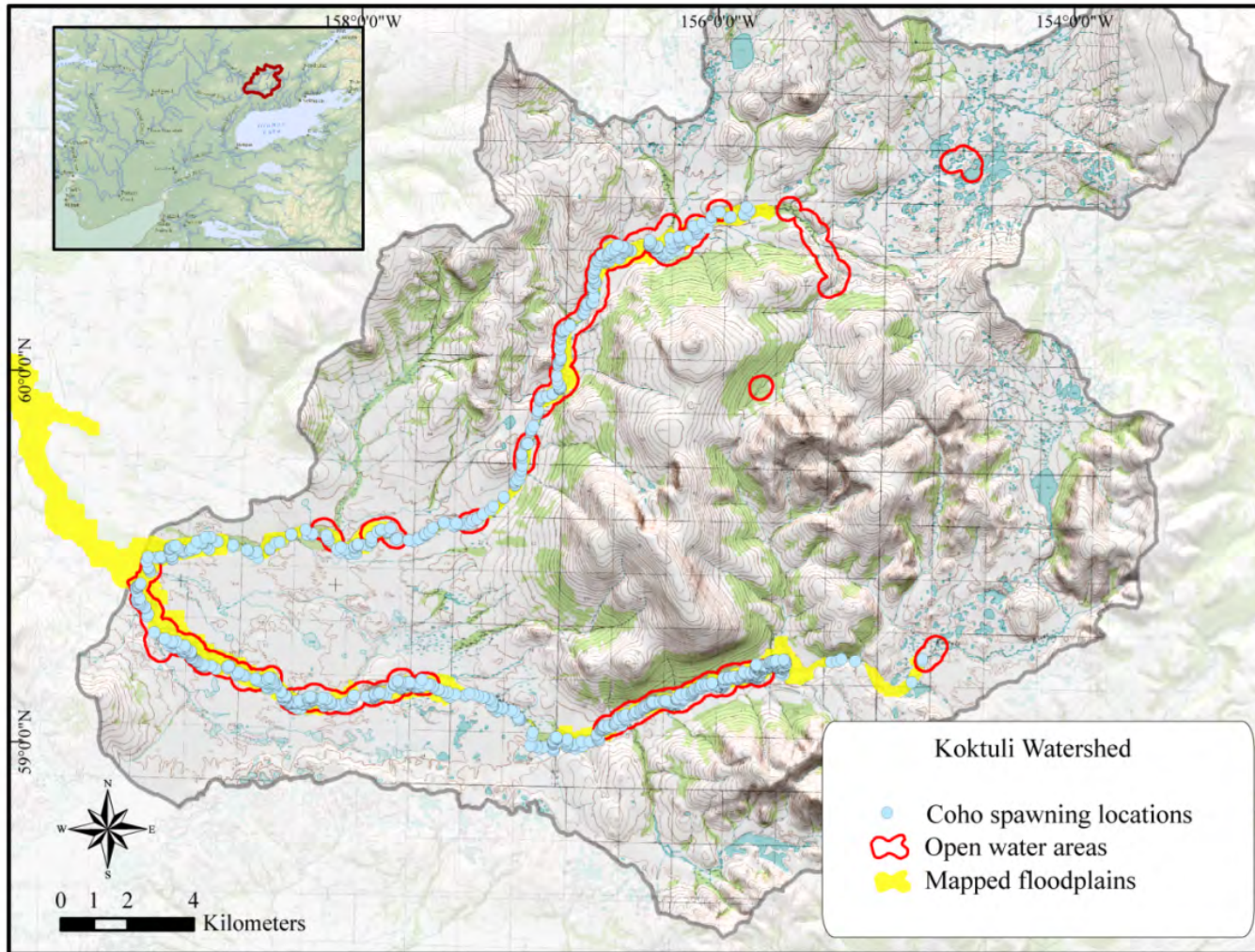
Fine-scale mapping



Floodplain confinement ($p < 0.05$)



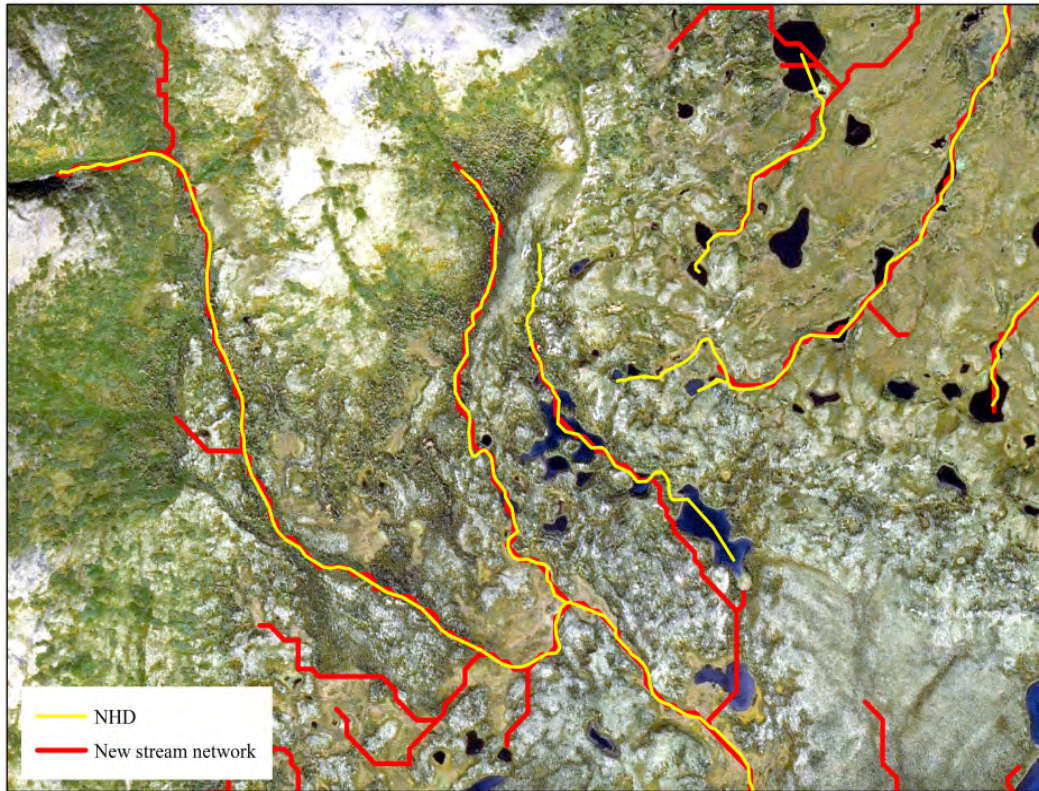
Fine-scale mapping



Floodplain confinement ($p < 0.05$)



Creating a new stream network

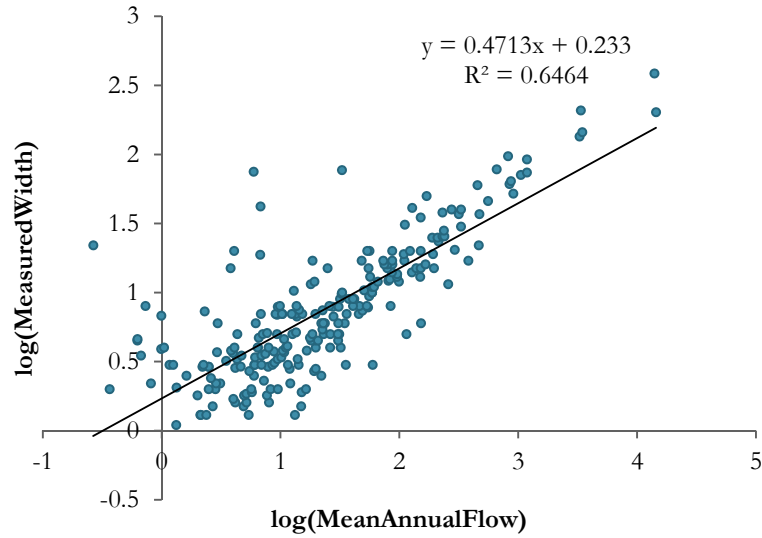


Coarse-scale mapping

- Floodplain width and confinement
- Elevation
- Reach slope
- Glacial influence
- Relationship to lakes
- Man-made and natural barriers
- Stream order
- Mean annual precipitation
- Mean annual flow

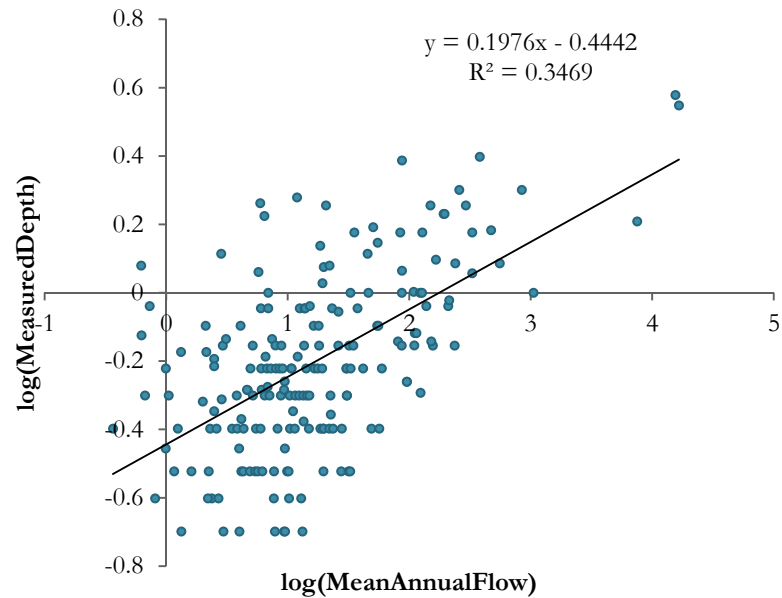


Coarse-scale mapping

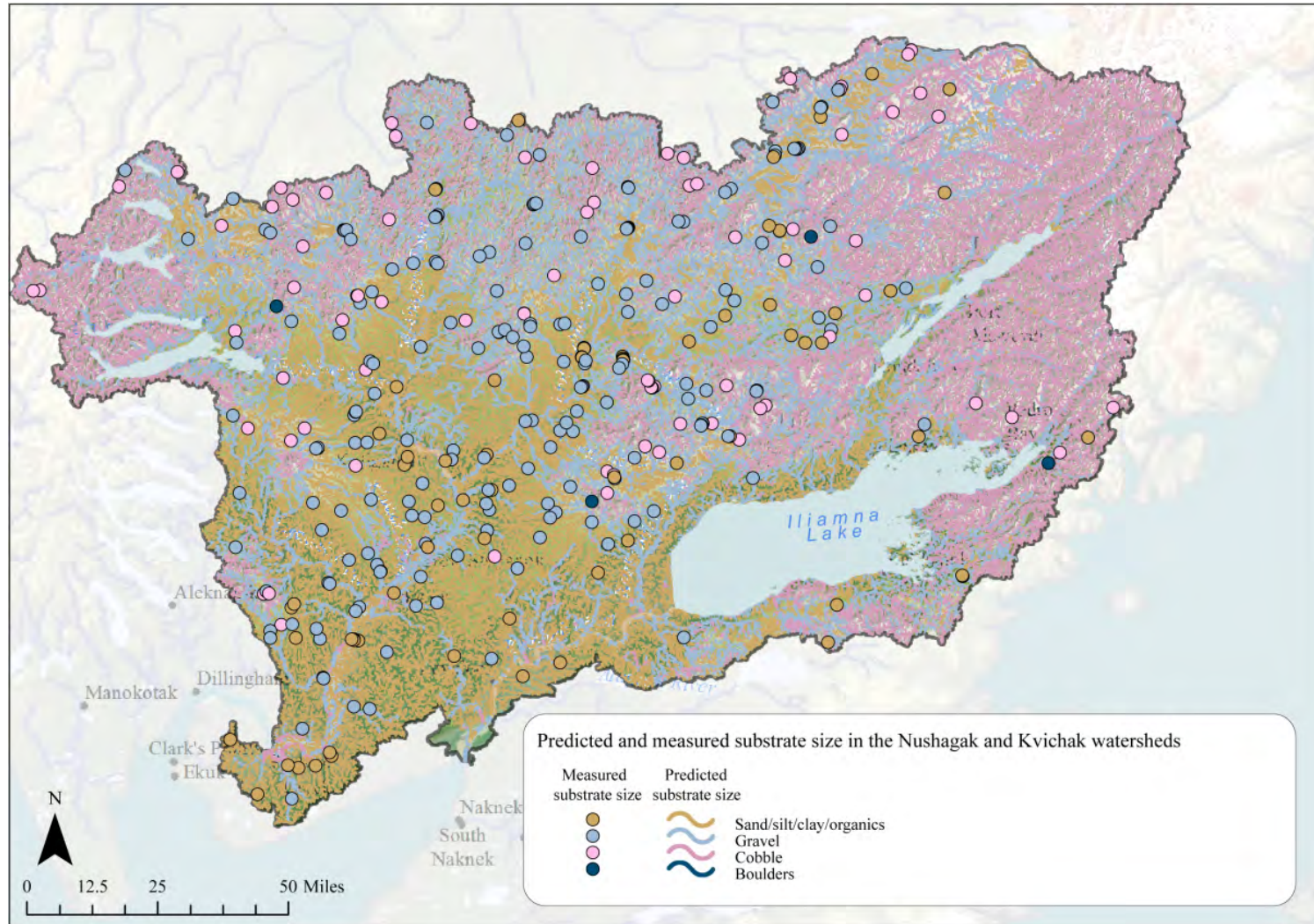


$$\text{width} = 1.71 Q^{0.47}$$

$$\text{depth} = 0.36 Q^{0.20}$$



Coarse-scale mapping

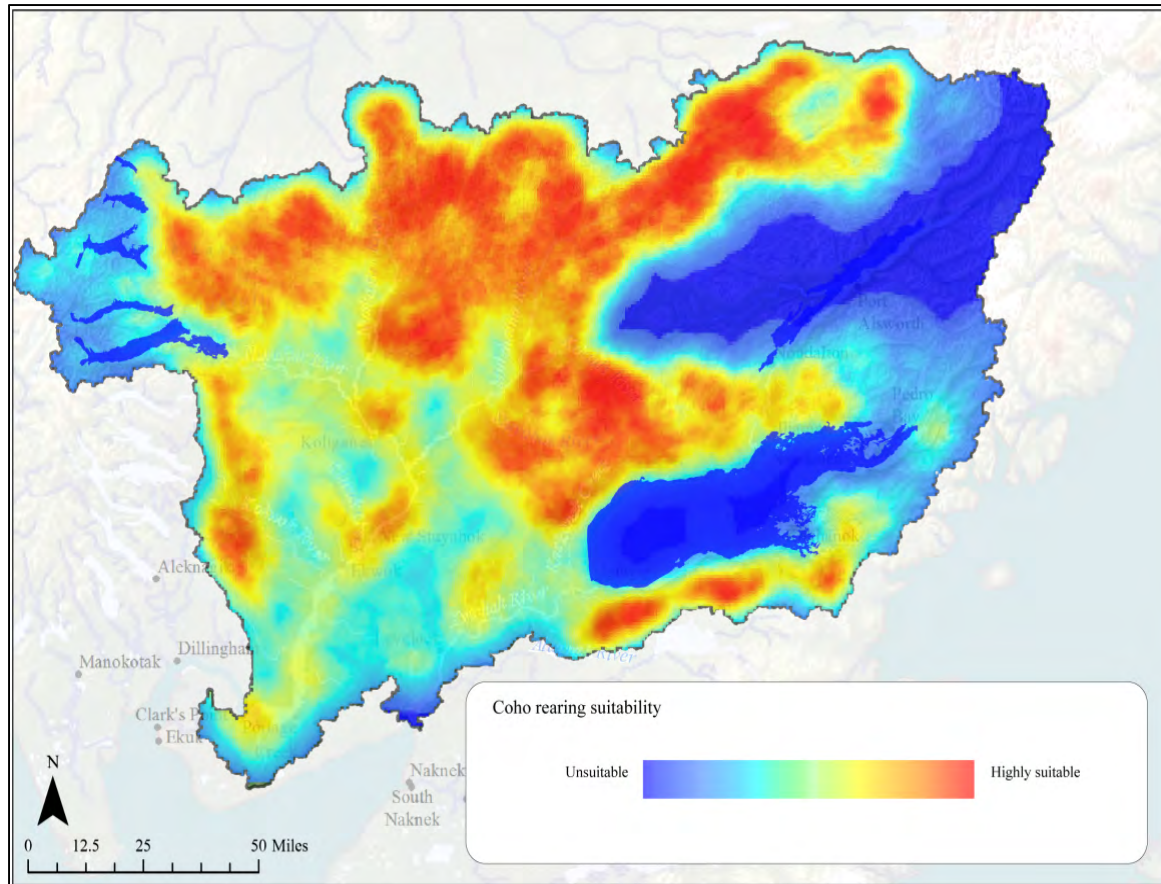


Mapping known distribution and abundance

- Anadromous waters catalog (ADFG 2014)
- Catch, escapement, escapement indices, and abundance estimates (Jones et al. 2013)
- Aerial surveys (Morstad 2003; Dye and Schwanke 2012)
- Telemetry (Daigneault et al. 2007; Young 2005)
- Sr Isotope work
- Traditional Ecological Knowledge (Stickman et al. 2003; NMWC 2007)
- Subsistence Harvest information (ADFG)
- Sportfishing data (ADFG 2014)



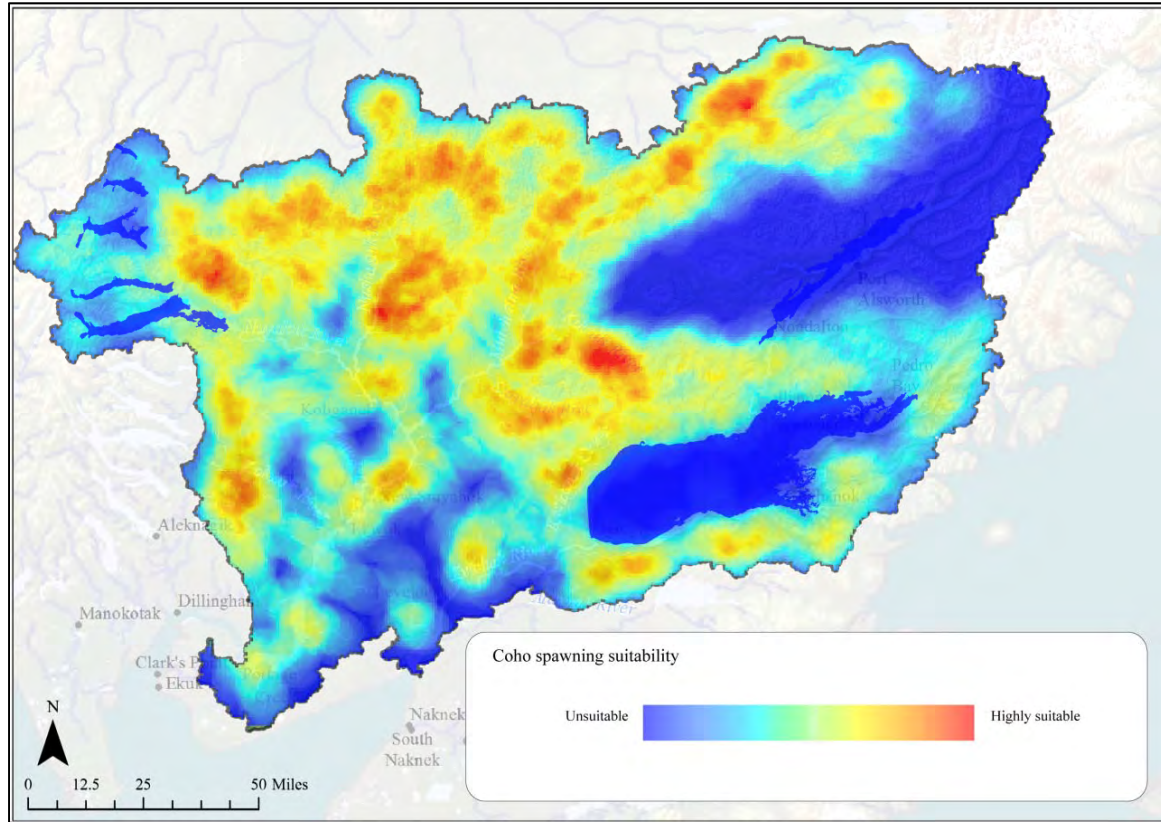
Salmon habitat models



Floodplain width, gradient, stream size; glacial influence



Salmon habitat models



Floodplain confinement, substrate size, glacial influence



Field work



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Limitations and Recommendations

- Remote sensing products
- Habitat variables not analyzed
- Qualitative fish models



Applications

- Long-term biological monitoring
- Temperature monitoring
- Chinook salmon otolith work
- NHD+
- Others?



Conclusions

- Salmon habitat characteristics
- Better mapping of critical salmon habitats and abundance
- Habitat and diversity
- Land use planning



Distribution

- Final report and dataset:
<http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/alaska>
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Questions?

