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# Cold Water Mapping and Salmon Habitat Characterization Guide Land Conservation and Restoration in Cook Inlet Watersheds

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Where's the sweet spot for salmon habitat conservation?

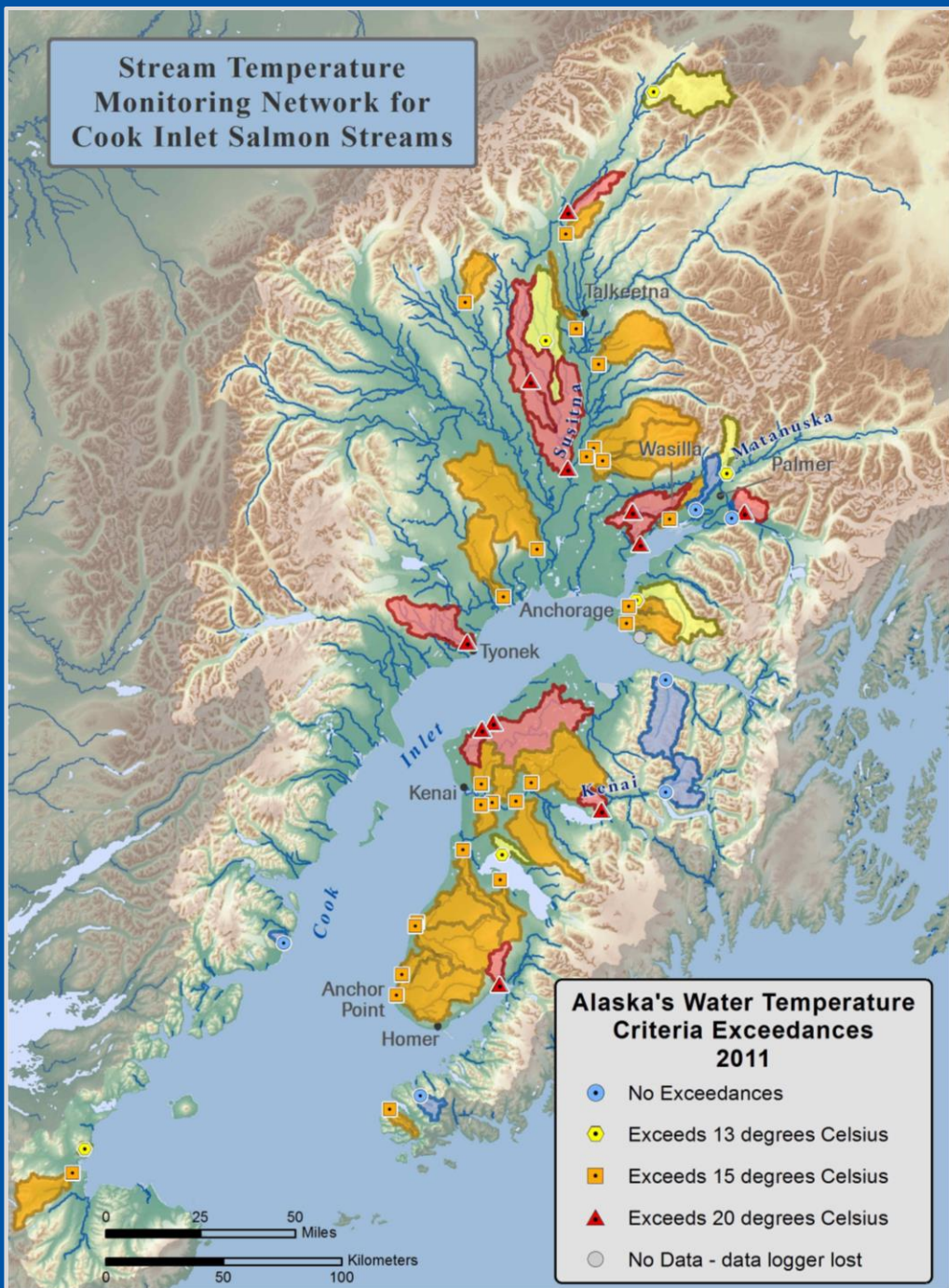
Developing strategies aimed at maintaining resilience

Using new technology

Developing new partnerships



**Stream Temperature  
Monitoring Network for  
Cook Inlet Salmon Streams**



cold water refuges  
watersheds  
microhabitats



# Thermal Infrared Technology

## Anchor and Ninilchik Rivers

Surveys:

June 30, 2010

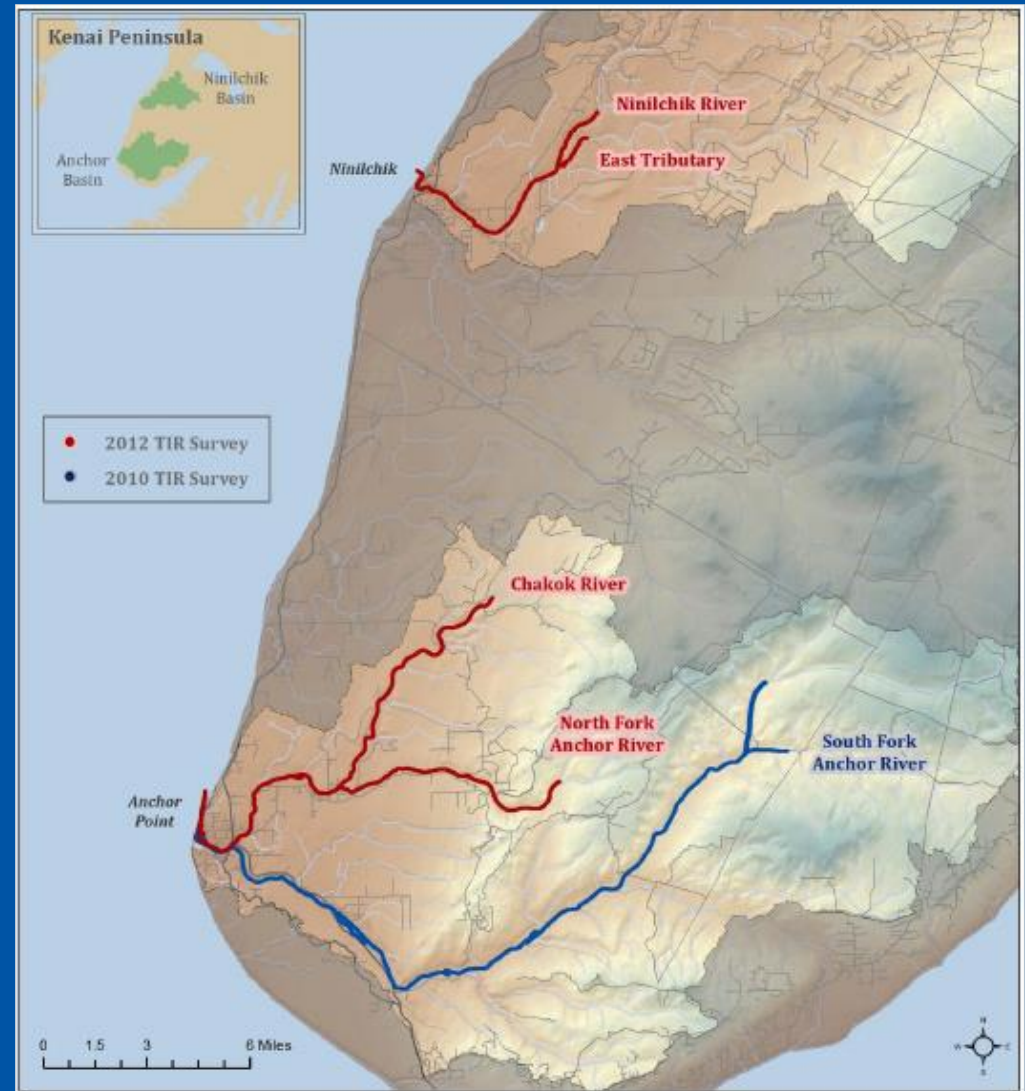
July 10, 2012

Flight above ground:

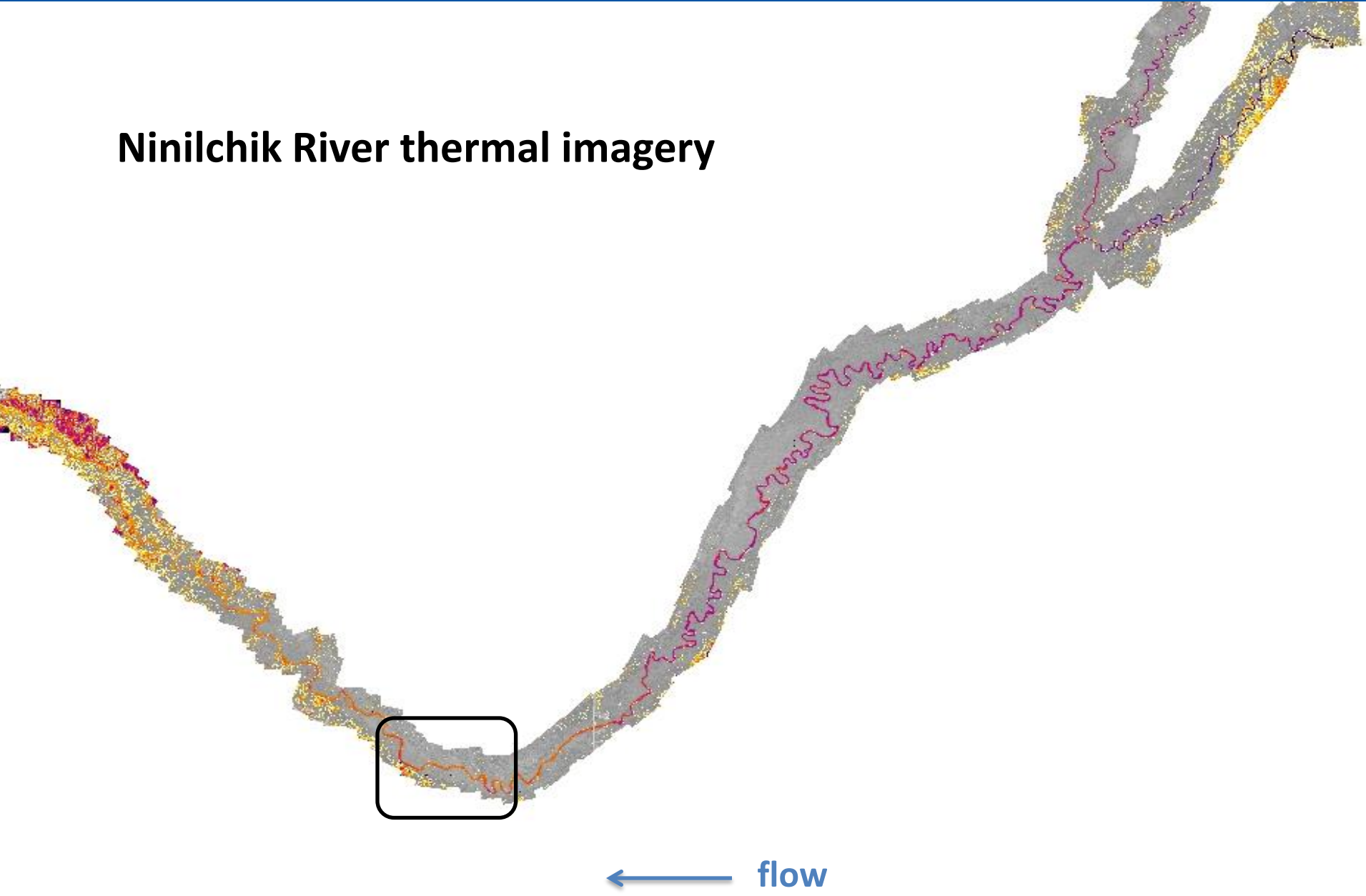
2,000 - 1,200 ft

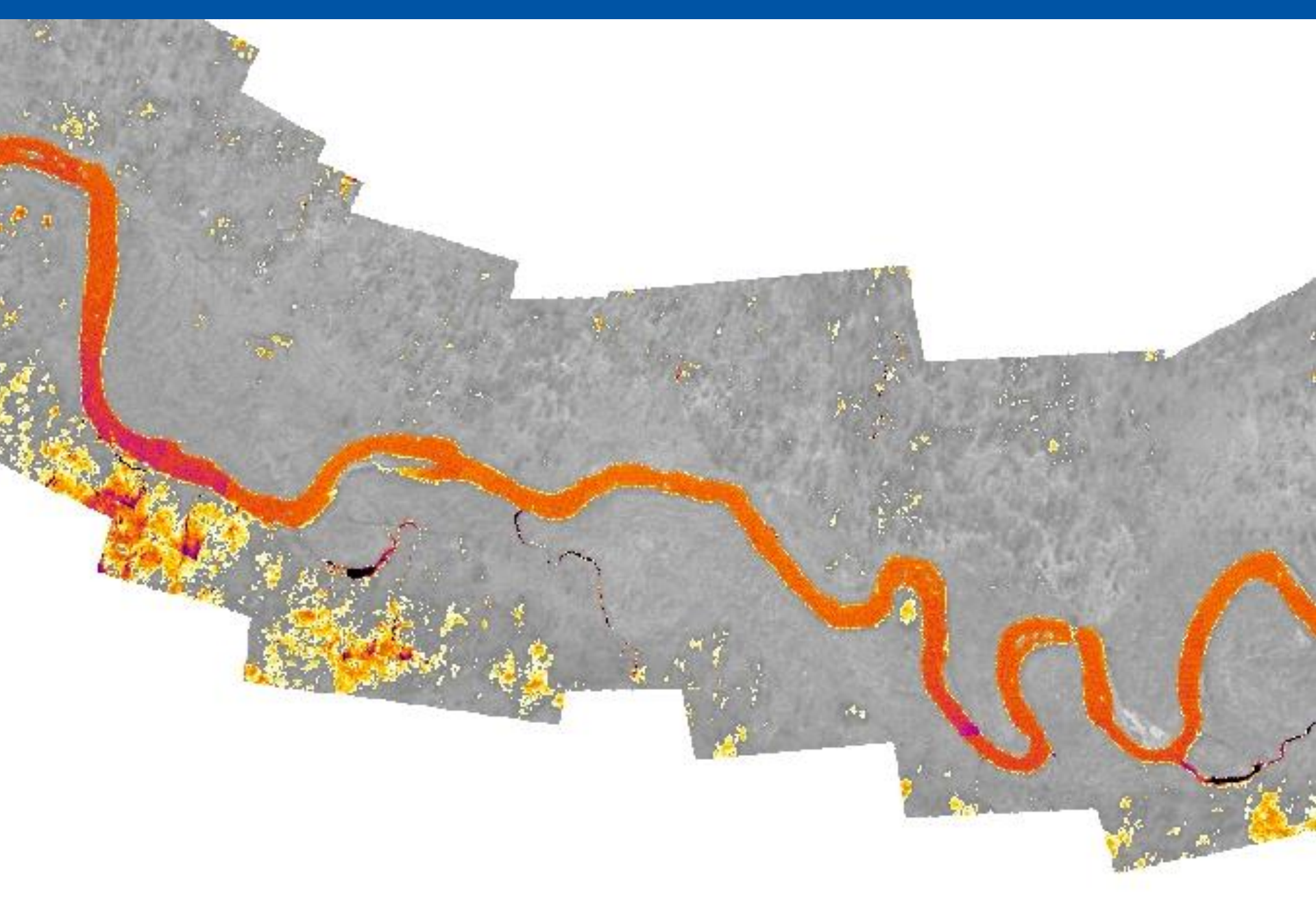
Pixel resolution:

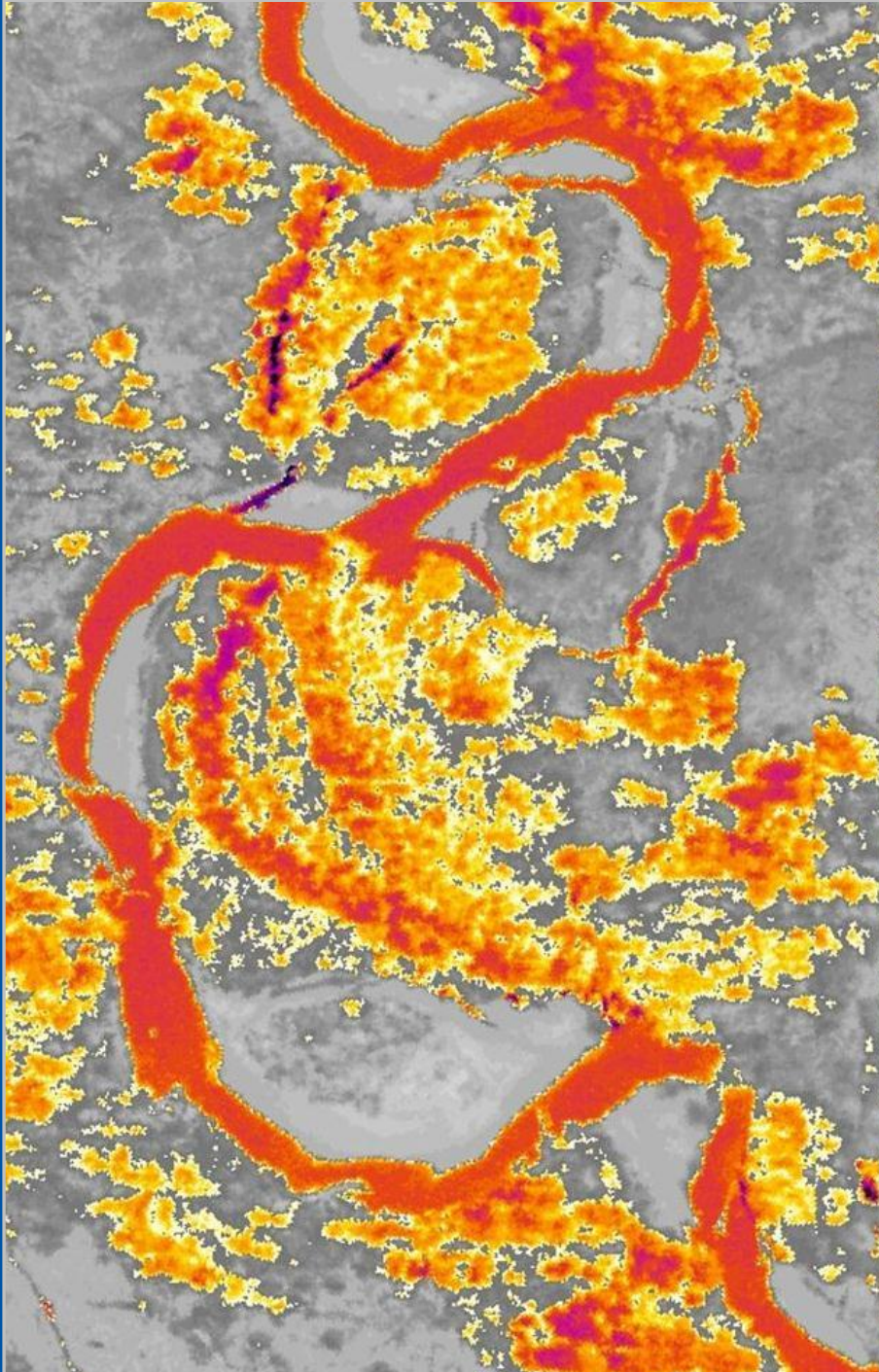
2.0 ft – 1.6 ft



# Ninilchik River thermal imagery







# Refuge as a cold water source



# Refuge effectiveness as habitat

Accessibility

Predation risk

Water chemistry (dissolved oxygen)

Competition

Depth

Frequency

Connectivity between patches



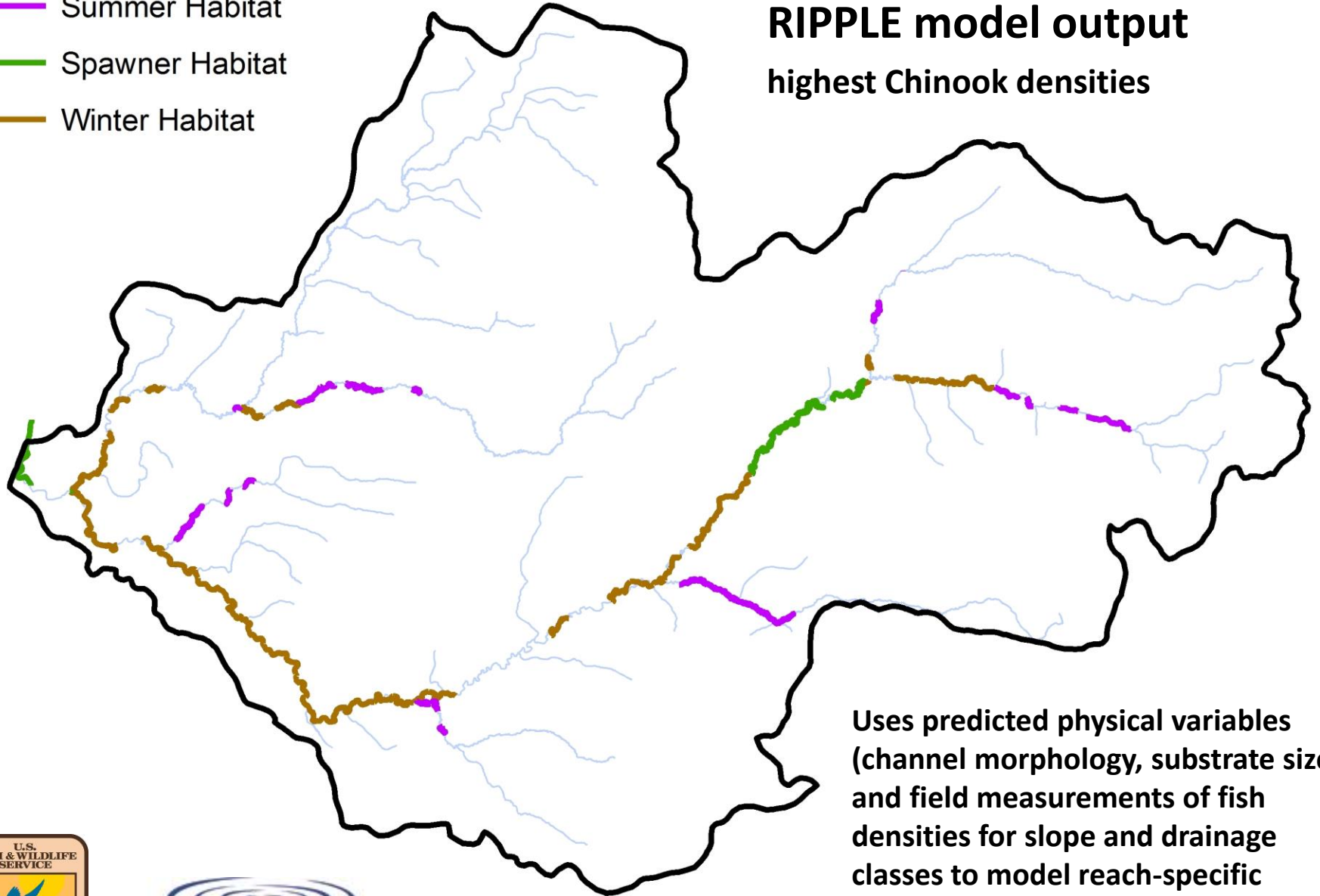


# Legend

- Summer Habitat
- Spawner Habitat
- Winter Habitat

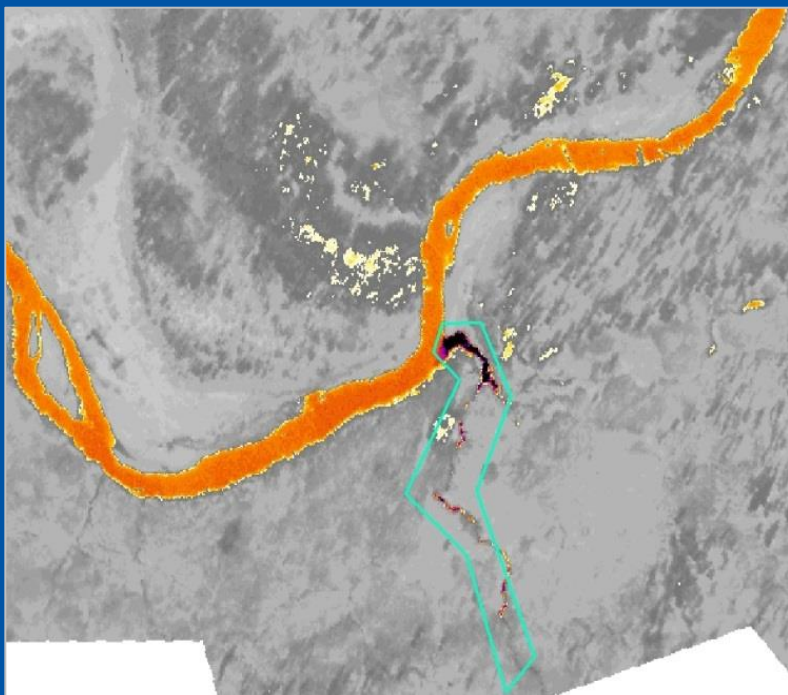
## Anchor River

**RIPPLE model output**  
highest Chinook densities



Uses predicted physical variables (channel morphology, substrate size) and field measurements of fish densities for slope and drainage classes to model reach-specific carrying capacities





Description  
small tributary

Likely fish use

Chinook:

moderate summer rearing  
moderate winter rearing

Coho:

moderate fall rearing  
significant summer rearing

Current landowner status  
private (2 parcels)

Notes: -3.9°C (based on 2010 TIR)  
-4.1°C (field visit, 2013)



## Identifying restoration needs

reconnecting a cold water input to the Ninilchik River

in a high public use area with great outreach opportunities



# Big Lake Basin

Survey:

July 29, 2011

Flight

above ground:

1,300 ft

Pixel resolution:

1.3 ft





Lucille and Meadow Creek  
August 2014



## Summary

By using both remotely derived data (thermal imagery) and fish distribution and density field studies, we aim to improve sub-watershed-scale resilience for salmon in Cook Inlet streams.

Working with local biologists and Land Trust partners is providing a unique opportunity to link state-of-the-art technology with conservation planning and land protection strategies designed to benefit salmon.



# Acknowledgements

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