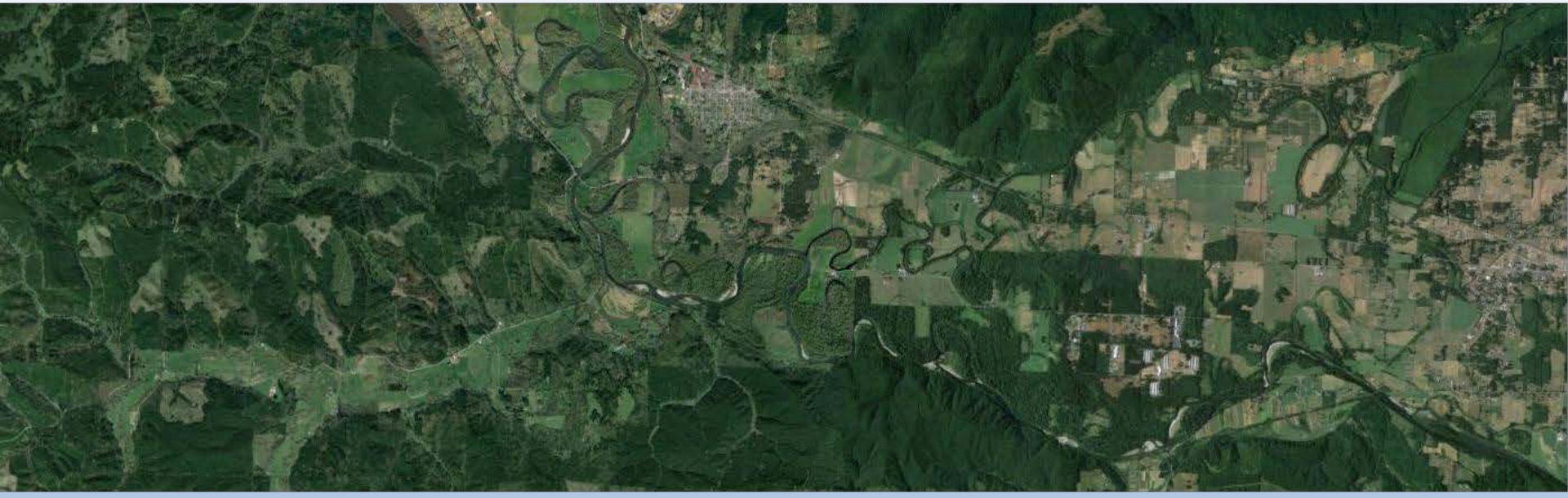
Floodplain habitat assessment and monitoring: PNW examples



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NOAA Fisheries, Northwest Fisheries Science Center, Seattle

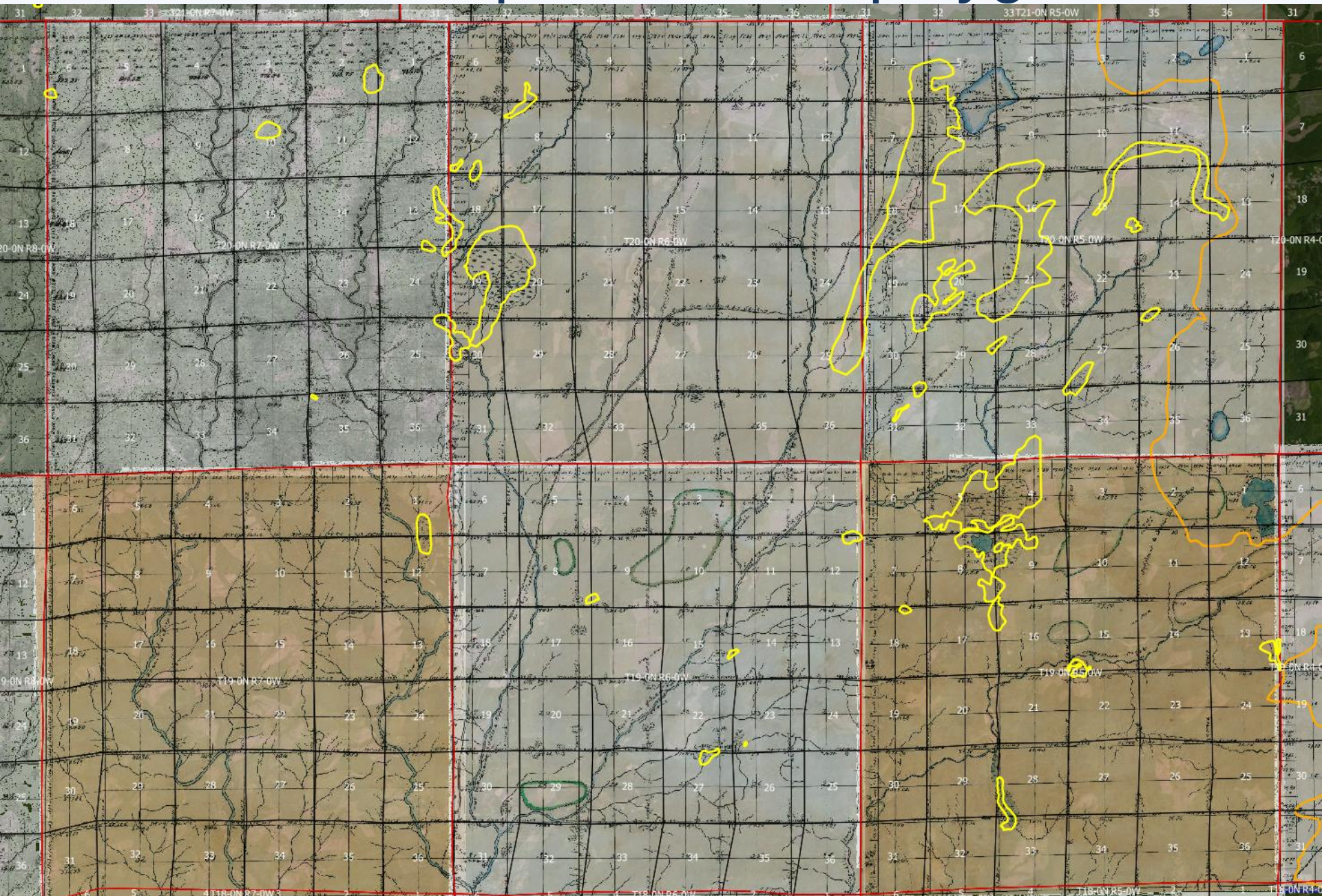
Motivations for floodplain analysis

- Evaluate habitat loss
- Identify restoration opportunities
- Monitor habitat change for ESA status reviews

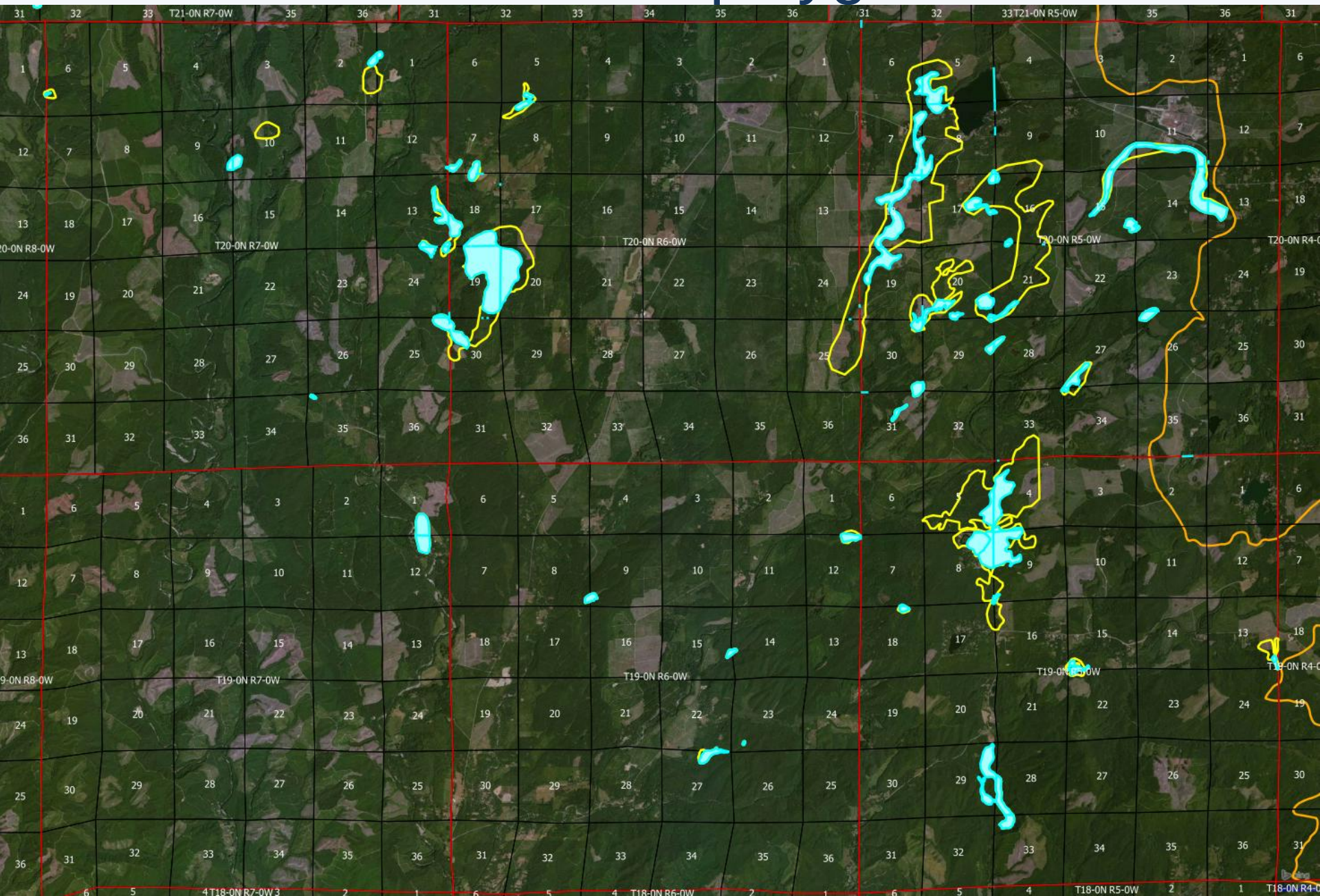
Evaluating habitat loss

- Map historical floodplain habitats from General Land Office (GLO) surveys (1853-1901)
- Merge with current datasets (e.g., NHD, WBHYDRO)
- Summarize historical and current habitat availability

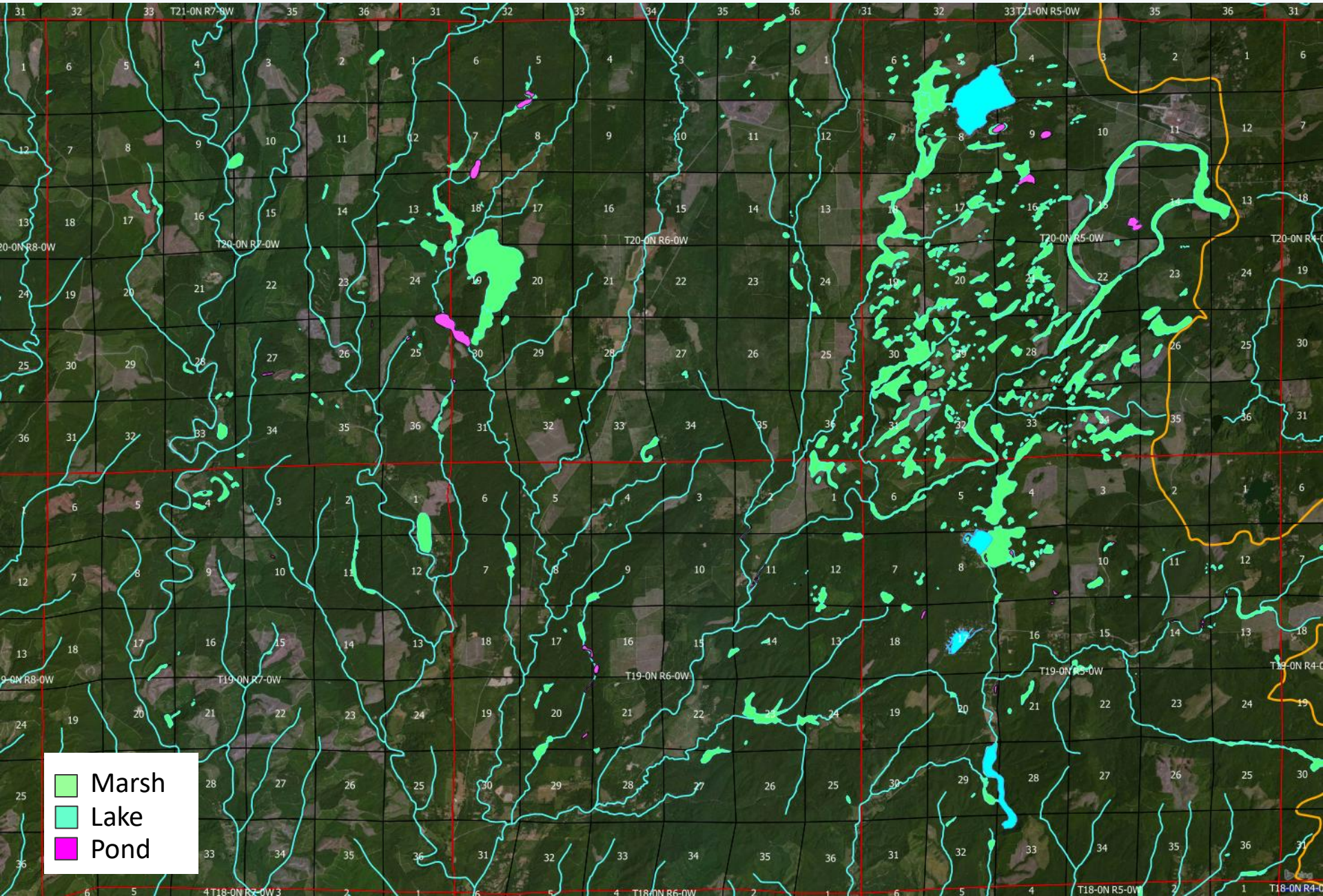
Draft floodplain habitat polygons



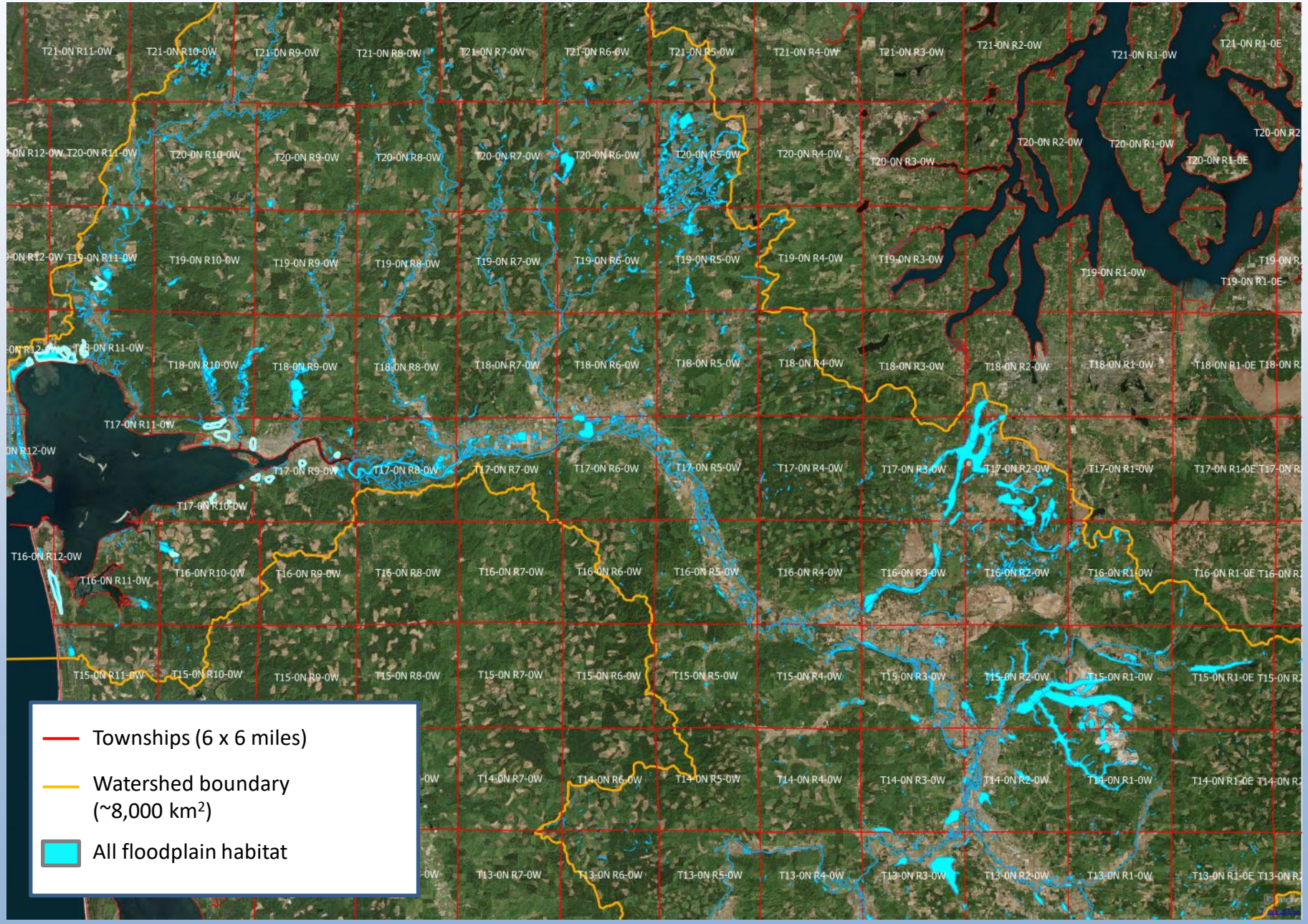
Edited GLO polygons



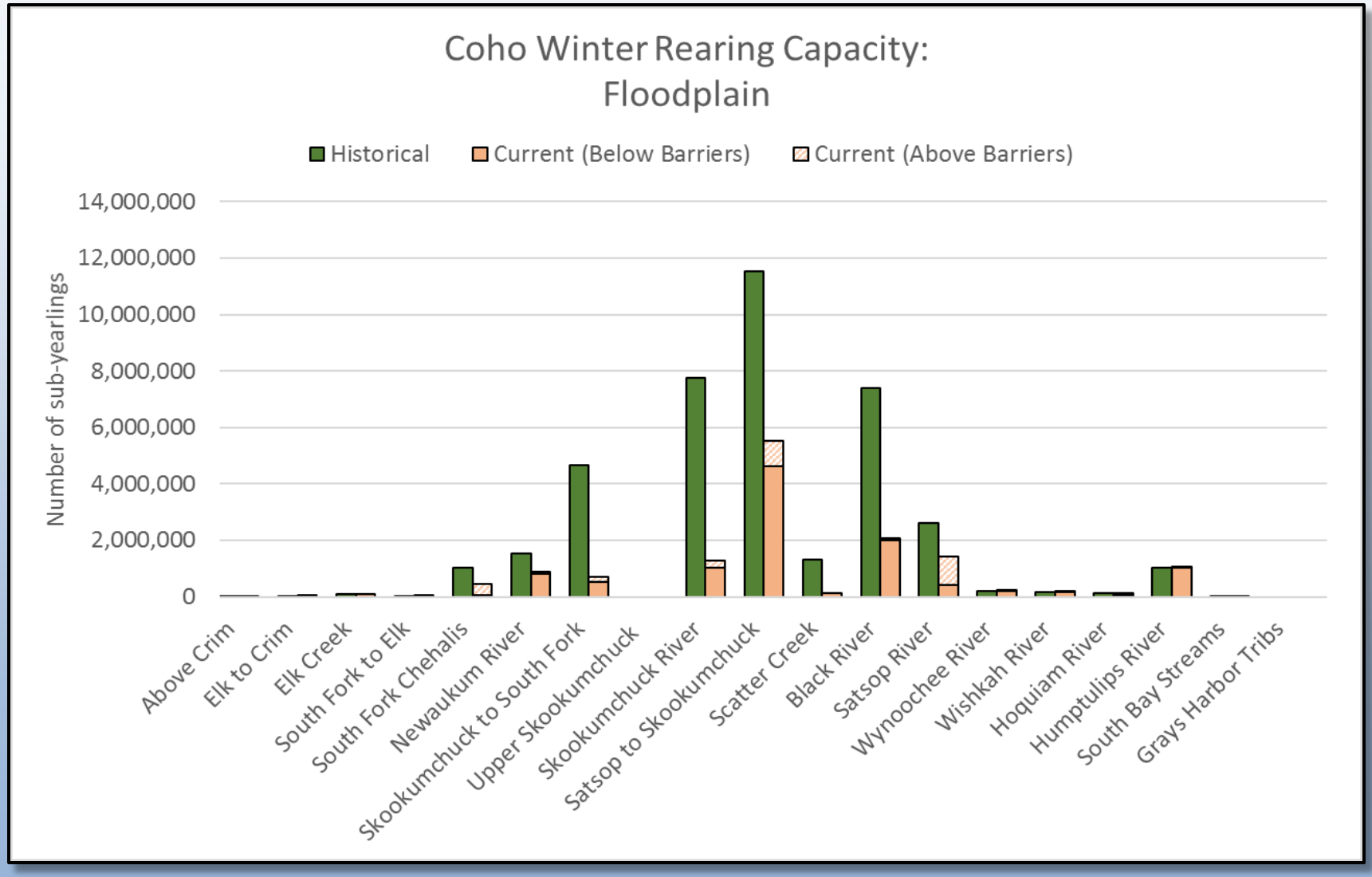
Merge GLO with NHD and other datasets



Chehalis floodplain habitat map

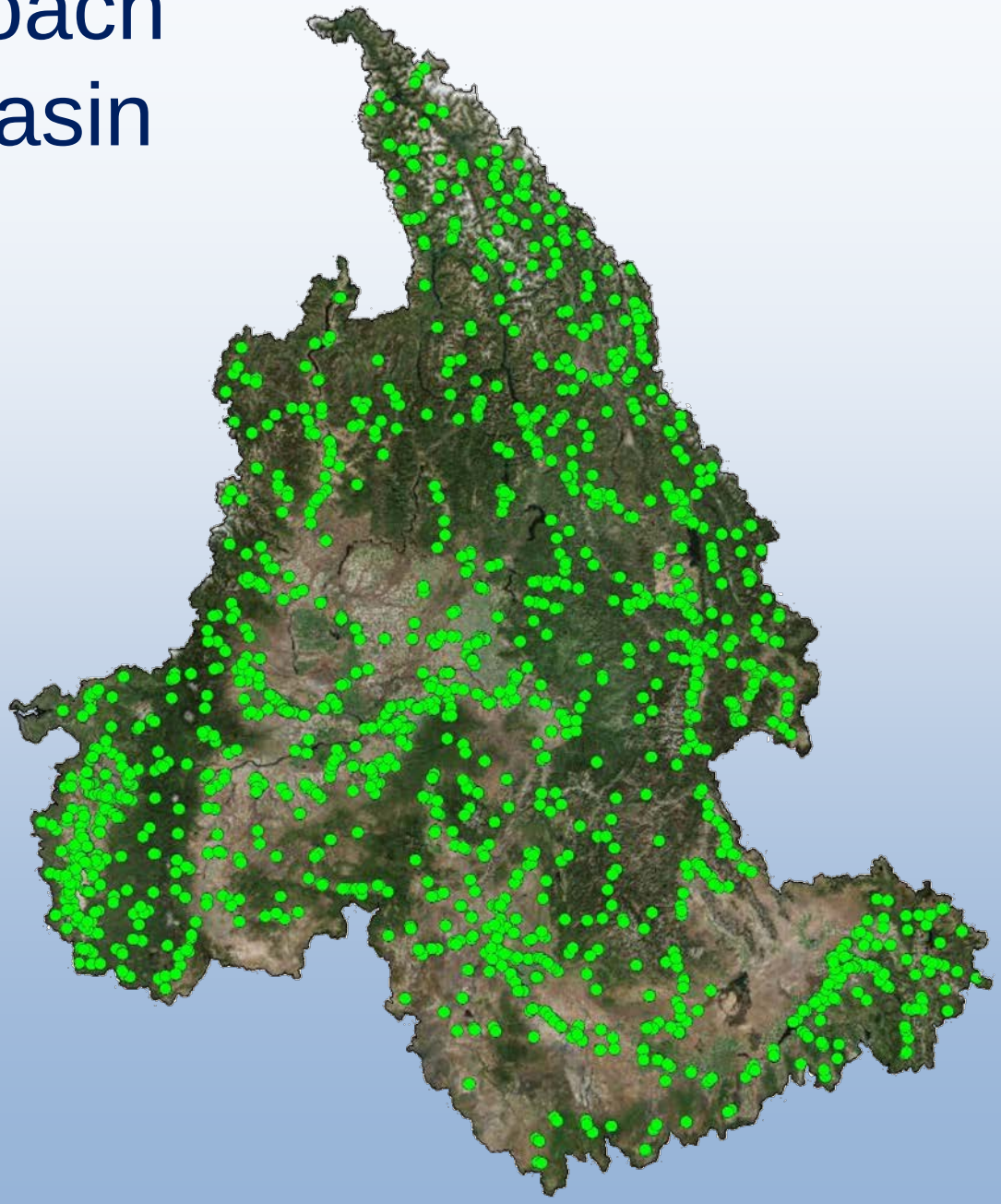


Floodplain habitat capacity change

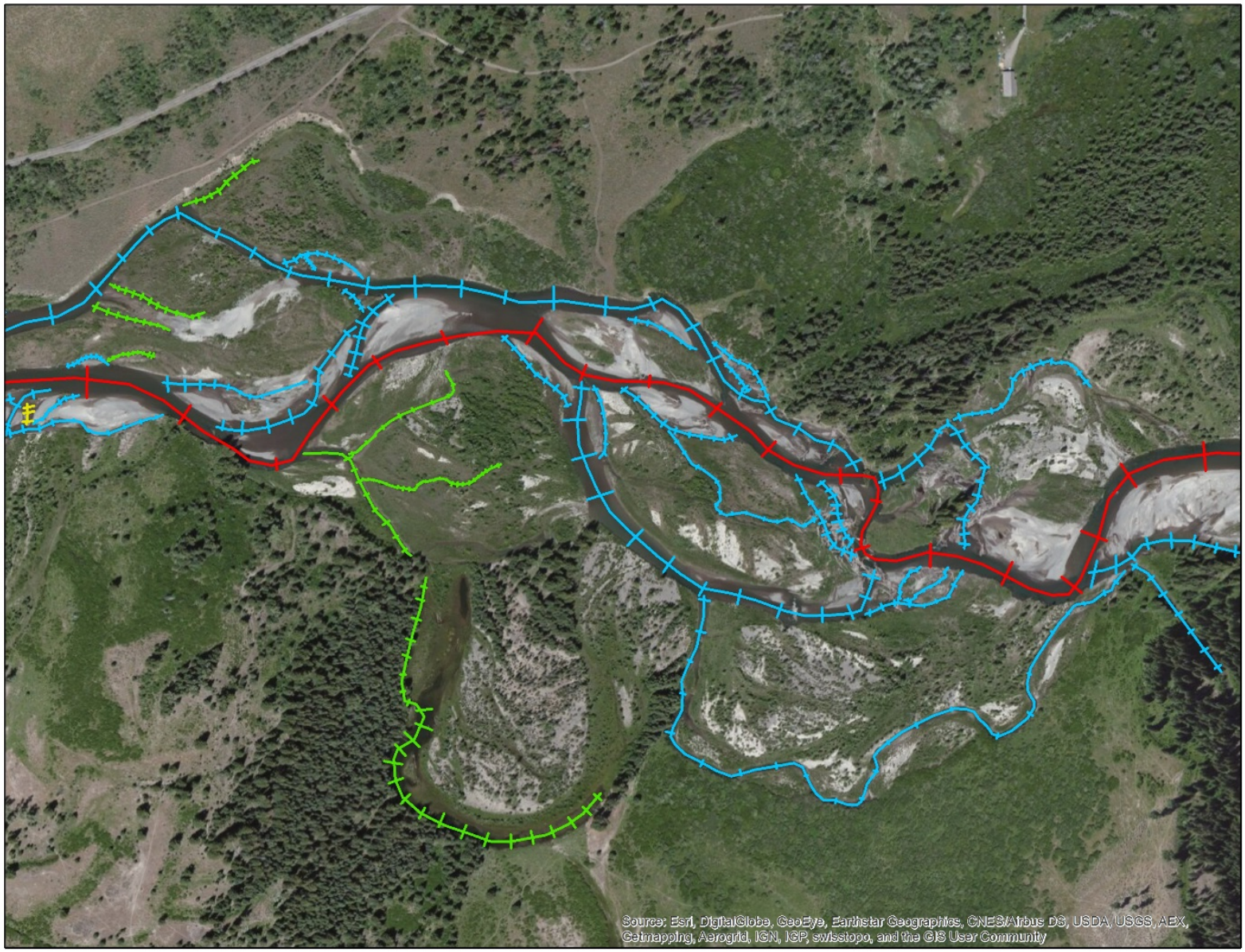


Sampling approach for Columbia basin

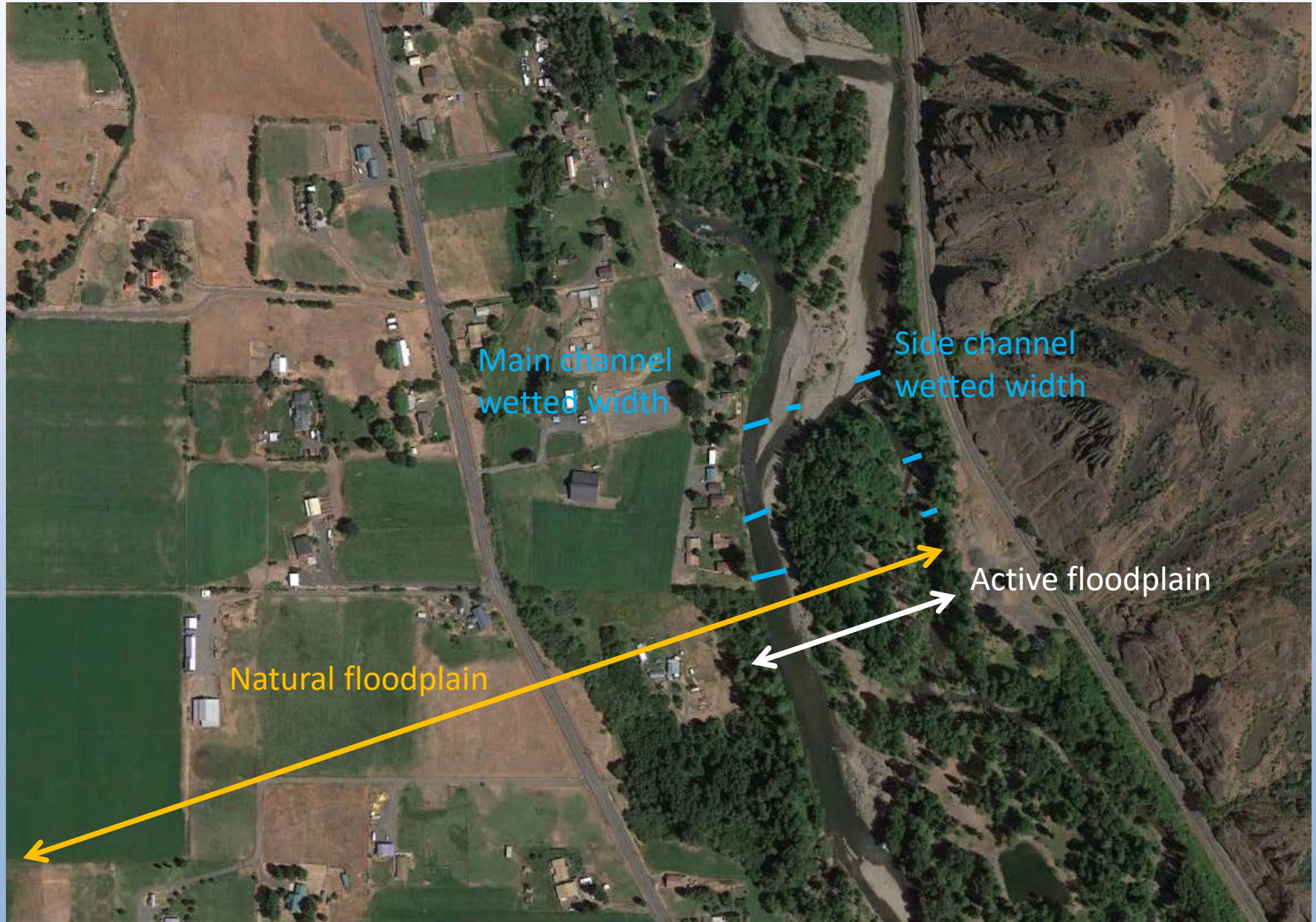
- >600,000 km^2
- Automated floodplain mapping with DEM, entire basin
- Manual floodplain width and habitat feature measurements at ~2200 sites

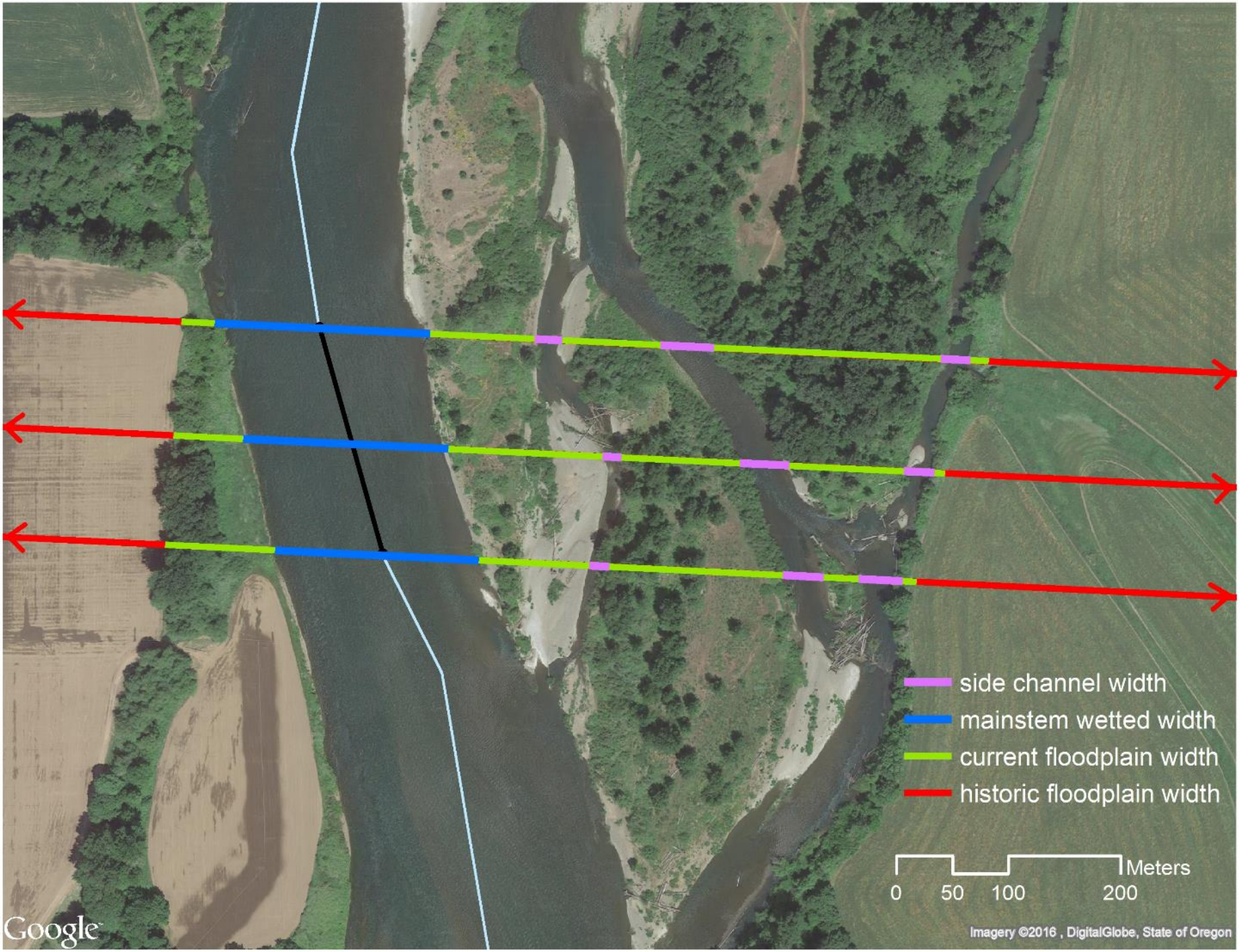


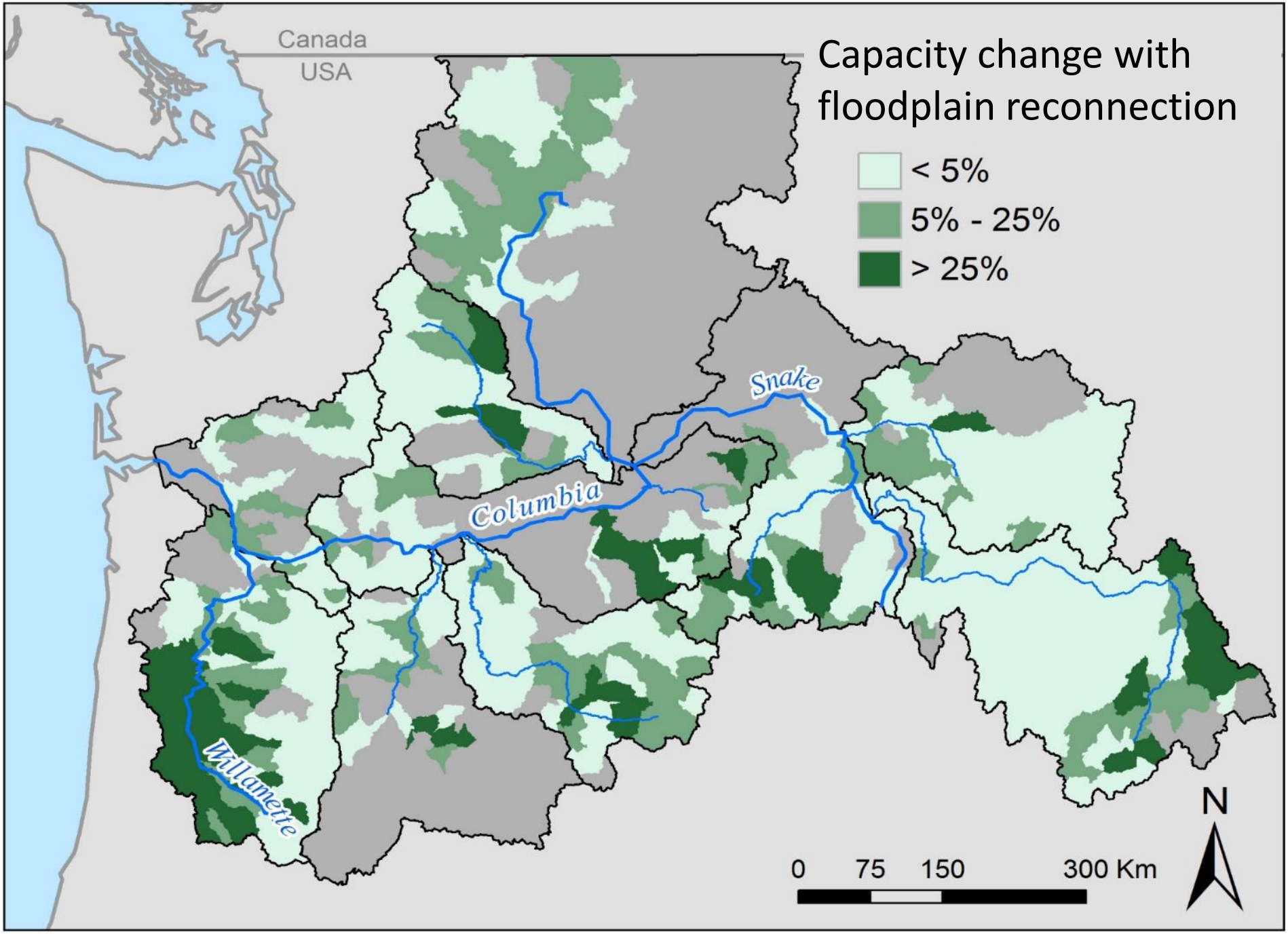
Satellite imagery measurements



Satellite imagery measurements




side channel width
mainstem wetted width
current floodplain width
historic floodplain width
Meters
0
50
100
200
Google
Imagery ©2016 , DigitalGlobe, State of Oregon


Canada
USA
Capacity change with floodplain reconnection
< 5%
5% - 25%
> 25%
Snake
Columbia
Willamette
N
0
75
150
300 Km

Identifying restoration opportunities

- Where was the historical floodplain?
- What habitats can be reconnected?

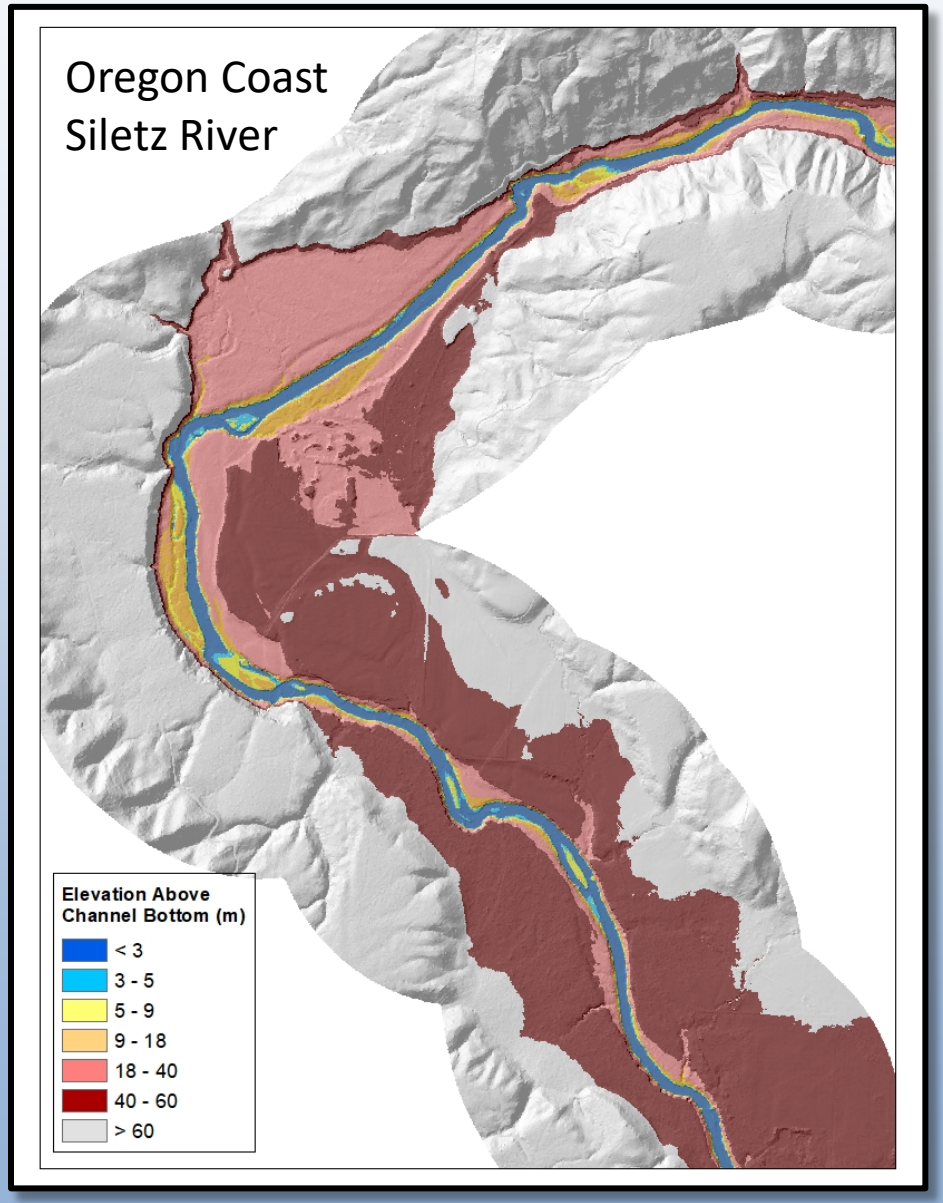
Where was the historical floodplain?

- Start with aerial photography

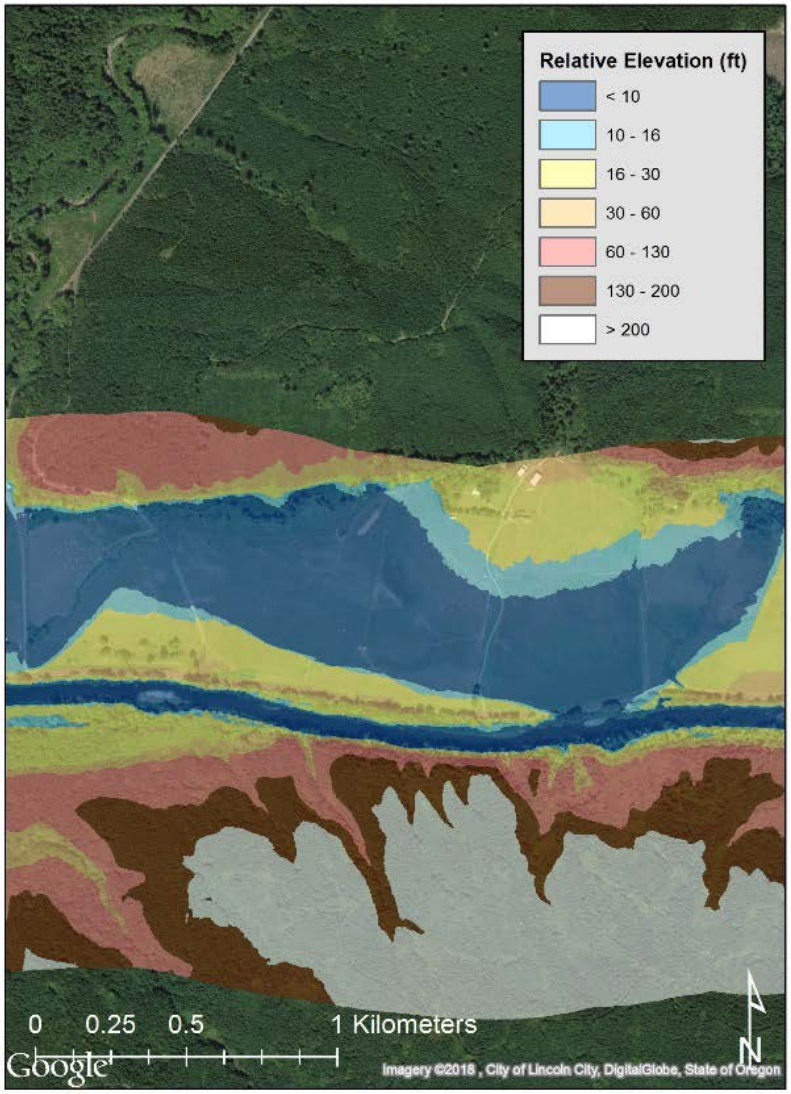
- Assisted with lidar

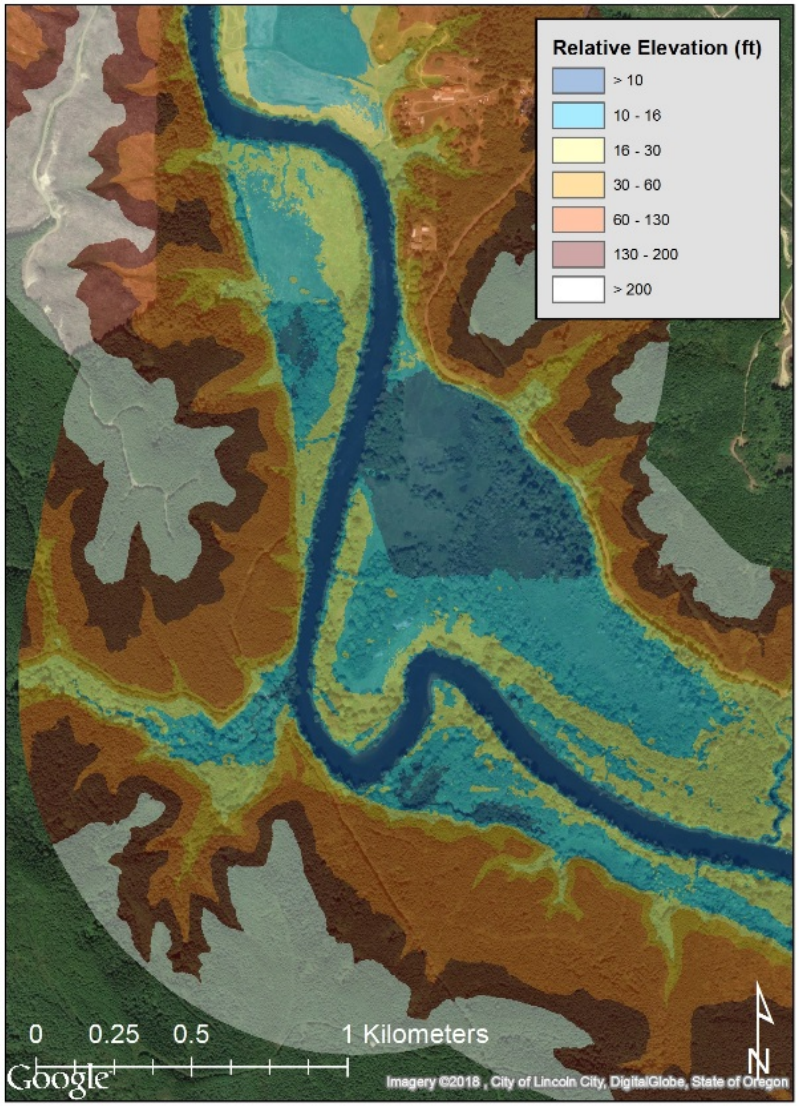
Where was the historical floodplain?

- Most re-connectable surfaces are <20 feet above the channel (blue and yellow)
- Terraces >40 feet above the channel (dark red)

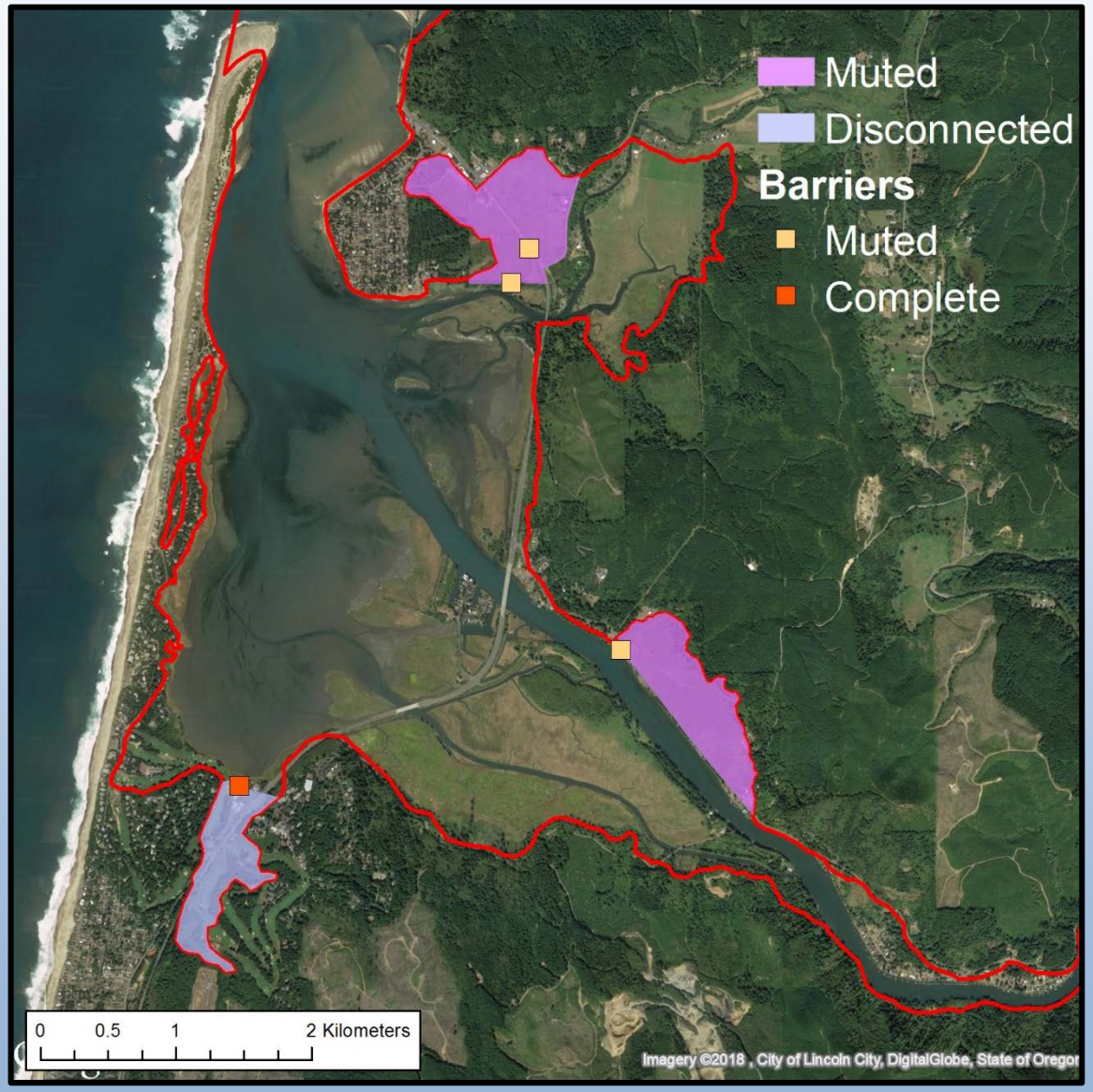


Identifying restoration opportunities



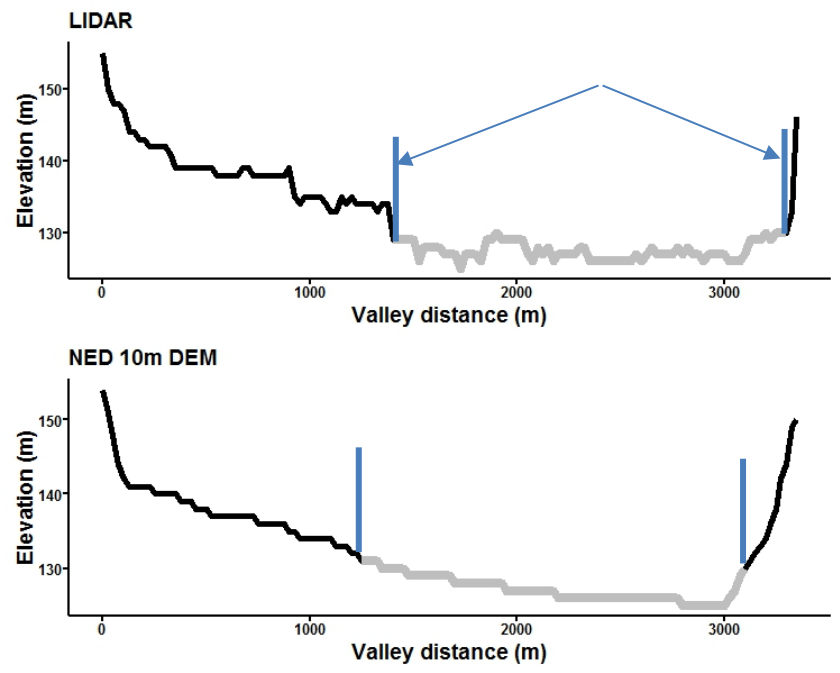


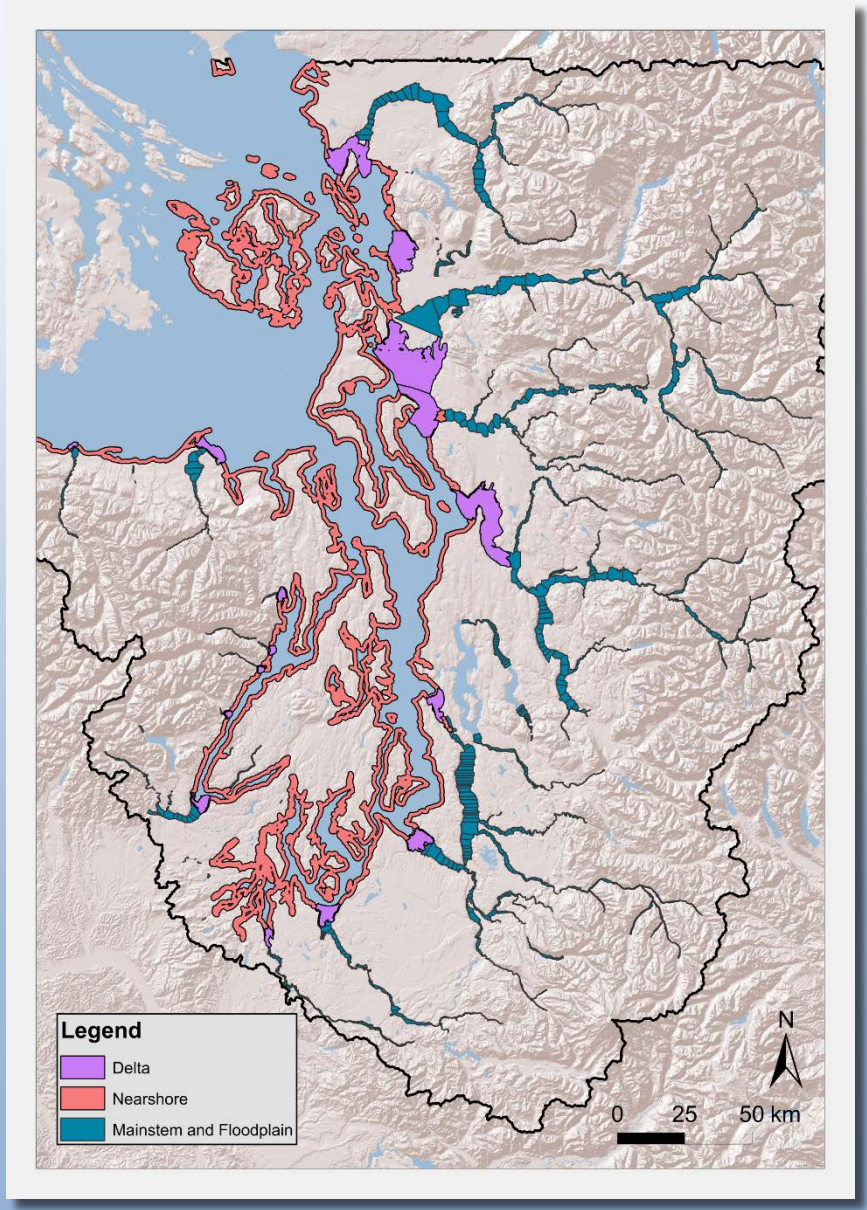
Identifying restoration opportunities



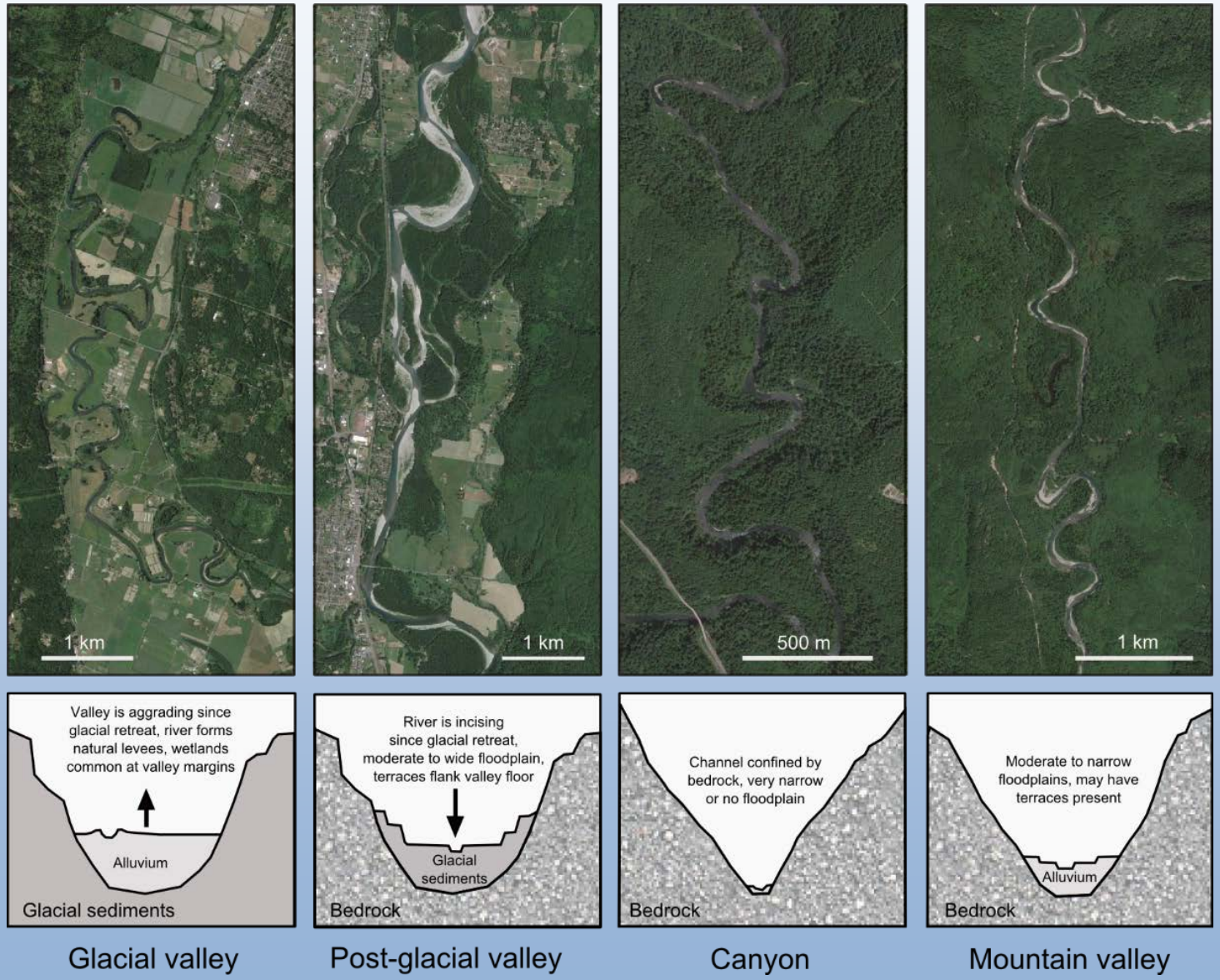
Monitoring habitat change

- Manually digitized floodplain boundaries with lidar and aerial photography

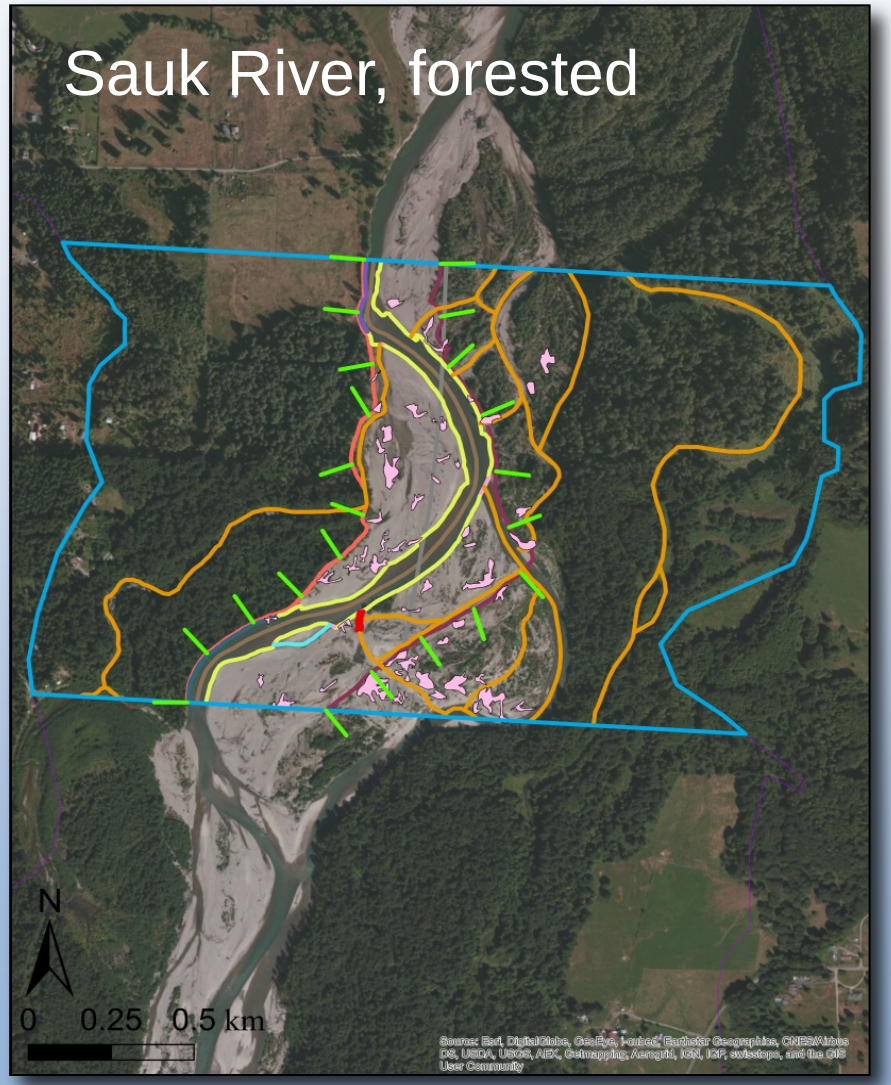




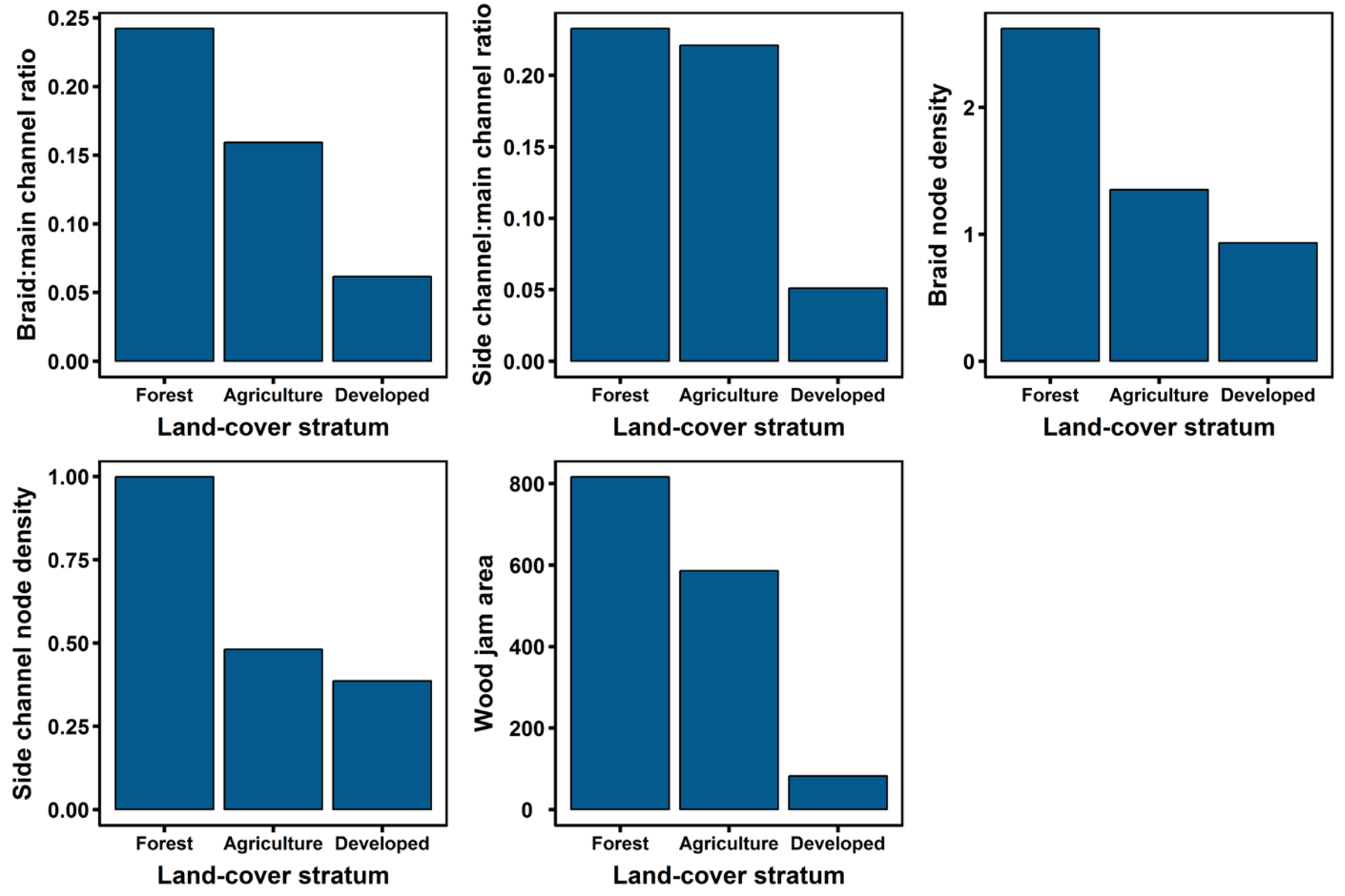
Stratify by geomorphic process domains



Digitized features: large river and floodplain



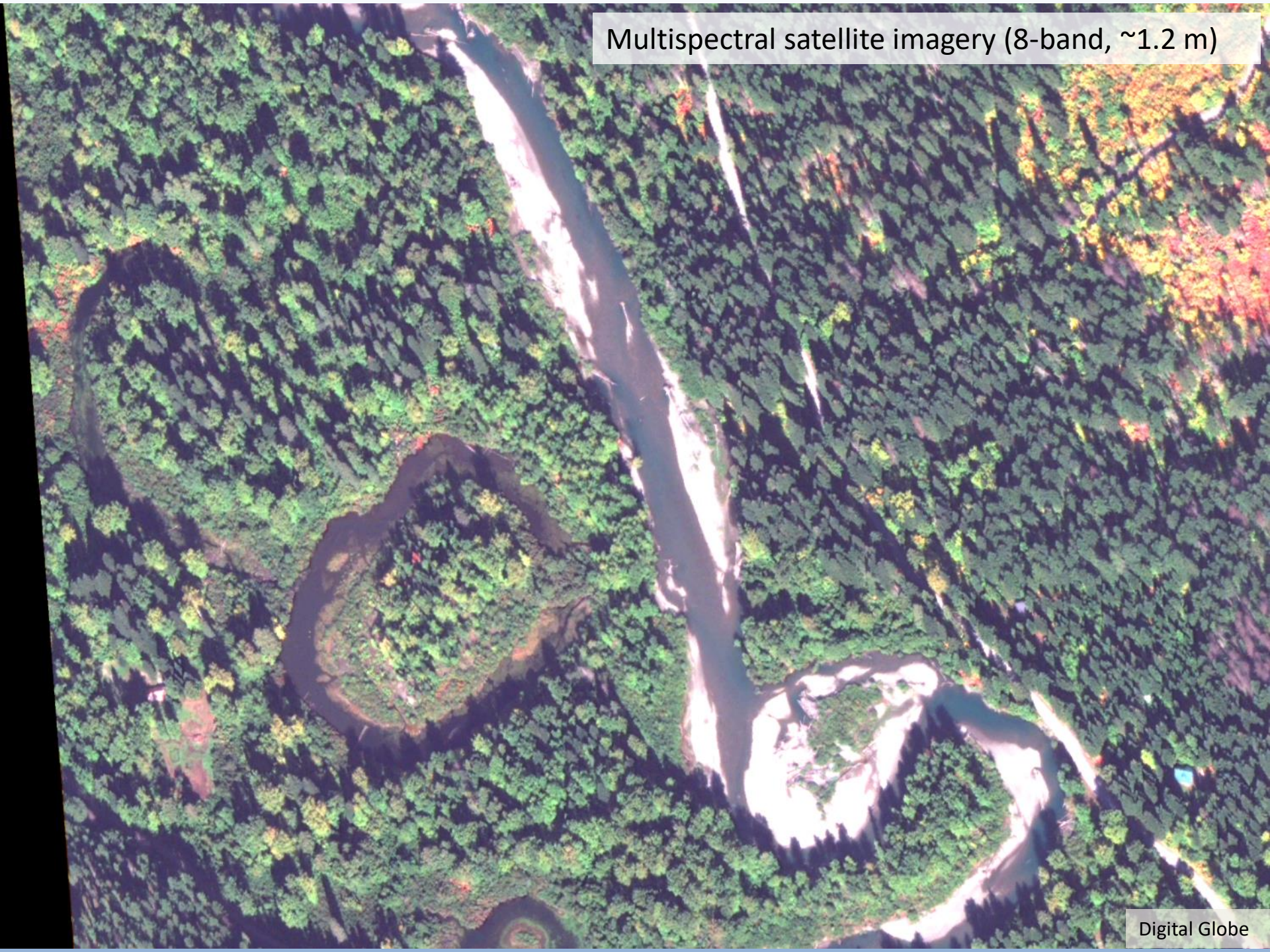
Habitat status by land cover class

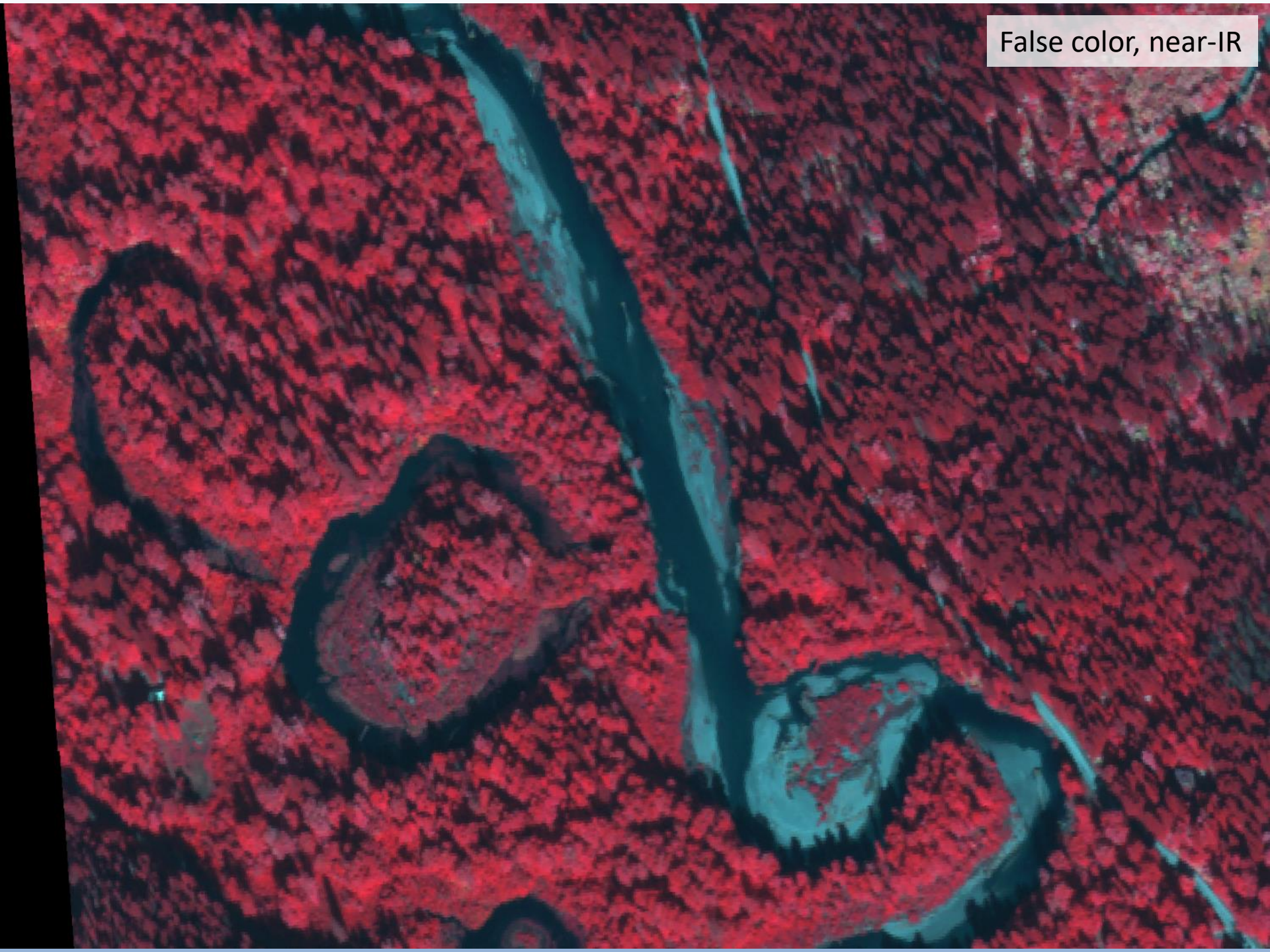


Summary

- Manual mapping vs. automated
  - Manual mapping more accurate where feasible (<100,000 km^2)
  - Automated mapping for larger areas, as long as lower accuracy is acceptable

- Habitat assessments useful for:
  - Evaluating habitat loss
  - Identifying restoration opportunities


Multispectral satellite imagery (8-band, ~1.2 m)
Digital Globe


False color, near-IR

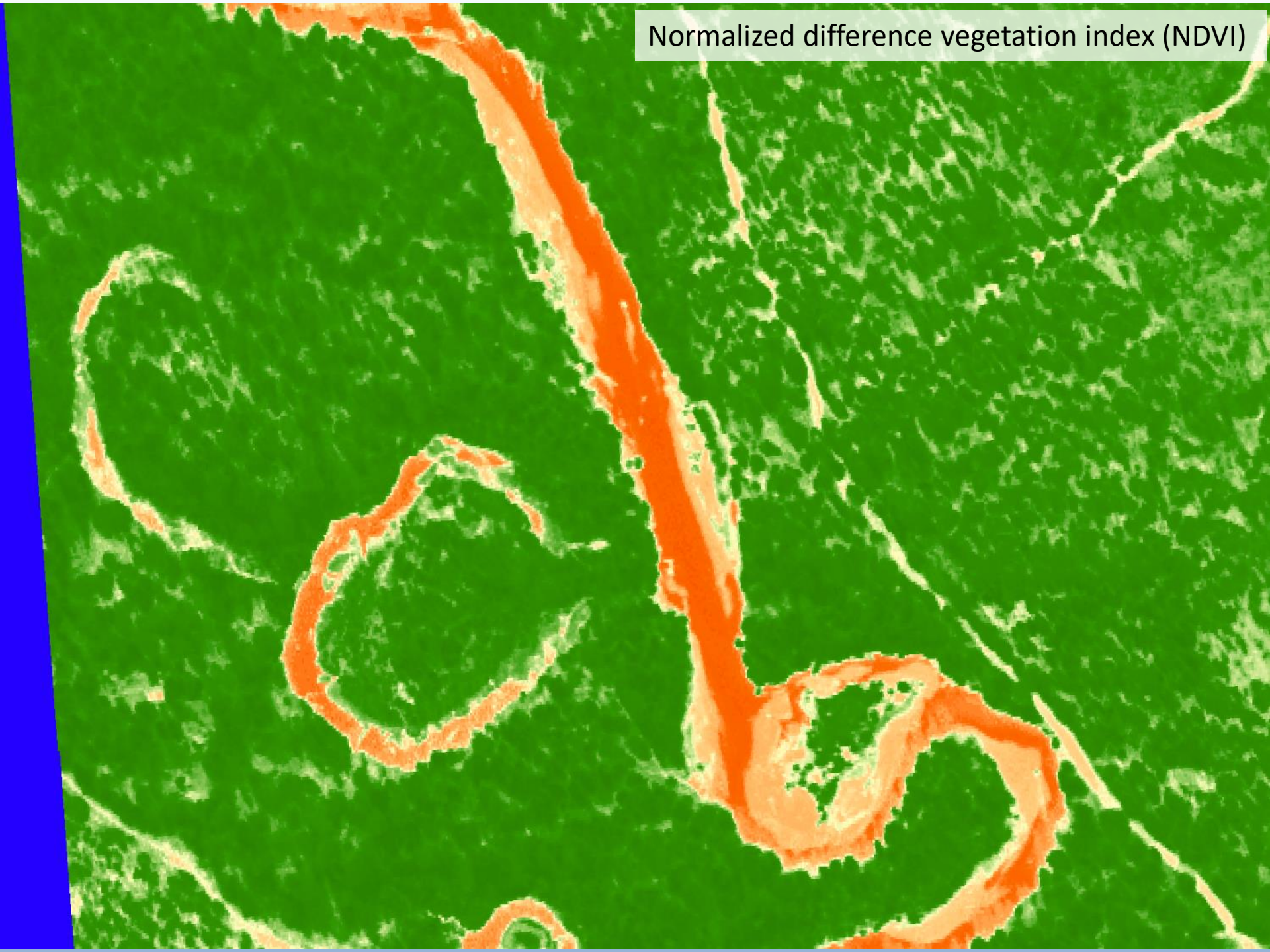

Normalized difference vegetation index (NDVI)


Image classification