Ecology of Loons Breeding in Thermokarst Ecosystems

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USGS
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Alaska Science Center
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Species

Yellow-billed Loon

Pacific Loon

Red-throated Loon

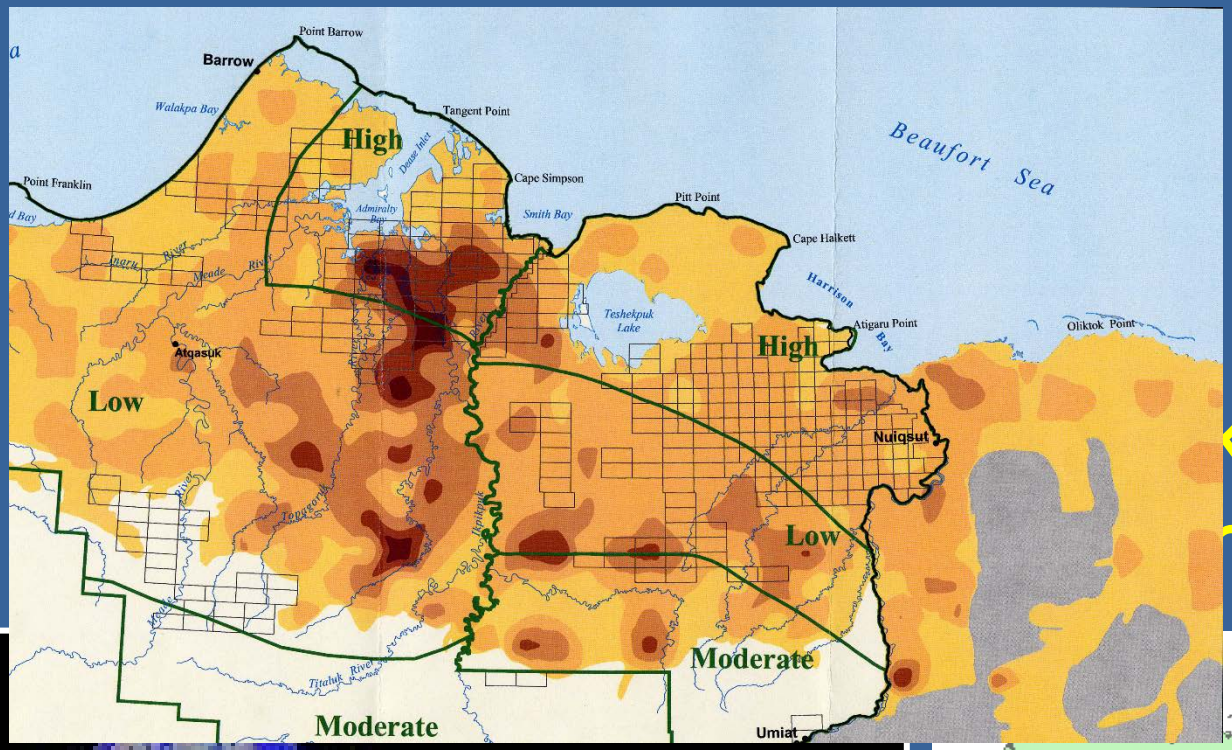
5.0 kg

Fish

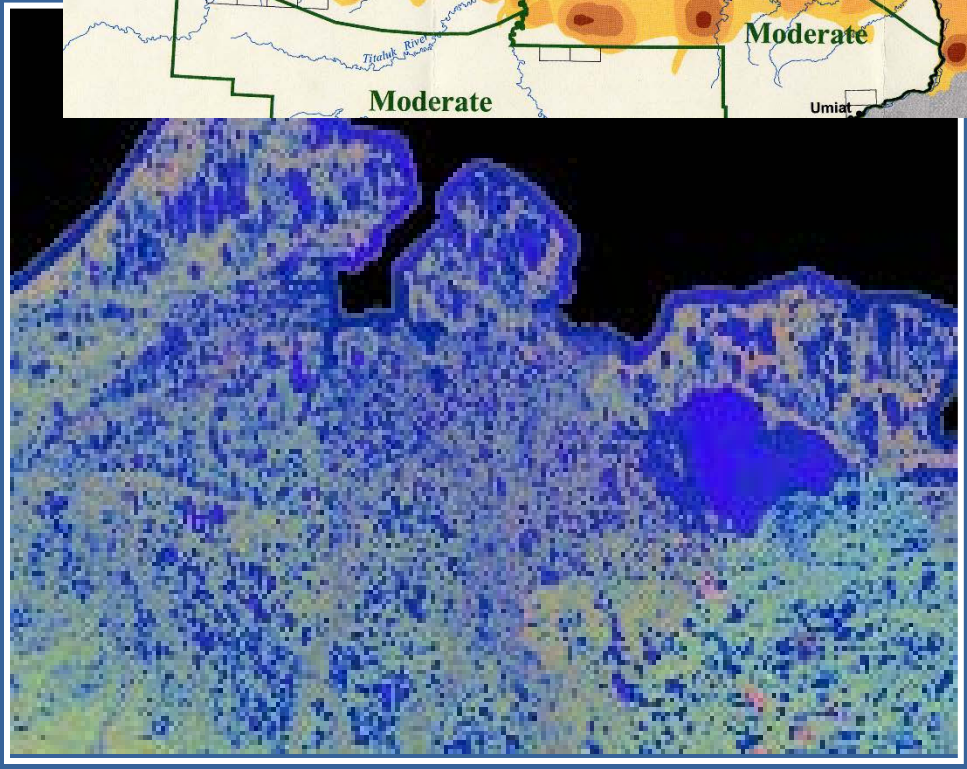
Large lakes

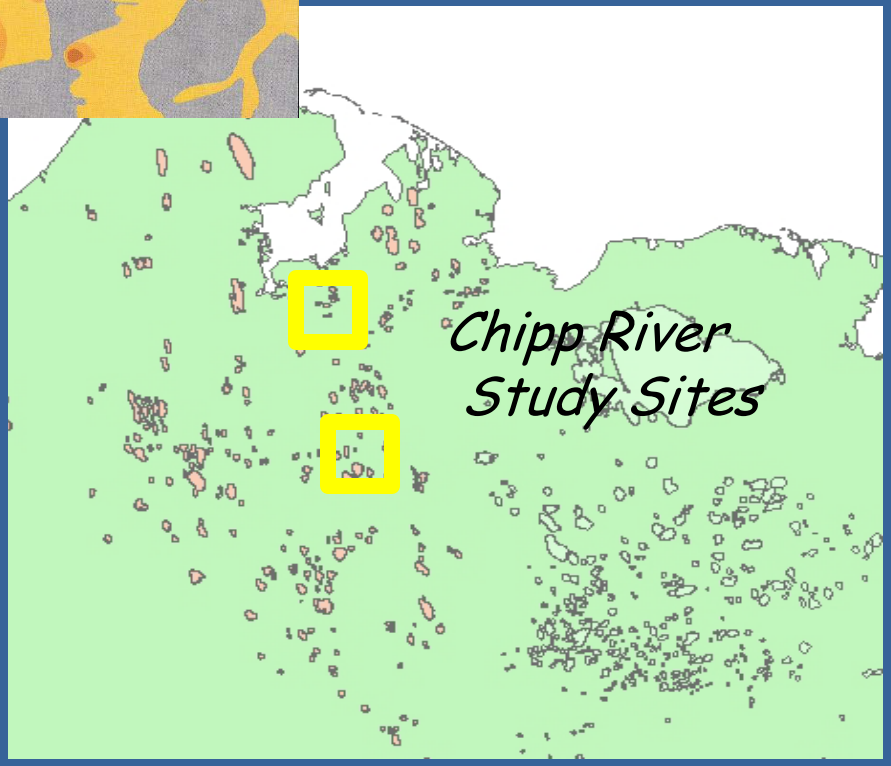
Minimum diameter = 300 m

Just enough to take off

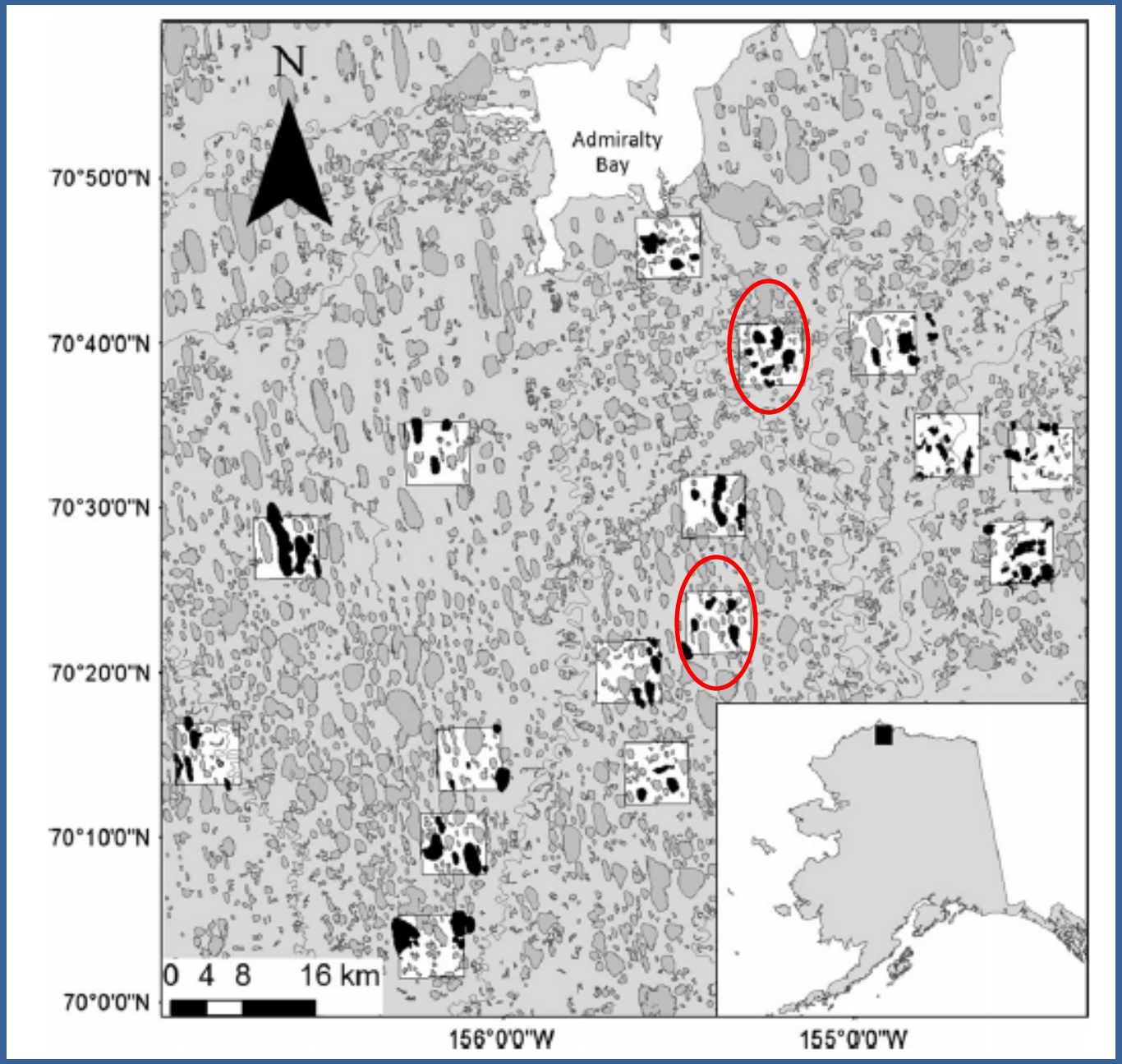


kes Deeper
han ~ 2 m





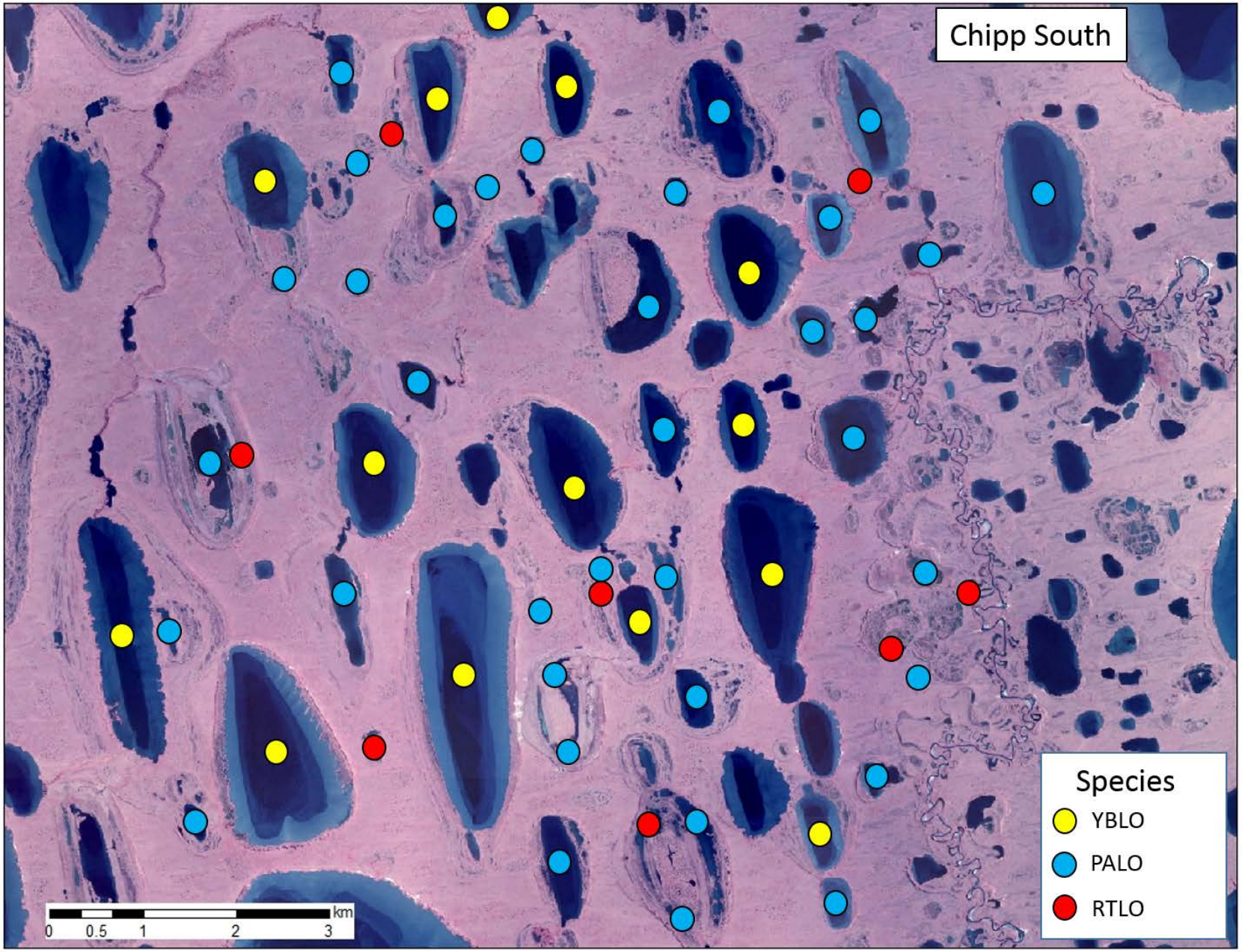
Two Scales of Lake Sampling



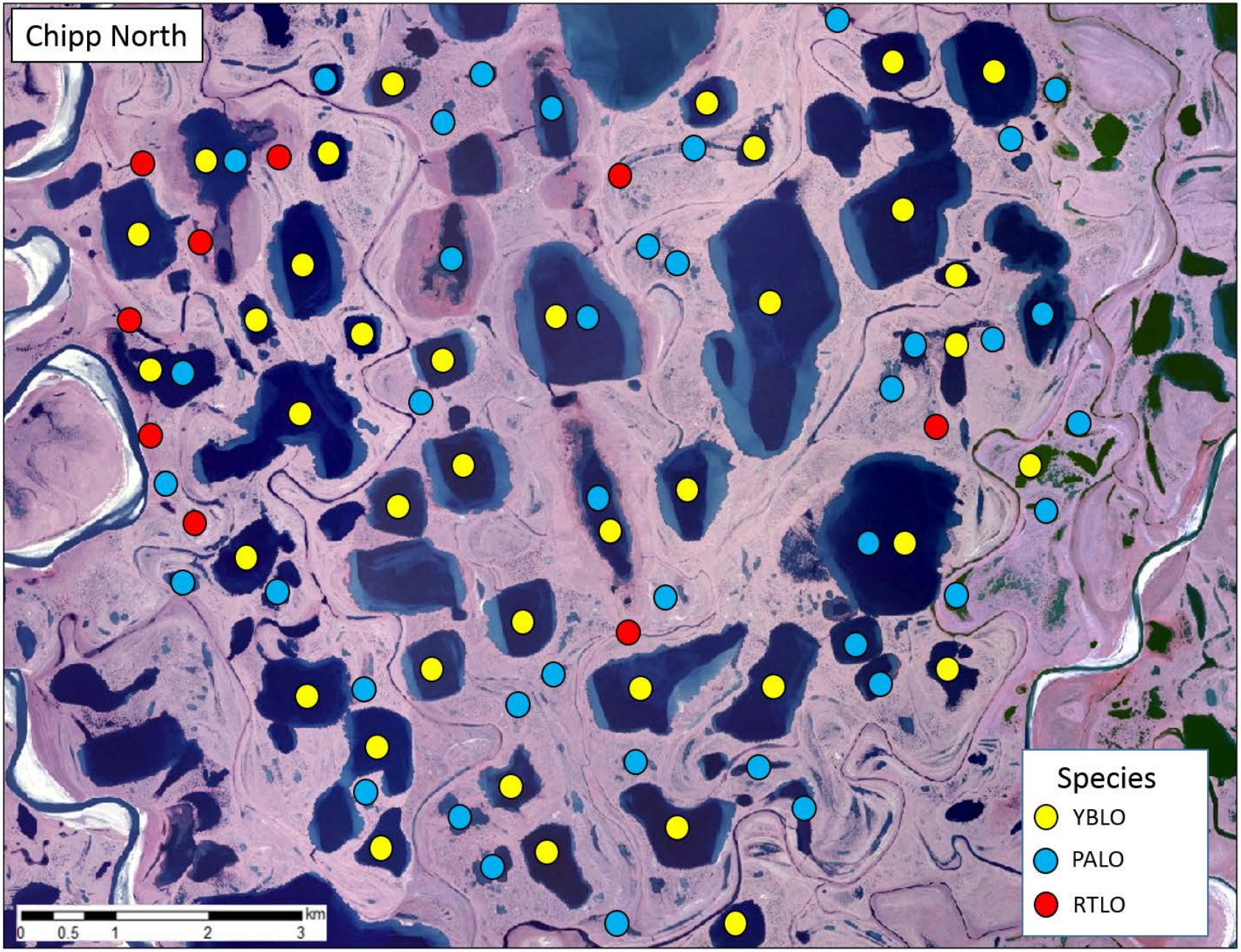
16 plots,
each 7 x 7 km

Minimum lake size
for sampling
= 7 hectares

Chipp South (~ 7 x 7 km2)



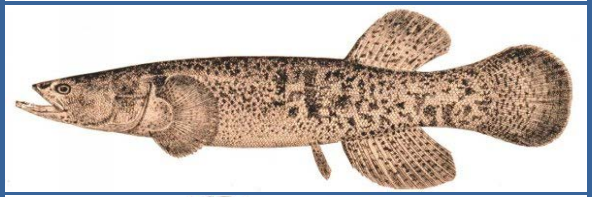
Chipp North (~ 7 x 7 km2)



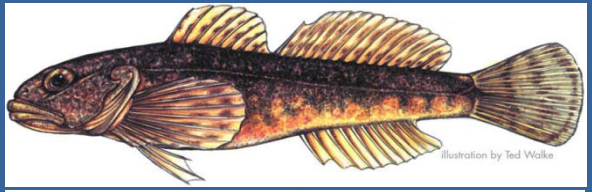
Fish species

Ninespine stickleback (NST)

Alaska blackfish (ALB)

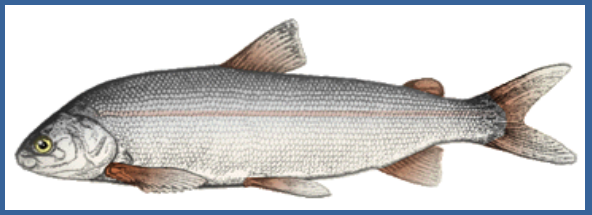


Slimy sculpin

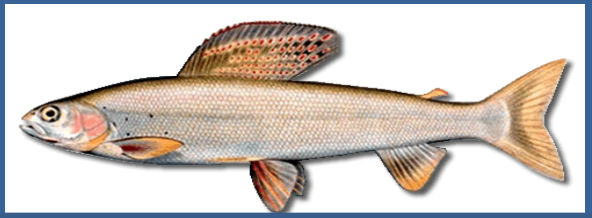


Least cisco (LCO)

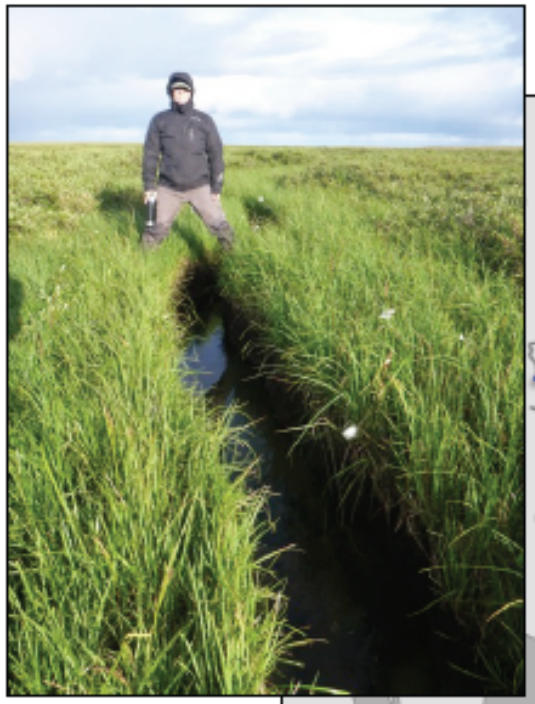
Broad whitefish (BWF)

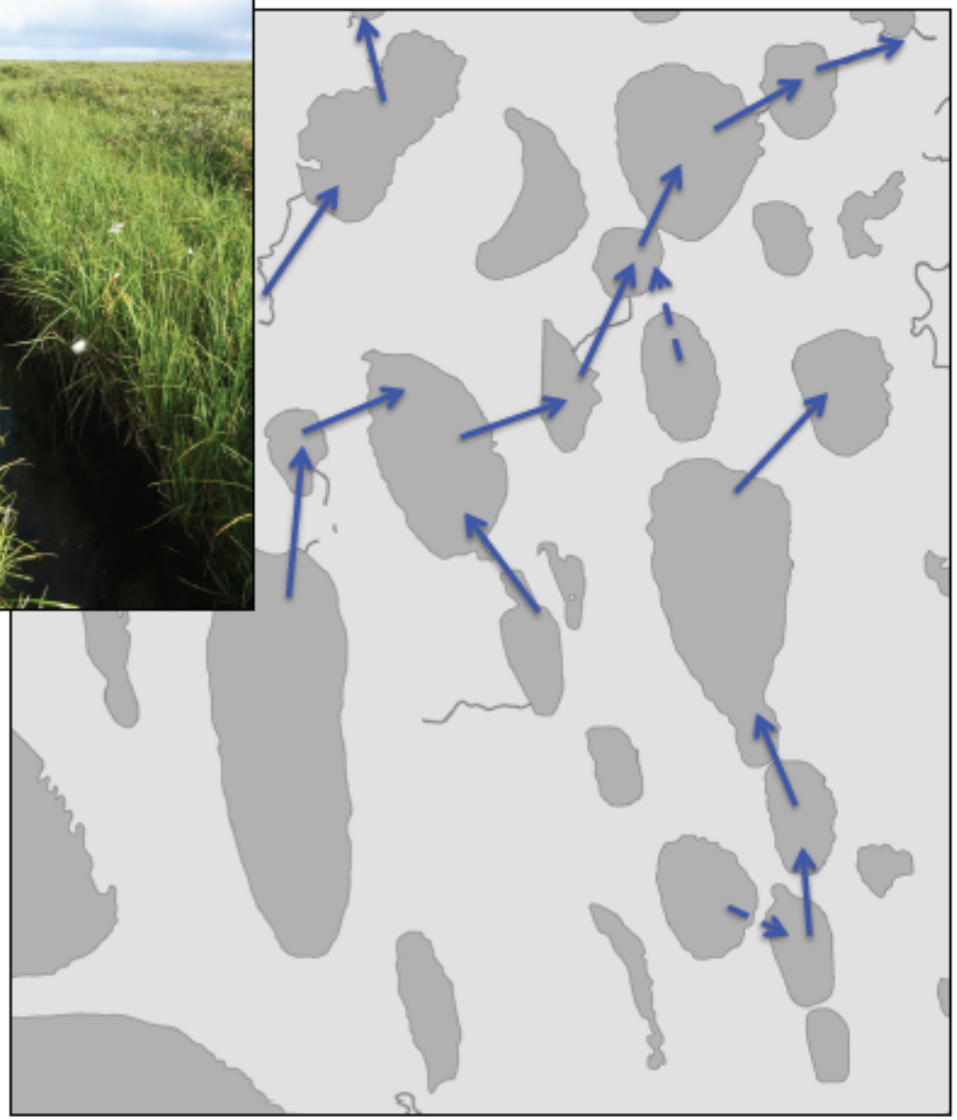


Arctic grayling (AGR)



Surface water connectivity





<u>Lake Order</u>

-3, disconnected

-2, wetland

-1, ephemeral flow

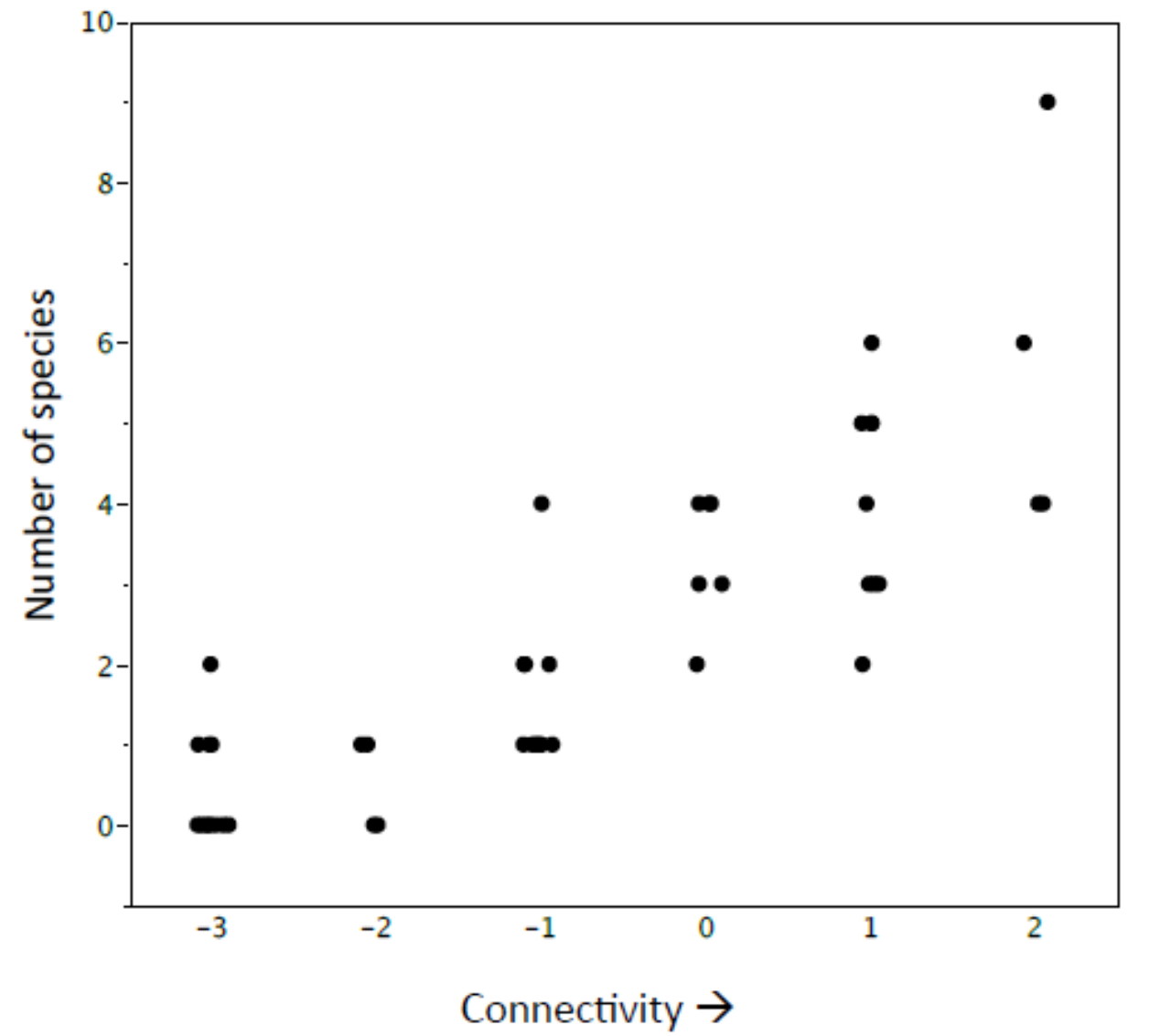
0, headwater lake

1, inflow & outflow

2, 3+ channels

Ref: Riera et al. 2000

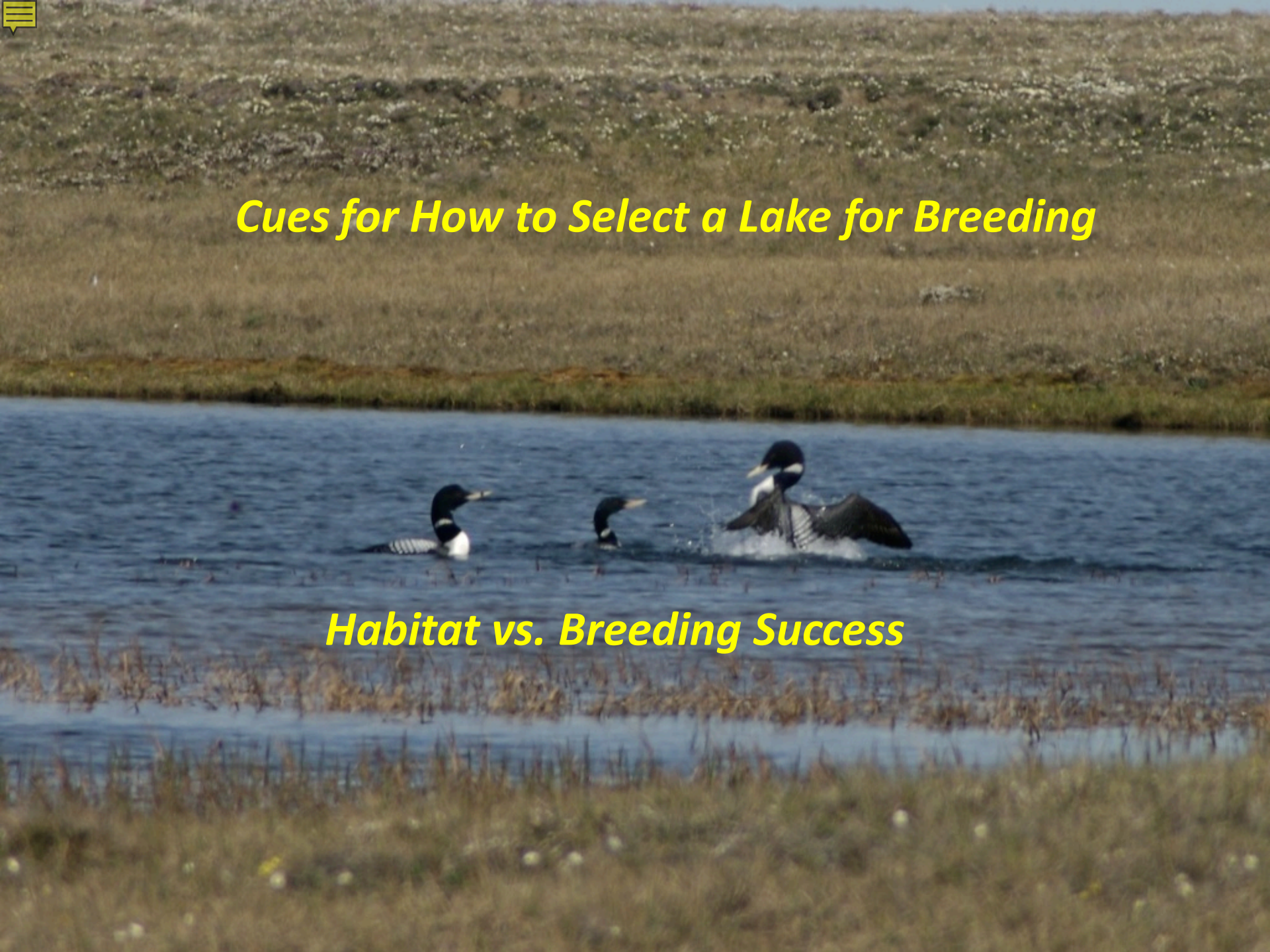
Fish Species Diversity = fxn (Waterbody Connectivity)



N
Image © 2015 DigitalGlobe
Google earth
2002
Imagery Date: 8/24/2011 70°24'36.91" N 155°22'42.92" W elev 88 ft eye alt 4323 ft

Little open water when loons arrive for breeding

Most nests are on the east side of lakes (minimize wind impacts)


Cues for How to Select a Lake for Breeding
Habitat vs. Breeding Success

Abundance of Loons

Yellow-billed Loon

Stable, slowly increasing

Pacific Loon

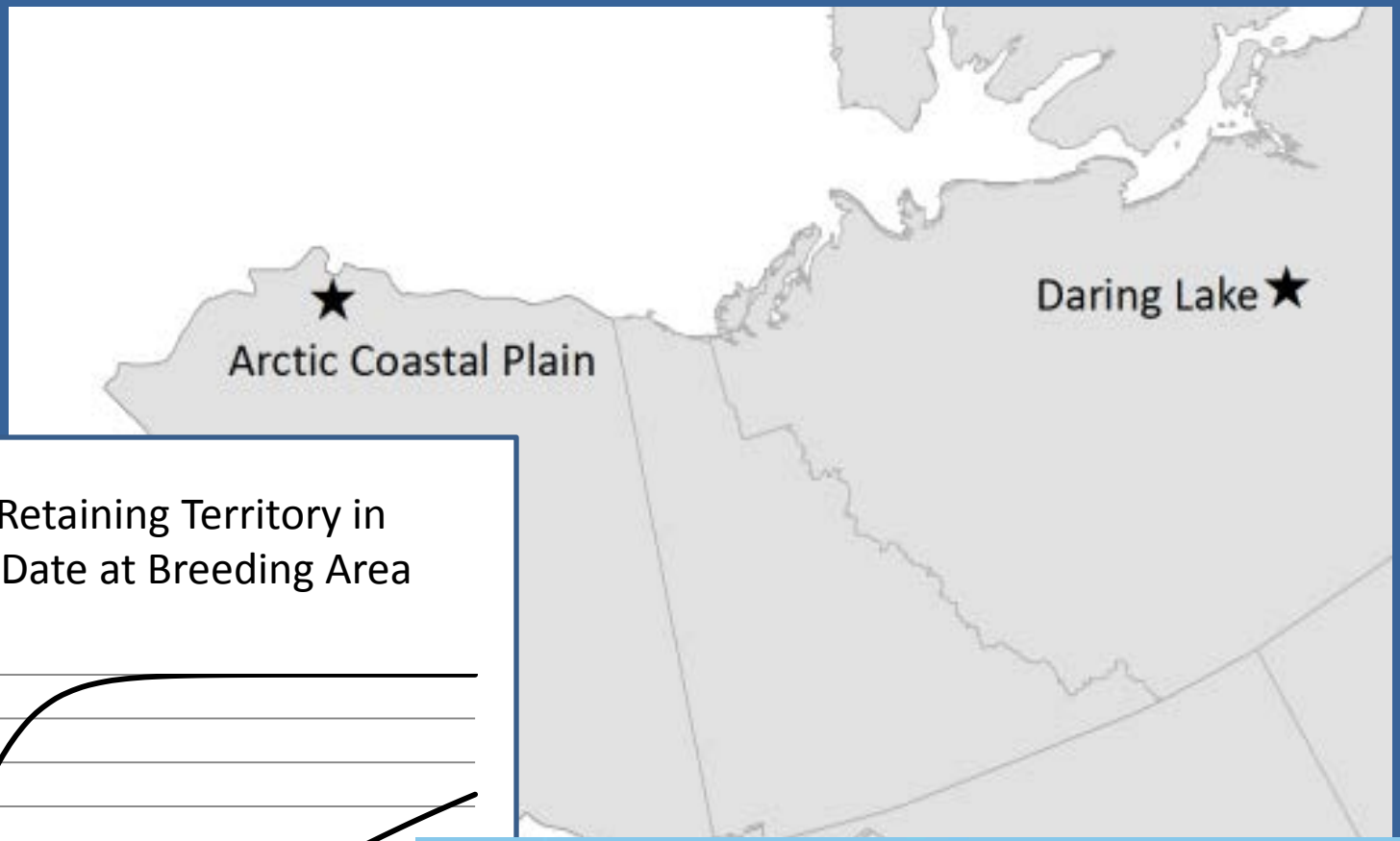
Stable, slowly increasing

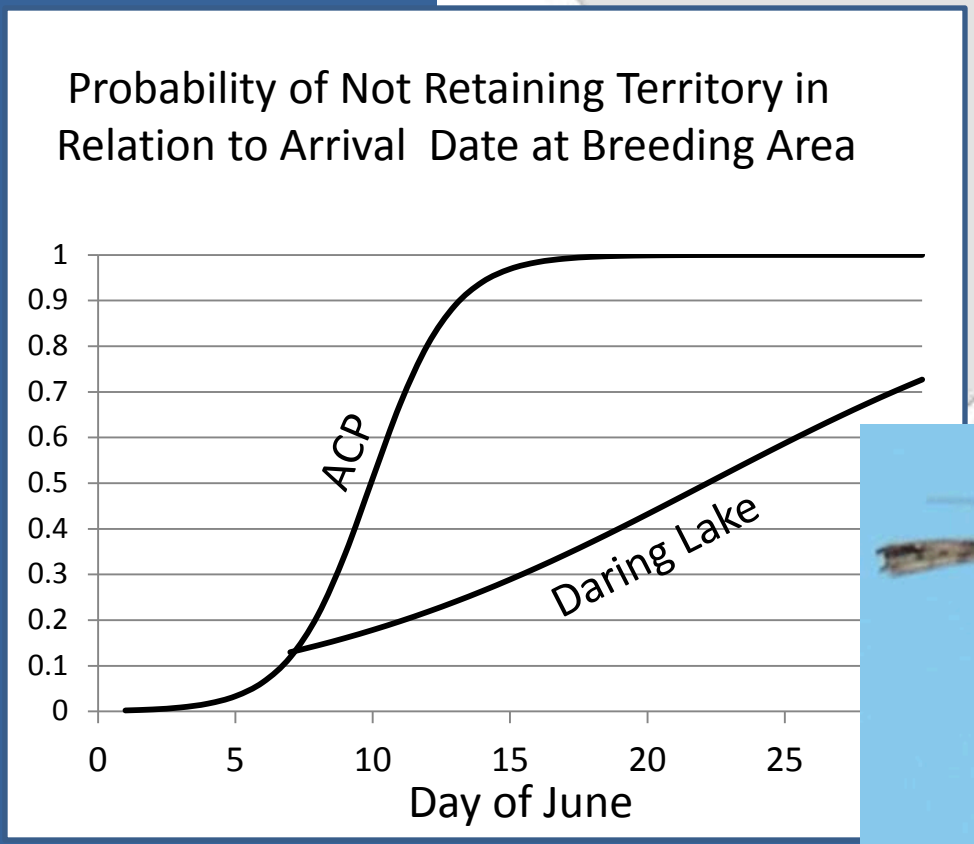
Red-throated Loon

Slowly decreasing

Summary

- Water budget volatile and affects nutrient availability
- Fertilizer stimulates ecosystem productivity
- Fish diversity = fxn (lake connectedness)
- Our ability to model fish distributions is improving, and relates to loon modeling
- Diets of loons remains uncertain; suspect Least Cisco a key species for YBLOs


Arctic Coastal Plain
Daring Lake


Probability of Not Retaining Territory in Relation to Arrival Date at Breeding Area
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5
10
15
20
25
Day of June
ACP
Daring Lake