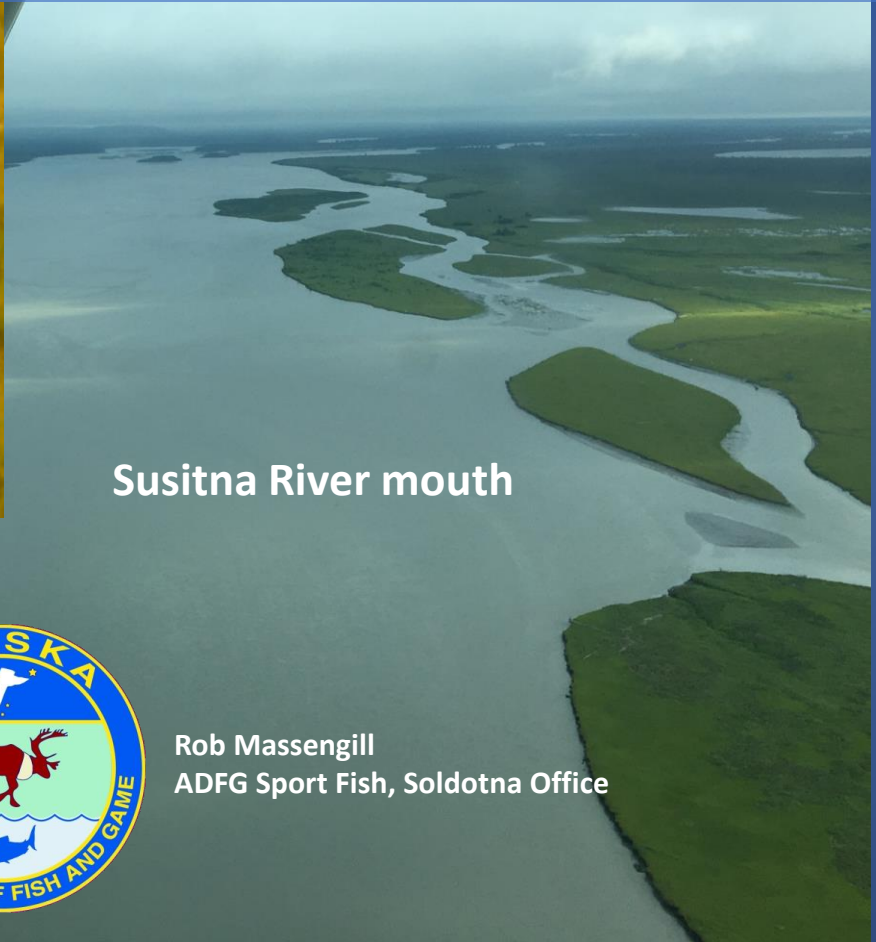


Cook Inlet as an Invasion Pathway for Invasive Northern Pike



Susitna River mouth



Rob Massengill
ADFG Sport Fish, Soldotna Office

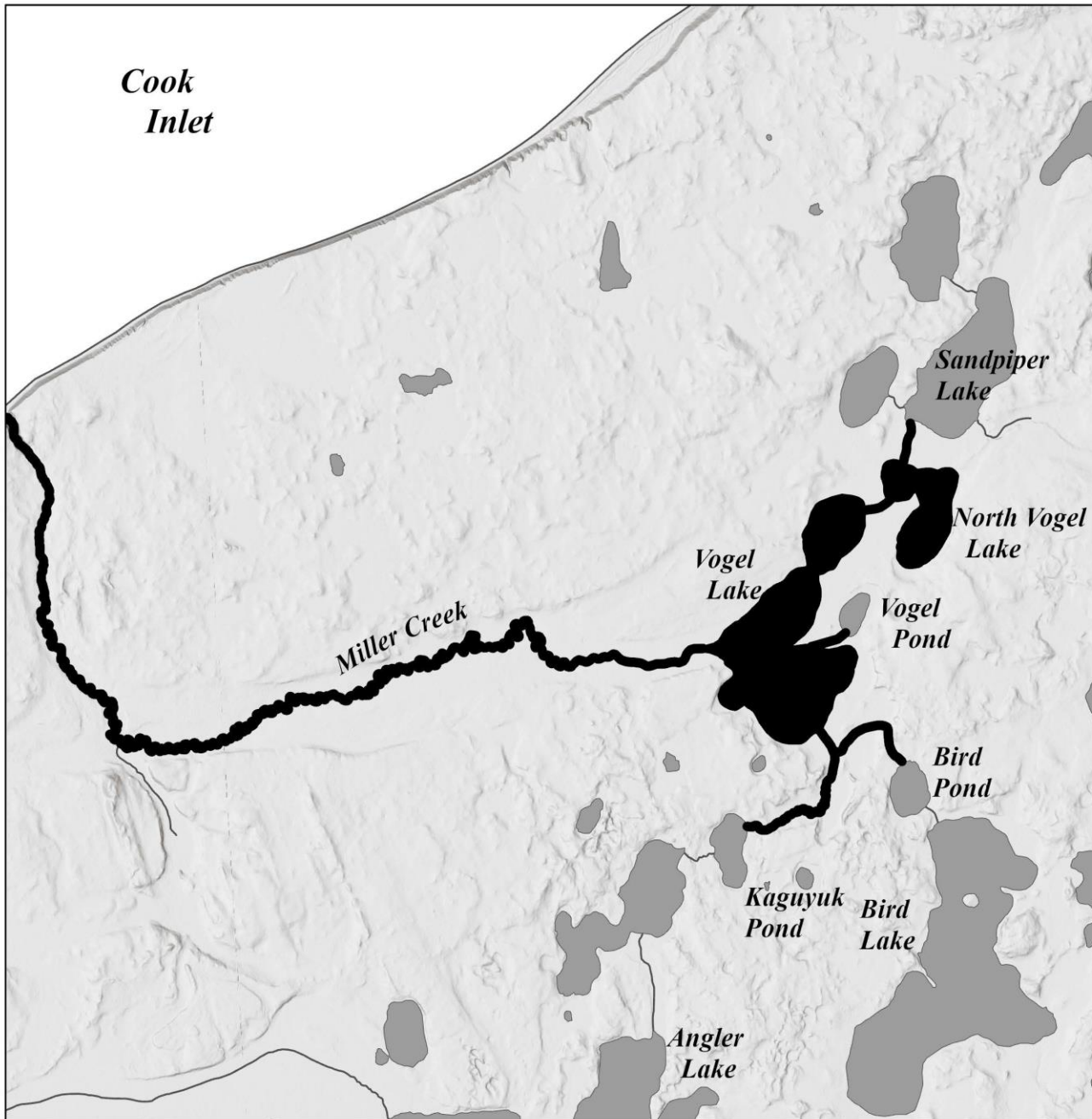
Rumors of pike in Cook Inlet have existed for decades



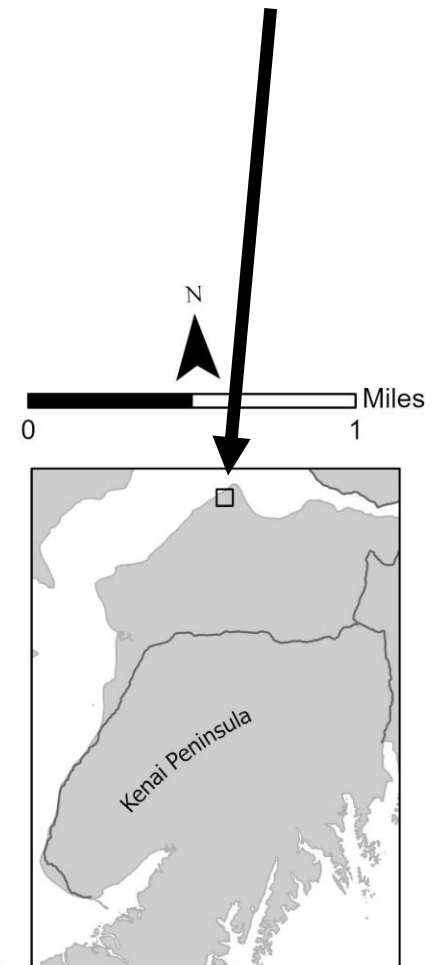
Confirmation of Cook Inlet Use



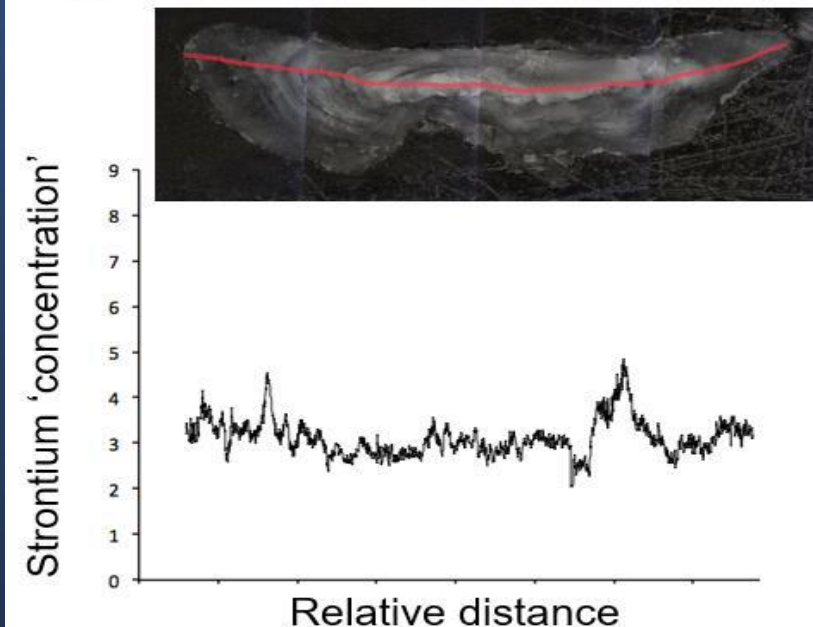
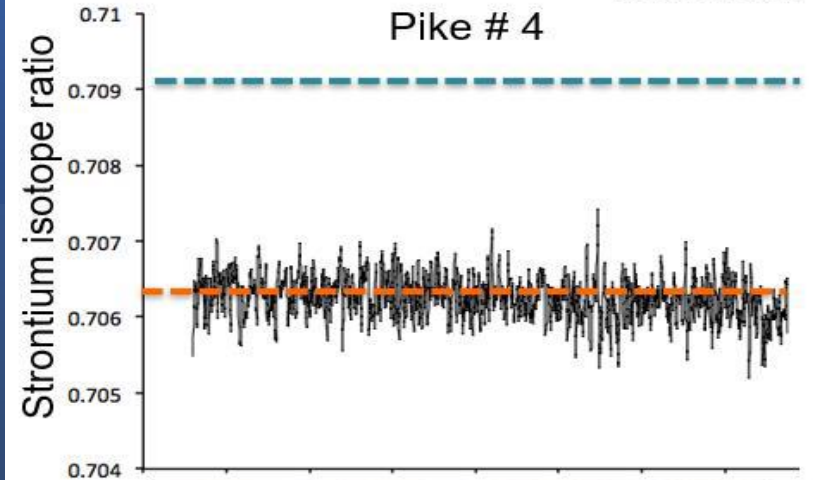
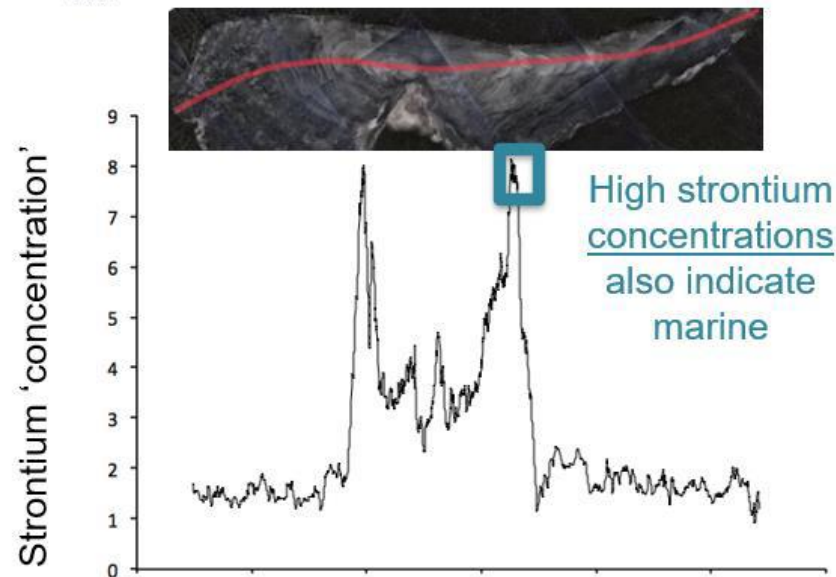
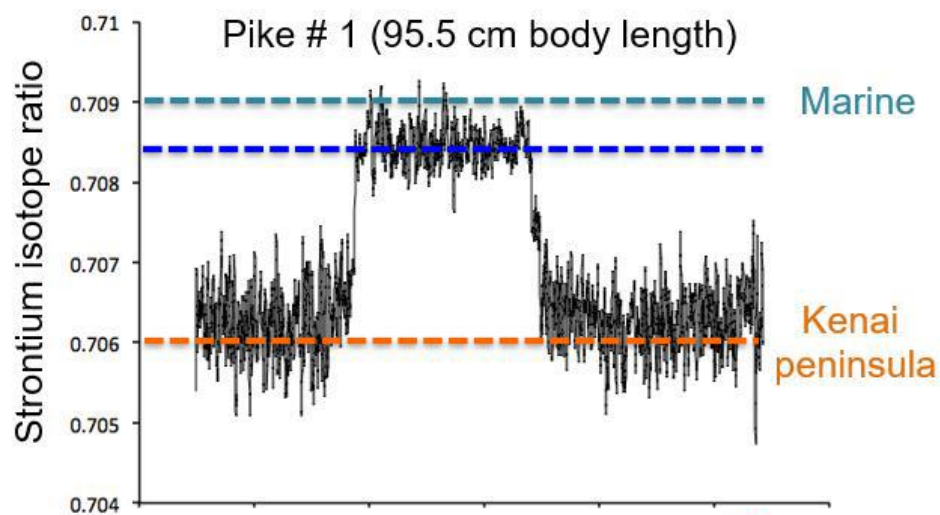
Jerry Strait, ADF&G Technician (retired) with a 16-lb. female northern pike from Vogel L. (Miller Creek drainage near Pt. Possession), collected May 2019.



The Miller Creek drainage is near Point Possession at the northern tip of the Kenai Peninsula.



Strontium isotope ratios ($^{87}\text{Sr}/^{86}\text{Sr}$) and total strontium ^{88}Sr values can tell us if a fish has been in a marine environment.

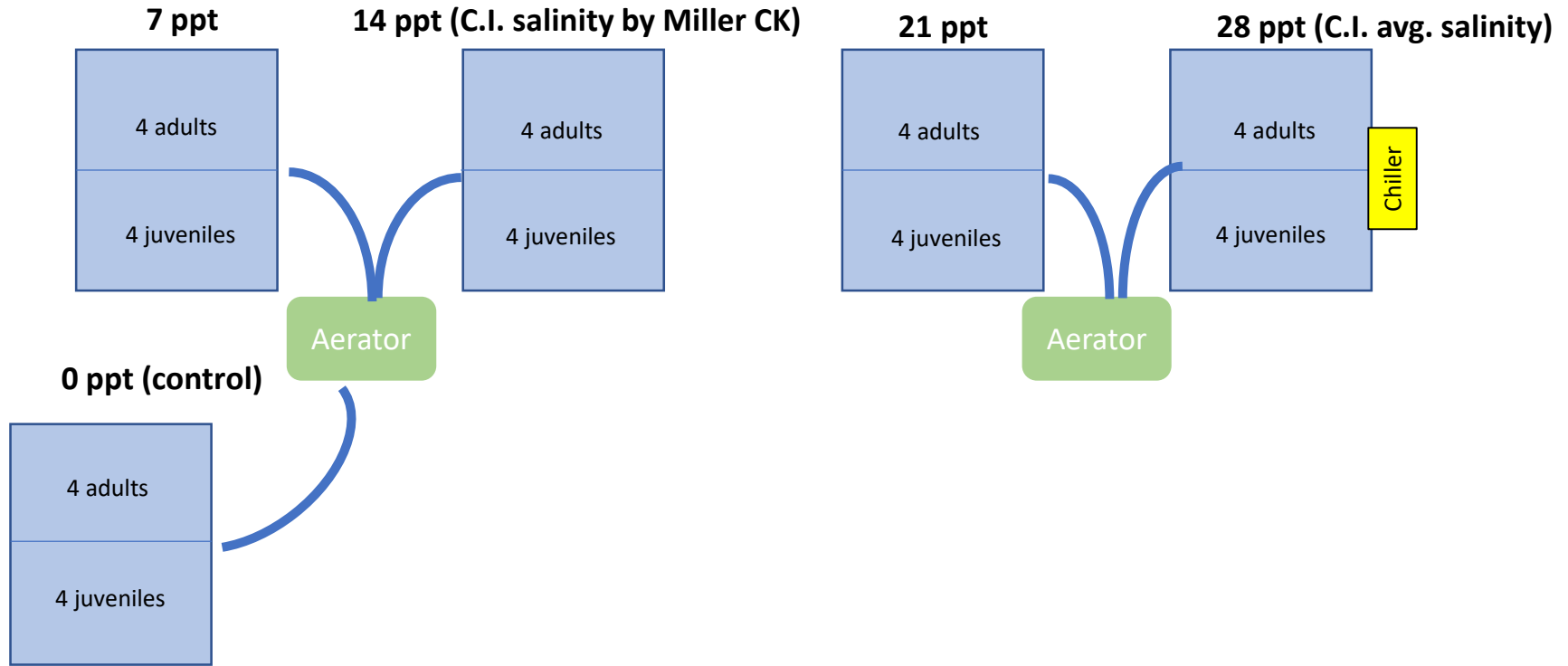


Images courtesy Dr. Matthew Wooller
Professor Marine Biology, UAF
Director Alaska Stable Isotope Facility, UAF

A rotenone tx removed the pike in the Miller CK drainage in 2021, a picket weir installed by the USFWS weir is intended to keep adult pike from migrating back via Cook Inlet - not a permanent solution.



Trying to Learn More: 2022 Pike Salinity Trials



Objective: estimate LC50 values over different exposure periods 12, 24, 48, 72, and 96-hours. We replicated a range of salinities found in upper Cook Inlet. All aquaria were run in duplicates.

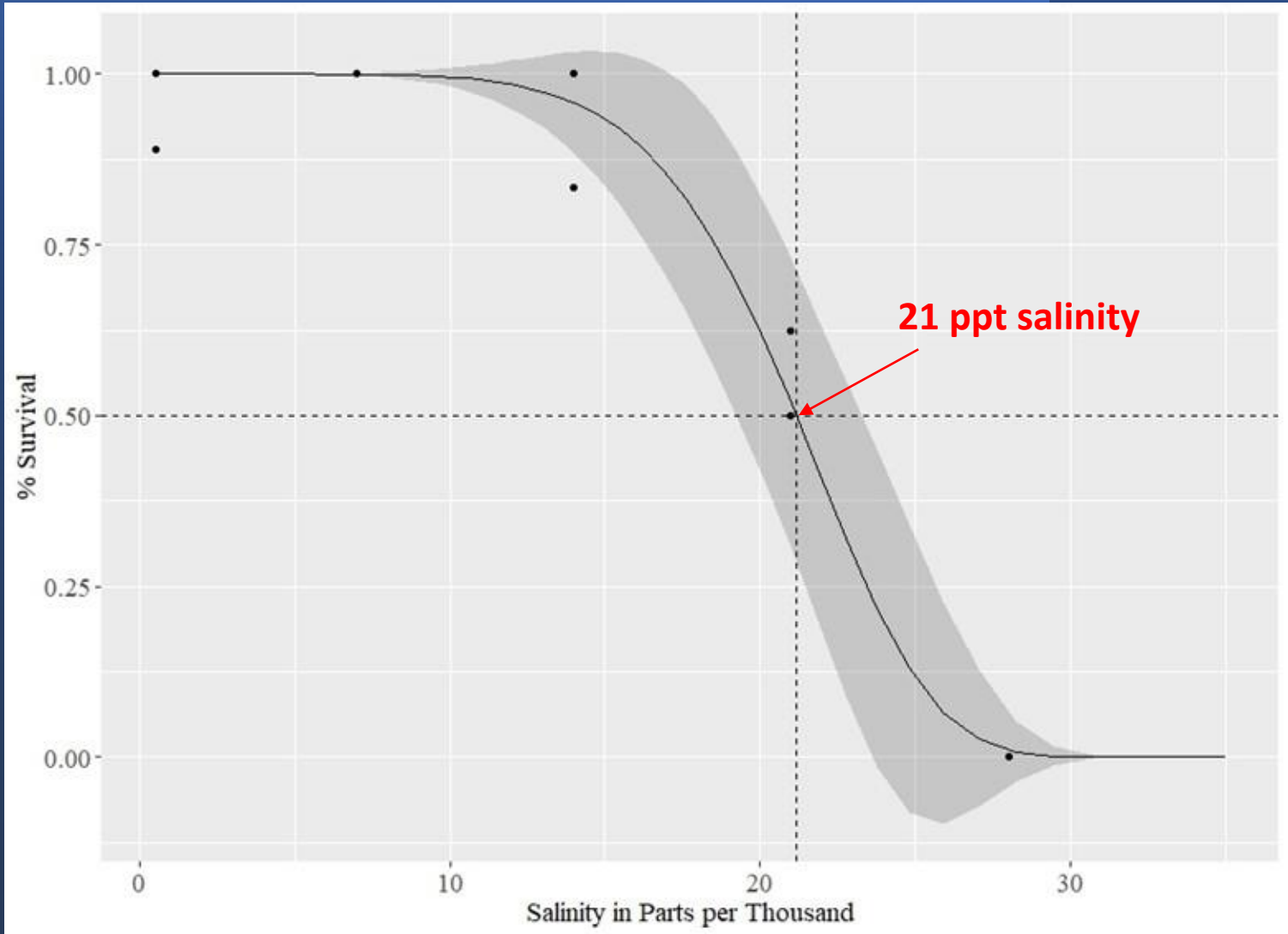
Aquaria set up



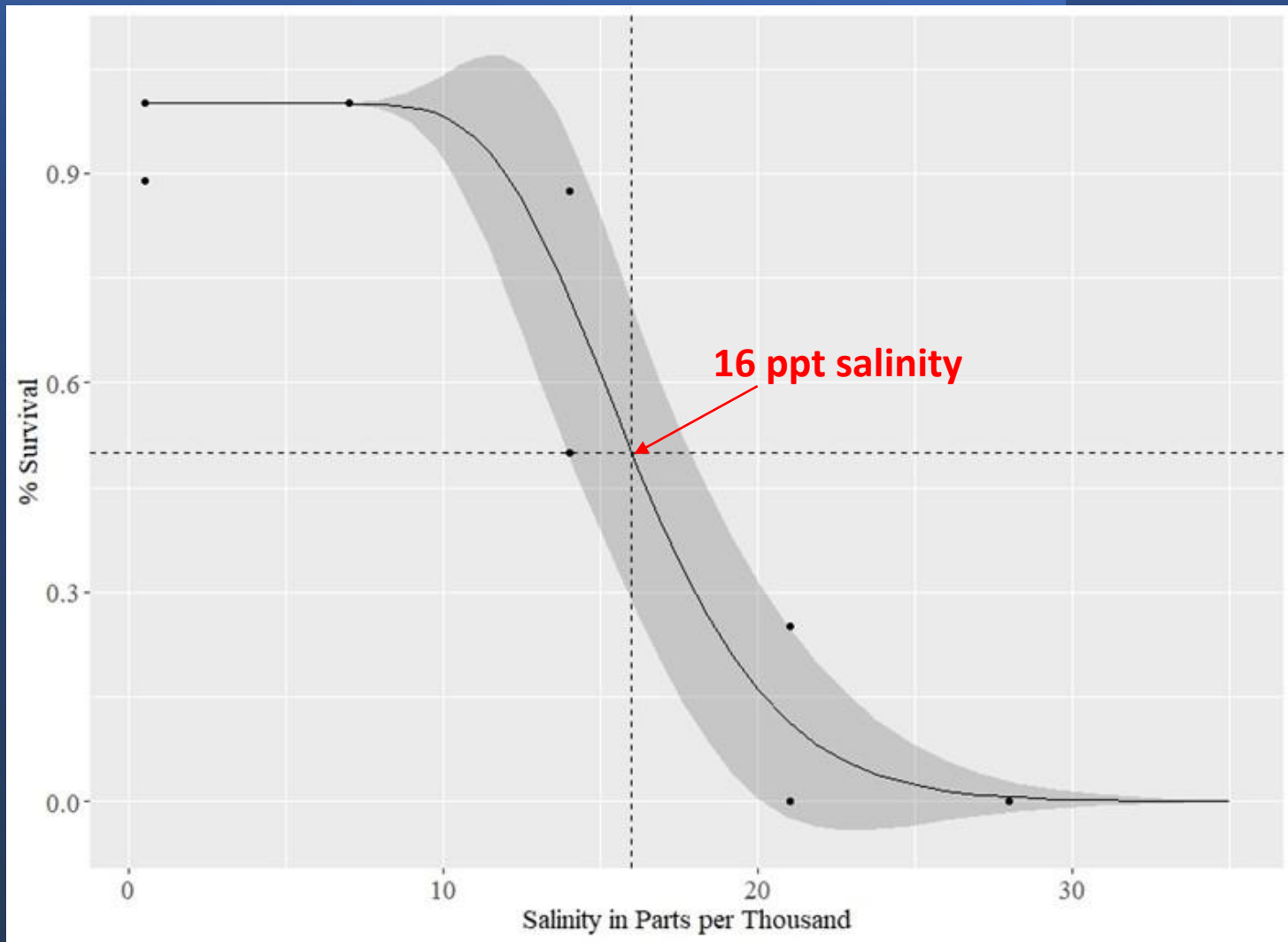
Similar salinity, temp,
and DO as Cook Inlet

Mixing salt dose: 7-hr.
salinity acclimatization
period





12-hour salinity LC50



96-hour salinity LC50

Exposure Period	Salinity in ppt		
	LC50 estimate	Lower 95% C.I.	Upper 95% C.I.
12-hour	21.16	19.22	23.09
24-hour	20.18	17.589	22.48
48-hour	17.5	15.25	19.74
72-hour	15.98	14.06	17.9
96-hour	15.98	14.06	17.9

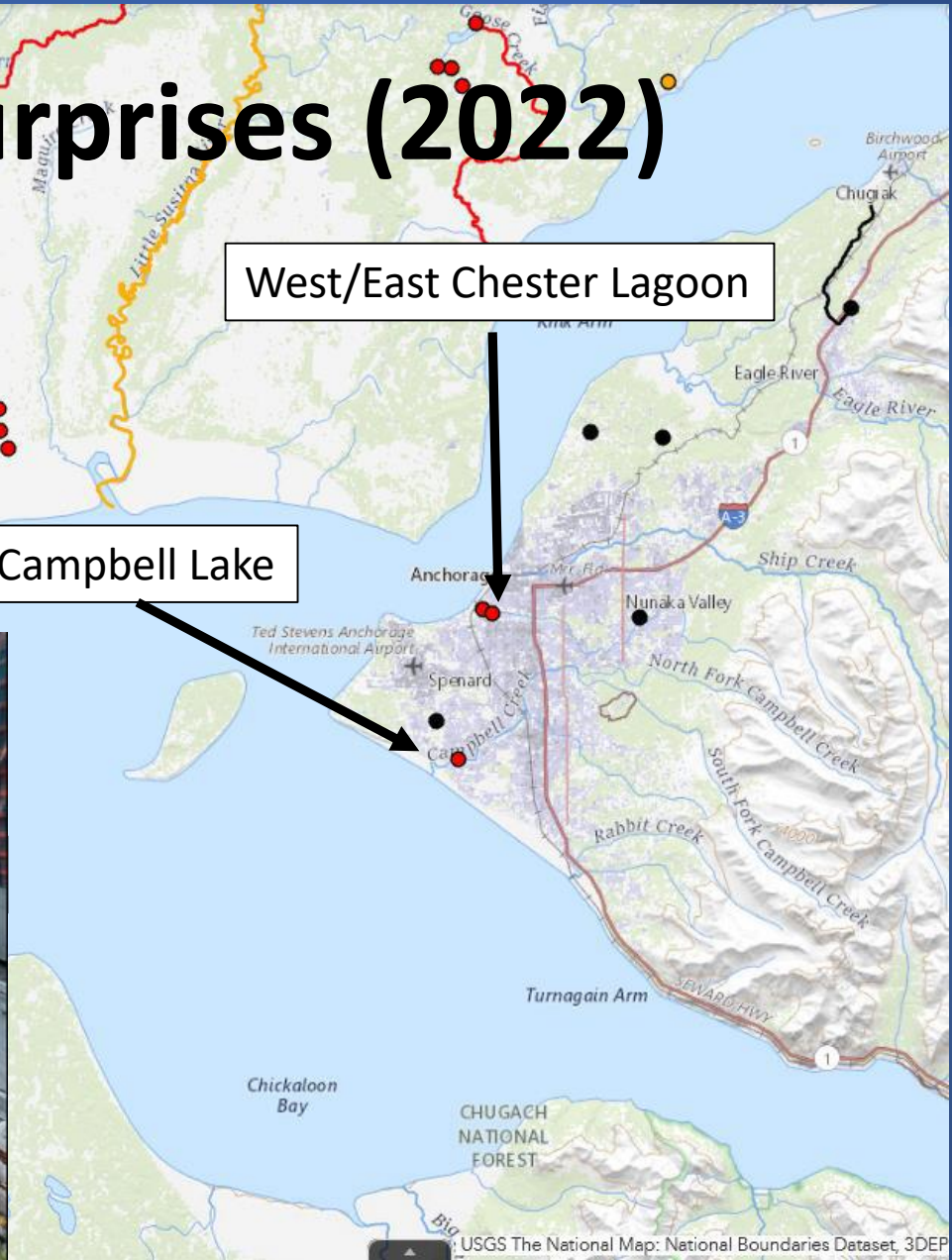
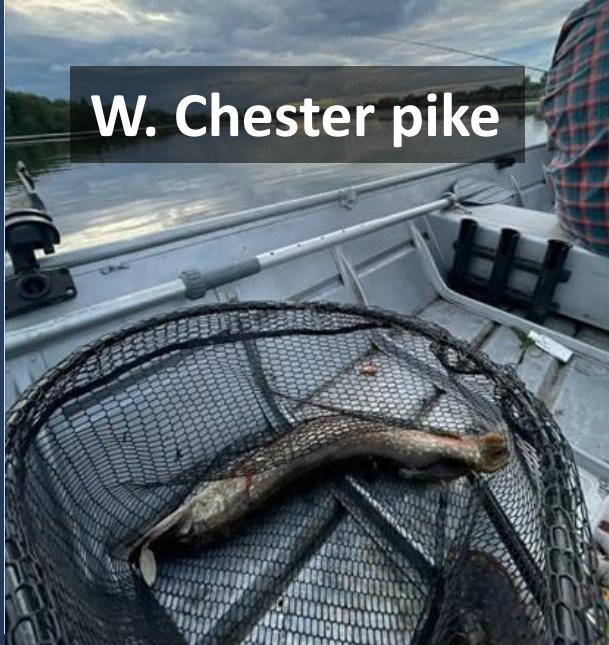
- ~5 ppt separates the 12-hour and 96-hour LC50.
- Salinities < 16ppt appear quite tolerable to most northern pike for an extended period (+72 hours), 63% of the fish exposed to 14ppt survived the entire 96-hour trial

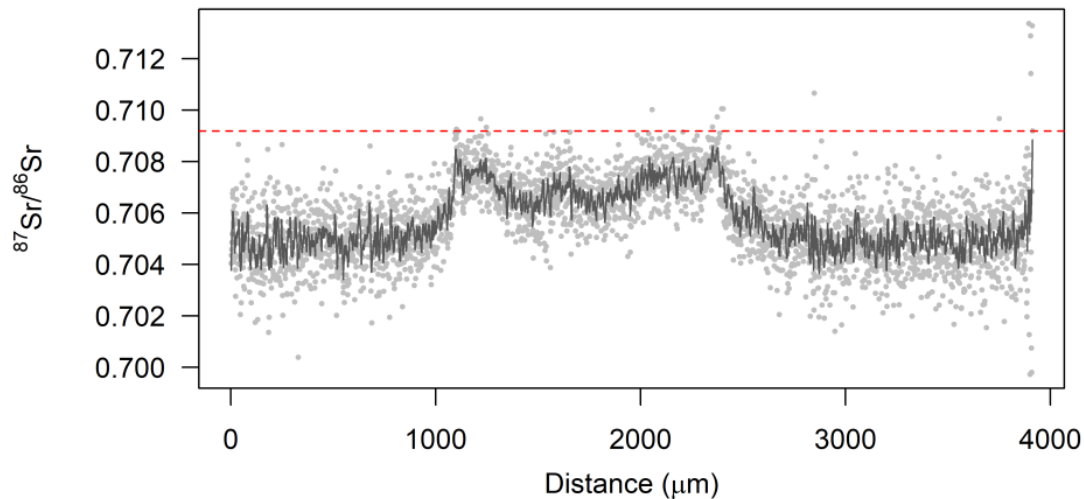
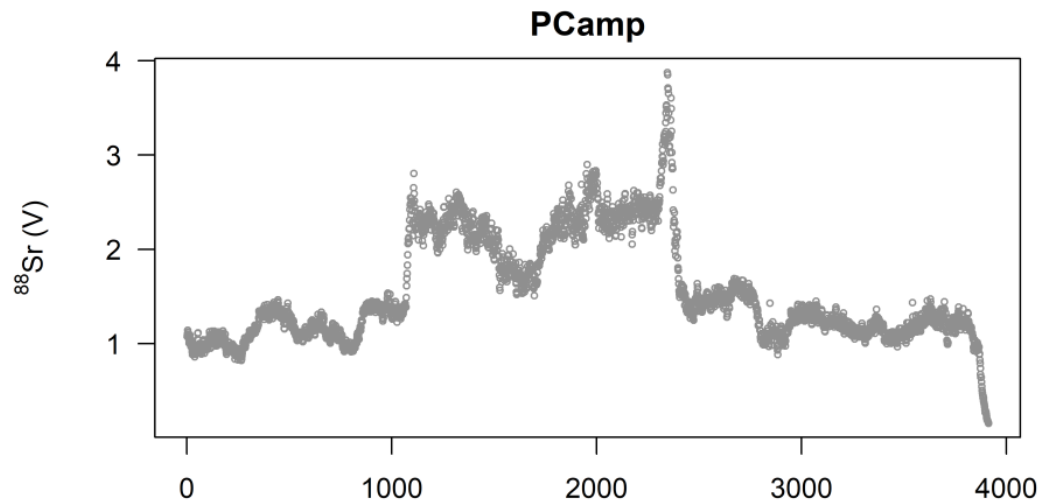
More surprises (2022)

West/East Chester Lagoon

Campbell Lake

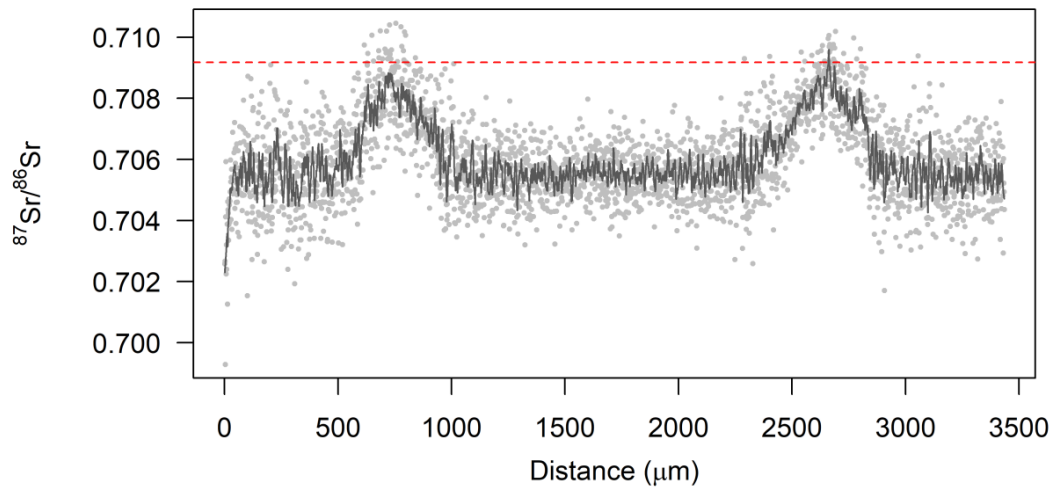
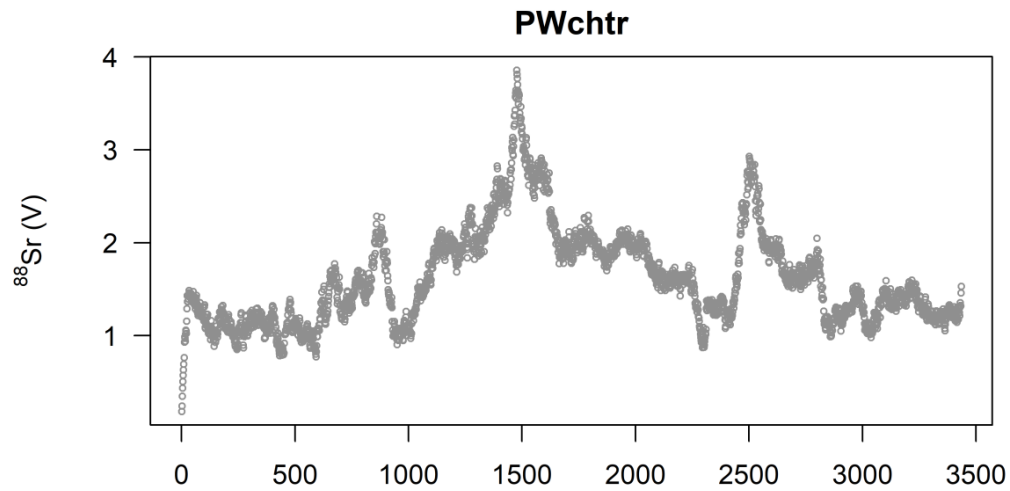
W. Chester pike





Images
courtesy Dr.
Matthew
Wooller
Professor
Marine
Biology, UAF
Director Alaska
Stable Isotope
Facility, UAF

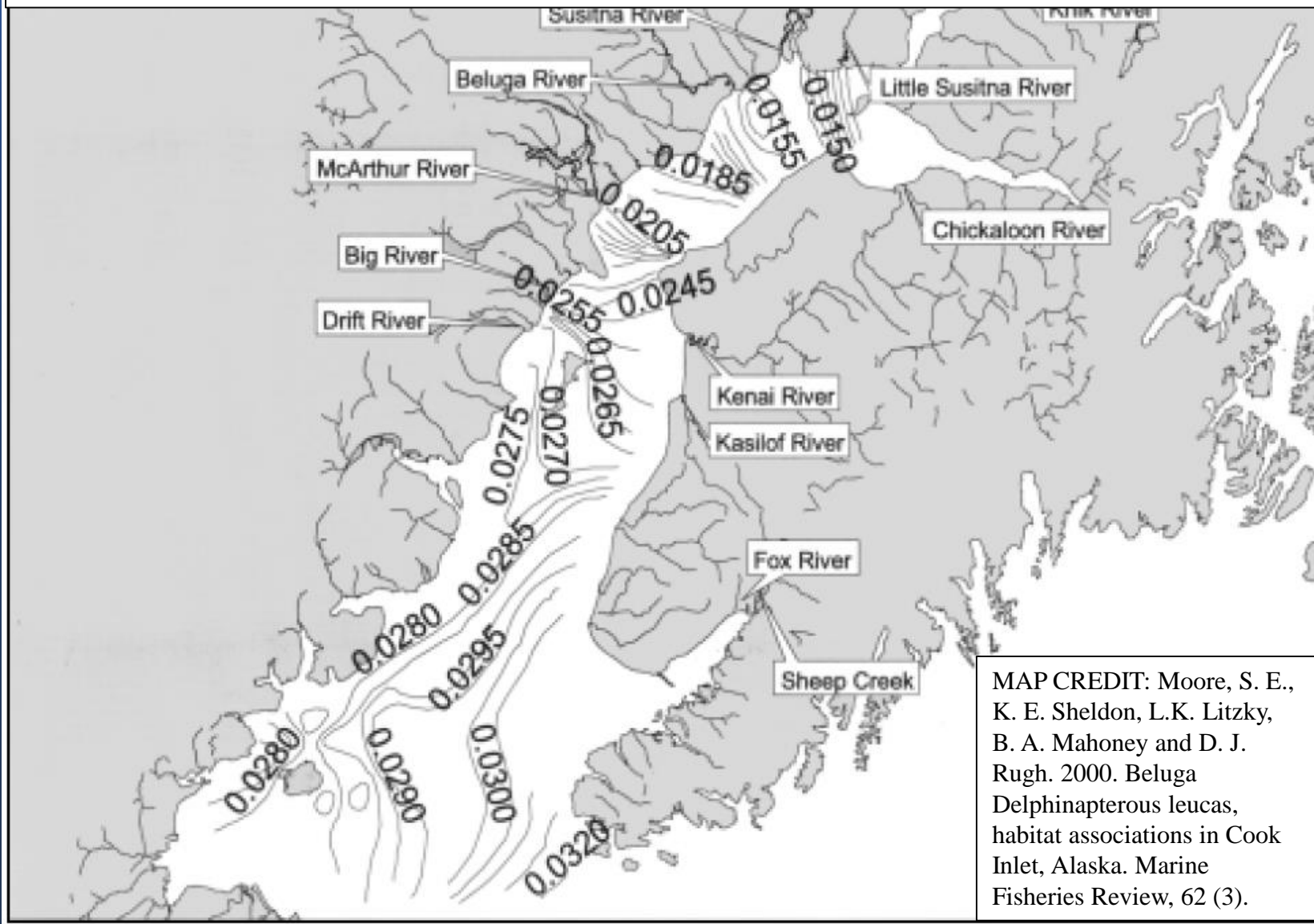
Strontium isotope concentrations (top) and ratios (bottom) for the age-3 northern pike captured in Campbell Lake, 2022. Red line indicates global marine Sr ratio.



Images
courtesy Dr.
Matthew
Wooller
Professor
Marine
Biology, UAF
Director Alaska
Stable Isotope
Facility, UAF

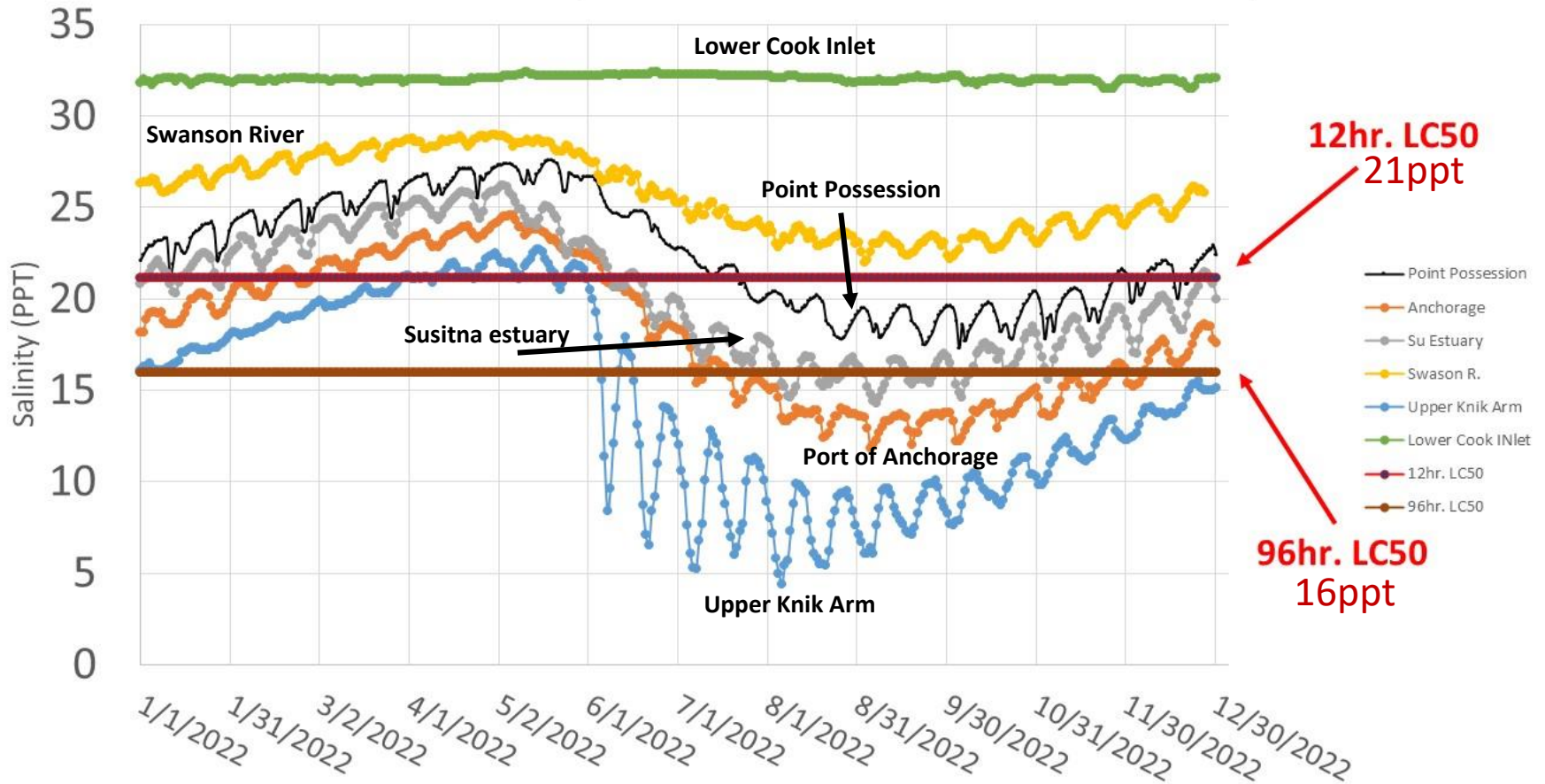
Strontium isotope concentrations (top) and ratios (bottom) for the age-3 northern pike captured in West Chester Lagoon, 2022. Red line indicates global marine Sr ratio.

June salinity map (isohaline) for Cook Inlet (2000)



MAP CREDIT: Moore, S. E., K. E. Sheldon, L.K. Litzky, B. A. Mahoney and D. J. Rugh. 2000. Beluga *Delphinapterous leucas*, habitat associations in Cook Inlet, Alaska. *Marine Fisheries Review*, 62 (3).

Examples of Seasonal Variation in Cook Inlet Salinity



Data source: <https://tidesandcurrents.noaa.gov/ofs/ciofs/ciofs.html>

Things we don't know, potential areas of research:

- Is there a seasonal pattern to pike use of Cook Inlet?
- How long does it take for a marine signature to be detectable on an otolith?
- How many pike utilize Cook Inlet?
- Where do pike using Cook Inlet originate? (otolith and genetic samples may be informative)
- What pike life-stage is most prone to enter Cook Inlet?
- Are pike attracted to freshwater plumes when in Cook Inlet, do they travel randomly?
- How does salinity exposure effect pike fitness?
- Can barriers be used to protect some drainages from pike entry via Cook Inlet?
- Do Cook Inlet tides aid or hinder pike movement?

End