



Ten-year Study of Piledriver Slough

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Background

The Piledriver Slough Study was a 10-year impact study conducted by the Tanana Valley Watershed Association (TVWA) in partnership with Salcha Elementary students and staff, to study the long term effects of the Tanana Crossing bridge and levee on the slough. In 2010 the Alaska Railroad Corporation was authorized to begin the first phase of construction of the Northern Railroad Extension to include the building of the bridge, approach road, and levee in Salcha, AK. The process of building the levee to protect the bridge took 9,000 truckloads of riprap and covered 600,000 cubic yards of embankment, cutting off the head of Piledriver Slough. The main focus of the study was to monitor fish passage, habitat, water quality, beaver dams, invasive plants, riparian changes and anything that may affect the minnows in the slough. Types of fish found in Piledriver Slough consist of Chinook Salmon, Chum Salmon, Longnose Sucker, Arctic Grayling, Burbot, Slimy Sculpin, and Lake Chub.

Data Collection Sites

- Dam (new land development)
- Riffles (remote, old beaver site) *see pic to right
- Xanthus (wooden residential bridge)
- 4 Wheeler Track (ATV trail through slough, recent beaver site)
- Ingrid Dr. (metal residential bridge)
- K-Bs (commercial flower farm, recent beaver site)
- Culvert A (large passage south side of gravel road)
- Culvert B (large passage north side of gravel road) *see pic to right



Methodology

- The Piledriver Slough study took place in the spring, summer, and fall of each year starting in summer 2012 through fall 2021.
- Two minnow traps were set up the day prior at each of the eight sites, baited with salmon roe to catch juvenile fish for identification.
- The following day Salcha Elementary students, staff, and alumni were bused to their field site (divided by grade level groups) where the minnow traps were checked and the fish identified with the assistance of school staff/alumni and TVWA scientists.
- Water samples were collected, measured and recorded at each of the eight sites for Temperature, Dissolved Oxygen, Turbidity, and pH using GLOBE hydrology protocols and Hannameter probes on the same day.



Mentoring Kindergartners in Water Quality Testing



Slimy Sculpin Measuring in a Photarium



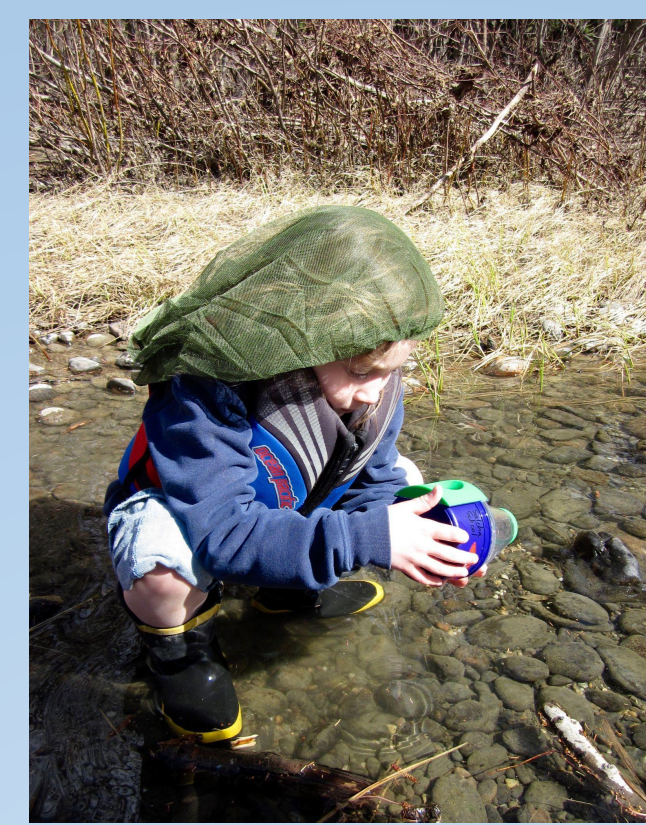
Prepping Water Quality Testing Materials

Why We Care

When the levee cut off the head of Piledriver Slough it was no longer fed or flushed by the Tanana River, relying solely on ground water. We were concerned that this might affect the slough's habitat for sport fishing and as a salmon spawning area. With the lack of "flushes" from the Tanana River, beaver dams increased (until removed under permit) and vegetation in the riparian zone changed. Recent low counts of salmon in the Salcha River have resulted in local fishing closures to reach escapement quotas for the Yukon Territory. Many families in our community rely on these fish for subsistence.



Tanana Crossing Levee Upriver from Bridge

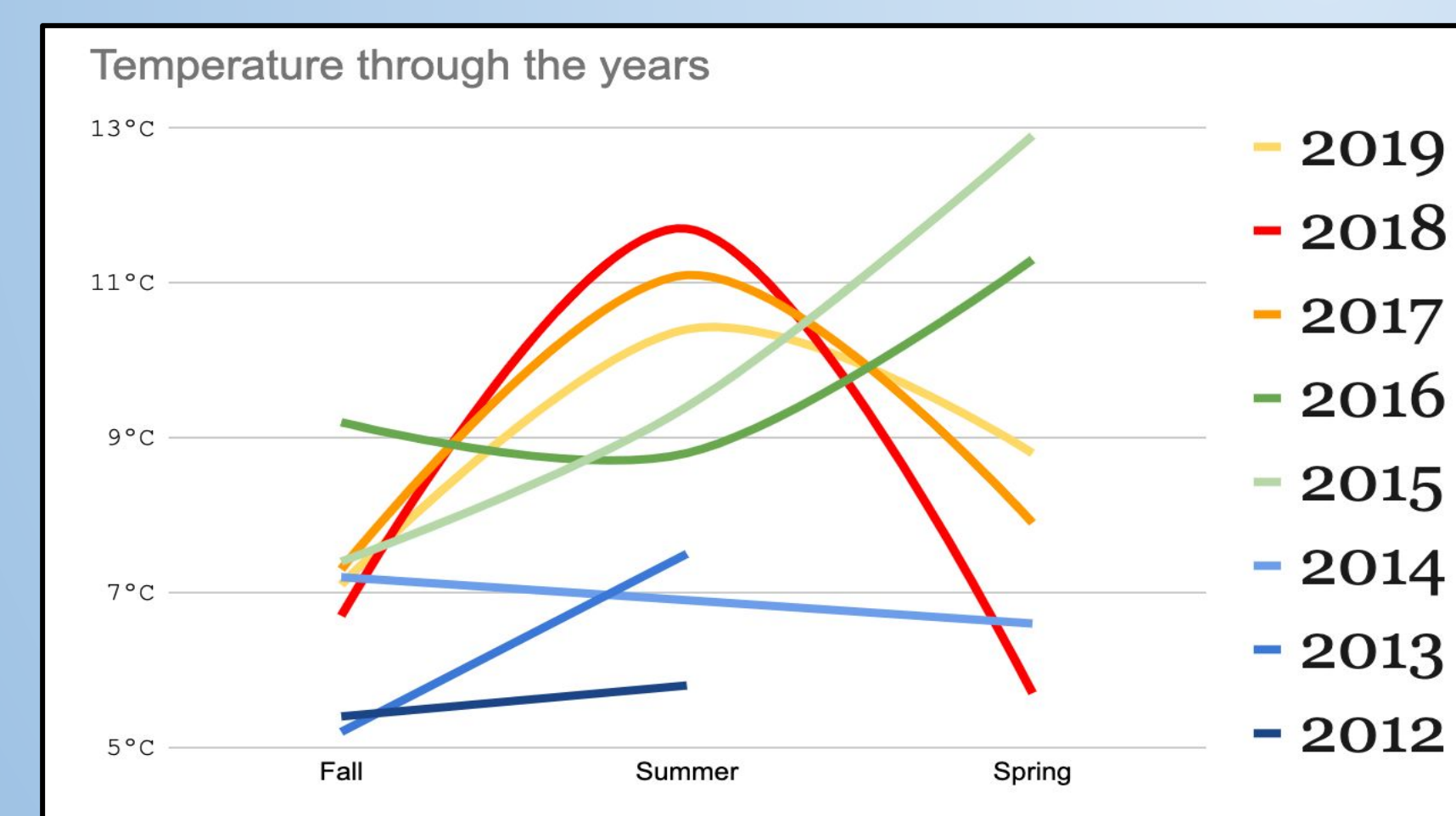


Teslin and Rusty Beginning Their Study Piledriver Slough, 2012

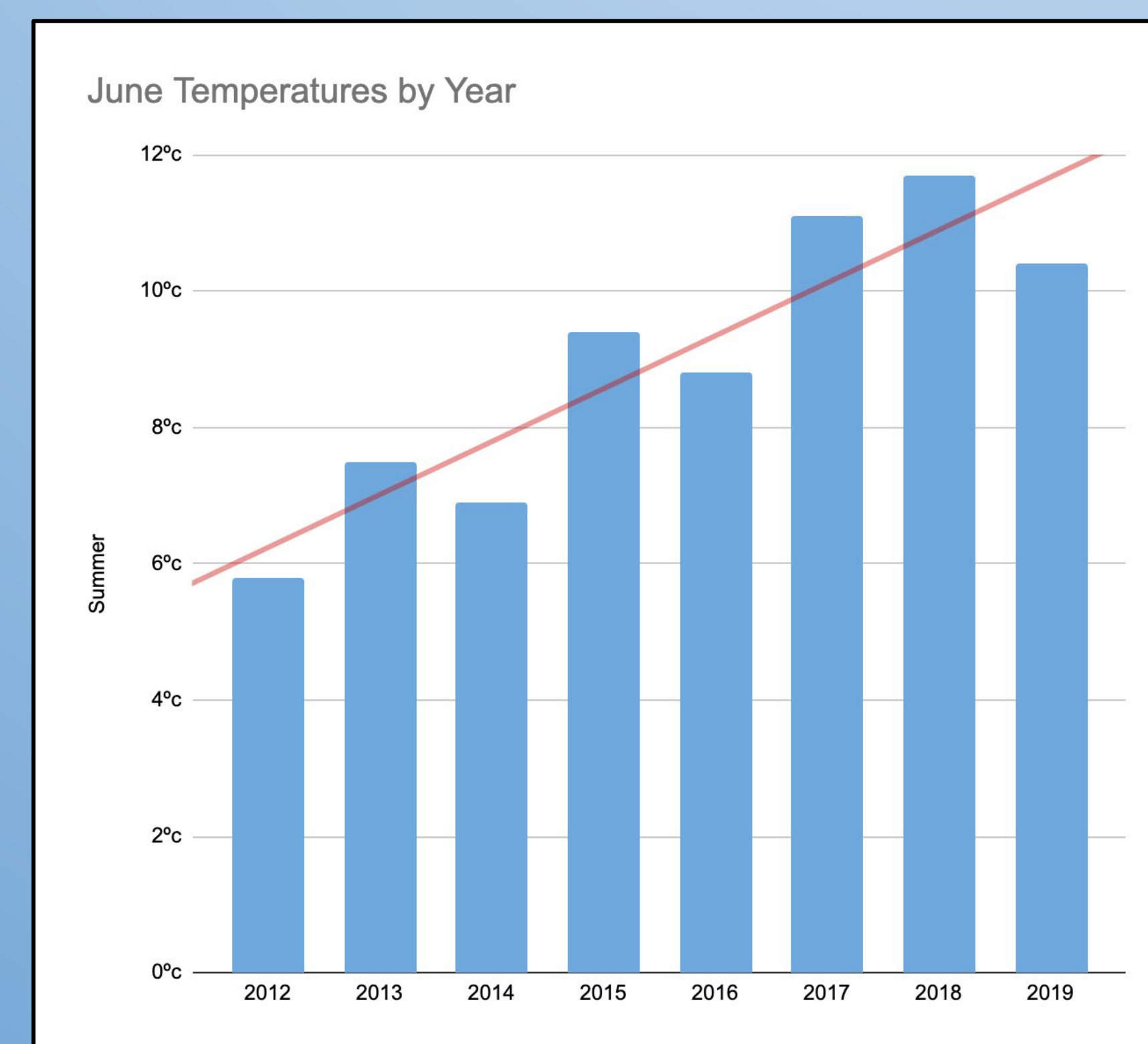


Rusty, Teslin, and Tori Spring 2020, K-B Site, New Beaver Activity

Preliminary Results



Piledriver Slough 8-site Average Water Temperatures 2012-2019



Piledriver Slough 8-site Water Temperature Averages, June 2012-2019



Water Temperature Measurement with Alcohol Thermometer



Measuring Turbidity at Culvert Sites

Discussion

We are still entering and reviewing the ten years worth of water quality and fish identification data, however our initial review of the average water temperatures of the eight sites in June indicates an increase of approximately 6 degrees Celsius from 2012-2019. This may have a significant impact in relation to preferred temperatures for specific fish species.

We have noticed that the fish species caught at each site has changed over time with more Slimy Sculpin caught in the traps when at first we caught more Lake Chub and salmon fry. Beaver activity increased (until trapped) and then decreased which may have impacted fish habitat and water temperatures. There were hardly any algae blooms or stagnant pollen filled pools in the beginning of the study but they have increased through the years.

Along with blocking off the head of Piledriver Slough, forcing it to be groundwater fed only, we have noticed more landowner development, decreased healthy riparian zones, increased algae blooms, decreased varieties of species of fish, and decreased deeper pools due to removal of beavers and their dams, all of which may be leading to increased water temperatures.



Algae Bloom Upstream of Dam Site



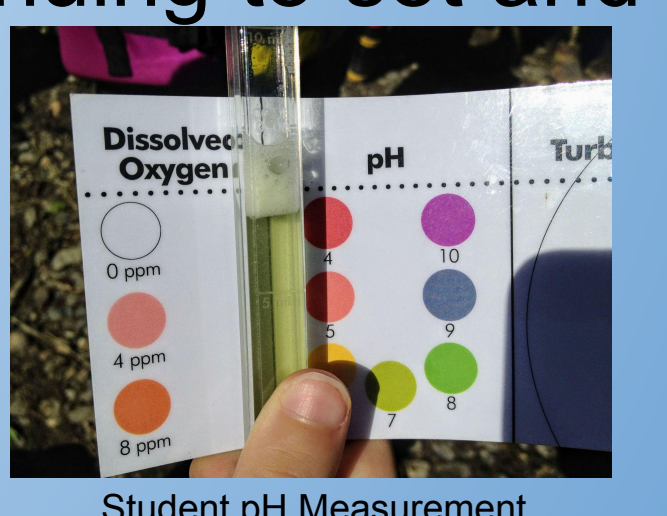
Measuring a Juvenile Chinook Salmon Early in the Study



Removing and Measuring a Fish from the Minnow Trap

Further Research

Our next steps will be to complete our data entry into the GLOBE database and take a deeper dive into the data to look for trends and correlations, specifically between water temperature, pH, dissolved oxygen, and fish species. In the future we hope to improve this project by entering new data into GLOBE as soon as it is collected. We could improve the project by continuing to collect more data to compare even though the funding for the study is finished, continuing to set and identify fish in minnow traps, discuss with the land owners about the importance of maintaining a healthy riparian zone, and removing invasive plant species.



Student pH Measurement

References

- We used the GLOBE Hydrology protocols and data entry tool for our project from the GLOBE website (globe.gov).
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