Piledriver and 23 Mile Slough Survey Report 2018

Tanana Valley Watershed Association
November 7, 2018

Introduction

This report discloses the findings of the 2018 study of fisheries, beaver activity, and water quality on Piledriver Slough and 23-mile Slough. The study was conducted by Tanana Valley Watershed Association (TVWA) contractors with assistance from the Salcha Elementary School. Survey site results are discussed below.

Purpose

2018 was the seventh year of a ten-year study to fulfill Mitigation Measure 56 of the Service Transportation Board. The measure states, "*prior to construction of Salcha Alternative Segment 1, ARRC shall develop appropriate mitigation in consultation with ADF&G to prevent blockage of Piledriver and 23 Mile Sloughs by beaver dams (as a result of flushing flows caused by ARRC-proposed channel plugs). Mitigation may include monitoring conducted by ARRC at a frequency agreed to by ADF&G.*" The Piledriver Slough Mitigation Plan was created to assess impacts of the Northern Rail Extension Project-Phase 1.

Need

In 2011 a levee was put into place to alleviate blockage to spring flow flushing from the Tanana River into the Piledriver Slough due to the construction of the new rail extension. With the construction of the levee, concerns were raised about the potential alteration in flow-rate because of the lacking ability of natural flushing of debris or ice build-up by spring flows. Resulting concerns include ice and log jams and beaver dams impeding fish passage. This study was created to assess the risk that such obstructions pose to fish passage.

Objectives

The Alaska Department of Fish and Game (AKDFG) consults TVWA in action through a Memorandum of Agreement implementing fish monitoring within the Piledriver and 23-mile sloughs. TVWA is charged to manage the Piledriver Slough Beaver Activity Survey program until to 2022, in which a final report will be submitted to AKDF&G and the Alaska Rail Road (AKRR). The report will compile results and conclusions drawn from outlined objectives and accomplishments achieved during the 10-year study.

Methodology

The ten-mile section of the Piledriver Slough was divided into two sections for managing monitoring based upon distance from the levee site to the Bailey Bridge. These sections were the *Upper Piledriver* and *Lower Piledriver*. Upper Piledriver surveying began from the levee site and ended at the Old Valdez Trail road crossing. This section was surveyed by TVWA staff with the assistance of citizen scientists from the Salcha Elementary. Lower Piledriver surveying began from the Old Valdez Trail road crossing ended at the Bailey Bridge, adjacent to Eielson Airforce Base. This section was surveyed by TVWA staff. Undivided, the 23 Mile Slough site was located and surveyed in its entirety off of Old Eielson Farm Road. All surveys took place late spring, summer, and late fall, which exact date's dependent on staff and school availability.

For the study of Upper Piledriver, TVWA trained volunteers and student citizen scientist to collaborate in the research process. The students were trained in water safety, fish, plant and invertebrate identification, fish handling, water quality, invasive species, aquatic invertebrates, and habitat assessment. Each child was equipped with a toolkit containing supplies and safety for the field surveying. Algae and aquatic plant identification education curriculum was added in 2014. Fish factsheets, tracks sheets, and more complex habitat assessments were added in 2015. Compasses and magnifying boxes were added to the curriculum in 2016. In 2017 we added curriculum on water velocity and flow. 2018's new curriculum was centered on turbidity, pH in the classroom and insects.

TVWA contractor Heather Mirczak (L) and Sacha staff and students team up to identify aquatic insects.

Equipment: Equipment used in the study by TVWA staff were a Garmin GPS 62s, PentaxWGIII SR Adventure Proof GPS Camera, GoPro video camera, Android telephone camera for capturing photos and videos to be used for analysis and reporting. GPS units were used for marking identified dams and lodges as well as geo-referencing photos.

Water Quality Sampling: TVWA's "Adopt-a-Stream" water quality sampling protocol was used to record water quality at each Upper Piledriver Site and five sites on Lower Piledriver Slough. This data was then submitted to the Dept. of Environmental Quality. This protocol is detailed below:

Step 1: Perform a Hanna meter pre-sampling check with tap water. Using the pH 4 and 1413 conductivity standards provided, test your meter's accuracy. Turn on your meter. Place a small amount of the pH 4 standard into plastic cup marked "pH4 check" (just enough to cover the sensor). Take a pH reading and record the result. It should fall between 3.8 and 4.2. Rinse the meter in tap water and shake it gently to remove excess water. Then, place a small amount of the 1413 conductivity standard into the plastic cup marked "conductivity check" and take a reading. Note the conductivity level. It should fall between 1342 and 1484. Rinse the meter again in tap water and shake it gently to remove excess water before replacing the cap. The standards are safe to pour down the drain with a little tap water. DO NOT pour them into the stream.

Step 2: Collect water sample: A few yards away (preferable downstream or down current) from your exact sampling site, rinse the plastic bucket three times with stream water. Then go to your site and, facing upstream, lower the bucket gently into the water, and fill it to a level about 2 inches from the lip of the bucket. If you are working in very shallow water, do not disturb the bottom while collecting the sample.

Step 3: Measure pH and Conductivity with Hanna Meter: Turn on the meter. Hold it or clip it

to the side of the bucket in the sample water for 5 minutes. Turn on the meter. Press SET/HOLD until it is in conductivity (µ) mode, wait 15 seconds, then record three (3) sequential readings for Conductivity at 15-second intervals. Press SET/HOLD until it is in pH mode and wait 15 seconds. Record three (3) pH readings at 15-second intervals. Finally, press SET/HOLD until it is in temperature mode and wait 15 seconds. Record three (3) water temperature readings at 15-second intervals. Turn the meter off. Put the cover back on the meter, making sure to moisten the pH sensor before doing so.

Step 4: Record the air temperature: Hang the air thermometer somewhere where it will not lean against any solid objects and where it is protected as much as possible from direct wind and sunlight. The thermometer will take at least five minutes to equilibrate. It might take longer if it has to adjust for large changes in temperature. Recording the air temperature after you have completed the water quality sampling should ensure that the thermometer has had ample time to adjust.

Step 5: Perform the meter post-sampling check-in office with tap water: Using the pH 10 and 1413 conductivity standards provided, test your meter's accuracy. Turn on your meter. Place a small amount of the pH 10 standard into plastic cup marked "pH10 check" (just enough to cover the sensor). Take a pH reading and record the result. It should fall between 9.8 and 10.2. Rinse the meter in tap water and shake it gently to remove excess water. Then, place a small amount of the 1413 conductivity standard into the plastic cup marked "conductivity check" and take a reading. Note the conductivity level. It should fall between 1342 and 1484. Rinse the meter again in tap water and shake it gently to remove excess water before replacing the cap. The standards are safe to pour down the drain with a little tap water. DO NOT pour them into the stream.

Fish Sampling: TVWA's "Chena Salmon" sampling protocol was used for recording information on fish. Gee-type minnow traps (23 x 45 cm, 0.64 cm wire mesh, with 2.5 cm diameter openings) were baited with salmon roe and set 5-10 mm apart for a 24-hour soak time (Swales, 1987). After the 24 hour soak, scientists identify and count all fish in the trap and determine length using a Photarium viewing box (Duvall, WA, USA). Fish were released after identification and measurements are taken. Any incidental fish deaths were labeled and brought to the USFWS laboratory in Fairbanks for further processing.


Salcha school principal Tori Brannan assists students in ID and measurement of fish caught during June sampling.

Sampling procedures:

1. Set Traps:

- Place bait ball in the trap
- Put traps in suitable location length-wise to current. Slow moving water with in-stream cover is best but this may not be possible at all sites. Put traps in the slowest moving water available at your site because fish will get exhausted swimming against current
- Let your trap soak overnight and check on it 24 hours later
- Be as consistent as possible with the length of soak -me!
- Get traps in deep enough water to cover the trap (deeper is better)
- Don't put traps in a high use area because they may get vandalized or stolen
- Make sure that traps are well-secured to something on the bank

2. Checking Traps

- Have all of your equipment ready before removing any traps from the water.
- Fill your counting and holding buckets half full of river water.
- Remove one of your traps from the water and gently pour fish into your counting buckets.
- Catch one fish at a time with the dip net and place it in the viewing box to identify it.
- Go to your guide. If the fish has an adipose fin, use the upper key. If it doesn't have an adipose fin,
  use the bottom key. Pictures & descriptions for each species are in the guide (with TVWA).
- Record length of first 10 fish you identify for each habitat type using length markings on viewing box or measuring tube.
- After identification, put fish into the holding bucket.
- After you are finished counting and identifying all of the fish from one trap gently pour

the holding bucket into the river and start counting your next trap
- Record total numbers for each species on the datasheet if no fish are caught record that
- Complete one data sheet for both habitat types, try to keep neat, organized notes

3. Fish Handling Guidelines- Our goal is to minimize stress, limit handling, and treat them with respect!
- Keep your hands wet at all times.
- Use bare hands, gloves can damage scales.
- Handle fish as little as possible.
- Only empty one trap into the counting bucket at a -me (to maximize oxygen content).
- If counting is taking a long -me you can try carefully changing out some of the water to maintain oxygen content and water temperature.
- Release fish in the same place where you caught them.

Beaver Survey: Beaver dams and lodges were surveyed visually by foot on Upper Piledriver Slough and by canoe on Lower Piledriver. Beaver dams were defined as dams built by beavers to provide ponds as protection against predators such as coyotes, wolves, and bears, and to provide easy access to food during winter. Beaver lodges were defined as dwellings constructed on the side of the stream that does not impede passage. All dams and lodges were photographed, GPS locations were recorded, and sites were described. Dams were measured for height, the diameter of logs and width of passage. Dams were categorized based on activity by beavers (active, inactive) and type of dwelling (primary dam, secondary dam, and lodge). Active was defined as dams or lodges that exhibited signs of recent activity including fresh chews, moved materials, feed piles, tracks, beaver slides, or beaver presence etc. Inactive dams and lodges were defined as places which did not exhibit the signs of use identified in the "active" definition. Primary dam was considered the largest dam in a ½ mile area that displayed the most use. Secondary dam was determined as a smaller dam.

Follow Up:

All equipment was inventoried, cleaned, and serviced before and after the surveying season. Fish data reports were sent to the Alaska Dept. of Fish and Game, in compliance with our permit requirement.

Study Survey Results

TVWA contractor Heather Mirczak met with Salcha staff in May and September to discuss curriculum development. In the spring, she reviewed pH lessons and discussed how to better integrate the lessons into the classroom before and after the Piledriver field trip. In the fall Heather introduced new kit for turbidity, insects and pH use for classrooms. She took feedback from the teachers and discussed future ideas for the partnership and curriculum. The Piledriver project maintained strong community involvement throughout the study duration: 15 members of the Salcha Elementary School staff, 10 community and parent volunteers, 78 children (spring) and 85 children (fall) attending Salcha Elementary School, 1 TVWA staff, 2 contractors, 6 volunteers, the Department of Fish and Game, and the U.S. Department of Fish and Wildlife.

The study had a total of twenty-eight survey sites. Eight survey sites (with 2 traps each) on the Upper Piledriver were within the periods of May 10-11, June 21-22 and September 4-5. This Upper Piledriver was monitored with the assistance of the Salcha Elementary School through the citizen scientist collaboration. Sixteen sites (with one trap each) were surveyed on Lower Piledriver by TVWA field technicians and volunteers on May 10-11, June 21-22 and September 4-5. Undivided, 23 Mile Slough had four survey locations that took place on June 21-22 and September 4-5 by

TVWA field technicians and volunteers. TVWA staff included supervision by Bryn McElroy. Contractors were Jenna Jonas, Heather Mirczak, and David Jonas. Volunteers included: Maria Baker, Brad Baker, Ben Beifuss, Hannah Beifuss, Karina Beifuss, and Monica Kopp.

In 2015, TVWA staff began recording qualitative data after each float and continued this practice in 2018.

Salcha students practice the new stream flow curriculum in June.

Fish: AKF&G issued TVWA a Fish Resource Permit for the study (See Appendix A). Surveying took place post-permit issuance. Data collection recorded fish species identified, relative size, and location assisted by equipment (minnow traps, fish viewer, bucket, and identification book). The compilation of fish parameters was reported to AKRR as the *Fish Collection Report* (See Appendix B). Fish monitoring was conducted at 28 sites with a total of 27 caught-and-release fish recorded.

Beaver: Beaver dams were categorized based on whether or not it was actively used by beavers, which simply were active or inactive. Secondary categorization was based on dwelling type of dam; primary dam, secondary dam and lodge. Dam activity and dwelling type were recorded as well as coordinates.

Discussion of Study Outcomes & Activities

Promotion: Piledriver curriculum was used at other TVWA water sampling events such as those used with the Adopt-A-Stream program. The curriculum was also a component of TVWA's summer camp for children.

Hydrology Monitor

2018 was not a scheduled year for hydrology monitoring, thus there is no data recorded in 2018.

Appendix A: Fish Resource Permit: Fish Resource Permit

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
333 Raspberry Road
ANCHORAGE, ALASKA 99518

Permit No. **SF2018-083**

Expires: **10/1/2018**

AQUATIC RESOURCE PERMIT
(For Scientific/Educational/Collection Purposes)

This permit authorizes: **Jenna Jonas**
(whose signature is required on page 2 for permit validation)

Of

Tanana Valley Watershed Association
516 Second Ave, Suite 412, Fairbanks, AK 99701
(248) 568-0345 jenna.e.jonas@gmail.com

to conduct the following activities from **May 1, 2018** to **October 1, 2018** in accordance with AS 16.05.930, AS 16.05.340(b), and 5 AAC 41.

Purpose: To examine fish presence and abundance in the target locations in fulfillment of Mitigation Measure 56 of the Service Transportation Board while incorporating a Citizen Science project with Salcha Elementary School students.

Location: Piledriver Slough (334-40-11000-2490-3315), 23 Mile Slough (334-40-11000-2490-3315-4010)

Species: Local species

Method of Capture: Minnow trap **(Stipulations #5–7)**

Final Disposition: Any number of fish may be captured, identified, and released alive at the site of capture during each sampling event.
≤50 individuals of each species encountered at each sample location may also be measured for length and/or weight prior to release.
≤2 individuals of each unknown species may be killed and saved for later identification.
All unintended mortalities must be recorded and either returned to capture site waters or provided to the U.S. Fish & Wildlife Service as vouchers.

COLLECTION REPORT DUE November 1, 2018 and RESEARCH REPORT DUE April 1, 2019; see **Stipulations #2** and **#3** for more information. Data from such reports are considered public information. Reports must be submitted by email (dfg.dsf.permitcoordinator@alaska.gov) or by mail to: Alaska Department of Fish and Game, Division of Sport Fish-HQ, 333 Raspberry Rd, Anchorage, AK 99518. A report is required whether or not collecting activities were undertaken.

GENERAL CONDITIONS, EXCEPTIONS, AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions, or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.
2. No specimens taken under authority hereof may be sold, bartered, or consumed. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.
3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.
4. Permits will not be renewed until detailed reports, as specified in the Stipulations section, have been received by the department.
5. UNLESS SPECIFICALLY STATED HEREIN, this permit does not authorize the exportation of specimens or the taking of specimens outside of existing regulations.

Permit Coordinator Division of Sport Fish	T. Taube for Director Division of Sport Fish	3-12-18 Date

SF2018-083 *continued (page 2 of 2)*

Authorized Personnel: The following persons may perform collecting activities under terms of this permit:

Jenna Jonas, Audra Ashby, Bryn McElroy, Heather Mirczak, Jewelz Barker, Christy Everett, David Jonas, Annie Keep Barnes, Ed Barnes, Ben Kennedy, Tori Brannan, Gale Vick, Royce Conlon, Dave Welborn, Ian Olson

Employees and volunteers under the direct supervision of, and in the presence of, one of the authorized personnel listed above may participate in collecting activities under terms of this permit.

Permit Stipulations:

1) **Klaus Wuttig** (459-7344; klaus.wuttig@alaska.gov) – the Tanana River (Fairbanks) Area Management Biologist (AMB), must be contacted for final authorization **prior** to you engaging in any collecting activities. *The time/date of this contact must be included in your collections report (using the "data submission form" furnished by ADF&G).* AMBs have the right to specify methods for collecting, as well as limiting the collections of any species by number, time, and location.

2) **A report of collecting activities, referencing this aquatic resource permit, must be submitted within 30 days after the expiration of this permit.** The report (using a data submission form furnished by ADF&G), shall include all species, numbers, dates, locations of collection (datum/GPS coordinates in the decimal degrees format (dd.ddddd)), and disposition, and if applicable, sex, age, and breeding condition, and lengths and weights of fish handled. It must also include the date/time the local biologist was contacted for final authorization to carry out collecting activities.

3) **A report of research activities, referencing this aquatic resource permit, must be submitted within 6 months after the expiration of this permit.** This report should present the research conducted in a format similar to a scientific paper including the following: introduction (objective of the study plan and hypothesis), methods, and results. The report is intended to show that the specimens were used in a scientific method, and allows for the evaluation of potential cumulative effects from multiple projects in the same area. A report is required whether or not collecting activities were undertaken.

4) An instance of >10% unintended collecting mortality requires sampling at a site to cease and the AMB contacted.

5) Each piece of unattended sampling gear must be: 1) labeled with the permittee's name, telephone number, and permit number, 2) properly secured to ensure retrieval, 3) placed in a location where they will not be easily noticed (e.g. under cut banks, in pools away from roads or trails), 4) allowed to soak no more than twenty-four hours at a time, 5) located with GPS coordinates, and 6) accounted for and removed at the conclusion of sampling.

6) Salmon eggs used as bait in traps must either be sterilized commercial eggs or, if raw, disinfected prior to use. A 10-minute soak in 1/100 Betadyne solution or some other iodophor disinfectant is adequate. Commercial eggs must be placed into a container that does not allow the fish to consume them (e.g., film canister with holes punched in it or a perforated plastic bag).

7) Gloves, boots, and collecting gear should be cleaned and disinfected between streams to reduce the potential of pathogen transmission and the spread of invasive species. Clean all equipment free of sediment, vegetation, and seeds, and then wash/rinse in 1/100 Betadyne solution or soak in 10% bleach solution for a minimum of 10 minutes. Felt or absorbent soles on waders and wading boots are prohibited.

8) If new anadromous fish species *or* previously undocumented life stages of anadromous fish are found in permitted streams, rivers, and lakes, the permit holder will work closely with ADF&G to see that information is included in the database for the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes.* Anadromous fish include *Oncorhynchus spp.*, Arctic char, Dolly Varden, sheefish, smelts, lamprey, whitefish, and sturgeon. Please direct questions to **J Johnson** (907-267-2337; j.johnson@alaska.gov).

9) Contact **Tammy Davis** with the ADF&G Invasive Species Program (907-465-6183 or 1-877-INVASIV), and the nearest AMB (**Stipulation #1**) within 24 hours should you find any species suspected to be a **non-native species** during your sampling. If possible the organism should be killed, preserved by freezing or placing into 90% alcohol, and taken to the nearest ADF&G office. Please take a photo of the organism, as well as a photo of the organism in the environment in which it was observed, and note the location with a GPS or by describing it on a map with landmarks.

10) A copy of this permit, including any amendments, must be made available at all field collection sites and project sites for inspection upon request by a representative of the department or a law enforcement officer.

11) Issuance of this permit does not absolve the permittee from securing any other required state, federal, or local permits, including securing permissions to trespass on controlled lands.

12) Failure to comply with the conditions of this permit will result in the loss of future permitting privileges.

13) PERMIT VALIDATION requires permittee's signature agreeing to abide by permit conditions before beginning collecting activities:

_____

Signature of Permittee

ecc: Klaus Wuttig, Division of Sport Fish, Fairbanks
Brandy Baker, Division of Sport Fish, Delta Junction
Bonnie Borba, Division of Commercial Fisheries, Fairbanks
Audra Brase, Division of Habitat, Fairbanks
Michelle Morris, Commercial Fisheries Permit Coordinator, Juneau
Colonel Hall, Alaska Wildlife Troopers
Captain Leath, Alaska Wildlife Troopers Northern Detachment

Appendix B: Fish Collection Report: Fish Collection Report

Summary

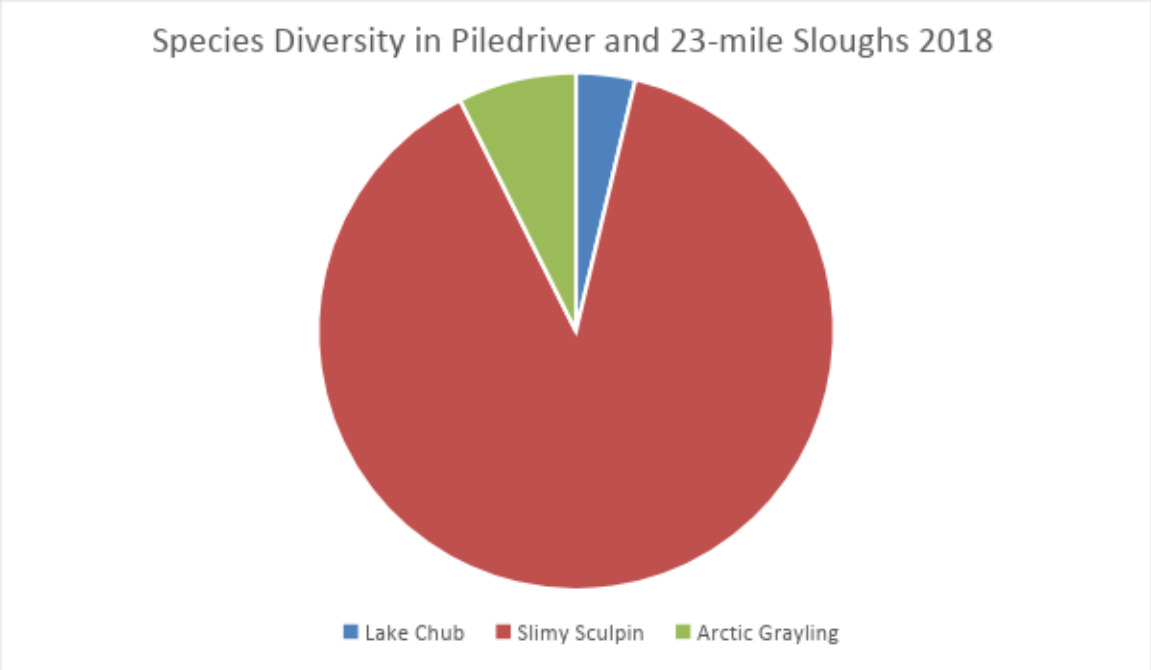
In 2018 27 fish were caught, identified and released in piledriver and 23 mile sloughs. Of these, 8were caught on Upper Piledriver with the Salcha Elementary students and 18 on Lower Piledriver, and 1 on 23 mile slough.

Place	Total Fish Caught	Slimy Sculpin	Lake Chub	Burbot	Arctic Grayling	Chinook Salmon	Days Sampled	# traps set
Upper Piledriver	8	7	1	0	0	0	May 10-11, June 21-22, Sept 4-5	16
Lower Piledriver	18	17	0	0	1	0	May 10-11, June 21-22, Sept 4-5	16
23-Mile Slough	1	0	0	0	1	0	June 21-22, Sept 4-5	4

Equipment Used

Gee-type minnow traps (23 x 45 cm, 0.64 cm bar mesh, with 2.5 cm diameter opening) were baited with disinfected salmon roe and set for 24 hours for each sampling event. Traps were placed in a variety of habitat types including cut banks, slough mouths, in woody debris, and on either side of beaver dams. All captured fish were identified to species. The fork length of the fish identified at each site each week was measured using the ruler on a medium Photarium viewing box (Duvall, WA). Fish were released after identification and measurement.

Species Diversity



The most commonly caught fish this year was the slimy sculpin (24 fish). We caught the majority of the slimy sculpin on lower Piledriver Slough during the June sampling. The second most commonly caught fish was Arctic Grayling (2). In past years, the Slimy Sculpin has been the most commonly caught fish except for when sampling coincided with lake chub spawning events.

The slimy sculpin (Cottus cognatus), a bottom-dwelling fish, can be found throughout most of the northern United States, Canada, and Alaska. The slimy sculpin is an ambush predator. It feeds primarily on insects but also eats crustaceans, fish eggs, and small fish. The slimy sculpins' size and poor swimming ability make it a great prey item for larger fish. The slimy sculpin has been studied in waters where there is current acidification (water that is more acidic). The sculpin's were found to be less active and have lower rates of reproduction when found in these waters. For these reasons, the slimy sculpin has been identified as a good indicator species (a species that indicates a change in environment by a difference in behavior or population size) for acidification in lakes and ponds and possibly for streams.[1] Our water quality data thus far does not show that acidification is occurring in Piledriver Slough, the challenge that we have observed is an increased sedimentation. Interestingly, the Slimy Sculpin does fan their nests to remove silt, an adaptation that may allow them to thrive in the changing Piledriver Slough. *The slimy sculpin moves to shallower waters during the spawning season, which is in the spring, usually after break-up occurs. Males establish a nesting spot under a rock or log and groom the area by fanning fine sediment and moving small pebbles with its mouth out of the area. Males are territorial and can be aggressive towards other males. A male courts a female until she deposits her eggs, which are yellow to pink, on the underside of the rock or log. The female does this from the upside-down position while the male fertilizes the eggs with his milt. The female leaves after egg deposition. A single male may spawn with several females. Once the eggs are fertilized, the male guards his nest until the young fish are ready to leave. During this time the male fans the eggs to remove silt and provide oxygen and keeps the nest clean. The eggs*

[1] "Slimy Sculpin" Alaska Dept. of Fish and Game Wildlife Notebook Series, Kelly Mansfield, 2004

hatch about 30 days after being fertilized. The sac-fry stay in the nest, usually resting on the bottom. They remain there for about a week while the yolk is being absorbed. Once the yolk sac is gone, the sculpin leaves the nest as fry.

The lake chub (Couesius plumbeus) belongs to the largest freshwater fish family, the minnows (Cyprinidae). They are a small fish, with adults averaging from 5-10 cm long. The lake chub is found in all types of freshwater bodies (lakes and streams), but in Alaska, it has been found more often in silty waters. It tends to prefer shallow water, although it will move to deeper water during hot weather. The lake chub is usually abundant wherever it is found. Young lake chubs feed primarily on zooplankton. Older lake chubs feed on terrestrial and aquatic insects, but also feed on algae, occasionally small fishes, and have been known to scavenge on decaying fish. [2] This makes sense as our surveys of Piledriver's aquatic invertebrates have found the habitat to be host an extensive array of aquatic insects and we have observed increasing amounts of algae in the past years. We additionally believe that we encountered the Lake Chub during their spawning period, which is known to occur between spring and early summer. This would account, in part, for their abundance although lake chub prefer spawning areas with shallow water and rocky or gravelly bottoms.

In 2018 TVWA field staff did not observe the large numbers of grayling, ranging in size from 2-16 inches traveling in schools, mostly heading upstream that we saw in 2015 and 2016. We observed some grayling, but much less than in years previous. In the September sampling, no grayling were observed upstream of the beaver dams, leading us to conclude that they dams were blocking passage. TVWA staff also noted less spawning chum salmon also downstream of the dams in the slough during the September sampling on Lower Piledriver slough. In addition to the new dams blocking passage, the sampling dates (Sept 4-5) were later this year than they had been in previous years so it is possible that grayling and salmon had completed their migrations before sampling occurred.

Number of Fish Caught

Year	Number of Fish Caught
2018	27
2017	40
2016	252
2015	373
2014	58
2013	24
2012	101

The drop in fish numbers between 2015/16 and 2017/18 is due largely to the lack of lake chub. We believe this was because our dates were slightly different this year and we did not fish while the lake chub were spawning locally. There is not yet enough data to determine a significant trend in fish numbers.

[2] "Lake Chub" Alaska Dept. of Fish and Game Wildlife Notebook Series, Kelly Mansfield, 2004

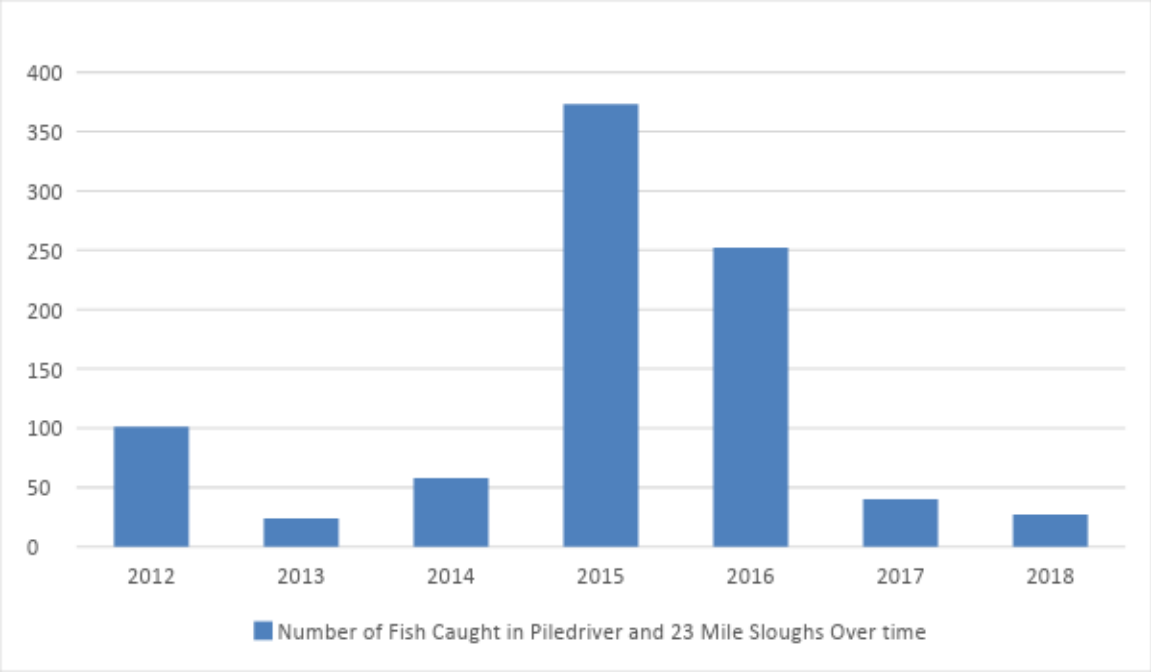
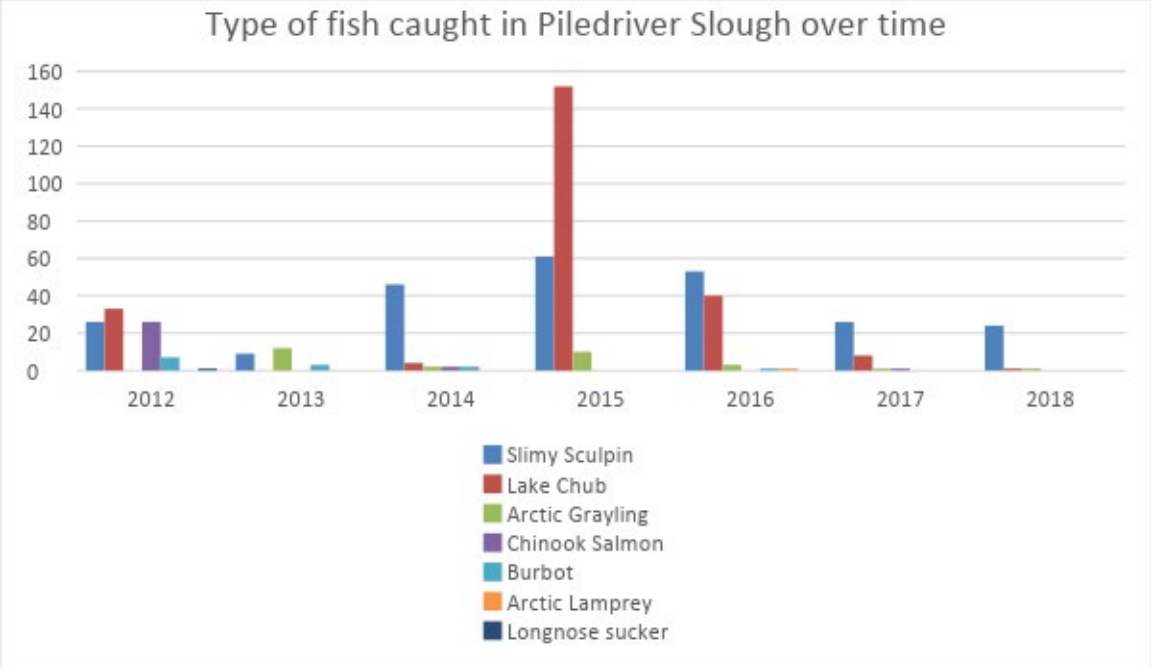


Figure 2: Number of Juvenile Fish Caught in Piledriver and 23 Mile Slough Annually



Sampling Sites

The sites used in 2018 were consistent with those used in 2017.

UPD1	64.6018	-147.09177
UPD2	64.60178	-147.09187

UPD3	64.60045	-147.09204
UPD4	64.59783	-147.08635
UPD5	64.59399	-147.08316
UPD6	64.5928	-147.07324
UPD7	64.58724	-147.06953
UPD8	64.58625	-147.06802
LPD1	64.60266	-147.09044
LPD2	64.60271	-147.08661
LPD3	64.60302	-147.08371
LPD4	64.60332	-147.08566
LPD5	64.6044	-147.088
LPD6	64.60557	-147.08635
LPD7	64.60987	-147.09038
LPD8	64.61433	-147.08876
LPD9	64.61646	-147.07796
LPD10	64.62141	-147.09123
LPD11	64.62368	-147.08742
LPD12	64.62975	-147.09305
LPD13	64.63709	-147.09296
LPD14	64.63757	-147.10167
LPD15	64.64543	-147.09499
LPD16	64.6543	-147.11346
23MS1	64.6562	-147.17168
23MS2	64.65607	-147.17122
23MS3	64.65688	-147.16965
23MS4	64.65918	-147.16942

Appendix C: Beaver Report

Piledriver Slough Beaver Activity Survey Report 2018

Tanana Valley Watershed Association

October 1 2018

Purpose:

The Piledriver slough mitigation plan monitors changes to the Piledriver slough that may be caused by beaver activity. Due to the construction of the new rail extension, a levee was put in place that blocks flushing flows into the Piledriver Slough from the Tanana River. The flow-rate changes may cause ice and log jams that would hinder fish passage. Beaver dams may no longer be knocked out by flushing spring flows and could cause further fish passage issues. Beavers are a natural part of the local environment and can help or hinder the other wildlife in the area. In the case of Piledriver Slough, monitoring will be conducted to evaluate the beaver dams and determine if they need to be removed to aid fish passage through the slough.

Methods

The ten-mile section of Piledriver from the levee site to the Bailey Bridge was monitored in two sections: "Upper Piledriver" from the levee site to the Old Valdez Trail road crossing and "Lower Piledriver" from the Old Valdez Trail road crossing to the Bailey Bridge adjacent to Eielson Airforce Base. Piledriver Slough was monitored on May 10-11, June 21-22 and Sept 4-5 2017. Identification of dam and lodges were marked with GPS Locations. Pictures and videos were taken for further comparison and review. Beaver dam activity was classified as active or inactive and labeled as a dam, secondary dam, and lodge.

Report

In 2018 it appears that the beaver population is healthy and has moved back into this stretch of lower Piledriver Slough. There was no noted disruption to the dams or lodges due to flooding or flushing flows, which allowed the beavers to develop unimpeded and create a dam habitat which blocked the passage of adult salmon, grayling, and other species.

Active beavers were present on lower Piledriver slough in 2018. We saw signs (chew sticks, vegetation removed, old dams re-constructed etc) during June sampling and during September sampling of two old dam sites (1 and 2) that were fully constructed and blocking fish passage. An additional new dam at site 4 was built but did not fully block passage. Finally, an additional new dam was found on 23-mile slough during the September sampling. No dams or beaver activity was found on upper piledriver slough.

The location of the problem dams site 1 and 2 was close (1/2 mile approximately) from the uppermost limit of the observed spawning area (by the Barnes' property). Without removing or killing the beavers, there was little point in removing the dam as it would be swiftly rebuilt. TVWA contractors made a small breach on Sept 4 in the primary and secondary dams. We will continue to correspond with ADFG, the Railroad and Mr. Cady about this dam issue in the future.

Dam and Lodge Report:

Site 0:

64.39166 147.06473

During the September float, TVWA contractors noted that an old lodge site was clearly re-inhabited. A large feed pile located close to the entrance of the lodge was stocked full of fresh alder, willow, and birch indicating that the beavers will over-winter at this lodge.

Large feed pile in front of lodge site comprised of fresh alder and birch found on September float.

One can see the entrance to the lodge as well as fresh mud and debris used to reinforce it on top.

Site 1:

64.3612 147.0507

1 6

A primary dam was found downstream of the lodge at site 0 and Alan Cady's property. This dam was 3 feet tall and blocked all passage during June and September floats. TVWA contractors punched a 2-foot hole in the dam during the September float to allow for some fish passage.

Setting fish traps below site 1 in June. Note complete blocking of passage.

Site 1: The site 1 dam in September. Note the small diameter brush.

Site 1: TVWA contractor Jenna Jonas removes some of site 1 dam.

The resulting hole in the site 1 dam.

Site 2:

147.051

64.36158 71

This is a secondary dam located downstream of site 1 dam. It similarly blocked passage and a 2-foot section was removed during September sampling.

Site 4:

64.37252 147.05126

This dam is much farther down Piledriver slough than the first two. We observed that it grew from June to September sampling dates. It is at a natural narrow spot in the slough and during the September float, this was still not fully blocking passage. We suspect that this dam is associated with beavers that have been observed by the Bailey Bridge takeout area rather than the ones occupying the area by the Cady property upstream.

Site 4 during the June float.

Site 4 during the September float. Note the passage on the far right.

Site 5: A new large dam was noted just upstream of the bridge on 23 mile slough. This lodge was not present during June sampling but was fully constructed in September.

Site 5 lodge during September sampling.

Figure 1. Dam 1 in Green was the primary dam, Dam site 2 is shown as the top red line.