Piledriver and 23 Mile Slough Survey Report 2019

Tanana Valley Watershed Association

December 23, 2019

Salcha Elementary students, staff, and volunteers at fireside wrap-up of September sampling.

Introduction

This report discloses the findings of the 2019 study of fisheries, beaver activity, and water quality on Piledriver Slough and 23 mile Slough. The study was conducted by the Tanana Valley Watershed Association (TVWA) contractors with assistance from the Salcha Elementary School. Survey site results are discussed below.

Purpose

2019 was the eighth 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 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 loss of natural flushing of debris or ice build-up by spring flows. Resulting concerns include ice and log jams as well as 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 (ADF&G) 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 2022, in which a final report will be submitted to ADF&G and the Alaska RailRoad (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 to manage monitoring based upon distance from the levee site to the Bailey Bridge. These sections were the *Upper Piledriver* and *Lower Piledriver.* Upper Piledriver survey 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 Salcha Elementary school. Lower Piledriver survey began from the Old Valdez Trail road crossing and 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, the exact dates 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 tool kit 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. 2019 focus was on elements of water quality, specifically dissolved oxygen.

TVWA contractor Jenna Jonas navigates snow and aufeis on lower Piledriver slough during May sampling.

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 object, 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 needs 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. There were no incidental deaths during the 2019 field season. If there were any incidental fish deaths they would be labeled and brought to the USFWS laboratory in Fairbanks for further processing.

Salmon caught on lower Piledriver slough during September sampling.

Sampling procedures:

1. Set Traps:

- Place bait ball in the trap.
- Put trap 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 length of soak.
- 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.
- Use identification guide to identify fish.
- Record length of each first using length markings on the photarium.
- 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.

3. Fish Handling Guidelines

- 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 time (to maximize oxygen content).
- 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 do not impeded passage. All dams and lodges were photographed, GPS locations were recorded, sites were described. Dams were measured for height, 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, 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.

All equipment was inventoried, cleaned, and serviced before and after the surveying season. Fish data reports were sent to the ADF&G, in compliance with our permit requirement.

Study Survey Results

TVWA contractor Heather Mirczak focused on dissolved oxygen curriculum for Salcha school in 2019. She provided an outline for integrating content in the classroom along with specific lesson activities for grades k – 6. The school became part of the GLOBAL citizen science program through UAF and had 2 of their staff trained in the GLOBAL protocols. The Piledriver project maintained strong community involvement throughout the study duration: in 2019, there were 15 members of the Salcha Elementary School staff, 9 community and parent volunteers, 2 bus drivers, 73 children attending Salcha Elementary School, 1 TVWA staff, 2 contractors, and ADF&G.

The study had a total of twenty-eight survey sites. Eight survey sites (with 2 traps each) on the Upper Piledriver were sampled within the periods of May 25-26, June 4-5 and September 5-6. 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 25-26, June 4-5 and September 5-6. Undivided, 23 Mile Slough had four survey locations that took place on May 25-26, June 4-5 by TVWA field technicians and volunteers. TVWA staff included supervision by Science Director Cynthia Nelson. Contractors were Jenna Jonas and Heather Mirczak.

In 2015, TVWA staff began recording qualitative data after each float and continued this practice in 2019.

Salcha elementary students explore a site on Upper Piledriver during June sampling.

Fish: ADF&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, 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 they are actively used by beavers. The categories were active or inactive. Secondary categorization was based on type of dam or dwelling, which consisted of primary dam, secondary dam and lodge. Dam activity and dwelling type were recorded as well as coordinates.

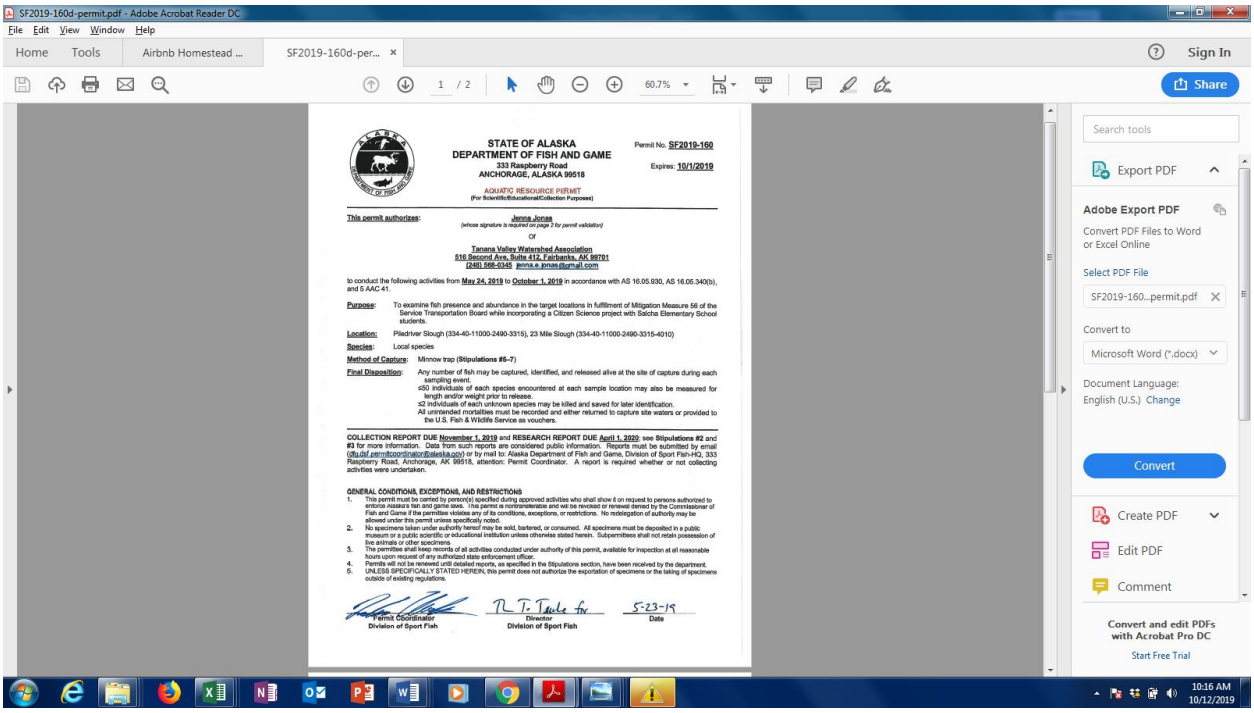
Discussion of Study Outcomes & Activities

Promotion: Curriculum developed for this study 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 in 2018. Portable kits were prepared in 2018, and are available for use by local educators.

Hydrology Monitor

2019 was not a scheduled year for hydrology monitoring, thus there is no data recorded in 2019.

Appendix A: Fish Resource Permit: Fish Resource Permit



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

Permit No. SF2019-160
Expires: 10/1/2019

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

This permit authorizes: Jenna Jones
(whose signature is required on page 2 for permit validation)
Of
Tanana Valley Watershed Association
510 Second Ave, Suite 412, Fairbanks, AK 99701
(240) 566-0345 jenna.e.jones@gmail.com

to conduct the following activities from May 24, 2019 to October 1, 2019 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, 2019 and RESEARCH REPORT DUE April 1, 2020; 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 Road, Anchorage, AK 99518, attention: Permit Coordinator. 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

5-23-19
Date

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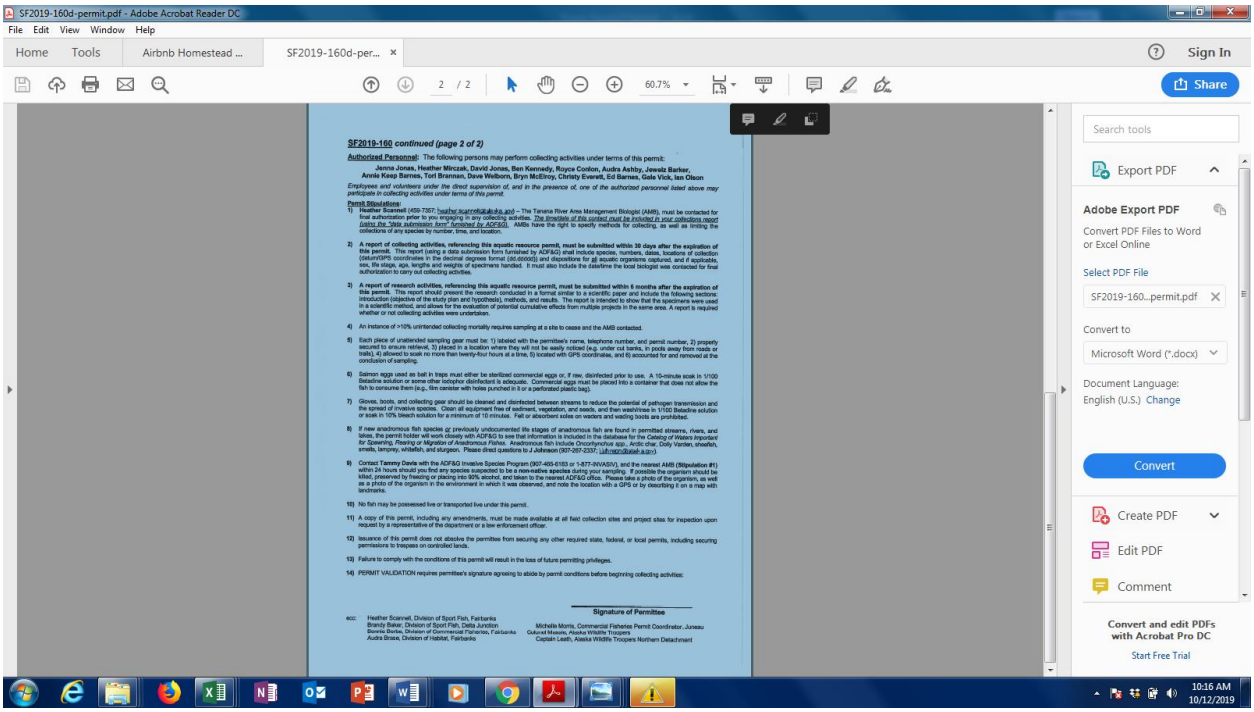

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Authorized Personnel: The following persons may perform collecting activities under terms of this permit:
Jenna Jones, Heather Mirczak, David Jones, Ben Kennedy, Royce Conlon, Audra Ashby, Jewels Barker, Annie Keep Barnes, Tori Brannan, Dave Welborn, Bryn McElroy, Christy Everett, Ed Barnes, Gale Vick, 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) Heather Scannell (459-7267; heather.scannell@alaska.gov) – The Tanana River Area Management Biologist (AMB), must be contacted for final authorization prior to you engaging in any collecting activities. *The timetable 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. This report (using a data submission form furnished by ADF&G) shall include species, numbers, dates, locations of collection (datum/GPS coordinates in the decimal degrees format (dd.ddddd)) and dispositions for all aquatic organisms captured, and if applicable, sex, life stage, age, lengths and weights of specimens 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 and include the following sections: 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 15-minute soak in 1/100 Betadine 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 Betadine 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; jill.mcn@alaska.gov).

9) Contact Tammy Davis with the ADF&G Invasive Species Program (907-465-6165 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) No fish may be possessed live or transported live under this permit.

11) 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.

12) 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.

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

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

Signature of Permittee

ecc: Heather Scannell, 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 Massie, Alaska Wildlife Troopers
Captain Leath, Alaska Wildlife Troopers Northern Detachment

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Appendix B: Fish Collection Report: Fish Collection Report

Summary

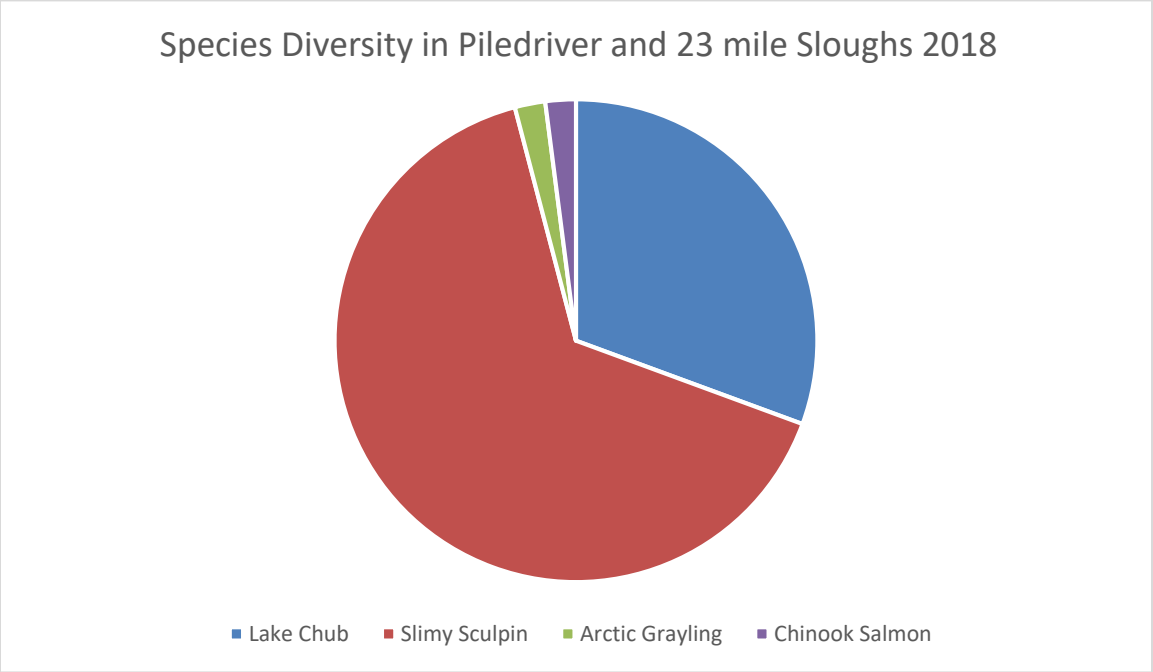
In 2018 49 fish were caught, identified and released in Piledriver and 23 mile sloughs. Of these, 14 were caught on Upper Piledriver with the Salcha Elementary students and 24 on Lower Piledriver, and 1 on 23 mile slough.

Place	Total Fish Caught	Slimy Sculpin	Lake Chub	Burbot	Arctic Grayling	Chinook Salmon	Days Sampled	# traps set
Upper Piledriver	14	14	0	0	0	0	May 25-26, June 4-5 and September 5-6	16
Lower Piledriver	34	18	15	0	0	1	May 25-26, June 4-5 and September 5-6	16
23-Mile Slough	1	0	0	0	1	0	May 25-26, June 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 (32 fish). The second most commonly caught fish was Lake Chub (15). The majority of these fish were caught during May sampling on Lower Piledriver slough, around the time of spawning. Additional fish caught include Arctic Grayling (1) on 23 mile slough and Chinook Salmon (1) on lower piledriver slough. 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 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 makes 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 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 do 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. 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*

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

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 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 leave 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 2019 TVWA field staff did not observe 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 fewer 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 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 5-6) 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
2019	49
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

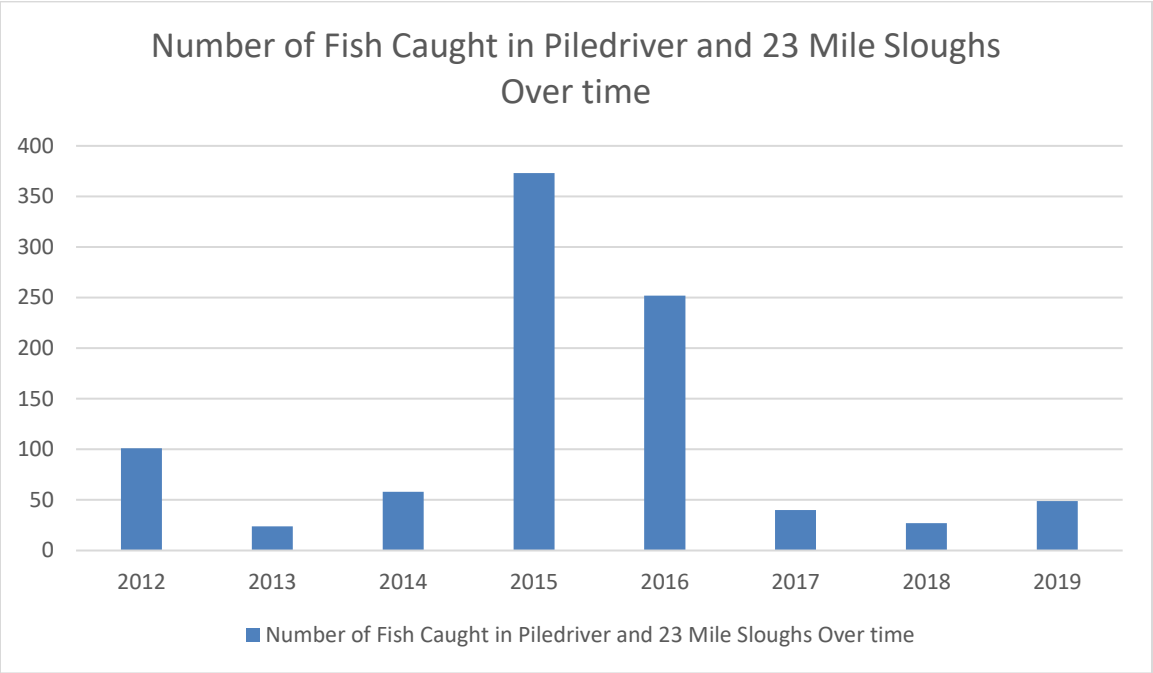
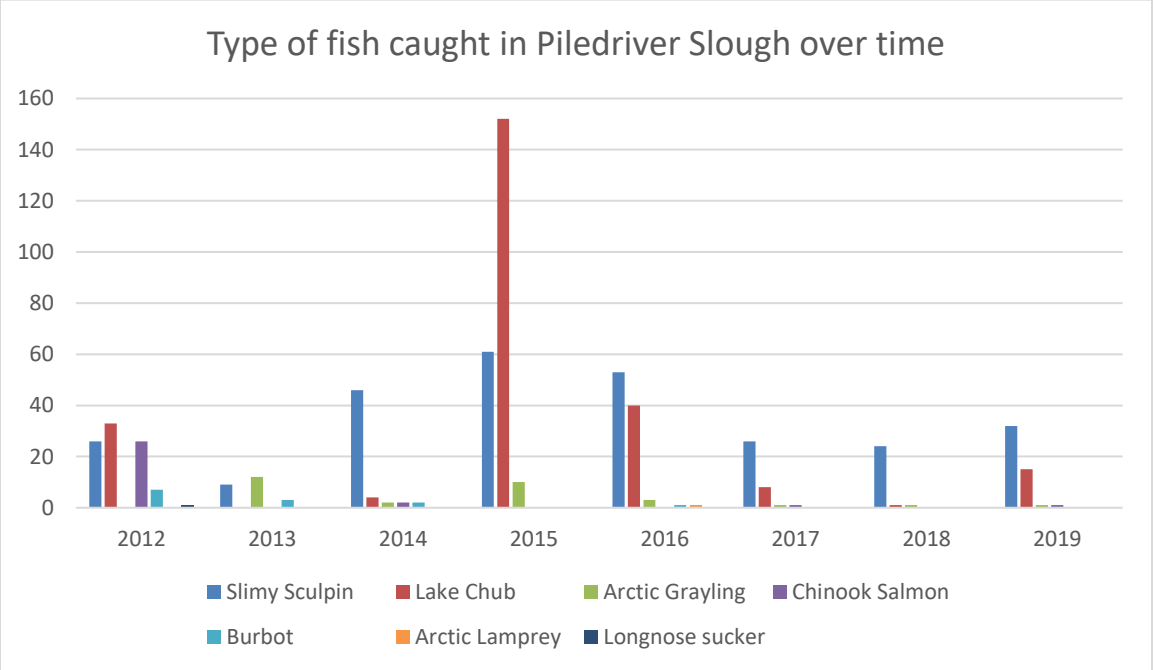


Figure 2: Number of Juvenile Fish Caught in Piledriver and 23 Mile Slough Annually



Sampling Sites

The sites used in 2019 were consistent with those used in 2018.

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
		-147.09044
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 2019

Tanana Valley Watershed Association

October 1 2019

Purpose:

The Piledriver slough mitigation plan monitors changes to the Piledriver slough that may be caused by beaver activity. Due to 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 25-26, June 4-5 and September 5-6 2019. 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 2019 it appears that the beaver population is healthy and has moved back into this stretch of lower Piledriver Slough and expanded the number of lodges and dams. 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 2019. We saw sign (chew sticks, vegetation removed, old dams re-constructed, etc.) during May and September sampling the two old dam sites (1 and 2) were fully constructed and blocking fish passage. An additional new dam at site 4 was also reconstructed and fully blocked passage for the first time this year.

In 2019 we saw a new lodge at 64.62057, 147.09087. This lodge supports our theory that at least two separate beaver colonies made Piledriver Slough their home this year. The first colony is based out of the lodge at "Site 0" and supported by primary dam "Site 1" and Secondary dams at "Site 2" and also refurbished this year, "Site 3". The second colony is based out of the new lodge "2019 lodge" and supported by a primary dam at "Site 4" and new smaller secondary dams at "2019 Dam 1" (64.60448, 147.08798) and "2019 Dam 2" (64.60552, 147.08673).

The location of the problem dams, site 1 and 2, are close (1/2 mile approximately) to 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 during June sampling to the primary and secondary dams. We will continue to correspond with ADF&G, the Railroad and Mr. Cady about this dam issue in the future.

Dam and Lodge Site Report:

Upper PD site 5:

64.59399 -147.08316

This year there was a new dam at Site 5 on upper Piledriver Slough observed during the September sampling period. This dam caused significant changes to the hydrology of the site, raising the water about 11 inches from normal levels and changing where we could set fish traps. Students from Salcha Elementary were eager to explore this major change to the site.

Site 5 dam on Upper Piledriver Slough during September sampling.

Site 0:

64.39166 147.06473

During the September float, TVWA contractors noted than an old lodge site near the Cady's property was clearly being inhabited. A large food cache stocked full of fresh alder, willow, and birch indicating that the beavers will over-winter at this lodge again this winter.

Site 1:

64.36121 147.05076

A primary dam was found downstream of the lodge at site 0 and Alan Cady's property. This dam ranged from 2-3 feet tall and blocked all passage during May, June and September floats.

Site 1 during May sampling.

Site 1 during June sampling.

Site 2:

64.36158 147.05171

This is the secondary dam associated with site 1 dam. It was observed during all 3 floats as blocking passage in 2019.

Site 2 during May sampling.

Detail of site 2 including rocks and beaver feces.

2019 Dam 1:
64.60448, 147.08798

This was a secondary dam located just downstream of Site 2. 2019 was the first year that we have observed a dam at this location. It indicates the spread of the beaver colony in this area.

2019 Dam 1 (foreground) and site 2 (background) during May sampling

2019 Dam 1 (foreground) and Site 2 (background) during June sampling

2019 Lodge:
64.62057, 147.09087

This lodge was noted during September sampling this year. It was a new lodge created in what had possibly been an old site. It was complete with a large feed pile, indicating that the beavers will likely be inhabiting it this winter.

2019 Dam 2:
64.60552, 147.08673

There were a series of old dam sites indicated by remaining rocks and small debris throughout Piledriver Slough. In 2019 we observed some of these sites being reclaimed and added to. This is the case with 2019 Dam 2. It was first observed during June sampling when water was lower but was added to in September. The dam was not blocking passage completely during either sampling but will be monitored.

Part of 2019 Dam 2 during June sampling.

Another section of 2019 Dam 2 during June 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 May to September sampling dates. It is at a natural narrow spot in the slough and was

observed blocking passage completely during all sampling periods. We punched a small hole in this dam during June sampling.

Site 4 dam during May sampling

TVWA Science Director Cynthia Nelson making a small breach in site 4 during June sampling.

Site 4 was observed in September sampling to be fully constructed and blocking fish passage.