Tanana Valley Watershed Association

# Documenting Juvenile Chinook Salmon Presence in Chena River Tributaries, 2021






*January 2022*

# Documenting Juvenile Chinook Salmon Presence in Chena River Tributaries, 2021

## Naomi Rambo

### Introduction

The U.S. Fish and Wildlife Service (USFWS) awarded Tanana Valley Watershed Association (TVWA) a grant to identify priority habitats for restoration and protection in the Tanana Valley (NOAL F17AP00301). Under stipulation 4 of the grant, "Assess the potential of sites to meet watershed needs", there is the task "Identify expected fish, wildlife and habitat values". This study focused on identifying juvenile Chinook Salmon presence in Chena River tributaries. Chinook Salmon are anadromous fish (fish that migrate up rivers from the sea to spawn). As juveniles, they typically spend one year in our local Chena River watershed. The Chena River has the second-largest annual run of Chinook Salmon in the Alaska portion of the Yukon River (Howard et al. 2009).

Rivers, lakes and streams or their parts that are important for spawning rearing or migration of anadromous fish shall be protected under Alaska Statute 16.05.871. Identification of important rearing habitat for juvenile Chinook Salmon in the Chena River watershed is lacking. Nominating waters, where juvenile Chinook Salmon and other anadromous fish are found, to the State of Alaska's Anadromous Waters Catalog (AWC; Johnson and Blossom 2018) will have a direct benefit for habitat protection.

The objectives of this project were:

1) Determine the presence of juvenile Chinook salmon and other anadromous fish in Chena River tributaries not currently listed in the Anadromous Water Catalog (AWC);
2) Sample and document life history stages of anadromous fish and water quality characteristics in tributaries of the Chena River; and
3) Complete nominations for qualifying waters of anadromous fish species information for all waters that satisfy AWC requirements.

### Study Area

The Chena River watershed (Figure 1) lies within the Tanana Valley of Interior Alaska and is tributary to the Tanana River. The watershed comprises wetlands with meandering streams, side sloughs, forested lowlands, uplands, and highlands much of which is underlain by discontinuous permafrost (USACE 2009). There are numerous tributaries such as the Little Chena River, South, Middle, North, and West forks (Brabets et al. 2000). The Chena River is fed by snowmelt and rain runoff and is humic stained. The lower portion of the basin is developed and densely populated by residents of Fairbanks, Fort Wainwright, and North Pole. The upper portion is more sparsely populated but experiences substantial recreational use, placer mining, and military training activity.

### Methods

*Fish sampling*

Streams sampled were prioritized based on the following criteria: 1) Previously undocumented in AWC; 2) Risk level of imminent or future habitat alteration; 3) Stream has previously tested positive for Chinook Salmon eDNA; and 4) Level of foot, vehicle, or boat accessibility.

Habitat characteristics were also recorded for each sampling location. Streams sampled in 2021 were Little Chena River, Stiles Creek, and Monument Creek (Figure 1). Each location was visually surveyed for woody debris, water flow, wildlife, and Chinook Salmon habitat characteristics; including log jams, underwater plants, root wads, cut banks and pools.

Sampled water bodies were accessed by foot, pack raft, and all-terrain vehicles. Fish were sampled using baited minnow traps and small mesh dip nets between June 9 and September 8, 2021. Minnow traps were baited with cured salmon roe and placed in areas with potential Chinook Salmon habitat. Minnow traps were placed in locations upstream from coordinates previously entered in the AWC or a few feet from the confluence of a stream not recorded in the AWC. If fish were captured at these locations during the 2021 season, traps were moved further upstream until anadromous fish presence was no longer detected or until the season ended.

*Fish identification*

All fish were identified using external characteristics. The external characteristics were compared by meristics and physical features to photos, and from published literature. A Photarium was used to facilitate digital imagery of each captured fish and document species presence. Juvenile salmon lengths were measured using fork length to the nearest one millimeter. Non-target species were identified and released.

*Habitat sampling*

A handheld global positioning system (GPS) was used to record geospatial coordinates in decimal degree units for the WGS84 datum. Water quality measurements, including temperature (°C), pH and conductivity (µS/cm) were measured using a Hanna Instruments HI98129 portable water meter. Turbidity (ntu) was measured using a Sper Scientific 860040 turbidity meter, and dissolved oxygen (mg/l) was measured using an Extech DO600 Waterproof ExStik II Dissolved Oxygen Meter. Measurements were recorded on hard copy data sheets at each site and subsequently entered into a MS Excel spreadsheet. All instruments were calibrated each day before sampling. Three replicate samples were taken for each water quality characteristic at each sample site and reported as an average measurement.

## Results

*Fish sampling*

Little Chena River, Stiles Creek and Monument Creek tributaries were sampled for fish between June 9 and September 8 (Figure 2–4). Little Chena River and Monument Creek had no existing AWC nominations. Minnow traps and dipnets were the only gear used, and in the Little Chena River we captured Slimy Sculpin, Arctic Grayling and Burbot; in Stiles Creek, Slimy Sculpin and Chinook Salmon were captured; and Slimy Sculpin were captured in Monument Creek (Table 1 and 2). Chinook Salmon captured in Stiles Creek were within AWC designated waters because of inadvertent trap placement (Figure 3).

*Habitat Sampling*

Little Chena River, Stiles Creek, and Monument Creek tributaries were sampled for water quality characteristics between June 8 and September 6 (Table3 ). The ranges of average water quality measurements over the sample season for the Little Chena River (n=10) were: pH 7.26–7.38, conductivity (µS/cm) 186–206, dissolved oxygen (mg/l) 1.15–8.15, temperature (°C) 9.4–12.4, and turbidity (NTU) 13.17–20.60; Stiles Creek (n=4) pH 7.19–7.96, conductivity (µS/cm) 272–292, dissolved oxygen (mg/l) 6.32–6.51, temperature (°C) 9.7–13.8, and turbidity (NTU) 1.02–2.30; and

Monument Creek (n=3) pH 7.20–7.31, conductivity (µS/cm) 127–148, dissolved oxygen (mg/l) 7.32–7.48, temperature (°C) 8.8–9.0, and turbidity (NTU) 0.86–4.02.

## Discussion

Interior Alaska had a very active wildfire season making many areas of the Chena River basin inaccessible. The Little Chena River water levels fluctuated over the course of the summer, but when levels were low Burbot, Slimy Sculpin and Arctic Grayling were captured. Pack rafts were utilized this season to access harder to reach areas with success for non-target species, but no Chinook Salmon were found. Little Chena River continues to show favorable salmon rearing habitat but remains unsuccessful for anadromous fish capture. Stiles Creek continued to have juvenile Chinook Salmon activity, but none were trapped above the existing AWC marker. Stiles Creek was part of the area affected by wildfires and limited sampling ability. By the end of the sampling season when fire activity was down, water levels were high and rapid and no Chinook Salmon were captured. Monument Creek was sampled at the beginning and very end of the season while it was accessible. Monument Creek appeared to have adequate salmon rearing habitat, but only Slimy Sculpin were found with the time and weather permitting (Figure 5).

The North Fork, West Fork, and Angel Creek were not sampled due to wildfire activity but should be considered for sampling beyond their current AWC designations because their habitat characteristics appear similar to other Chena River tributaries where juvenile Chinook Salmon have been documented.

## Acknowledgements

Tanana Valley Watershed Association would like to thank Ray Hander for his constant support and action on this project.

Tanana Valley Watershed Association would also like to thank Lauren Schour for all her hard work this field season.

## References

Howard, K.G., S.J. Hayes and D.F. Evenson. 2009. Yukon River Chinook Salmon stock status and action plan 2010; a report to the Alaska Board of Fisheries. Special Publication No. 09-26, Anchorage.

Johnson, J., and B. Blossom. 2018. Catalog of waters important for spawning, rearing, or migration of anadromous fishes - Interior Region, Effective June 1, 2018. Alaska Department of Fish and Game, Special Publication No. 18-03, Anchorage.

USACE (U.S. Army Corps of Engineers). 2009. Alaska baseline erosion assessment, study findings and technical report. U.S. Army Corps of Engineers, Elmendorf Air Force Base, Alaska.

Brabets, T.P., B. Wang, and R.H. Meade. 2000. Environmental and hydrological overview of the Yukon River basin, Alaska and Canada. U.S. Geological Survey, Water-Resources Investigations Report 99-4204.

**Table 1. Sample stream, stop date, minnow trap number, and location for Chena River tributary sampling, 2021.**

| Stream | Stop date | Trap number | Latitude | Longitude |
|---|---|---|---|---|
| Little Chena R. | 6/16 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 6/16 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 6/16 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 6/16 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 6/17 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 6/17 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 6/17 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 6/17 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 6/23 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 6/23 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 6/23 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 6/23 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 6/24 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 6/24 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 6/24 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 6/24 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 6/25 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 6/25 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 6/25 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 6/25 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 7/6 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 7/6 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 7/6 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 7/6 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 7/7 | 1 | 64.85611 | -147.40624 |
| Little Chena R. | 7/7 | 2 | 64.85614 | -147.40595 |
| Little Chena R. | 7/7 | 3 | 64.85610 | -147.40604 |
| Little Chena R. | 7/7 | 4 | 64.85612 | -147.40583 |
| Little Chena R. | 7/8 | 1 | 64.85611 | -147.40624 |
| Little Chena R. | 7/8 | 2 | 64.85614 | -147.40595 |
| Little Chena R. | 7/8 | 3 | 64.85610 | -147.40604 |
| Little Chena R. | 7/8 | 4 | 64.85612 | -147.40583 |
| Little Chena R. | 7/7 | dipnet | 64.85603 | -147.40612 |
| Little Chena R. | 7/8 | dipnet | 64.85603 | -147.40612 |
| Little Chena R. | 7/13 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/13 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/13 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/13 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/14 | 1 | 64.85641 | -147.40387 |

**Table 1. Continued.**

| Stream | Stop date | Trap number | Latitude | Longitude |
|---|---|---|---|---|
| Little Chena R. | 7/14 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/14 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/14 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/20 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/20 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/20 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/20 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/21 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/21 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/21 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/21 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/22 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/22 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/22 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/22 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/25 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/25 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/25 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/25 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/27 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/27 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/27 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/27 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/28 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/28 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/28 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/28 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 7/29 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 7/29 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 7/29 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 7/29 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 8/15 | 1 | 64.85641 | -147.40387 |
| Little Chena R. | 8/15 | 2 | 64.85649 | -147.40288 |
| Little Chena R. | 8/15 | 3 | 64.85733 | -147.40061 |
| Little Chena R. | 8/15 | 4 | 64.85820 | -147.39805 |
| Little Chena R. | 8/22 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 8/22 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 8/22 | 3 | 64.85626 | -147.40423 |

**Table 1. Continued**

| Stream | Stop date | Trap number | Latitude | Longitude |
|---|---|---|---|---|
| Little Chena R. | 8/22 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 8/27 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 8/27 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 8/27 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 8/27 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 8/28 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 8/28 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 8/28 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 8/28 | 4 | 64.85639 | -147.40441 |
| Little Chena R. | 8/29 | 1 | 64.85617 | -147.40464 |
| Little Chena R. | 8/29 | 2 | 64.85618 | -147.40446 |
| Little Chena R. | 8/29 | 3 | 64.85626 | -147.40423 |
| Little Chena R. | 8/29 | 4 | 64.85639 | -147.40441 |
| Stiles Creek | 8/5 | 1 | 64.93728 | -146.26906 |
| Stiles Creek | 8/5 | 2 | 64.93714 | -146.26933 |
| Stiles Creek | 8/5 | 3 | 64.93751 | -146.26905 |
| Stiles Creek | 8/5 | 4 | 64.93774 | -146.26905 |
| Stiles Creek | 8/31 | 1 | 64.94250 | -146.26528 |
| Stiles Creek | 8/31 | 2 | 64.94767 | -146.26410 |
| Stiles Creek | 8/31 | 3 | 64.94821 | -146.26248 |
| Stiles Creek | 9/5 | 1 | 64.94250 | -146.26528 |
| Stiles Creek | 9/5 | 2 | 64.94767 | -146.26410 |
| Stiles Creek | 9/5 | 3 | 64.94821 | -146.26248 |
| Stiles Creek | 9/8 | 1 | 64.94250 | -146.26528 |
| Stiles Creek | 9/8 | 2 | 64.94767 | -146.26410 |
| Stiles Creek | 9/8 | 3 | 64.94821 | -146.26248 |
| Monument Creek | 6/9 | 1 | 65.06675 | -146.08415 |
| Monument Creek | 6/9 | 2 | 65.06674 | -146.08414 |
| Monument Creek | 6/9 | 3 | 65.06660 | -146.08389 |
| Monument Creek | 6/9 | 4 | 65.06568 | -146.08103 |
| Monument Creek | 6/10 | 1 | 65.06675 | -146.08415 |
| Monument Creek | 6/10 | 2 | 65.06674 | -146.08414 |
| Monument Creek | 6/10 | 3 | 65.06660 | -146.08389 |
| Monument Creek | 6/10 | 4 | 65.06568 | -146.08103 |
| Monument Creek | 6/29 | 1 | 65.06657 | -146.08383 |
| Monument Creek | 6/29 | 2 | 65.06656 | -146.08386 |
| Monument Creek | 6/29 | 3 | 65.06672 | -146.08412 |
| Monument Creek | 6/29 | 4 | 65.06711 | -146.08485 |
| Monument Creek | 6/30 | 1 | 65.06657 | -146.08383 |

**Table 1. Continued.**

| Stream | Stop date | Trap Number | Latitude | Longitude |
|---|---|---|---|---|
| Monument Creek | 6/30 | 2 | 65.06656 | -146.08386 |
| Monument Creek | 6/30 | 3 | 65.06672 | -146.08412 |
| Monument Creek | 6/30 | 4 | 65.06711 | -146.08485 |
| Monument Creek | 7/1 | 1 | 65.06657 | -146.08383 |
| Monument Creek | 7/1 | 2 | 65.06656 | -146.08386 |
| Monument Creek | 7/1 | 3 | 65.06672 | -146.08412 |
| Monument Creek | 7/1 | 4 | 65.06711 | -146.08485 |
| Monument Creek | 7/1 | 5 | 65.05395 | -146.05271 |
| Monument Creek | 7/1 | 6 | 65.05387 | -146.05229 |
| Monument Creek | 8/17 | 1 | 65.06675 | -146.08415 |
| Monument Creek | 8/17 | 2 | 65.06674 | -146.08414 |
| Monument Creek | 8/17 | 3 | 65.06660 | -146.08389 |
| Monument Creek | 8/17 | 4 | 65.06568 | -146.08103 |
| Monument Creek | 8/18 | 1 | 65.06675 | -146.08415 |
| Monument Creek | 8/18 | 2 | 65.06674 | -146.08414 |
| Monument Creek | 8/18 | 3 | 65.06660 | -146.08389 |
| Monument Creek | 8/18 | 4 | 65.06568 | -146.08103 |
| Monument Creek | 8/19 | 1 | 65.06675 | -146.08415 |
| Monument Creek | 8/19 | 2 | 65.06674 | -146.08414 |
| Monument Creek | 8/19 | 3 | 65.06660 | -146.08389 |
| Monument Creek | 8/19 | 4 | 65.06568 | -146.08103 |
| Monument Creek | 8/20 | 1 | 65.06675 | -146.08415 |
| Monument Creek | 8/20 | 2 | 65.06674 | -146.08414 |
| Monument Creek | 8/20 | 3 | 65.06660 | -146.08389 |
| Monument Creek | 8/20 | 4 | 65.06568 | -146.08103 |

**Table 2. Sample stream, date, effort (minnow trap hours), species, number of fish captured (*n*), and catch-per-unit-effort (CPUE) of fish captured in 2021. Table acronym: NFC=no fish captured, and NA=not applicable.**

| Date | Number of traps | Effort (h) | Species | *n* | CPUE |
|---|---|---|---|---|---|
| **Little Chena River** | | | | | |
| 6/15 | 4 | 92 | NFC | 0 | 0 /h |
| 6/16 | 4 | 92 | NFC | 0 | 0 /h |
| 6/22 | 4 | 92 | NFC | 0 | 0 /h |
| 6/23 | 4 | 91 | NFC | 0 | 0 /h |
| 6/24 | 4 | 96 | NFC | 0 | 0 /h |
| 7/5 | 4 | 96 | SLSC | 1 | 0.01/h |
| 7/6 | 4 | 92 | SLSC | 1 | 0.01/h |
| 7/7 | 4 | 96 | NFC | 0 | 0 /h |
| 7/7 | DIP | NA | ARGR | 3 | 3/dip |
| 7/7 | DIP | NA | ARGR | 1 | 1/dip |
| 7/12 | 4 | 92 | SLSC | 1 | 0.01/h |
| 7/12 | 4 | 92 | BURB | 1 | 0.01/h |
| 7/13 | 4 | 92 | NFC | 0 | 0 /h |
| 7/19 | 4 | 92 | SLSC | 3 | 0.03/h |
| 7/20 | 4 | 92 | SLSC | 2 | 0.02/h |
| 7/21 | 4 | 96 | NFC | 0 | 0 /h |
| 7/24 | 4 | 92 | SLSC | 2 | 0.02/h |
| 7/26 | 4 | 92 | SLSC | 1 | 0.01/h |
| 7/27 | 4 | 96 | NFC | 0 | 0 /h |
| 7/28 | 4 | 92 | SLSC | 2 | 0.02/h |
| 8/14 | 4 | 92 | NFC | 0 | 0 /h |
| 8/21 | 4 | 92 | NFC | 0 | 0 /h |
| 8/26 | 4 | 92 | NFC | 0 | 0 /h |
| 8/27 | 4 | 96 | SLSC | 2 | 0.02/h |
| 8/28 | 4 | 92 | SLSC | 1 | 0.01/h |
| **Stiles Creek** | | | | | |
| 8/4 | 4 | 92 | SLSC | 24 | 0.26/h |
| 8/4 | 4 | 92 | CHIN | 21 | 0.23/h |
| 8/30 | 3 | 69 | NFC | 0 | 0 /h |
| 9/4 | 3 | 69 | NFC | 0 | 0 /h |
| 9/7 | 3 | 66 | NFC | 0 | 0 /h |

**Table 2. Continued.**

| Date | Number of traps | Effort (h) | Species | *n* | CPUE |
|---|---|---|---|---|---|
| **Monument Creek** | | | | | |
| 6/8 | 4 | 96 | NFC | 0 | 0/h |
| 6/9 | 4 | 92 | NFC | 0 | 0 /h |
| 6/28 | 4 | 92 | NFC | 0 | 0 /h |
| 6/29 | 4 | 92 | SLSC | 9 | 0.10/h |
| 6/30 | 6 | 138 | SLSC | 1 | 0.01/h |
| 8/16 | 4 | 93 | NFC | 0 | 0 /h |
| 8/17 | 4 | 96 | NFC | 0 | 0 /h |
| 8/18 | 4 | 93 | SLSC | 3 | 0.03/h |
| 8/19 | 4 | 96 | SLSC | 1 | 0.01/h |

**Table 3. Sample stream, location, date, and water quality measurement averages of pH, conductivity (µS/cm), dissolved oxygen (mg/l), temperature (°C), and turbidity (ntu) for sampled streams in 2021.**

| Stream | Latitude | Longitude | Date | pH | Conductivity (µS/cm) | Dissolved Oxygen (mg/l) | Temperature (°C) | Turbidity (ntu) |
|---|---|---|---|---|---|---|---|---|
| Little Chena R. | 64.85625 | -147.40422 | 6/17 | 7.35 | 203 | 1.94 | 11.2 | 20.58 |
| Little Chena R. | 64.85625 | -147.40422 | 6/23 | 7.28 | 197 | 1.98 | 11.2 | 19.44 |
| Little Chena R. | 64.85625 | -147.40422 | 7/8 | 7.27 | 201 | 2.00 | 11.2 | 20.60 |
| Little Chena R. | 64.85640 | -147.40386 | 7/12 | 7.32 | 206 | 2.06 | 11.1 | 18.36 |
| Little Chena R. | 64.85640 | -147.40386 | 7/19 | 7.34 | 199 | 1.15 | 10.6 | 13.94 |
| Little Chena R. | 64.85640 | -147.40386 | 7/24 | 7.38 | 192 | 1.91 | 9.4 | 13.17 |
| Little Chena R. | 64.85640 | -147.40386 | 7/26 | 7.35 | 193 | 8.15 | 12.4 | 18.93 |
| Little Chena R. | 64.85640 | -147.40386 | 8/14 | 7.30 | 186 | 2.10 | 10.9 | 17.26 |
| Little Chena R. | 64.85625 | -147.40422 | 8/21 | 7.26 | 202 | 1.86 | 9.9 | 14.27 |
| Little Chena R. | 64.85625 | -147.40422 | 8/26 | 7.29 | 196 | 2.01 | 9.5 | 15.30 |
| Stiles Creek | 64.93728 | -146.26906 | 8/4 | 7.96 | 292 | 6.51 | 13.8 | 1.02 |
| Stiles Creek | 64.94525 | -146.26527 | 8/30 | 7.87 | 275 | 6.32 | 11.1 | 1.22 |
| Stiles Creek | 64.94525 | -146.26527 | 9/4 | 7.19 | 273 | 6.45 | 10.1 | 1.30 |
| Stiles Creek | 64.94525 | -146.26527 | 9/7 | 7.25 | 272 | 6.50 | 9.7 | 2.30 |
| Monument Cr. | 65.06567 | -146.08103 | 6/10 | 7.28 | 148 | 7.63 | 9.0 | 1.14 |
| Monument Cr. | 65.06567 | -146.08103 | 6/30 | 7.20 | 146 | 7.43 | 9.0 | 0.86 |
| Monument Cr. | 65.06567 | -146.08103 | 8/16 | 7.31 | 127 | 7.32 | 8.8 | 4.02 |

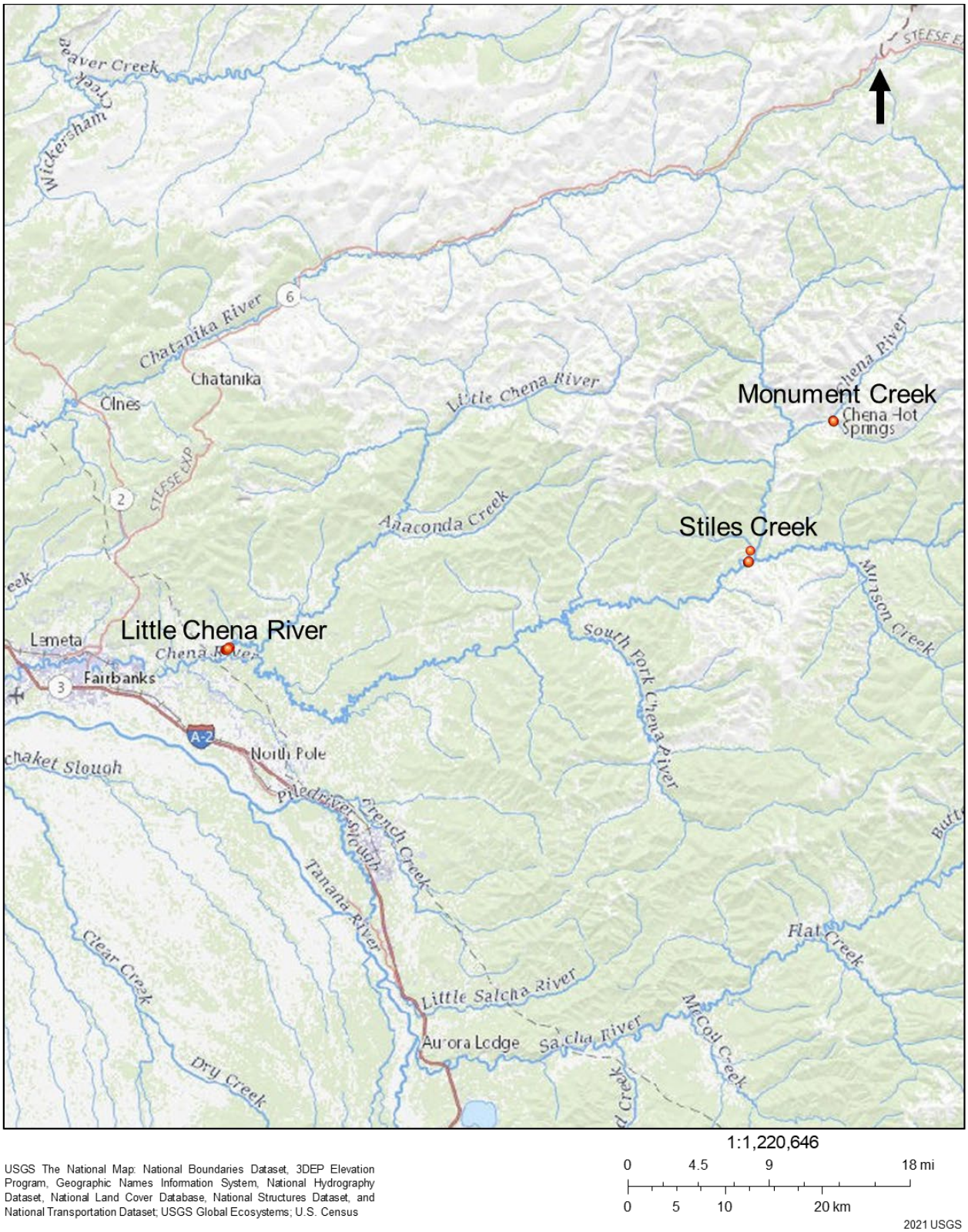


Figure 1. A portion of the Chena River watershed and sites where fish and habitat sampling occurred, 2021.

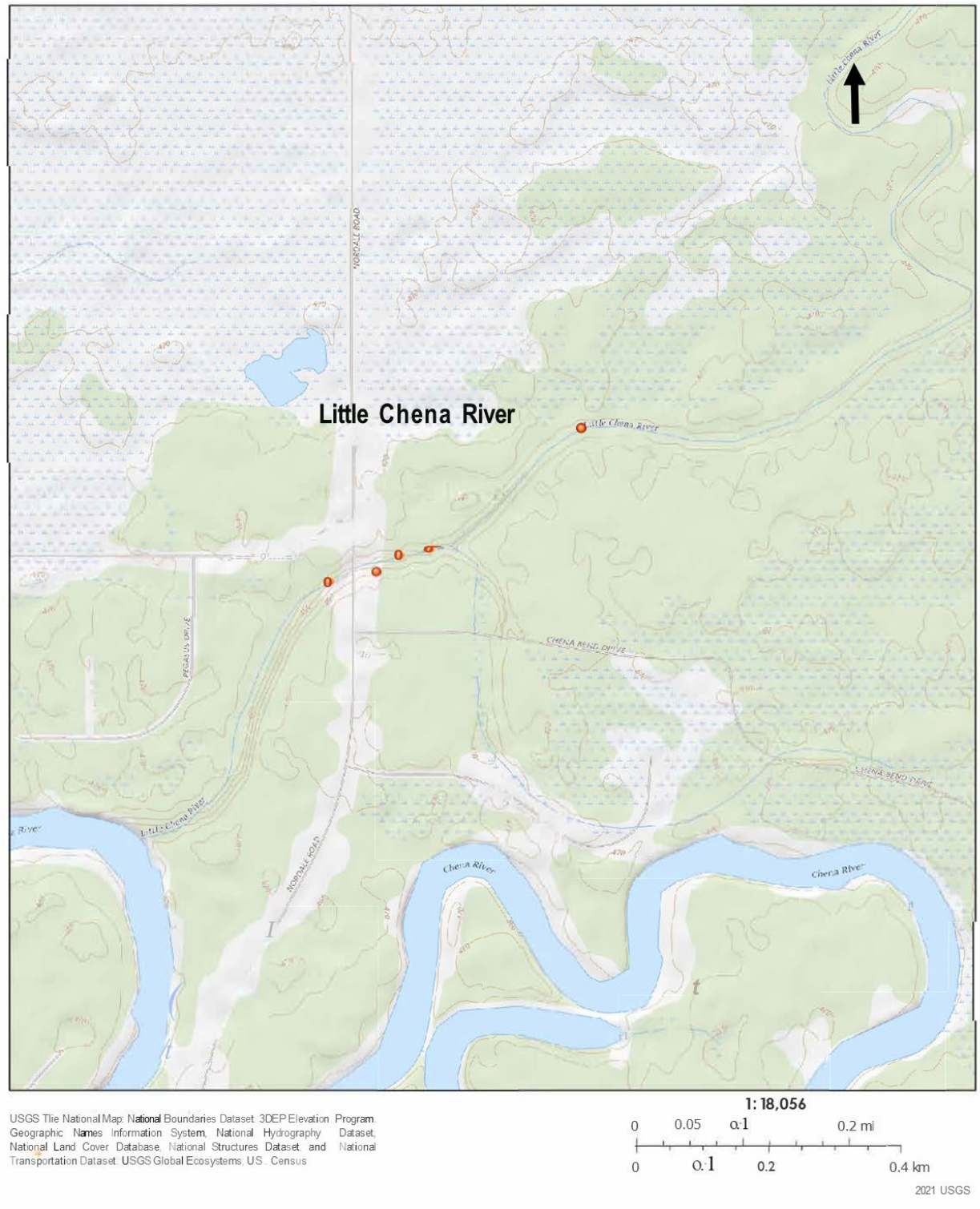


Figure 2. The Little Chena River fish and habitat sampling sites, 2021.


Figure 3. Stiles Creek fish and habitat sampling sites, 2021. Red star indicates the furthest upstream extent of AWC documentation.

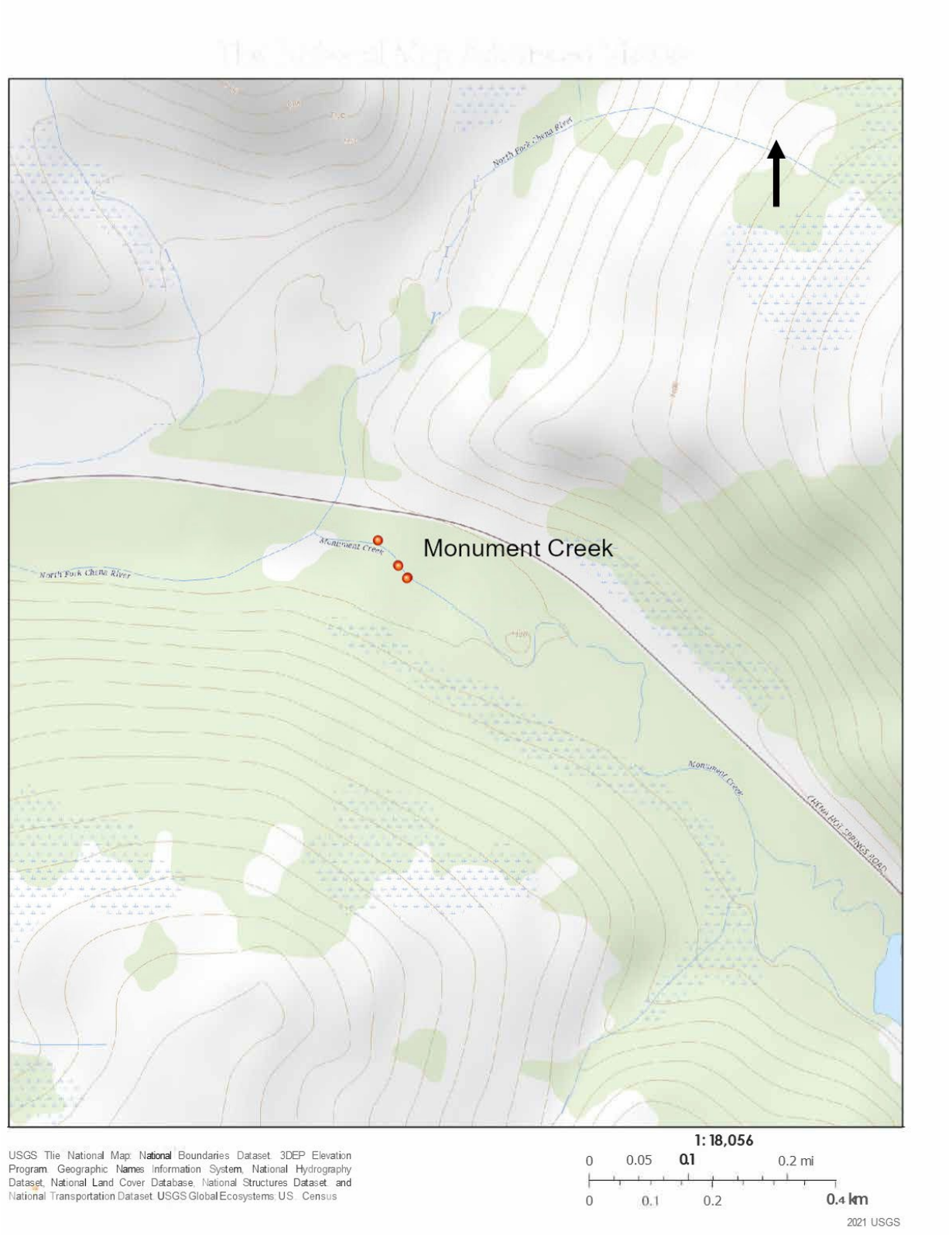


Figure 4. Monument Creek fish and habitat sampling sites, 2021.

**Figure 5. Monument Creek log jam, trap site.**

**Little Chena River, exposed root systems and trap site.**